

# MBS Bluetooth Plugin Documentation

Christian Schmitz

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## 0.1 Introduction

This is the PDF version of the documentation for the Xojo Plug-in from Monkeybread Software Germany.  
Plugin part: MBS Bluetooth Plugin

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# Chapter 3

## Bluetooth

### 3.1 class CBATTRequestMBS

#### 3.1.1 class CBATTRequestMBS

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** The CBATTRequest class represents Attribute Protocol (ATT) read and write requests from remote central devices (represented by CBCentral objects).

**Notes:** Remote centrals use these ATT requests to read and write characteristic values on local peripherals (represented by CBPeripheralManager objects). Local peripherals, on the other hand, use the properties of CBATTRequest objects to respond to the read and write requests appropriately, using the `respondToRequest:withResult:` method of the CBPeripheralManager class.

This is an abstract class. You can't create an instance, but you can get one from various plugin functions.

#### 3.1.2 Methods

#### 3.1.3 Available as boolean

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** Whether this class is available.

**Notes:** Returns true on macOS 10.9 or newer.

#### 3.1.4 Constructor

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** The private constructor.

### 3.1.5 Properties

#### 3.1.6 `central` as `CBCentralMBS`

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** The remote central device that originated the request.

**Notes:** (Read only property)

#### 3.1.7 `characteristic` as `CBCharacteristicMBS`

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** The characteristic whose value is to be read or written.

**Notes:** (Read only property)

#### 3.1.8 `Handle` as `Integer`

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** The internal object reference.

**Notes:** (Read and Write property)

#### 3.1.9 `offset` as `UInt64`

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** The zero-based index of the first byte for the read or write request.

**Notes:** You can use the value of this property to ensure that the ATT request is attempting to read or write within the proper bounds of the characteristic's value. For an example of how to take a request's offset property into account when responding to a read or write request, see Responding to Read and Write Requests from a Central in Apple documentation.

(Read only property)

#### 3.1.10 `value` as `MemoryBlock`

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** The data being read or written.

**Notes:** The value of this property differs according to the type of request. For read requests, the property of this value is nil and should be set before responding to the remote central through the `respondToRequest` method. For write requests, the value of this property is the data that is to be written to the characteristic's value.

(Read and Write property)

## 3.2 class CAttributeMBS

### 3.2.1 class CAttributeMBS

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** CAttribute is an abstract base class that defines behavior common to the collection of objects that represent aspects of services offered by a peripheral.

**Notes:** Concrete subclasses of CAttribute (and their mutable counterparts) are used to represent the services a peripheral offers, the characteristics of those services, and the descriptors attached to those characteristics. The concrete subclasses are:

- CService
- CCharacteristic
- CDescriptor

This is an abstract class. You can't create an instance, but you can get one from various plugin functions.

### 3.2.2 Methods

### 3.2.3 Available as boolean

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** Whether this class is available.

**Notes:** Returns true on macOS 10.13 or newer.

### 3.2.4 Constructor

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** The private constructor.

### 3.2.5 Properties

### 3.2.6 Handle as Integer

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** The internal object reference.

**Notes:** (Read and Write property)

### 3.2.7 UUID as CBUUIDMBS

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** The Bluetooth-specific UUID of the attribute.

**Notes:** This property is a 128-bit UUID that identifies the attribute.  
(Read only property)

## 3.3 class CBCentralManagerMBS

### 3.3.1 class CBCentralManagerMBS

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** CBCentralManager objects are used to manage discovered or connected remote peripheral devices (represented by CBPeripheral objects), including scanning for, discovering, and connecting to advertising peripherals.

**Notes:** Before you call CBCentralManager methods, the state of the central manager object must be powered on, as indicated by the CBCentralManagerStatePoweredOn constant. This state indicates that the central device (your iPhone or iPad, for instance) supports Bluetooth low energy and that Bluetooth is on and available to use.

Please build as 64-bit as 32-bit is no longer supported well by Apple.

Subclass of the CBManagerMBS class.

#### Blog Entries

- [MBS Xojo Plugins, version 21.6pr3](#)

### 3.3.2 Methods

#### 3.3.3 Available as boolean

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** Whether this class is available.

**Notes:** Returns true on MacOS 10.7 or later.

#### 3.3.4 cancelPeripheralConnection(Peripheral as CBPeripheralMBS)

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** Cancels an active or pending local connection to a peripheral.

**Notes:** peripheral: The peripheral to which the central manager is either trying to connect or has already connected.

This method is nonblocking, and any CBPeripheral class commands that are still pending to peripheral may or may not complete. Because other apps may still have a connection to the peripheral, canceling a local connection does not guarantee that the underlying physical link is immediately disconnected. From the app's perspective, however, the peripheral is considered disconnected, and the central manager object calls the didDisconnectPeripheral event.

### 3.3.5 CBATTErrorDomain as String

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** The domain for Core Bluetooth ATT errors.

**Notes:** This value is used in the NSError class.

### 3.3.6 CBCentralManagerOptionRestoreIdentifierKey as String

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** One of the keys used to pass options to the CBCentralManager method.

**Notes:** A string containing a unique identifier (UID) for the central manager that is being instantiated.

The system uses this UID to identify a specific central manager. As a result, the UID must remain the same for subsequent executions of the app in order for the central manager to be successfully restored.

### 3.3.7 CBCentralManagerOptionShowPowerAlertKey as String

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** One of the keys used to pass options to the CBCentralManager method.

**Notes:** A Boolean value that specifies whether the system should display a warning dialog to the user if Bluetooth is powered off when the central manager is instantiated.

The value for this key is a number. If the key is not specified, the default value is false.

### 3.3.8 CBCentralManagerRestoredStatePeripheralsKey as String

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** One of the options keys.

**Notes:** See connectPeripheral method.

An array of CBPeripheral objects containing all peripherals that were connected or pending connection at the time the application was terminated by the system. When possible, all known information for each peripheral will be restored, including any discovered services, characteristics and descriptors, as well as characteristic notification states.

### 3.3.9 CBCentralManagerRestoredStateScanOptionsKey as String

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** One of the options keys.

**Notes:** A dictionary containing the scan options at the time the application was terminated by the system.

See also `scanForPeripheralsWithServices` method.

### 3.3.10 `CBCentralManagerRestoredStateScanServicesKey` as String

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** One of the options keys.

**Notes:** An array of `CBUUID` objects containing the service(s) being scanned for at the time the application was terminated by the system.

See also `scanForPeripheralsWithServices` method.

### 3.3.11 `CBCentralManagerScanOptionAllowDuplicatesKey` as String

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** One of the keys used to pass options to the `scanForPeripheralsWithServices` method.

**Notes:** A Boolean value that specifies whether the scan should run without duplicate filtering.

The value for this key is a number. If true, filtering is disabled and a discovery event is generated each time the central receives an advertising packet from the peripheral. Disabling this filtering can have an adverse effect on battery life and should be used only if necessary. If false, multiple discoveries of the same peripheral are coalesced into a single discovery event. If the key is not specified, the default value is false.

### 3.3.12 `CBCentralManagerScanOptionSolicitedServiceUUIDsKey` as String

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** One of the keys used to pass options to the `scanForPeripheralsWithServices` method.

**Notes:** An array of service UUIDs (represented by `CBUUID` objects) that you want to scan for.

Specifying this scan option causes the central manager to also scan for peripherals soliciting any of the services contained in the array.

### 3.3.13 `CBConnectPeripheralOptionNotifyOnConnectionKey` as String

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** One of the keys used to pass options to the `connectPeripheral` method.

**Notes:** A Boolean value that specifies whether the system should display an alert for a given peripheral if the app is suspended when a successful connection is made.

The value for this key is a number. This key is useful for apps that have not specified the bluetooth-central background mode and cannot display their own alert. If more than one app has requested notification for a given peripheral, the one that was most recently in the foreground receives the alert. If the key is not

specified, the default value is false.

### 3.3.14 CBCConnectPeripheralOptionNotifyOnDisconnectionKey as String

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** One of the keys used to pass options to the connectPeripheral method.

**Notes:** A Boolean value that specifies whether the system should display a disconnection alert for a given peripheral if the app is suspended at the time of the disconnection.

The value for this key is a number. This key is useful for apps that have not specified the bluetooth-central background mode and cannot display their own alert. If more than one app has requested notification for a given peripheral, the one that was most recently in the foreground receives the alert. If the key is not specified, the default value is false.

### 3.3.15 CBCConnectPeripheralOptionNotifyOnNotificationKey as String

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** One of the keys used to pass options to the connectPeripheral method.

**Notes:** A Boolean value that specifies whether the system should display an alert for all notifications received from a given peripheral if the app is suspended at the time.

The value for this key is a number. This key is useful for apps that have not specified the bluetooth-central background mode and cannot display their own alert. If more than one app has requested notification for a given peripheral, the one that was most recently in the foreground receives the alert. If the key is not specified, the default value is false.

### 3.3.16 CLErrorDomain as String

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** The domain for Core Bluetooth errors.

**Notes:** This value is used in the NSError class.

### 3.3.17 connectPeripheral(peripheral as CBPeripheralMBS, options as Dictionary = nil)

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** Establishes a local connection to a peripheral.

**Notes:** peripheral: The peripheral to which the central is attempting to connect.

options: A dictionary to customize the behavior of the connection. For available options, see Peripheral

Connection Options.

If a local connection to a peripheral is successfully established, the central manager object calls the `centralManager:didConnectPeripheral:` method of its delegate object. If the connection attempt fails, the central manager object calls the `didFailToConnectPeripheral` event. Attempts to connect to a peripheral do not time out. To explicitly cancel a pending connection to a peripheral, call the `cancelPeripheralConnection` method. The `cancelPeripheralConnection` method is implicitly called when peripheral is deallocated.

### 3.3.18 `Constructor(options as dictionary = nil)`

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** Initializes the central manager.

**Notes:** `options`: An optional dictionary containing initialization options for a central manager.

### 3.3.19 `Destructor`

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** The destructor.

### 3.3.20 `retrieveConnectedPeripheralsWithServices(serviceUUIDs() as CBUUIDMBS) as CBPeripheralMBS()`

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** Returns a list of the peripherals (containing any of the specified services) currently connected to the system.

**Notes:** `serviceUUIDs`: A list of service UUIDs (represented by CBUUID objects).

Returns a list of the peripherals that are currently connected to the system and that contain any of the services specified in the `serviceUUID` parameter.

The list of connected peripherals can include those that are connected by other apps and that will need to be connected locally using the `connectPeripheral` method before they can be used.

### 3.3.21 retrievePeripheralsWithIdentifiers(identifiers() as NSUUIDMBS) as CBPeripheralMBS()

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** Returns a list of known peripherals by their identifiers.

**Notes:** identifiers: A list of peripheral identifiers (represented by NSUUID objects) from which CBPeripheral objects can be retrieved.

Returns a list of peripherals that the central manager is able to match to the provided identifiers.

### 3.3.22 scanForPeripheralsWithServices(serviceUUIDs() as CBUUIDMBS = nil, options as Dictionary = nil)

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** Scans for peripherals that are advertising services.

**Notes:** serviceUUIDs: An array of CBUUID objects that the app is interested in. In this case, each CBUUID object represents the UUID of a service that a peripheral is advertising.

options: An optional dictionary specifying options to customize the scan. For available options, see Peripheral Scanning Options.

You can provide an array of CBUUID objects—representing service UUIDs—in the serviceUUIDs parameter. When you do, the central manager returns only peripherals that advertise the services you specify (recommended). If the serviceUUIDs parameter is nil, all discovered peripherals are returned regardless of their supported services (not recommended). If the central manager is already scanning with different parameters, the provided parameters replace them. When the central manager object discovers a peripheral, it calls the didDiscoverPeripheral event.

Apps that have specified the bluetooth-central background mode are allowed to scan while in the background. That said, they must explicitly scan for one or more services by specifying them in the serviceUUIDs parameter. The CBCentralManager scan option is ignored while scanning in the background.

### 3.3.23 stopScan

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** Asks the central manager to stop scanning for peripherals.

### 3.3.24 Properties

### 3.3.25 isScanning as Boolean

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** Whether or not the central is currently scanning.

**Notes:** (Read only property)

### 3.3.26 Events

### 3.3.27 DidConnectPeripheral(peripheral as CBPeripheralMBS)

Plugin Version: 18.1, Platform: macOS, Targets: .

**Function:** Invoked when a connection is successfully created with a peripheral.

**Notes:** peripheral: The peripheral that has been connected to the system.

This method is invoked when a call to connectPeripheral is successful. You typically implement this method to set the peripheral's delegate and to discover its services.

### 3.3.28 DidDisconnectPeripheral(peripheral as CBPeripheralMBS, error as NSErrorMBS)

Plugin Version: 18.1, Platform: macOS, Targets: .

**Function:** Invoked when an existing connection with a peripheral is torn down.

**Notes:** peripheral: The peripheral that has been disconnected.

error: If an error occurred, the cause of the failure.

This method is invoked when a peripheral connected via the connectPeripheral method is disconnected. If the disconnection was not initiated by cancelPeripheralConnection, the cause is detailed in error. After this method is called, no more methods are invoked on the peripheral device's CBPeripheralDelegate object. Note that when a peripheral is disconnected, all of its services, characteristics, and characteristic descriptors are invalidated.

### 3.3.29 DidDiscoverPeripheral(peripheral as CBPeripheralMBS, advertisementData as Dictionary, RSSI as String)

Plugin Version: 18.1, Platform: macOS, Targets: .

**Function:** Invoked when the central manager discovers a peripheral while scanning.

**Notes:** peripheral: The discovered peripheral.

advertisementData: A dictionary containing any advertisement data.

RSSI: The current received signal strength indicator (RSSI) of the peripheral, in decibels.

The advertisement data can be accessed through the keys listed in Advertisement Data Retrieval Keys. You must retain a local copy of the peripheral if any command is to be performed on it. In use cases where it makes sense for your app to automatically connect to a peripheral that is located within a certain range, you can use RSSI data to determine the proximity of a discovered peripheral device.

### 3.3.30 DidFailToConnectPeripheral(peripheral as CBPeripheralMBS, error as NSErrorMBS)

Plugin Version: 18.1, Platform: macOS, Targets: .

**Function:** Invoked when the central manager fails to create a connection with a peripheral.

**Notes:** peripheral: The peripheral that failed to connect.

error: The cause of the failure.

This method is invoked when a connection initiated via the connectPeripheral method fails to complete. Because connection attempts do not time out, a failed connection usually indicates a transient issue, in which case you may attempt to connect to the peripheral again.

### 3.3.31 DidUpdateState

Plugin Version: 18.1, Platform: macOS, Targets: .

**Function:** Invoked when the central manager's state is updated.

**Notes:** You implement this required method to ensure that Bluetooth low energy is supported and available to use on the central device. You should issue commands to the central manager only when the state of the central manager is powered on, as indicated by the CBCentralManagerStatePoweredOn constant. A state with a value lower than CBCentralManagerStatePoweredOn implies that scanning has stopped and that any connected peripherals have been disconnected. If the state moves below CBCentralManagerStatePoweredOff, all CBPeripheral objects obtained from this central manager become invalid and must be retrieved or discovered again. For a complete list and discussion of the possible values representing the state of the central manager, see the CBCentralManagerState enumeration in CBCentralManager.

### 3.3.32 WillRestoreState(dict as dictionary)

Plugin Version: 18.1, Platform: macOS, Targets: .

**Function:** Invoked when the central manager is about to be restored by the system.

**Notes:** dict: A dictionary containing information about the central manager that was preserved by the system at the time the app was terminated. For the available keys to this dictionary, see Central Manager State Restoration Options.

For apps that opt in to the state preservation and restoration feature of Core Bluetooth, this is the first method invoked when your app is relaunched into the background to complete some Bluetooth-related task. Use this method to synchronize the state of your app with the state of the Bluetooth system.

### 3.3.33 Constants

#### Att Errors

Constant	Value	Description
CBATTErrorAttributeNotFound	&h0A	The attribute is not found within the specified attribute handle range.
CBATTErrorAttributeNotLong	&h0B	The attribute cannot be read or written using the ATT read blob or write request.
CBATTErrorInsufficientAuthentication	5	The attribute requires authentication before its value can be read or written.
CBATTErrorInsufficientAuthorization	8	The attribute requires authorization before its value can be read or written.
CBATTErrorInsufficientEncryption	&h0F	The attribute requires encryption before its value can be read or written.
CBATTErrorInsufficientEncryptionKeySize	&h0C	The encryption key size used for encrypting this link is insufficient.
CBATTErrorInsufficientResources	&h11	Resources are insufficient to complete the ATT request.
CBATTErrorInvalidAttributeValueLength	&h0D	The length of the attribute,Äs value is invalid for the intended operation.
CBATTErrorInvalidHandle	1	The attribute handle is invalid on this peripheral.
CBATTErrorInvalidOffset	7	The specified offset value was past the end of the attribute,Äs value.
CBATTErrorInvalidPdu	4	The attribute Protocol Data Unit (PDU) or ,Ämessage,Ä is invalid.
CBATTErrorPrepareQueueFull	9	The prepare queue is full, because too many prepare write requests are queued.
CBATTErrorReadNotPermitted	2	The attribute,Äs value cannot be read.
CBATTErrorRequestNotSupported	6	The attribute server does not support the request received by the peripheral.
CBATTErrorSuccess	0	The ATT command or request successfully completed.
CBATTErrorUnlikelyError	&h0E	The ATT request has encountered an unlikely error and therefore cannot be completed.
CBATTErrorUnsupportedGroupType	&h10	The attribute type is not a supported grouping attribute as defined by the Bluetooth layer specification.
CBATTErrorWriteNotPermitted	3	The attribute,Äs value cannot be written.

#### States

Constant	Value	Description
CBCentralManagerStatePoweredOff	4	Bluetooth is currently powered off.
CBCentralManagerStatePoweredOn	5	Bluetooth is currently powered on and is available to use.
CBCentralManagerStateResetting	1	The connection with the system service was momentarily lost; an update is imminent.
CBCentralManagerStateUnauthorized	3	The app is not authorized to use the Bluetooth low energy peripheral/server role.
CBCentralManagerStateUnknown	0	The current state of the peripheral manager is unknown; an update is imminent.
CBCentralManagerStateUnsupported	2	The platform doesn't support the Bluetooth low energy peripheral/server role.

## Errors

Constant	Value	Description
CLErrorAlreadyAdvertising	9	The peripheral is already advertising.
CLErrorConnectionFailed	10	The connection failed.
CLErrorConnectionLimitReached	11	The device already has the maximum number of connections.
CLErrorConnectionTimeout	6	The connection timed out.
CLErrorEncryptionTimedOut	15	Timeout in encryption.
CLErrorInvalidHandle	2	The specified attribute handle is invalid.
CLErrorInvalidParameters	1	The specified parameters are invalid.
CLErrorNotConnected	3	The device is not currently connected.
CLErrorOperationCancelled	5	The operation is canceled.
CLErrorOperationNotSupported	13	Operation not supported.
CLErrorOutOfSpace	4	The device has run out of space to complete the intended operation.
CLErrorPeerRemovedPairingInformation	14	Peer removed pairing information, e.g. pairing was reset on the other device.
CLErrorPeripheralDisconnected	7	The peripheral disconnected.
CLErrorTooManyLEPairedDevices	16	Too many paired devices for Bluetooth LE.
CLErrorUnknown	0	An unknown error occurred.
CLErrorUnknownDevice	12	Unknown device.
CLErrorUUIDNotAllowed	8	The specified UUID is not permitted.

## 3.4 class CBCentralMBS

### 3.4.1 class CBCentralMBS

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** The central CoreBluetooth class.

**Notes:** The CBCentral class represents remote central devices that have connected to an app implementing the peripheral role on a local device. That is, when you are implementing the peripheral role using the CBPeripheralManager class, centrals that connect to your local peripheral are represented as CBCentral objects. Remote centrals are identified by universally unique identifiers (UUIDs), represented by NSUUID objects.

Subclass of the CBPeerMBS class.

This is an abstract class. You can't create an instance, but you can get one from various plugin functions.

### 3.4.2 Methods

### 3.4.3 Available as boolean

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** Whether this class is available.

**Notes:** Returns true on MacOS 10.9 or newer.

### 3.4.4 Constructor

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** The private constructor.

### 3.4.5 Properties

### 3.4.6 maximumUpdateValueLength as Integer

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** The maximum amount of data, in bytes, that the central can receive in a single notification or indication.

**Notes:** (Read only property)

## 3.5 class CBCharacteristicMBS

### 3.5.1 class CBCharacteristicMBS

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** The class for a service characteristic.

**Notes:** CBCharacteristic and its subclass CBMutableCharacteristic represent further information about a peripheral,Äôs service. CBCharacteristic objects in particular represent the characteristics of a remote peripheral,Äôs service (remote peripheral devices are represented by CBPeripheral objects). A characteristic contains a single value and any number of descriptors describing that value. The properties of a characteristic determine how the value of the characteristic can be used and how the descriptors can be accessed.

Subclass of the CBAttributeMBS class.

This is an abstract class. You can't create an instance, but you can get one from various plugin functions.

### 3.5.2 Methods

### 3.5.3 Constructor

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** The private constructor.

### 3.5.4 descriptors as CBDescriptorMBS()

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** A list of the descriptors that have been discovered in this characteristic.

**Notes:** The value of this property is an array of CBDescriptor objects that represent a characteristic,Äôs descriptors. Characteristic descriptors provide more information about a characteristic,Äôs value. For example, they may describe the value in human-readable form and describe how the value should be formatted for presentation purposes. For more information about characteristic descriptors, see CBDescriptor.

### 3.5.5 Properties

### 3.5.6 isBroadcasted as Boolean

Plugin Version: 18.2, Platform: macOS, Targets: All.

**Function:** Whether the characteristic is currently broadcasted or not.

**Notes:** Available in MacOS 10.9 or newer.

(Read only property)

### 3.5.7 isNotifying as Boolean

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** A Boolean value indicating whether the characteristic is currently notifying a subscribed central of its value.

**Notes:** True if you have enabled notifications or indications for the characteristic by successfully calling the `setNotifyValue` method of the `CBPeripheral` class. If the value of this property is true, the peripheral updates the subscribed central that it is connected to whenever the characteristic's value has changed. If the value of the property is false, notifications (or indications) have not been enabled for the characteristic, and the peripheral does not update the central that it is connected to whenever the characteristic's value has changed.

(Read only property)

### 3.5.8 properties as Integer

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** The properties of the characteristic.

**Notes:** The properties of a characteristic determine how the characteristic's value and descriptors can be used and accessed. For a list of the possible values representing the properties of a characteristic, see constants.

(Read only property)

### 3.5.9 service as CBServiceMBS

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** The service that this characteristic belongs to.

**Notes:** (Read only property)

### 3.5.10 value as MemoryBlock

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** The value of the characteristic.

**Notes:** This property contains the value of the characteristic. For example, a temperature measurement characteristic of a health thermometer service may have a value that indicates a temperature in Celsius.

(Read only property)

### 3.5.11 Constants

#### Property Constants

Constant	Value	Description
kPropertyAuthenticatedSignedWrites	&h40	Signed writes of the characteristic,Äôs value are permitted, without a response from the peripheral to indicate that the write was successful.
kPropertyBroadcast	1	The characteristic,Äôs value can be broadcast using a characteristic con- tention descriptor.
kPropertyExtendedProperties	&h80	Additional characteristic properties are defined in the characteristic ex- tended properties descriptor.
kPropertyIndicate	&h20	Indications of the characteristic,Äôs value are permitted, with a response from the central to indicate that the indication was received.
kPropertyIndicateEncryptionRequired	&h200	Only trusted devices can enable indications of the characteristic,Äôs value.
kPropertyNotify	&h10	Notifications of the characteristic,Äôs value are permitted, without a response from the central to indicate that the notification was received.
kPropertyNotifyEncryptionRequired	&h100	Only trusted devices can enable notifications of the characteristic,Äôs value.
kPropertyRead	2	The characteristic,Äôs value can be read.
kPropertyWrite	8	The characteristic,Äôs value can be written, with a response from the periph- eral to indicate that the write was successful.
kPropertyWriteWithoutResponse	4	The characteristic,Äôs value can be written, without a response from the periph- eral to indicate that the write was successful.

## 3.6 class CBDescriptorMBS

### 3.6.1 class CBDescriptorMBS

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** The CoreBluetooth class for a characteristic description.

**Notes:** CBDescriptor and its subclass CBMutableDescriptor represent a descriptor of a peripheral, a characteristic. CBDescriptor objects in particular represent the descriptors of a remote peripheral, a characteristic (remote peripheral devices are represented by CBPeripheral objects). Descriptors provide further information about a characteristic, a value. For example, they may describe the value in human-readable form and describe how the value should be formatted for presentation purposes. Characteristic descriptors also indicate whether a characteristic, a value is configured on a server (a peripheral) to indicate or notify a client (a central) when the value of the characteristic changes.

There are six predefined types of descriptors that—along with their corresponding value types—are detailed in CBUUID. CBDescriptor lists the predefined types of descriptors and the CBUUIDMBS constants that are used to represent them.

Descriptor type	Descriptor constant
Characteristic extended properties	CBUUIDMBS.CBUUIDCharacteristicExtendedPropertiesString
Characteristic user description	CBUUIDMBS.CBUUIDCharacteristicUserDescriptionString
Client characteristic configuration	CBUUIDMBS.CBUUIDClientCharacteristicConfigurationString
Server characteristic configuration	CBUUIDMBS.CBUUIDServerCharacteristicConfigurationString
Characteristic format	CBUUIDMBS.CBUUIDCharacteristicFormatString
Characteristic aggregate format	CBUUIDMBS.CBUUIDCharacteristicAggregateFormatString

Subclass of the CBAAttributeMBS class.

This is an abstract class. You can't create an instance, but you can get one from various plugin functions.

### 3.6.2 Methods

### 3.6.3 Available as boolean

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** Whether this class is available.

**Notes:** Returns true on MacOS 10.7 or newer.

### 3.6.4 Constructor

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** The private constructor.

### 3.6.5 Properties

### 3.6.6 Characteristic as *CBCharacteristicMBS*

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** The characteristic that this descriptor belongs to.

**Notes:** (Read only property)

### 3.6.7 Value as Variant

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** The value of the descriptor.

**Notes:** The value types for the various types of descriptors are detailed in *CBUUID*.

You can read the value of a descriptor by calling the `readValueForDescriptor:` method of the *CBPeripheral* class. You can write the value of a descriptor by calling the `writeValue` method of the *CBPeripheral* class. That said, you cannot use the `writeValue` method to write the value of a client configuration descriptor (*CBUUIDClientCharacteristicConfigurationString*); instead, you should use the `setNotifyValue` method of the *CBPeripheral* class to configure client indications or notifications of a characteristic,Äôs value on a server. (Read only property)

## 3.7 class CBL2CAPChannelMBS

### 3.7.1 class CBL2CAPChannelMBS

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** A CBL2CAPChannel represents a live L2CAP connection to a remote device.

### 3.7.2 Methods

### 3.7.3 Available as boolean

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** Whether the class is available.

**Notes:** Returns true on MacOS 10.13.

### 3.7.4 Constructor

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** The constructor.

### 3.7.5 Properties

### 3.7.6 Handle as Integer

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** The internal object reference.

**Notes:** (Read and Write property)

### 3.7.7 inputStream as NSInputStreamMBS

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** An NSStream used for reading data from the remote peer.

**Notes:** (Read only property)

### 3.7.8 outputStream as NSOutputStreamMBS

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** An NSSStream used for writing data to the peer.

**Notes:** (Read only property)

### 3.7.9 peer as CBPeerMBS

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** The peer connected to the channel.

**Notes:** (Read only property)

### 3.7.10 PSM as Integer

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** The PSM (Protocol/Service Multiplexer) of the channel.

**Notes:** (Read only property)

## 3.8 class CBManagerMBS

### 3.8.1 class CBManagerMBS

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** The abstract base class for Core Bluetooth manager objects (central and peripheral).

**Notes:** This is an abstract class. You can't create an instance, but you can get one from various plugin functions.

**Blog Entries**

- [MBS Xojo Plugins, version 19.4pr3](#)

### 3.8.2 Methods

### 3.8.3 Available as boolean

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** Whether the class is available.

**Notes:** Returns true on MacOS 10.13 or newer.

### 3.8.4 Constructor

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** The private constructor.

### 3.8.5 Properties

### 3.8.6 authorization as Integer

Plugin Version: 19.4, Platform: macOS, Targets: All.

**Function:** Queries the authorization state.

**Notes:** Requires MacOS 10.15 or newer.

(Read only property)

### 3.8.7 Handle as Integer

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** The internal object reference.

**Notes:** (Read and Write property)

### 3.8.8 State as Integer

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** The state of the manager.

**Notes:** (Read only property)

### 3.8.9 Constants

#### Authorization States

Constant	Value	Description
kAuthorizationStatusAuthorized	3	This app is authorized to share data using Bluetooth services while in background state.
kAuthorizationStatusDenied	2	The user explicitly denied this app from sharing data using Bluetooth services while in the background state.
kAuthorizationStatusNotDetermined	0	The user has not yet made a choice regarding whether this app can share data using Bluetooth services while in the background state.
kAuthorizationStatusRestricted	1	This app is not authorized to share data using Bluetooth services while in background state. The user cannot change this app's status, possibly to active restrictions such as parental controls being in place.

#### States

Constant	Value	Description
kStatePoweredOff	4	Bluetooth is currently powered off.
kStatePoweredOn	5	Bluetooth is currently powered on and available to use.
kStateResetting	1	The connection with the system service was momentarily lost, update imminent.
kStateUnauthorized	3	The application is not authorized to use the Bluetooth Low Energy role.
kStateUnknown	0	State unknown, update imminent.
kStateUnsupported	2	The platform doesn't support the Bluetooth Low Energy Central/Client role.

## 3.9 class CBMutableCharacteristicMBS

### 3.9.1 class CBMutableCharacteristicMBS

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** CBMutableCharacteristic objects represent the characteristics of a local peripheral,Ãs service (local peripheral devices are represented by CBPeripheralManager objects).

**Notes:** This class adds write access to many of the properties in the CBCharacteristic class it inherits from.

You use this class to create a characteristic and to set its properties and permissions as desired. After you create a characteristic and add it to a local service, you can publish it (and the service) to the peripheral,Ãs local database using the addService method of the CBPeripheralManager class. After you publish a characteristic, the characteristic is cached and you can no longer make changes to it.

Subclass of the CBCharacteristicMBS class.

### 3.9.2 Methods

### 3.9.3 Available as boolean

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** Whether the class is available.

**Notes:** Returns true on MacOS 10.9 or later.

### 3.9.4 Constructor(UUID as CBUUIDMBS, properties as Integer, value as MemoryBlock, permissions as Integer)

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** Returns a newly initialized mutable characteristic with specified permissions, properties, and value.

**Notes:** UUID: A 128-bit UUID that identifies the characteristic.

properties: The properties of the characteristic.

value: The characteristic value to be cached. If nil, the value is dynamic and will be requested on demand.

permissions: The permissions of the characteristic value.

Returns a newly initialized mutable characteristic.

If you specify a value for the characteristic, the value is cached and its properties and permissions are set to CBCharacteristicPropertyRead and CBAttributePermissionsReadable, respectively. Therefore, if you need the value of a characteristic to be writeable, or if you expect the value to change during the lifetime of the pub-

lished service to which the characteristic belongs, you must specify the value to be nil. So doing ensures that the value is treated dynamically and requested by the peripheral manager whenever the peripheral manager receives a read or write request from a central. When the peripheral manager receives a read or write request from a central, it calls the `didReceiveReadRequest` or the `didReceiveWriteRequests` event, respectively.

### 3.9.5 `setDescriptors(Descriptors())` as `CBDescriptorMBS()`

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** Set the list of descriptors that describe the characteristic.

**Notes:** The value of this property is an array of `CBDescriptor` objects that represent a characteristic's descriptors. Characteristic descriptors provide more information about a characteristic's value. For example, they may describe the value in human-readable form and describe how the value should be formatted for presentation purposes. For more information about characteristic descriptors, see `CBDescriptor`.

### 3.9.6 `subscribedCentrals` as `CBDescriptorMBS()`

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** A list of centrals currently subscribed to the characteristic's value.

**Notes:** The value of this property is an array of `CBCentral` objects that are currently subscribed to the characteristic's value. The array is empty if the characteristic is not configured to support notifications or indications. Even if the characteristic is configured to support notifications or indications, the array is empty if no centrals are currently subscribing to the characteristic's value.

### 3.9.7 Properties

#### 3.9.8 `permissions` as `Integer`

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** The permissions of the characteristic value.

**Notes:** Characteristic permissions represent the read, write, and encryption permissions for a characteristic's value. For a complete list and discussion of the characteristic permissions that may be set, see constants.

(Read and Write property)

#### 3.9.9 `properties` as `Integer`

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** The properties of the characteristic.

**Notes:** The properties of a characteristic determine how the characteristic,Äôs value and descriptors can be used and accessed. The characteristic properties `CBCharacteristicPropertyBroadcast` and `CBCharacteristicPropertyExtendedProperties` are not allowed for mutable characteristics. That is, you cannot set these properties when you initialize a `CBMutableCharacteristic` object using the `Constructor` method. For a list of the possible values representing the properties of a characteristic, see the `CBCharacteristicProperties` enumeration in `CBCharacteristic`.

(Read and Write property)

### 3.9.10 value as `MemoryBlock`

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** The value of the characteristic.

**Notes:** This property contains the value of the characteristic. For example, a temperature measurement characteristic of a health thermometer service may have a value that indicates a temperature in Celsius.

(Read and Write property)

### 3.9.11 Constants

Permissions Flags

Constant	Value	Description
<code>kReadable</code>	1	The characteristic,Äôs value has read-only permission.
<code>kReadEncryptionRequired</code>	4	The characteristic,Äôs value is readable only by trusted devices.
<code>kWriteable</code>	2	The characteristic,Äôs value has write-only permission.
<code>kWriteEncryptionRequired</code>	8	The characteristic,Äôs value is writeable only by trusted devices.

## 3.10 class CBMutableDescriptorMBS

### 3.10.1 class CBMutableDescriptorMBS

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** CBMutableDescriptor objects represent the descriptors of a local peripheral, a characteristic (local peripheral devices are represented by CBPeripheralManager objects).

**Notes:** You use the CBMutableDescriptor class to create a local characteristic descriptor. After you create a descriptor and associate it with a local characteristic, you can publish it (along with the characteristic and local service to which it belongs) to the peripheral, a local database via the addService: method of the CBPeripheralManager class. After you publish a local descriptor, the descriptor is cached and you can no longer make changes to it.

There are six predefined types of descriptors that—along with their corresponding value types—are detailed in CBUUID. That said, only two of these are currently supported when creating local, mutable descriptors: the characteristic user description descriptor and the characteristic format descriptor, represented by the CBUUID constants CBUUIDCharacteristicUserDescriptionString and CBUUIDCharacteristicFormatString, respectively. The system automatically creates the characteristic extended properties descriptor and the client characteristic configuration descriptor, depending on the properties of the characteristic to which the descriptor belongs.

Subclass of the CBDescriptorMBS class.

### 3.10.2 Methods

### 3.10.3 Constructor(UUID as CBUUIDMBS, value as variant)

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** Returns a newly initialized mutable descriptor with a specified value.

**Notes:** UUID: A 128-bit UUID that identifies the characteristic. You must use only one of the two currently supported descriptor types: CBUUIDCharacteristicUserDescriptionString or CBUUIDCharacteristicFormatString. For more details about these descriptor types, see CBUUID.

value: The descriptor value to be cached. This value is required (that is, it must not be nil) and cannot be updated dynamically after the descriptor has been published.

Returns a newly initialized mutable descriptor.

The value type of value depends on the type of descriptor.

- The value type of a characteristic user description descriptor (CBUUIDCharacteristicUserDescriptionString) is a string that can be used to provide a human-readable description of the characteristic, a value.

- The value type of a characteristic format descriptor (CBUUIDCharacteristicFormatString) is a memoryblock that can be used to specify how the characteristic,Äôs value should be formatted for presentation purposes.

If you want to create a local characteristic format descriptor, the descriptor,Äôs value must conform to the attribute value of the characteristic format descriptor as defined in the Bluetooth 4.0 specification, Volume 3, Part G, Section 3.3.3.5 (for more information, see Bluetooth 4.0 Characteristic Presentation Format).

## 3.11 class CBMutableServiceMBS

### 3.11.1 class CBMutableServiceMBS

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** The CBMutableService class adds write access to all of the properties in the CBService class it inherits from.

**Notes:** You use this class to create a service or an included service on a local peripheral device (represented by a CBPeripheralManager object). After you create a service, you can add it to the peripheral,Ås local database using the addService method of the CBPeripheralManager class. After you add a service to the peripheral,Ås local database, the service is cached and you can no longer make changes to it.

Subclass of the CBServiceMBS class.

### 3.11.2 Methods

#### 3.11.3 Constructor(UUID as CBUUIDMBS, isPrimary as Boolean)

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** Returns a newly initialized mutable service specified by UUID and service type.

**Notes:** UUID: A 128-bit UUID that identifies the service.

isPrimary: A Boolean value indicating whether the type of service is primary or secondary. If the value is true, the type of service is primary. If the value is false, the type of service is secondary.

#### 3.11.4 setCharacteristics(characteristics() as CBCharacteristicMBS)

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** Sets list of characteristics of a service.

**Notes:** An array containing CBCharacteristic objects that represent a service,Ås characteristics. Characteristics provide further details about a peripheral,Ås service. For example, a heart rate service may contain one characteristic that describes the intended body location of the device,Ås heart rate sensor and another characteristic that transmits heart rate measurement data.

#### 3.11.5 setIncludedServices(includedServices() as CBServiceMBS)

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** Sets the list of included services.

**Notes:** A service of a peripheral may contain a reference to other services that are available on the peripheral. These other services are the included services of the service.



## 3.12 class CBPeerMBS

### 3.12.1 class CBPeerMBS

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** The CBPeer class is an abstract base class that defines common behavior for objects representing remote devices.

**Notes:** You typically do not create instances of either CBPeer or its concrete subclasses. Instead, the system creates them for you during the process of peer discovery.

Your app running on the local device takes the role of either a central (by creating an instance of CBCentralManager) or a peripheral (by creating an instance of CBPeripheralManager), and interacts through the manager with remote devices in the opposite role. During the process of peer discovery, where a central device scans for peripherals advertising services, the system creates objects from the concrete subclasses of CBPeer to represent discovered remote devices.

The concrete subclasses of CBPeer are:

- CBPeripheralMBS
- CBCentralMBS

This is an abstract class. You can't create an instance, but you can get one from various plugin functions.

### 3.12.2 Methods

### 3.12.3 Available as boolean

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** Whether this class is available.

**Notes:** Returns true on Mac OS 10.13 or newer.

### 3.12.4 Constructor

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** The private constructor.

### 3.12.5 copy as CBPeerMBS

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** Creates a copy.

### 3.12.6 Properties

#### 3.12.7 Handle as Integer

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** The internal object reference.

**Notes:** (Read and Write property)

#### 3.12.8 identifier as String

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** The UUID associated with the peer.

**Notes:** The value of this property represents the unique identifier of the peer. The first time a local manager encounters a peer, the system assigns the peer a UUID, represented by a new NSUUID object. Peers are identified by NSUUID UUIDs instead of by the CBUUID objects that identify a peripheral, Å services, characteristics, and characteristic descriptors.

(Read only property)

## 3.13 class CBPeripheralManagerMBS

### 3.13.1 class CBPeripheralManagerMBS

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** The CoreBluetooth peripheral manager class.

**Notes:** CBPeripheralManager objects are used to manage published services within the local peripheral device, the Generic Attribute Profile (GATT) database and to advertise these services to central devices (represented by CBCentral objects). While a service is in the database, it is visible to, and can be accessed by, any connected central. That said, if your app has not specified the bluetooth-peripheral background mode, the contents of its services become disabled when it is in the background or in a suspended state; any remote central trying to access the service, characteristic value or characteristic descriptors receives an error.

Before you call CBPeripheralManager methods, the state of the peripheral manager object must be powered on, as indicated by the `kStatePoweredOn`. This state indicates that the peripheral device (your iPhone or iPad, for instance) supports Bluetooth low energy and that its Bluetooth is on and available to use.

Subclass of the `CBManagerMBS` class.

### 3.13.2 Methods

#### 3.13.3 `addService(service as CBMutableServiceMBS)`

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** Publishes a service and any of its associated characteristics and characteristic descriptors to the local GATT database.

**Notes:** `service`: The service you want to publish.

When you add a service to the database, the peripheral manager calls the `didAddService:error` event. If the service contains any included services, you must publish them first.

#### 3.13.4 `authorizationStatus as integer`

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** Returns the app's authorization status for sharing data while in the background state.

**Notes:** A value indicating whether the app is authorized to share data using Bluetooth services while in the background. For a list of the possible values, see constants.

The authorization status of a given app is managed by the system and determined by several factors. Apps

must be explicitly authorized to share data using Bluetooth services while in the background state. The system automatically displays a request for user authorization when your app first attempts to use Bluetooth services to share data.

Calling this method does not prompt the user for access. Instead, you use this method to detect restricted access and simply hide any affected UI features from the user.

Deprecated in MacOS 10.15 in favor of `CBManagerMBS`' authorization property.

### 3.13.5 Available as boolean

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** Checks whether this class is available.

**Notes:** Returns true for MacOS 10.9 or newer.

### 3.13.6 `CBPeripheralManagerOptionRestoreIdentifierKey` as String

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** One of the keys used to pass options to the Constructor.

**Notes:** A string containing a unique identifier (UID) for the peripheral manager that is being instantiated. The system uses this UID to identify a specific peripheral manager. As a result, the UID must remain the same for subsequent executions of the app in order for the peripheral manager to be successfully restored.

### 3.13.7 `CBPeripheralManagerOptionShowPowerAlertKey` as String

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** One of the keys used to pass options to the Constructor.

**Notes:** A Boolean value that specifies whether the system should display a warning dialog to the user if Bluetooth is powered off when the peripheral manager is instantiated.

The value for this key is a boolean. If the key is not specified, the default value is false.

### 3.13.8 `CBPeripheralManagerRestoredStateAdvertisementDataKey` as String

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** One of the keys used to pass options to the constructor.

**Notes:** A dictionary containing the data that the peripheral manager was advertising at the time the app was terminated by the system.

### 3.13.9 `CBPeripheralManagerRestoredStateServicesKey` as String

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** One of the keys used to pass options to the constructor.

**Notes:** An array of `CBMutableService` objects that contains all of the services that were published to the local peripheral,Â’s database at the time the app was terminated by the system.

### 3.13.10 `Constructor(options as Dictionary = nil)`

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** Initializes the peripheral manager.

### 3.13.11 `Destructor`

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** The destructor.

### 3.13.12 `removeAllServices`

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** Removes all published services from the local GATT database.

**Notes:** Because the GATT database is shared among apps on the local peripheral device, this method removes only the services that you have added using the `addService` method. Any services that have been published by other apps on the local peripheral device are not removed from the GATT database.

### 3.13.13 `removeService(service as CBMutableServiceMBS)`

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** Removes a specified published service from the local GATT database.

**Notes:** `service`: The service you want to remove.

Because the GATT database is shared among apps on the local peripheral device, more than one instance of a service may exist in the database. As a result, this method removes only the instance of the service that your app added to the database (using the `addService` method). If the service is included by any other services, you must remove them first.

**3.13.14 respondToRequest(request as CBATTRRequestMBS, error as integer)**

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** Responds to a read or write request from a connected central.

**Notes:** request: The read or write request that was received from the connected central. For more information about read and write requests, see CBATTRRequest.

result: The result of attempting to fulfill the request. For a list of possible results, see Core Bluetooth Constants.

When the peripheral manager receives a request (represented as a CBATTRRequest object) from a connected central to read or write a characteristic,Ãs value, it calls the didReceiveReadRequest or didReceiveWriteRequests event. Each time one of these events is called, you call this method to respond to the corresponding read or write request.

**3.13.15 setDesiredConnectionLatency(latency as integer, central as CBCentralMBS)**

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** Sets the desired connection latency for an existing connection to a central device.

**Notes:** latency: The desired connection latency. For a list of the possible connection latency values that you may set for the peripheral manager, see CBPeripheralManagerConnectionLatency.

central: The central that the peripheral manager is currently connected to.

The latency of a peripheral-central connection controls how frequently messages can be exchanged between the peripheral and the central to which the peripheral is connected. By setting a desired connection latency, you manage the relationship between the frequency with which data is exchanged and the resulting battery performance of the peripheral device. When you call this method to set the connection latency, note that connection latency changes are not guaranteed. And so, the resultant latency may vary. If you do not explicitly set a latency, the connection latency is set to the latency that was chosen by the central device when the connection was first established. Typically, it is not necessary to change the connection latency.

**3.13.16 startAdvertising(advertisementData as Dictionary)**

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** Invoked when you start advertising the local peripheral device,Ãs data.

**Notes:** error: If an error occurred, the cause of the failure.

This event is invoked when your app calls the startAdvertising method to begin advertising the local peripheral device,Ãs data. If successful, the error parameter is nil. If there is a problem advertising the data, the error parameter returns the cause of the failure.

### 3.13.17 stopAdvertising

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** Stops advertising peripheral manager data.

**Notes:** Call this method when you no longer want to advertise peripheral manager data.

### 3.13.18 updateValue(value as MemoryBlock, characteristic as CBMutableCharacteristicMBS, onSubscribedCentrals() as CBCentralMBS = nil) as Boolean

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** Sends an updated characteristic value to one or more subscribed centrals, via a notification or indication.

**Notes:** value: The characteristic value you want to send via a notification or indication.

characteristic: The characteristic whose value has changed.

centrals: A list of centrals (represented by CBCentral objects) that have subscribed to receive updates of the characteristic,Äôs value. If nil, all subscribed centrals are updated. Centrals that have not subscribed to a characteristic,Äôs value are ignored.

Returns true if the update is successfully sent to the subscribed central or centrals. false if the update is not successfully sent because the underlying transmit queue is full.

You use this method to send updates of a characteristic,Äôs value—through a notification or indication—to selected centrals that have subscribed to that characteristic,Äôs value. If the method returns false because the underlying transmit queue is full, the peripheral manager calls the peripheralManagerIsReadyToUpdateSubscribers event when more space in the transmit queue becomes available. After this delegate method is called, you may resend the update.

If the length of the value parameter exceeds the length of the maximumUpdateValueLength property of a subscribed CBCentral, the value parameter is truncated accordingly.

### 3.13.19 Properties

#### 3.13.20 isAdvertising as Boolean

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** A Boolean value indicating whether the peripheral is currently advertising data.

**Notes:** true if the peripheral is currently advertising data as a result of you successfully calling the startAdvertising method. false if the peripheral is not currently advertising data.

(Read only property)

### 3.13.21 Events

#### 3.13.22 DidAddService(service as CBServiceMBS, error as NSErrorMBS)

Plugin Version: 18.1, Platform: macOS, Targets: .

**Function:** Invoked when you publish a service, and any of its associated characteristics and characteristic descriptors, to the local Generic Attribute Profile (GATT) database.

**Notes:** service: The service that was added to the local GATT database.  
error: If an error occurred, the cause of the failure.

This event is invoked when your app calls the `addService` method to publish a service to the local peripheral, to the local GATT database. If the service is successfully published to the local database, the error parameter is `nil`. If unsuccessful, the error parameter returns the cause of the failure.

#### 3.13.23 DidOpenL2CAPChannel(channel as CBL2CAPChannelMBS, error as NSErrorMBS)

Plugin Version: 18.1, Platform: macOS, Targets: .

**Function:** Did open L2CAP channel.

#### 3.13.24 DidPublishL2CAPChannel(PSM as Integer, error as NSErrorMBS)

Plugin Version: 18.1, Platform: macOS, Targets: .

**Function:** This event is the response to a `publishL2CAPChannel` call.

**Notes:** PSM: The PSM of the channel that was published.  
error: If an error occurred, the cause of the failure.

The PSM will contain the PSM that was assigned for the published channel

#### 3.13.25 DidReceiveReadRequest(Request as CBATTRequestMBS)

Plugin Version: 18.1, Platform: macOS, Targets: .

**Function:** Invoked when a local peripheral device receives an Attribute Protocol (ATT) read request for a characteristic that has a dynamic value.

**Notes:** request: A `CBATTRequest` object that represents a request to read a characteristic, to its value.

Each time this method is invoked, you call the `respondToRequest` method of the `CBPeripheralManager` class

exactly once to respond to the read request.

### 3.13.26 DidReceiveWriteRequests(requests() as CBATTRequestMBS)

Plugin Version: 18.1, Platform: macOS, Targets: .

**Function:** Invoked when a local peripheral device receives an Attribute Protocol (ATT) write request for a characteristic that has a dynamic value.

**Notes:** requests: A list of one or more CBATTRequest objects, each representing a request to write the value of a characteristic.

In the same way that you respond to a read request, each time this method is invoked, you call the `respondToRequest:withResult:` method of the `CBPeripheralManager` class exactly once. If the `requests` parameter contains multiple requests, treat them as you would a single request—if any individual request cannot be fulfilled, you should not fulfill any of them. Instead, call the `respondToRequest` method immediately, and provide a result that indicates the cause of the failure.

When you respond to a write request, note that the first parameter of the `respondToRequest` method expects a single `CBATTRequest` object, even though you received an array of them from the `didReceiveWriteRequests` event. To respond properly, pass in the first request of the `requests` array.

### 3.13.27 DidStartAdvertising(error as NSErrorMBS)

Plugin Version: 18.1, Platform: macOS, Targets: .

**Function:** Advertising did start.

**Notes:** error: If an error occurred, the cause of the failure.

This event returns the result of a `startAdvertising` call. If advertisement could not be started, the cause will be detailed in the `error` parameter.

### 3.13.28 DidSubscribeToCharacteristic(central as CBCentralMBS, characteristic as CBCharacteristicMBS)

Plugin Version: 18.1, Platform: macOS, Targets: .

**Function:** Invoked when a remote central device subscribes to a characteristic's value.

**Notes:** central: The remote central device that subscribed to the characteristic's value.  
characteristic: The characteristic whose value has been subscribed to.

This method is invoked when a remote central device subscribes to the value of one of the local peripheral,Äôs characteristics, by enabling notifications or indications on the characteristic,Äôs value. You should use the invocation of this method as a cue to start sending the subscribed central updates as the characteristic,Äôs value changes. To send updated characteristic values to subscribed centrals, use the `updateValue` method of the `CBPeripheralManager` class.

### 3.13.29 DidUnpublishL2CAPChannel(PSM as Integer, error as NSErrorMBS)

Plugin Version: 18.1, Platform: macOS, Targets: .

**Function:** This event is the response to a `unpublishL2CAPChannel` call.

**Notes:** PSM: The PSM of the channel that was published.

error: If an error occurred, the cause of the failure.

### 3.13.30 DidUnsubscribeFromCharacteristic(central as CBCentralMBS, characteristic as CBCharacteristicMBS)

Plugin Version: 18.1, Platform: macOS, Targets: .

**Function:** Invoked when a remote central device unsubscribes from a characteristic,Äôs value.

**Notes:** central: The remote central device that subscribed to the characteristic,Äôs value.

characteristic: The characteristic whose value has been unsubscribed from.

This method is invoked when a remote central device unsubscribes from the value of one of the local peripheral,Äôs characteristics, by disabling notifications or indications on the characteristic,Äôs value. You should use the invocation of this method as a cue to stop sending the subscribed central updates as the characteristic,Äôs value changes.

### 3.13.31 DidUpdateState

Plugin Version: 18.1, Platform: macOS, Targets: .

**Function:** Invoked when the peripheral manager's state is updated.

**Notes:** You implement this required method to ensure that Bluetooth low energy is supported and available to use on the local peripheral device. Issue commands to the peripheral manager only when the state of the peripheral manager is powered on, as indicated by the `kStatePoweredOn` constant. A state with a value lower than `CBPeripheralManagerStatePoweredOn` implies that advertising has stopped and that any connected centrals have been disconnected. If the state moves below `CBPeripheralManagerStatePoweredOff`, advertising has stopped and must be explicitly restarted. In addition, the local database is cleared and all services must be explicitly added again. For a complete list and discussion of the possible values representing the state of the peripheral manager, see the `CBPeripheralManagerState` enumeration in `CBPeripheralManager`.

**3.13.32 IsReadyToUpdateSubscribers**

Plugin Version: 18.1, Platform: macOS, Targets: .

**Function:** Invoked when a local peripheral device is again ready to send characteristic value updates.

**Notes:** When a call to the `updateValue` method fails because the underlying queue used to transmit the updated characteristic value is full, the `peripheralManagerIsReadyToUpdateSubscribers:` method is invoked when more space in the transmit queue becomes available. You can then implement this event to resend the value.

**3.13.33 WillRestoreState(dic as dictionary)**

Plugin Version: 18.1, Platform: macOS, Targets: .

**Function:** Invoked when the peripheral manager is about to be restored by the system.

**Notes:** `dict:` A dictionary containing information about the peripheral manager that was preserved by the system at the time the app was terminated. For the available keys to this dictionary, see Peripheral Manager State Restoration Options.

For apps that opt in to the state preservation and restoration feature of Core Bluetooth, this is the first method invoked when your app is relaunched into the background to complete some Bluetooth-related task. Use this method to synchronize the state of your app with the state of the Bluetooth system.

**3.13.34 Constants**

## Authorization States

Constant	Value	Description
<code>kAuthorizationStatusAuthorized</code>	3	This app is authorized to share data using Bluetooth services while in background state.
<code>kAuthorizationStatusDenied</code>	2	The user explicitly denied this app from sharing data using Bluetooth services while in the background state.
<code>kAuthorizationStatusNotDetermined</code>	0	The user has not yet made a choice regarding whether this app can share data using Bluetooth services while in the background state.
<code>kAuthorizationStatusRestricted</code>	1	This app is not authorized to share data using Bluetooth services while in background state. The user cannot change this app's status, possibly to active restrictions such as parental controls being in place.

## Latencies

Constant	Value	Description
<code>kConnectionLatencyHigh</code>	2	Extending battery life has priority over rapid communication.
<code>kConnectionLatencyLow</code>	0	Rapid communication has priority over battery life.
<code>kConnectionLatencyMedium</code>	1	A balance exists between communication frequency and battery life.

## States

Constant	Value	Description
kStatePoweredOff	4	Bluetooth is currently powered off.
kStatePoweredOn	5	Bluetooth is currently powered on and is available to use.
kStateResetting	1	The connection with the system service was momentarily lost; an update is imminent.
kStateUnauthorized	3	The app is not authorized to use the Bluetooth low energy peripheral/server role.
kStateUnknown	0	The current state of the peripheral manager is unknown; an update is imminent.
kStateUnsupported	2	The platform doesn't support the Bluetooth low energy peripheral/server role.

## 3.14 class CBPeripheralMBS

### 3.14.1 class CBPeripheralMBS

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** The CBPeripheral class represents remote peripheral devices that your app—by means of a central manager (an instance of CBCentralManager)—has discovered advertising or is currently connected to.

**Notes:** Peripherals are identified by universally unique identifiers (UUIDs), represented by NSUUID objects. Peripherals may contain one or more services or provide useful information about their connected signal strength.

You use this class to discover, explore, and interact with the services available on a remote peripheral that supports Bluetooth low energy. A service encapsulates the way part of the device behaves. For example, one service of a heart rate monitor may be to expose heart rate data from the monitor, “heart rate sensor. Services themselves are made up of characteristics or included services (references to other services). Characteristics provide further details about a peripheral, “service. For example, the heart rate service just described may contain one characteristic that describes the intended body location of the device, “heart rate sensor and another characteristic that transmits heart rate measurement data. Finally, characteristics contain any number of descriptors that provide more information about the characteristic, “value, such as a human-readable description and a way to format the value.

Subclass of the CBPeerMBS class.

#### Blog Entries

- [Bluetooth for Xojo](#)

### 3.14.2 Methods

### 3.14.3 Available as boolean

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** Whether this class is available.

**Notes:** Returns true on Mac OS 10.7 and newer.

### 3.14.4 Constructor(Peripheral as CBPeripheralMBS)

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** The constructor.

**Notes:** You can subclass this class and fill events. Then when you get a Peripheral, you can call this constructor to make a new object of your subclass with the given Peripheral and connect the event.

### 3.14.5 Destructor

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** The destructor.

### 3.14.6 `discoverCharacteristics(characteristicUUIDs() as CBUUIDMBS = nil, service as CBSServiceMBS)`

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** Discovers the specified characteristics of a service.

**Notes:** `characteristicUUIDs`: An array of CBUUID objects that you are interested in. Here, each CBUUID object represents a UUID that identifies the type of a characteristic you want to discover.

`service`: The service whose characteristics you want to discover.

An array of CBUUID objects—representing characteristic UUIDs—can be provided in the `characteristicUUIDs` parameter. As a result, the peripheral returns only the characteristics of the service that your app is interested in (recommended). If the `characteristicUUIDs` parameter is `nil`, all the characteristics of the service are returned; setting the parameter to `nil` is considerably slower and is not recommended. When the peripheral discovers one or more characteristics of the specified service, it calls the `didDiscoverCharacteristicsForService` event. If the characteristics of a service are successfully discovered, you can access them through the `service`'s `characteristics` property.

### 3.14.7 `discoverDescriptorsForCharacteristic(Characteristic as CBCharacteristicMBS)`

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** Discovers the descriptors of a characteristic.

**Notes:** `characteristic`: The characteristic whose descriptors you want to discover.

When the peripheral discovers one or more descriptors of the specified characteristic, it calls the `didDiscoverDescriptorsForCharacteristic` event. If the descriptors of a characteristic are successfully discovered, you can access them through the `characteristic`'s `descriptors` property.

### 3.14.8 `discoverIncludedServices(includedServiceUUIDs() as CBUUIDMBS = nil, service as CBSServiceMBS)`

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** Discovers the specified included services of a service.

**Notes:** `includedServiceUUIDs`: An array of CBUUID objects that you are interested in. Here, each CBUUID object represents a UUID that identifies the type of included service you want to discover.

`service`: The service whose included services you want to discover.

You can provide an array of CBUUID objects—representing included service UUIDs—in the `includedServiceUUIDs` parameter. When you do, the peripheral returns only the included services of the service that your app is interested in (recommended). If the `includedServicesUUIDs` parameter is `nil`, all the included services of the service are returned; setting the parameter to `nil` is considerably slower and is not recommended. When the peripheral discovers one or more included services of the specified service, it calls the `didDiscoverIncludedServicesForService` event. If the included services of a service are successfully discovered, you can access them through the service’s `includedServices` property.

### 3.14.9 `discoverServices(serviceUUIDs() as CBUUIDMBS = nil)`

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** Discovers the specified services of the peripheral.

**Notes:** `serviceUUIDs`: An array of CBUUID objects that you are interested in. Here, each CBUUID object represents a UUID that identifies the type of service you want to discover.

You can provide an array of CBUUID objects—representing service UUIDs—in the `serviceUUIDs` parameter. When you do, the peripheral returns only the services of the peripheral that your app is interested in (recommended). If the `servicesUUIDs` parameter is `nil`, all the available services of the peripheral are returned; setting the parameter to `nil` is considerably slower and is not recommended. When the peripheral discovers one or more services, it calls the `didDiscoverServices` event. If the services of the peripheral are successfully discovered, you can access them through the peripheral’s `services` property.

### 3.14.10 `maximumWriteValueLengthForType(Type as Integer) as Integer`

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** The maximum amount of data, in bytes, that can be sent to a characteristic in a single write type.

**Notes:** Type can be `kWriteWithResponse` or `kWriteWithoutResponse`.

### 3.14.11 `readRSSI`

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** Retrieves the current RSSI value for the peripheral while it is connected to the central manager.

**Notes:** In macOS, when you call this method to retrieve the RSSI of the peripheral while it is currently

connected to the central manager, the peripheral calls the `peripheralDidUpdateRSSI` event. If the RSSI value of the peripheral is successfully retrieved, you can access it through the peripheral's `RSSI` property.

### 3.14.12 `readValueForCharacteristic(Characteristic as CBCharacteristicMBS)`

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** Retrieves the value of a specified characteristic.

**Notes:** `characteristic`: The characteristic whose value you want to read.

When you call this method to read the value of a characteristic, the peripheral calls the `peripheral:didUpdateValueForCharacteristic:error:` method of its delegate object. If the value of the characteristic is successfully retrieved, you can access it through the characteristic's `value` property.

Not all characteristics are guaranteed to have a readable value. You can determine whether a characteristic's value is readable by accessing the relevant properties of the `CBCharacteristicProperties` enumeration, which are detailed in `CBCharacteristic`.

### 3.14.13 `readValueForDescriptor(descriptor as CBDescriptorMBS)`

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** Retrieves the value of a specified characteristic descriptor.

**Notes:** `descriptor`: The characteristic descriptor whose value you want to read.

When you call this method to read the value of a characteristic descriptor, the peripheral calls the `didUpdateValueForDescriptor` event. If the value of the characteristic descriptor is successfully retrieved, you can access it through the characteristic descriptor's `value` property.

### 3.14.14 `services as CBServiceMBS()`

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** A list of services on the peripheral that have been discovered.

**Notes:** Returns an array of services (represented by `CBService` objects) that were discovered on the peripheral through a successful call to the `discoverServices` method. If you have yet to call the `discoverServices` method to discover the services of the peripheral, or if there was an error in doing so, the value of this property is `nil`.

### 3.14.15 setNotifyValue(enabled as Boolean, Characteristic as CBCharacteristicMBS)

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** Sets notifications or indications for the value of a specified characteristic.

**Notes:** enabled: A Boolean value indicating whether you wish to receive notifications or indications whenever the characteristic's value changes. true if you want to enable notifications or indications for the characteristic's value. false if you do not want to receive notifications or indications whenever the characteristic's value changes.

characteristic: The specified characteristic.

When you enable notifications for the characteristic's value, the peripheral calls the didUpdateNotificationStateForCharacteristic event to indicate whether or not the action succeeded. If successful, the peripheral then calls the didUpdateValueForCharacteristic event whenever the characteristic value changes. Because it is the peripheral that chooses when to send an update, your app should be prepared to handle them as long as notifications or indications remain enabled. If the specified characteristic is configured to allow both notifications and indications, calling this method enables notifications only. You can disable notifications and indications for a characteristic's value by calling this method with the enabled parameter set to false.

### 3.14.16 writeValue(data as MemoryBlock, Characteristic as CBCharacteristicMBS, Type as Integer)

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** Writes the value of a characteristic.

**Notes:** data: The value to be written.

characteristic: The characteristic whose value is to be written.

type: The type of write to be executed. For a list of the possible types of writes to a characteristic's value, see CBCharacteristicWriteType.

When you call this method to write the value of a characteristic, the peripheral calls the didWriteValueForCharacteristic event only if you specified the write type as CBPeripheralMBS.kWriteWithResponse. The response you receive through the didWriteValueForCharacteristic event indicates whether the write was successful; if the write failed, it details the cause of the failure in an error. If you specify the write type as CBCharacteristicWriteWithoutResponse, the write is best-effort and not guaranteed. If the write does not succeed in this case, you are not notified nor do you receive an error indicating the cause of the failure. The data passed into the data parameter is copied, and you can dispose of it after the method returns.

Characteristics may allow only certain type of writes to be performed on their value. To determine which types of writes are permitted to a characteristic's value, you access the relevant properties of the CBCharacteristicProperties enumeration, which are detailed in CBCharacteristic.

See also:

- 3.14.17 `writeValue(data as MemoryBlock, Descriptor as CBDescriptorMBS)`

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### 3.14.17 `writeValue(data as MemoryBlock, Descriptor as CBDescriptorMBS)`

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** Writes the value of a characteristic descriptor.

**Notes:** `data`: The value to be written.

`descriptor`: The descriptor whose value is to be written.

When you call this method to write the value of a characteristic descriptor, the peripheral calls the `peripheral:didWriteValueForDescriptor:error:` method of its delegate object. The data passed into the `data` parameter is copied, and you can dispose of it after the method returns.

You cannot use this method to write the value of a client configuration descriptor (represented by the `CBUUIDClientCharacteristicConfigurationString` constant), which describes how notification or indications are configured for a characteristic,Å value with respect to a client. If you want to manage notifications or indications for a characteristic,Å value, you must use the `setNotifyValue` method instead.

See also:

- 3.14.16 `writeValue(data as MemoryBlock, Characteristic as CBCharacteristicMBS, Type as Integer)`

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### 3.14.18 Properties

### 3.14.19 `CanSendWriteWithoutResponse` as Boolean

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** True if the remote device has space to send a write without response.

**Notes:** If this value is false, the value will be set to true after the current writes have been flushed, and `IsReadyToSendWriteWithoutResponse` event will be called.

(Read only property)

### 3.14.20 `Name` as String

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** The name of the peripheral.

**Notes:** The value of this property is a string containing the device name of the peripheral. You can access this property to retrieve a human-readable name of the peripheral. There may be two types of names associated with a peripheral: one that the device advertises and another that the device publishes in its database as its Bluetooth low energy Generic Access Profile (GAP) device name. Although this property may contain either type of name, the GAP device name takes priority. This means that if a peripheral has both types of names associated with it, this property returns its GAP device name.

(Read only property)

### 3.14.21 RSSI as String

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** The RSSI, in decibels, of the peripheral.

**Notes:** Returns a number, in decibels, that indicates the RSSI of the peripheral while it is currently connected to the central manager. You can use a connected peripheral's RSSI property to determine the peripheral's proximity. The default value of this property is nil and is set the first time you successfully call the readRSSI method.

(Read only property)

### 3.14.22 State as Integer

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** The current connection state of the peripheral.

**Notes:** The value of this property represents the current connection state of the peripheral. For a list of the possible values of this property, see CBPeripheralState.

(Read only property)

### 3.14.23 Events

#### 3.14.24 DidDiscoverCharacteristicsForService(service as CBServiceMBS, error as NSErrorMBS)

Plugin Version: 18.1, Platform: macOS, Targets: .

**Function:** Invoked when you discover the characteristics of a specified service.

**Notes:** peripheral: The peripheral providing this information.

service: The service that the characteristics belong to.

error: If an error occurred, the cause of the failure.

This event is invoked when your app calls the discoverCharacteristics method. If the characteristics of the specified service are successfully discovered, you can access them through the service's characteristics property. If successful, the error parameter is nil. If unsuccessful, the error parameter returns the cause of the failure.

### 3.14.25 `DidDiscoverDescriptorsForCharacteristic(characteristic as CBCharacteristicMBS, error as NSErrorMBS)`

Plugin Version: 18.1, Platform: macOS, Targets: .

**Function:** Invoked when you discover the descriptors of a specified characteristic.

**Notes:** peripheral: The peripheral providing this information.

characteristic: The characteristic that the characteristic descriptors belong to.

error: If an error occurred, the cause of the failure.

This event is invoked when your app calls the `discoverDescriptorsForCharacteristic` method. If the characteristic descriptors of the specified characteristic are successfully discovered, you can access them through the `characteristic.descriptors` property. If successful, the error parameter is nil. If unsuccessful, the error parameter returns the cause of the failure.

### 3.14.26 `DidDiscoverIncludedServicesForService(service as CBServiceMBS, error as NSErrorMBS)`

Plugin Version: 18.1, Platform: macOS, Targets: .

**Function:** Invoked when you discover the included services of a specified service.

**Notes:** peripheral: The peripheral providing this information.

service: The `CBService` object containing the included service.

error: If an error occurred, the cause of the failure.

This event is invoked when you app calls the `discoverIncludedServices` method. If the included services of the specified service are successfully discovered, you can access them through the `service.includedServices` property. If successful, the error parameter is nil. If unsuccessful, the error parameter returns the cause of the failure.

### 3.14.27 `DidDiscoverServices(error as NSErrorMBS)`

Plugin Version: 18.1, Platform: macOS, Targets: .

**Function:** Invoked when you discover the peripheral's available services.

**Notes:** peripheral: The peripheral that the services belong to.

error: If an error occurred, the cause of the failure.

This event is invoked when your app calls the `discoverServices` method. If the services of the peripheral are successfully discovered, you can access them through the `peripheral.services` property. If successful, the error parameter is nil. If unsuccessful, the error parameter returns the cause of the failure.

**3.14.28 DidModifyServices(invalidatedServices() as CBServiceMBS)**

Plugin Version: 18.1, Platform: macOS, Targets: .

**Function:** Invoked when a peripheral's services have changed.

**Notes:** invalidatedServices: A list of services that have been invalidated.

This method is invoked whenever one or more services of a peripheral have changed. A peripheral's services have changed if:

- A service is removed from the peripheral's database
- A new service is added to the peripheral's database
- A service that was previously removed from the peripheral's database is readded to the database at a different location

If you previously discovered any of the services that have changed, they are provided in the invalidatedServices parameter and can no longer be used. You can use the discoverServices method to discover any new services that have been added to the peripheral's database or to find out whether any of the invalidated services that you were using (and want to continue using) have been added back to a different location in the peripheral's database.

**3.14.29 DidOpenL2CAPChannel(channel as CBL2CAPChannelMBS, error as NSErrorMBS)**

Plugin Version: 18.1, Platform: macOS, Targets: .

**Function:** Called when channel is opened.

**3.14.30 DidReadRSSI(RSSI as String, error as NSErrorMBS)**

Plugin Version: 18.1, Platform: macOS, Targets: .

**Function:** Invoked after you call readRSSI to retrieve the value of the peripheral's current RSSI while it is connected to the central manager.

**Notes:** peripheral: The peripheral providing this information.

RSSI: The RSSI, in decibels, of the peripheral.

error: If an error occurred, the cause of the failure.

This event is invoked when your app calls the readRSSI method. If successful, the error parameter is nil and the parameter RSSI reports the receiver's signal strength, in decibels. If unsuccessful, the error parameter returns the cause of the failure.

### 3.14.31 DidUpdateName

Plugin Version: 18.1, Platform: macOS, Targets: .

**Function:** Invoked when a peripheral,Ãs name changes.

**Notes:** The event is invoked whenever the peripheral device,Ãs Generic Access Profile (GAP) device name has changed. Since a peripheral device can change its GAP device name, you can implement this method if your app needs to display the current name of the peripheral device.

### 3.14.32 DidUpdateNotificationStateForCharacteristic(characteristic as CBCharacteristicMBS, error as NSErrorMBS)

Plugin Version: 18.1, Platform: macOS, Targets: .

**Function:** Invoked when the peripheral receives a request to start or stop providing notifications for a specified characteristic,Ãs value.

**Notes:** characteristic: The characteristic for which notifications of its value are to be configured.  
error: If an error occurred, the cause of the failure.

This event is invoked when your app calls the setNotifyValue method. If successful, the error parameter is nil. If unsuccessful, the error parameter returns the cause of the failure.

### 3.14.33 DidUpdateRSSI(error as NSErrorMBS)

Plugin Version: 18.1, Platform: macOS, Targets: .

**Function:** Invoked when you retrieve the value of the peripheral,Ãs current RSSI while it is connected to the central manager.

**Notes:** error: If an error occurred, the cause of the failure.

This event is invoked when your app calls the readRSSI method. If successful, the error parameter is nil. If unsuccessful, the error parameter returns the cause of the failure.

### 3.14.34 DidUpdateValueForCharacteristic(characteristic as CBCharacteristicMBS, error as NSErrorMBS)

Plugin Version: 18.1, Platform: macOS, Targets: .

**Function:** Invoked when you retrieve a specified characteristic,Ãs value, or when the peripheral device notifies your app that the characteristic,Ãs value has changed.

**Notes:** peripheral: The peripheral providing this information.  
characteristic: The characteristic whose value has been retrieved.

error: If an error occurred, the cause of the failure.

This method is invoked when your app calls the `readValueForCharacteristic:` method, or when the peripheral notifies your app that the value of the characteristic for which notifications and indications are enabled (via a successful call to `setNotifyValue for Characteristic`) has changed. If successful, the error parameter is nil. If unsuccessful, the error parameter returns the cause of the failure.

### 3.14.35 `DidUpdateValueForDescriptor(descriptor as CBDescriptorMBS, error as NSErrorMBS)`

Plugin Version: 18.1, Platform: macOS, Targets: .

**Function:** Invoked when you retrieve a specified characteristic descriptor,Ãs value.

**Notes:** peripheral: The peripheral providing this information.

descriptor: The characteristic descriptor whose value has been retrieved.

error: If an error occurred, the cause of the failure.

This event is invoked when your app calls the `readValueForDescriptor` method. If successful, the error parameter is nil. If unsuccessful, the error parameter returns the cause of the failure.

### 3.14.36 `DidWriteValueForCharacteristic(characteristic as CBCharacteristicMBS, error as NSErrorMBS)`

Plugin Version: 18.1, Platform: macOS, Targets: .

**Function:** Invoked when you write data to a characteristic,Ãs value.

**Notes:** peripheral: The peripheral providing this information.

characteristic: The characteristic whose value has been written.

error: If an error occurred, the cause of the failure.

This event is invoked only when your app calls the `writeValue for Characteristic` method with the `CBCharacteristicWriteWithResponse` constant specified as the write type. If successful, the error parameter is nil. If unsuccessful, the error parameter returns the cause of the failure.

### 3.14.37 `DidWriteValueForDescriptor(descriptor as CBDescriptorMBS, error as NSErrorMBS)`

Plugin Version: 18.1, Platform: macOS, Targets: .

**Function:** Invoked when you write data to a characteristic descriptor,Ãs value.

**Notes:** descriptor: The characteristic descriptor whose value has been written.

error: If an error occurred, the cause of the failure.

This event is invoked when your app calls the `writeValue for Descriptor` method. If successful, the error parameter is `nil`. If unsuccessful, the error parameter returns the cause of the failure.

### 3.14.38 `IsReadyToSendWriteWithoutResponse`

Plugin Version: 18.1, Platform: macOS, Targets: .

**Function:** The peripheral providing this update..

**Notes:** This event is invoked after a failed call to `writeValue for Characteristic`, when peripheral is again ready to send characteristic value updates.

### 3.14.39 Constants

Constants

Constant	Value	Description
<code>kWriteWithoutResponse</code>	1	One of the constants to specify which type of write is to be performed on a <code>CBCharacteristic</code> . Writes without response.
<code>kWriteWithResponse</code>	0	One of the constants to specify which type of write is to be performed on a <code>CBCharacteristic</code> . Write with Response.

States

Constant	Value	Description
<code>kStateConnected</code>	2	The peripheral is currently connected to the central manager.
<code>kStateConnecting</code>	1	The peripheral is currently in the process of connecting to the central manager.
<code>kStateDisconnected</code>	0	The peripheral is currently not connected to the central manager.
<code>kStateDisconnecting</code>	3	The peripheral is currently in the process of disconnecting from the central manager.

## 3.15 class CBServiceMBS

### 3.15.1 class CBServiceMBS

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** The class for a service.

**Notes:** CBService and its subclass CBMutableService represent a peripheral, “service”—a collection of data and associated behaviors for accomplishing a function or feature of a device (or portions of that device). CBService objects in particular represent services of a remote peripheral device (represented by a CBPeripheral object). Services are either primary or secondary and may contain a number of characteristics or included services (references to other services).

Subclass of the CBAAttributeMBS class.

This is an abstract class. You can’t create an instance, but you can get one from various plugin functions.

### 3.15.2 Methods

### 3.15.3 Available as boolean

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** Whether this class is available.

**Notes:** Returns true on MacOS 10.7 or newer.

### 3.15.4 characteristics as CBCharacteristicMBS()

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** A list of characteristics that have been discovered in this service.

**Notes:** This array contains CBCharacteristic objects that represent a service, “characteristics”. Characteristics provide further details about a peripheral, “service”. For example, a heart rate service may contain one characteristic that describes the intended body location of the device, “heart rate sensor” and another characteristic that transmits heart rate measurement data.

### 3.15.5 Constructor

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** The private constructor.

### 3.15.6 includedServices as CBServiceMBS()

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** A list of included services that have been discovered in this service.

**Notes:** This array contains CBService objects that represent the included services of a service. A service of a peripheral may contain a reference to other services that are available on the peripheral. These other services are the included services of the service and can be discovered using the discoverIncludedServices method of the CBPeripheral class.

### 3.15.7 Properties

#### 3.15.8 isPrimary as Boolean

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** A Boolean value indicating whether the type of service is primary or secondary.

**Notes:** A peripheral's service is either primary or secondary. A primary service describes the primary function of a device and can be included by another service. A secondary service describes a service that is relevant only in the context of another service that has referenced it. For example, the primary service of a heart rate monitor may be to expose heart rate data from the monitor's heart rate sensor, whereas a secondary service may be to expose the sensor's battery data. If the value of this property is true, the type of service is primary. If the value of this property is false, the type of service is secondary.

(Read only property)

#### 3.15.9 peripheral as CBPeripheralMBS

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** The peripheral to which this service belongs.

**Notes:** (Read only property)

## 3.16 class CBUUIDMBS

### 3.16.1 class CBUUIDMBS

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** The class for UUIDs in CoreBluetooth.

**Notes:** Instances of the CBUUID class represent the 128-bit universally unique identifiers (UUIDs) of attributes used in Bluetooth low energy communication, such as a peripheral, services, characteristics, and characteristic descriptors. This class provides a number of factory methods for dealing with long UUIDs when developing your app. For example, instead of passing around the string representation of a 128-bit Bluetooth low energy attribute in your code, you can create a CBUUID object that represents it, and pass that around instead.

Though not all UUIDs that identify Bluetooth-specific attributes are predefined by the Bluetooth Special Interest Group (SIG), Bluetooth SIG has defined and published a number of commonly used UUIDs that have been shortened to 16-bits or 32-bits for convenience. The CBUUID class provides methods that automatically transform these predefined shorter UUIDs into their 128-bit equivalent UUIDs. When you create a CBUUID object from a predefined 16-bit or 32-bit UUID, Core Bluetooth pre-fills the rest of the 128-bit UUID with the Bluetooth base UUID, which is defined in the Bluetooth 4.0 specification, Volume 3, Part F, Section 3.2.1.

In addition to providing methods for creating CBUUID objects, this class defines constants that represent the UUIDs of the Bluetooth-defined characteristic descriptors, which are defined in the Bluetooth 4.0 specification, Volume 3, Part G, Section 3.3.3.

This is an abstract class. You can't create an instance, but you can get one from various plugin functions.

### 3.16.2 Methods

### 3.16.3 Available as boolean

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** Whether this class is available.

**Notes:** Returns `true` on macOS 10.7 or newer.

### 3.16.4 CBAdvertisementDataIsConnectable as String

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** One of the keys used in an advertisementData dictionary.

**Notes:** A Boolean value that indicates whether the advertising event type is connectable.

The value for this key is a boolean. You can use this value to determine whether a peripheral is connectable at a particular moment.

### 3.16.5 CBAdvertisementDataLocalNameKey as String

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** One of the keys used in an advertisementData dictionary.

**Notes:** A string containing the local name of a peripheral.

### 3.16.6 CBAdvertisementDataManufacturerDataKey as String

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** One of the keys used in an advertisementData dictionary.

**Notes:** A memoryblock containing the manufacturer data of a peripheral.

### 3.16.7 CBAdvertisementDataOverflowServiceUUIDsKey as String

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** One of the keys used in an advertisementData dictionary.

**Notes:** An array of one or more CBUUID objects, representing CBService UUIDs that were found in the ,Áúoverflow,Äù area of the advertisement data.

Due to the nature of the data stored in this area, UUIDs listed here are ,Áúbest effort,Äù and may not always be accurate. For details about the overflow area of advertisement data, see the startAdvertising: method in CBPeripheralManager.

### 3.16.8 CBAdvertisementDataServiceDataKey as String

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** One of the keys used in an advertisementData dictionary.

**Notes:** A dictionary containing service-specific advertisement data.

The keys are CBUUID objects, representing CBService UUIDs. The values are NSData objects, representing service-specific data.

### 3.16.9 CBAdvertisementDataServiceUUIDsKey as String

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** One of the keys used in an advertisementData dictionary.

**Notes:** An array of service UUIDs.

### 3.16.10 CBAvertisementDataSolicitedServiceUUIDsKey as String

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** One of the keys used in an advertisementData dictionary.

**Notes:** An array of one or more CBUUID objects, representing CBService UUIDs.

### 3.16.11 CBAvertisementDataTxPowerLevelKey as String

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** One of the keys used in an advertisementData dictionary.

**Notes:** A number containing the transmit power of a peripheral.

This key and value are available if the broadcaster (peripheral) provides its Tx power level in its advertising packet. Using the RSSI value and the Tx power level, it is possible to calculate path loss.

### 3.16.12 CBUUIDCharacteristicAggregateFormatString as String

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** The string representation of the UUID for the aggregate descriptor.

### 3.16.13 CBUUIDCharacteristicExtendedPropertiesString as String

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** The string representation of the UUID for the extended properties descriptor.

**Notes:** The corresponding value for this descriptor is a number.

### 3.16.14 CBUUIDCharacteristicFormatString as String

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** The string representation of the UUID for the presentation format descriptor.

**Notes:** The corresponding value for this descriptor is a memoryblock.

### 3.16.15 CBUUIDCharacteristicUserDescriptionString as String

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** The string representation of the UUID for the user description descriptor.

**Notes:** The corresponding value for this descriptor is a string.

### 3.16.16 CBUUIDCharacteristicValidRangeString as String

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** The string representation of the UUID for the valid range descriptor.

### 3.16.17 CBUUIDClientCharacteristicConfigurationString as String

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** The string representation of the UUID for the client configuration descriptor.

**Notes:** The corresponding value for this descriptor is a number.

### 3.16.18 CBUUIDL2CAPPSMCharacteristicString as String

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** One of the characteristics keys.

**Notes:** The PSM (a little endian uint16\_t) of an L2CAP Channel associated with the GATT service containing this characteristic. Servers can publish this characteristic with the UUID ABDD3056-28FA-441D-A470-55A75A52553A

### 3.16.19 CBUUIDServerCharacteristicConfigurationString as String

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** The string representation of the UUID for the server configuration descriptor.

**Notes:** The corresponding value for this descriptor is a number.

### 3.16.20 Constructor

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** The private constructor.

### 3.16.21 copy as CBUUIDMBS

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** Creates a copy of the object.

### 3.16.22 isEqual(other as CBUUIDMBS) as Boolean

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** Checks whether two UUIDs are equal.

**Notes:** Returns true if both are equal.

### 3.16.23 Operator\_Compare(other as CBUUIDMBS) as Integer

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** Compares two objects for Xojo's comparison operators.

### 3.16.24 UUIDWithData(mem as MemoryBlock) as CBUUIDMBS

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** Creates and returns a CBUUID object from a 16-bit, 32-bit, or 128-bit UUID data container.

**Notes:** This method is useful when the UUID of a Bluetooth attribute is formatted in raw bytes.

### 3.16.25 UUIDWithNSUUID(uuid as NSUUIDMBS) as CBUUIDMBS

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** Creates and returns a CBUUID object from an NSUUID object.

### 3.16.26 UUIDWithString(s as string) as CBUUIDMBS

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** Creates and returns a CBUUID object from a 16-bit, 32-bit, or 128-bit UUID string.

**Notes:** Specify 128-bit UUIDs as a string of hexadecimal digits punctuated by hyphens, for example, 68753A44-4D6F-1226-9C60-0050E4C00067. Specify 16-bit or 32-bit UUIDs as a string of 4 or 8 hexadecimal digits, respectively.

### 3.16.27 Properties

#### 3.16.28 data as MemoryBlock

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** The data of the UUID.

**Notes:** (Read only property)

#### 3.16.29 Handle as Integer

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** The internal object reference.

**Notes:** (Read and Write property)

#### 3.16.30 UUIDString as String

Plugin Version: 18.1, Platform: macOS, Targets: All.

**Function:** The UUID represented as a string.

**Notes:** (Read only property)

## 3.17 class IOBluetoothDeviceInquiryMBS

### 3.17.1 class IOBluetoothDeviceInquiryMBS

Plugin Version: 18.3, Platform: macOS, Targets: Desktop, Console & Web.

**Function:** Object representing a device inquiry that finds Bluetooth devices in-range of the computer, and (optionally) retrieves name information for them.

**Notes:** You should only use this object if your application needs to know about in-range devices and cannot use the GUI provided by the IOBluetoothUI framework. It will not let you perform unlimited back-to-back inquiries, but will instead throttle the number of attempted inquiries if too many are attempted within a small window of time.

Important Note: DO NOT perform remote name requests on devices from events or while this object is in use. If you wish to do your own remote name requests on devices, do them after you have stopped this object. If you do not heed this warning, you could potentially deadlock your process.

#### Blog Entries

- [MBS Xojo Plugins, version 18.3pr4](#)

### 3.17.2 Methods

#### 3.17.3 clearFoundDevices

Plugin Version: 18.3, Platform: macOS, Targets: Desktop, Console & Web.

**Function:** Removes all found devices from the inquiry object.

### 3.17.4 Constructor

Plugin Version: 18.3, Platform: macOS, Targets: Desktop, Console & Web.

**Function:** Creates an inquiry object.

**Notes:** The inquiry is not automatically started. You must call start on it to start the search for in-range devices.

### 3.17.5 Destructor

Plugin Version: 18.3, Platform: macOS, Targets: Desktop, Console & Web.

**Function:** The destructor.

### 3.17.6 foundDevices as IOBluetoothDeviceMBS()

Plugin Version: 18.3, Platform: macOS, Targets: Desktop, Console & Web.

**Function:** Returns found IOBluetoothDevice objects as an array.

**Notes:** Will not return nil. If there are no devices found, returns an array with length of 0.

### 3.17.7 setSearchCriteria(ServiceClassMajor as Integer, MajorDeviceClass as Integer, MinorDeviceClass as Integer)

Plugin Version: 18.3, Platform: macOS, Targets: Desktop, Console & Web.

**Function:** Use this method to set the criteria for the device search.

**Notes:** inServiceClassMajor: Set the major service class for found devices. Set to kBluetoothServiceClassMajorAny for all devices. See BluetoothAssignedNumbers.h for possible values.

inMajorDeviceClass: Set the major device class for found devices. Set to kBluetoothDeviceClassMajorAny for all devices. See BluetoothAssignedNumbers.h for possible values.

inMinorDeviceClass: Set the minor device class for found devices. Set to kBluetoothDeviceClassMinorAny for all devices. See BluetoothAssignedNumbers.h for possible values.

The default inquiry object will search for all types of devices. If you wish to find only keyboards, for example, you might use this method like this:

```
setSearchCriteria(kBluetoothServiceClassMajorAny, kBluetoothDeviceClassMajorPeripheral, kBluetoothDeviceClassMinorPeripheralKeyboard)
```

However, we recommend only using this if you are certain of the device class you are looking for, as some devices may report a different/unexpected device class, and the search may miss the device you are interested in.

### 3.17.8 Start

Plugin Version: 18.3, Platform: macOS, Targets: Desktop, Console & Web.

**Function:** Tells inquiry object to begin the inquiry and name updating process, if specified.

**Notes:** Sets lasterror to kIOReturnSuccess if start was successful. Returns kIOReturnBusy if the object is already in process. May return other IOReturn values, as appropriate.

Calling start multiple times in rapid succession or back-to-back will probably not produce the intended results. Inquiries are throttled if they are called too quickly in succession.

### 3.17.9 Stop

Plugin Version: 18.3, Platform: macOS, Targets: Desktop, Console & Web.

**Function:** Halts the inquiry object.

**Notes:** Could either stop the search for new devices, or the updating of found device names.

Lasterror is set to kIOReturnSuccess if the inquiry is successfully stopped. Or set to kIOReturnNotPermitted if the inquiry object is already stopped. May set other IOReturn values, as appropriate.

### 3.17.10 Properties

#### 3.17.11 Handle as Integer

Plugin Version: 18.3, Platform: macOS, Targets: Desktop, Console & Web.

**Function:** The internal object reference.

**Notes:** (Read and Write property)

#### 3.17.12 inquiryLength as Integer

Plugin Version: 18.3, Platform: macOS, Targets: Desktop, Console & Web.

**Function:** The length of the inquiry that is performed each time start is used on an inquiry object.

**Notes:** seconds: Number of seconds the inquiry will search for in-range devices before refreshing device names, if specified.

Returns number of seconds the search will be performed.

A default of 10 seconds is used, unless a different value is specified using this method. Note that if you have called -start again too quickly, your inquiry may actually take much longer than what length you specify, as inquiries are throttled in the system. Also note that if you have the inquiry object updating device names for you, the whole inquiry process could be much longer than the specified length, depending on the number of devices found and how responsive to name requests they are. If you -must- have a strict inquiry length, disable name updates. In other words, this "length" only refers to the actual device discovery portion of the whole inquiry process.

(Read and Write property)

#### 3.17.13 Lasterror as Integer

Plugin Version: 18.3, Platform: macOS, Targets: Desktop, Console & Web.

**Function:** The last error code.

**Notes:** (Read and Write property)

### 3.17.14 searchType as Integer

Plugin Version: 18.3, Platform: macOS, Targets: Desktop, Console & Web.

**Function:** The devices that are found.

**Notes:** searchType: Bluetooth versions the search will discover.

A default of `kIOBluetoothDeviceSearchClassic` is used, unless a different value is specified using this property.

(Read and Write property)

### 3.17.15 updateNewDeviceNames as Boolean

Plugin Version: 18.3, Platform: macOS, Targets: Desktop, Console & Web.

**Function:** Whether or not the inquiry object will retrieve the names of devices found during the search.

**Notes:** Pass true if names are to be updated, otherwise pass false.

The default value for the inquiry object is true, unless this property is used to change it.

(Read and Write property)

### 3.17.16 Events

### 3.17.17 Complete(error as Integer, aborted as Boolean)

Plugin Version: 18.3, Platform: macOS, Targets: .

**Function:** Inquiry is stopped.

**Notes:** error: Error code. `kIOReturnSuccess` if the inquiry completed without incident.

aborted: True if user called stop on the inquiry.

When the inquiry is completely stopped, this delegate method will be invoked. It will supply an error code value, `kIOReturnSuccess` if the inquiry stopped without problem, otherwise a non-`kIOReturnSuccess` error code will be supplied.

### 3.17.18 DeviceFound(device as IOBluetoothDeviceMBS)

Plugin Version: 18.3, Platform: macOS, Targets: .

**Function:** A new device has been found.

**Notes:** You do not need to retain the device - it will be held in the internal storage of the inquiry, and can be accessed later using foundDevices.

### 3.17.19 DeviceNameUpdated(device as IOBluetoothDeviceMBS, devicesRemaining as Integer)

Plugin Version: 18.3, Platform: macOS, Targets: .

**Function:** A device name has been retrieved.

**Notes:** Also indicates how many devices are left to be updated.

device: IOBluetoothDevice that was updated.

devicesRemaining: Number of devices remaining to update.

### 3.17.20 Started

Plugin Version: 18.3, Platform: macOS, Targets: .

**Function:** This event will be delivered when the inquiry actually starts.

**Notes:** Since the inquiry could be throttled, this message may not be received immediately after called -start.

### 3.17.21 UpdatingDeviceNamesStarted(devicesRemaining as Integer)

Plugin Version: 18.3, Platform: macOS, Targets: .

**Function:** The inquiry has begun updating device names that were found during the search.

**Notes:** devicesRemaining: Number of devices remaining to update.

### 3.17.22 Constants

Search Types

Constant	Value	Description
kIOBluetoothDeviceSearchClassic	1	Normal Bluetooth
kIOBluetoothDeviceSearchLE	2	Bluetooth LE

## 3.18 class IOBluetoothDeviceMBS

### 3.18.1 class IOBluetoothDeviceMBS

Plugin Version: 18.3, Platform: macOS, Targets: Desktop, Console & Web.

**Function:** An instance of IOBluetoothDevice represents a single remote Bluetooth device.

**Notes:** An IOBluetoothDevice object may exist independent of the existence of a baseband connection with the target device. Using this object, a client can request creation and destruction of baseband connections, and request the opening of L2CAP and RFCOMM channels on the remote device. Many of the other APIs in the IOBluetooth framework will return this object, or its C counterpart (IOBluetoothDeviceRef). This is an abstract class. You can't create an instance, but you can get one from various plugin functions.

#### Blog Entries

- [MBS Xojo Plugins, version 18.3pr4](#)
- [Bluetooth for Xojo](#)

### 3.18.2 Methods

#### 3.18.3 addToFavorites

Plugin Version: 18.3, Platform: macOS, Targets: Desktop, Console & Web.

**Function:** Adds the target device to the user's favorite devices list.

**Notes:** Lasterror is set to kIOReturnSuccess if the device was successfully added to the user's list of favorite devices.

#### 3.18.4 closeConnection

Plugin Version: 18.3, Platform: macOS, Targets: Desktop, Console & Web.

**Function:** Close down the baseband connection to the device.

**Notes:** Lasterror is set to kIOReturnSuccess if the connection has successfully been closed.

This method is synchronous and will not return until the connection has been closed (or the command failed). In the future this API will be changed to allow asynchronous operation.

#### 3.18.5 Constructor

Plugin Version: 18.3, Platform: macOS, Targets: Desktop, Console & Web.

**Function:** The private constructor.

### 3.18.6 Destructor

Plugin Version: 18.3, Platform: macOS, Targets: Desktop, Console & Web.

**Function:** The destructor.

### 3.18.7 deviceWithString(Address as String) as IOBluetoothDeviceMBS

Plugin Version: 18.3, Platform: macOS, Targets: Desktop, Console & Web.

**Function:** Returns the IOBluetoothDevice object for the given BluetoothDeviceAddress.

**Notes:** Within a single application, there will be only one instance of IOBluetoothDevice for a given remote device address.

The string should be of the form xx:xx:xx:xx:xx:xx

### 3.18.8 favoriteDevices as IOBluetoothDeviceMBS()

Plugin Version: 18.3, Platform: macOS, Targets: Desktop, Console & Web.

**Function:** Gets an array of the user's favorite devices.

**Notes:** Returns an array of device objects representing the user's favorite devices. If the user has no favorites, nil is returned.

### 3.18.9 openConnection

Plugin Version: 18.3, Platform: macOS, Targets: Desktop, Console & Web.

**Function:** Create a baseband connection to the device.

**Notes:** Lasterror is set to kIOReturnSuccess if the connection was successfully created.

This method is synchronous and will not return until either a connection has been established or the create connection has failed (perhaps timed out).

If authentication or a non-default page timeout is required the method openConnectionAsync() should be used instead.

As of OS X 10.7, this method will no longer mask out "Connection Exists" 'errors' with a success result

code; your code must account for the cases where the baseband connection is already open.

### 3.18.10 openConnectionAsync

Plugin Version: 18.3, Platform: macOS, Targets: Desktop, Console & Web.

**Function:** Create a baseband connection to the device.

**Notes:** Sets `lasterror` to `kIOReturnSuccess` if the connection was successfully created (or if asynchronous, if the `CREATE_CONNECTION` command was successfully issued).

The open connection call is asynchronous and on completion of the `CREATE_CONNECTION` command, the `connectionCompleted` event will be called on the specified target. If no target is specified, the call is synchronous and will not return until the connection is open or the `CREATE_CONNECTION` call has failed. This call will proceed without authentication required, and using the default page timeout value. If authentication or a non-default page timeout is required the method `openConnectionAsync()` with timeout should be used instead.

As of OS X 10.7, this method will no longer mask out "Connection Exists" 'errors' with a success result code; your code must account for the cases where the baseband connection is already open.  
See also:

- 3.18.11 `openConnectionAsync(timeout as integer, authenticationRequired as boolean)` 92

### 3.18.11 openConnectionAsync(timeout as integer, authenticationRequired as boolean)

Plugin Version: 18.3, Platform: macOS, Targets: Desktop, Console & Web.

**Function:** Create a baseband connection to the device with timeout.

**Notes:** Sets `lasterror` to `kIOReturnSuccess` if the connection was successfully created (or if asynchronous, if the `CREATE_CONNECTION` command was successfully issued).

The open connection call is asynchronous and on completion of the `CREATE_CONNECTION` command, the `connectionCompleted` event will be called on the specified target. If no target is specified, the call is synchronous and will not return until the connection is open or the `CREATE_CONNECTION` call has failed.

As of OS X 10.7, this method will no longer mask out "Connection Exists" 'errors' with a success result code; your code must account for the cases where the baseband connection is already open.  
See also:

- 3.18.10 `openConnectionAsync` 92

### 3.18.12 pairedDevices as IOBluetoothDeviceMBS()

Plugin Version: 18.3, Platform: macOS, Targets: Desktop, Console & Web.

**Function:** Gets an array of all of the paired devices on the system.

**Notes:** Returns an array of device objects for all of the paired devices on the system. If there are no paired devices, nil is returned.

The paired devices are currently NOT stored per user, so this is all devices paired by any user.

### 3.18.13 performSDPQuery

Plugin Version: 18.3, Platform: macOS, Targets: Desktop, Console & Web.

**Function:** Performs an SDP query on the target device.

**Notes:** Lasterror is set to kIOReturnSuccess if the SDP query was successfully started.

As a result of this call, a baseband connection will be built to the device (if not already connected). Then, an L2CAP channel will be opened to the SDP server on the device. At that point, a Service Search Attribute request will be issued with a UUID of 0x0100 (L2CAP) and an attribute range of 0 - &hfff specified. This will cause the SDP server to return all attributes of all L2CAP-derived services on the device. The results essentially encompass all services on the device. This function is always asynchronous.

When the SDP query is complete (or an error is encountered), the SDPQueryCompleted event will be called.

### 3.18.14 recentDevices(numDevices as Integer = 0) as IOBluetoothDeviceMBS()

Plugin Version: 18.3, Platform: macOS, Targets: Desktop, Console & Web.

**Function:** Gets an array of recently used Bluetooth devices.

**Notes:** numDevices: The number of devices to return.

Returns an array of device objects recently used by the system. If no devices have been accessed, nil is returned.

The resulting array contains IOBluetoothDevice objects sorted in reverse chronological order. The most recently accessed devices are first. If the numDevices parameter is 0, all devices accessed by the system are returned. If numDevices is non-zero, only the most recent devices are returned.

NOTE: This method is only available in macOS 10.2.4 (Bluetooth v1.1) or later.

### 3.18.15 remoteNameRequest

Plugin Version: 18.3, Platform: macOS, Targets: Desktop, Console & Web.

**Function:** Issues a remote name request to the target device.

**Notes:** Lasterror is set to kIOReturnSuccess if the remote name request was successfully issued (and if synchronous, if the request completed successfully).

Later remoteNameRequestCompleted is called with result.

This call with operate with the default page timeout value. If a different page timeout value is desired, please pass pageTimeoutValue parameter.

See also:

- 3.18.16 remoteNameRequest(pageTimeoutValue as Integer) 94

### 3.18.16 remoteNameRequest(pageTimeoutValue as Integer)

Plugin Version: 18.3, Platform: macOS, Targets: Desktop, Console & Web.

**Function:** Issues a remote name request to the target device.

**Notes:** Lasterror is set to kIOReturnSuccess if the remote name request was successfully issued (and if synchronous, if the request completed successfully).

Later remoteNameRequestCompleted is called with result.

This call with operate with the default page timeout value. If a different page timeout value is desired, please pass pageTimeoutValue parameter.

See also:

- 3.18.15 remoteNameRequest 94

### 3.18.17 removeFromFavorites

Plugin Version: 18.3, Platform: macOS, Targets: Desktop, Console & Web.

**Function:** Removes the target device from the user's favorite devices list.

**Notes:** Lasterror is set to kIOReturnSuccess if the device was successfully removed from the user's list of favorite devices.

This method is only available in macOS 10.2.4 (Bluetooth v1.1) or later.

### 3.18.18 requestAuthentication

Plugin Version: 18.3, Platform: macOS, Targets: Desktop, Console & Web.

**Function:** Requests that the existing baseband connection be authenticated.

**Notes:** Returns kIOReturnSuccess if the connection has been successfully been authenticated. Returns an error if authentication fails or no baseband connection exists.

In order to authenticate a baseband connection, a link key needs to be generated as a result of the pairing process. This call will synchronously initiate the pairing process with the target device and not return until the authentication process is complete. This API will be updated to allow for asynchronous operation.

### 3.18.19 SendL2CAPEchoRequest(Data as MemoryBlock)

Plugin Version: 18.3, Platform: macOS, Targets: Desktop, Console & Web.

**Function:** Send an echo request over the L2CAP connection to a remote device.

**Notes:** data: Buffer to send.

Lasterror is set to kIOReturnSuccess if the echo request was able to be sent.

The current implementation returns when the request has been sent, but does not indicate when a response is received. Also, the baseband connection must be up for the echo request to be sent. In the future, this method will also open the connection if necessary. The API will be updated to allow the client to be informed when the echo response has been received (both synchronously and asynchronously).

### 3.18.20 ServiceRecordForUUID(sdpUUID as IOBluetoothSDPUUIDMBS) as IOBluetoothSDPServiceRecordMBS

Plugin Version: 18.3, Platform: macOS, Targets: Desktop, Console & Web.

**Function:** Search for a service record containing the given UUID.

**Notes:** sdpUUID: UUID value to search for.

Returns the first service record that contains the given uuid. If no service record is found, nil is returned.

This method searches through the device's services to find a service that contains the given UUID. Only the first service record will be returned. This method only operates on services that have already been queried. It will not initiate a new query. This method should probably be updated to return an array of service records if more than one contains the UUID.

### 3.18.21 services as IOBluetoothSDPServiceRecordMBS()

Plugin Version: 18.3, Platform: macOS, Targets: Desktop, Console & Web.

**Function:** Gets an array of service records for the device.

**Notes:** Returns an array of service records for the device if an SDP query has been performed. If no SDP query has been performed, nil is returned.

The resulting array contains IOBluetoothSDPServiceRecord objects. The service records are only present if an SDP query has been done on the target object. This can be determined by calling LastServicesUpdate. It will return the last date/time of the SDP query. To initiate an SDP query on a device, use performSDP-Query: as defined above.

Instead of allowing individual clients to query for different services and service attributes, the system request all of the device's services and service attributes.

### 3.18.22 setSupervisionTimeout(timeout as integer)

Plugin Version: 18.3, Platform: macOS, Targets: Desktop, Console & Web.

**Function:** Sets the connection supervision timeout.

**Notes:** timeout: A client-supplied link supervision timeout value to use to monitor the connection. The timeout value should be specified in slots, so you can use the BluetoothGetSlotsFromSeconds macro to get the proper value. e.g. BluetoothGetSlotsFromSeconds( 5.0 ) will give yield the proper number of slots (8000) for 5 seconds.

Sets lasterror to kIOReturnSuccess if it was possible to set the connection supervision timeout.

This method is only available in macOS 10.5 (Bluetooth v2.0) or later.

### 3.18.23 Properties

#### 3.18.24 addressString as String

Plugin Version: 18.3, Platform: macOS, Targets: Desktop, Console & Web.

**Function:** Get the Bluetooth device address for the target device.

**Notes:** (Read only property)

#### 3.18.25 classOfDevice as Integer

Plugin Version: 18.3, Platform: macOS, Targets: Desktop, Console & Web.

**Function:** Gets the full class of device value for the remote device.

**Notes:** This value is only meaningful if the target device has been seen during an inquiry. This can be by checking the result of LastInquiryUpdate. If nil is returned, then the device hasn't been seen.

(Read only property)

### 3.18.26 ClockOffset as Integer

Plugin Version: 18.3, Platform: macOS, Targets: Desktop, Console & Web.

**Function:** Get the clock offset value of the device.

**Notes:** This value is only meaningful if the target device has been seen during an inquiry. This can be by checking the result of LastInquiryUpdate. If nil is returned, then the device hasn't been seen.

(Read only property)

### 3.18.27 deviceClassMajor as Integer

Plugin Version: 18.3, Platform: macOS, Targets: Desktop, Console & Web.

**Function:** Get the major device class of the device.

**Notes:** This value is only meaningful if the target device has been seen during an inquiry. This can be by checking the result of LastInquiryUpdate. If nil is returned, then the device hasn't been seen.

(Read only property)

### 3.18.28 deviceClassMinor as Integer

Plugin Version: 18.3, Platform: macOS, Targets: Desktop, Console & Web.

**Function:** Get the minor service class of the device.

**Notes:** This value is only meaningful if the target device has been seen during an inquiry. This can be by checking the result of LastInquiryUpdate. If nil is returned, then the device hasn't been seen.

(Read only property)

### 3.18.29 EncryptionMode as Integer

Plugin Version: 18.3, Platform: macOS, Targets: Desktop, Console & Web.

**Function:** Get the encryption mode for the baseband connection.

**Notes:** Returns the encryption mode for the baseband connection. If no baseband connection is present, kEncryptionDisabled is returned.

This method only returns a valid result if a baseband connection is present (`isConnected` returns true).  
(Read only property)

### 3.18.30 Handle as Integer

Plugin Version: 18.3, Platform: macOS, Targets: Desktop, Console & Web.

**Function:** The internal object reference.

**Notes:** (Read and Write property)

### 3.18.31 isConnected as Boolean

Plugin Version: 18.3, Platform: macOS, Targets: Desktop, Console & Web.

**Function:** Indicates whether a baseband connection to the device exists.

**Notes:** Returns true if a baseband connection to the device exists.

(Read only property)

### 3.18.32 isFavorite as Boolean

Plugin Version: 18.3, Platform: macOS, Targets: Desktop, Console & Web.

**Function:** Reports whether the target device is a favorite for the user.

**Notes:** Returns true if the target device is a favorite for the user, false if not.

(Read only property)

### 3.18.33 isIncoming as Boolean

Plugin Version: 18.3, Platform: macOS, Targets: Desktop, Console & Web.

**Function:** Returns true if the device connection was generated by the remote host.

**Notes:** Returns true if the device connection was generated by the remote host. False if the connection was generated by some other device that connected to the local host.

(Read only property)

### 3.18.34 isPaired as Boolean

Plugin Version: 18.3, Platform: macOS, Targets: Desktop, Console & Web.

**Function:** Returns whether the target device is paired.

**Notes:** Returns true if the target device is paired, false if not.  
(Read only property)

### 3.18.35 Lasterror as Integer

Plugin Version: 18.3, Platform: macOS, Targets: Desktop, Console & Web.

**Function:** The last error code.

**Notes:** (Read and Write property)

### 3.18.36 LastInquiryUpdate as Date

Plugin Version: 18.3, Platform: macOS, Targets: Desktop, Console & Web.

**Function:** Get the date/time of the last time the device was returned during an inquiry.

**Notes:** Returns the date/time of the last time the device was seen during an inquiry. If the device has never been seen during an inquiry, nil is returned.  
(Read only property)

### 3.18.37 LastInquiryUpdateDateTime as DateTime

Plugin Version: 20.5, Platform: macOS, Targets: Desktop, Console & Web.

**Function:** Get the date/time of the last time the device was returned during an inquiry.

**Notes:** Returns the date/time of the last time the device was seen during an inquiry. If the device has never been seen during an inquiry, nil is returned.  
(Read only property)

### 3.18.38 lastNameUpdate as Date

Plugin Version: 18.3, Platform: macOS, Targets: Desktop, Console & Web.

**Function:** Get the date/time of the last successful remote name request.

**Notes:** (Read only property)

### 3.18.39 lastNameUpdateDateTime as DateTime

Plugin Version: 20.5, Platform: macOS, Targets: Desktop, Console & Web.

**Function:** Get the date/time of the last successful remote name request.

**Notes:** (Read only property)

### 3.18.40 LastServicesUpdate as Date

Plugin Version: 18.3, Platform: macOS, Targets: Desktop, Console & Web.

**Function:** Get the date/time of the last SDP query.

**Notes:** Returns the date/time of the last SDP query. If an SDP query has never been performed on the device, nil is returned.

(Read only property)

### 3.18.41 LastServicesUpdateDateTime as DateTime

Plugin Version: 20.5, Platform: macOS, Targets: Desktop, Console & Web.

**Function:** Get the date/time of the last SDP query.

**Notes:** Returns the date/time of the last SDP query. If an SDP query has never been performed on the device, nil is returned.

(Read only property)

### 3.18.42 LinkType as Integer

Plugin Version: 18.3, Platform: macOS, Targets: Desktop, Console & Web.

**Function:** Get the link type for the baseband connection.

**Notes:** Returns the link type for the baseband connection. If no baseband connection is present, kBluetoothLinkTypeNone is returned.

(Read only property)

### 3.18.43 name as String

Plugin Version: 18.3, Platform: macOS, Targets: Desktop, Console & Web.

**Function:** Get the human readable name of the remote device.

**Notes:** This only returns a value if a remote name request has been performed on the target device. If a successful remote name request has not been completed, nil is returned. To perform a remote name request, call `remoteNameRequest`. If a remote name request has been successfully completed, the method `LastNameUpdate` will return the date/time of the last successful request.

(Read only property)

### 3.18.44 nameOrAddress as String

Plugin Version: 18.3, Platform: macOS, Targets: Desktop, Console & Web.

**Function:** Get the human readable name of the remote device.

**Notes:** If the name is not present, it will return a string containing the device's address.

If a remote name request has been successfully completed, the device name will be returned. If not, a string containing the device address in the format of "XX-XX-XX-XX-XX-XX" will be returned.

(Read only property)

### 3.18.45 PageScanMode as Integer

Plugin Version: 18.3, Platform: macOS, Targets: Desktop, Console & Web.

**Function:** Get the page scan mode for the device.

**Notes:** Returns the value for the page scan mode for the device.

This value is only meaningful if the target device has been seen during an inquiry. This can be by checking the result of LastInquiryUpdate. If nil is returned, then the device hasn't been seen.

(Read only property)

### 3.18.46 PageScanPeriodMode as Integer

Plugin Version: 18.3, Platform: macOS, Targets: Desktop, Console & Web.

**Function:** Get the value of the page scan period mode for the device.

**Notes:** Returns page scan period mode value for the device.

This value is only meaningful if the target device has been seen during an inquiry. This can be by checking the result of getLastInquiryUpdate. If nil is returned, then the device hasn't been seen.

(Read only property)

### 3.18.47 PageScanRepetitionMode as Integer

Plugin Version: 18.3, Platform: macOS, Targets: Desktop, Console & Web.

**Function:** Get the value of the page scan repetition mode for the device.

**Notes:** Returns the page scan repetition mode value for this device.

This value is only meaningful if the target device has been seen during an inquiry. This can be by checking

the result of `LastInquiryUpdate`. If `nil` is returned, then the device hasn't been seen.  
(Read only property)

### 3.18.48 `rawRSSI` as Integer

Plugin Version: 18.3, Platform: macOS, Targets: Desktop, Console & Web.

**Function:** Get the raw RSSI device (if connected).

**Notes:** This value is the perceived RSSI value, not relative the the golden range (see `RSSI` for that value). This value will not available on all Bluetooth modules. If the value cannot be read (e.g. the device is disconnected) or is not available on a module, a value of `+127` will be returned.  
(Read only property)

### 3.18.49 `RecentAccessDate` as Date

Plugin Version: 18.3, Platform: macOS, Targets: Desktop, Console & Web.

**Function:** Returns the date/time of the most recent access of the target device.

**Notes:** Returns the date/time of the most recent access of the target device. If the device has not been accessed, `nil` is returned.

This is the date that `recentDevices` uses to sort its list of the most recently accessed devices. This method is only available in macOS 10.2.4 (Bluetooth v1.1) or later.  
(Read only property)

### 3.18.50 `RecentAccessDateTime` as DateTime

Plugin Version: 20.5, Platform: macOS, Targets: Desktop, Console & Web.

**Function:** Returns the date/time of the most recent access of the target device.

**Notes:** Returns the date/time of the most recent access of the target device. If the device has not been accessed, `nil` is returned.

This is the date that `recentDevices` uses to sort its list of the most recently accessed devices. This method is only available in macOS 10.2.4 (Bluetooth v1.1) or later.  
(Read only property)

### 3.18.51 `RSSI` as Integer

Plugin Version: 18.3, Platform: macOS, Targets: Desktop, Console & Web.

**Function:** Get the RSSI device (if connected), above or below the golden range.

**Notes:** If the RSSI is within the golden range, a value of 0 is returned. For the actual RSSI value, use `getRawRSSI`. For more information, see the Bluetooth 4.0 Core Specification.

Returns the RSSI of the device. If the value cannot be read (e.g. the device is disconnected), a value of +127 will be returned.

(Read only property)

### 3.18.52 `serviceClassMajor` as Integer

Plugin Version: 18.3, Platform: macOS, Targets: Desktop, Console & Web.

**Function:** Get the major service class of the device.

**Notes:** This value is only meaningful if the target device has been seen during an inquiry. This can be by checking the result of `LastInquiryUpdate`. If nil is returned, then the device hasn't been seen.

(Read only property)

### 3.18.53 Events

#### 3.18.54 `connectionCompleted(status as integer)`

Plugin Version: 18.3, Platform: macOS, Targets: .

**Function:** Event called when `openConnectionAsync` completes.

#### 3.18.55 `remoteNameRequestCompleted(status as integer)`

Plugin Version: 18.3, Platform: macOS, Targets: .

**Function:** The event called when `remoteNameRequest` completes.

#### 3.18.56 `SDPQueryCompleted(status as integer)`

Plugin Version: 18.3, Platform: macOS, Targets: .

**Function:** The event called when `performSDPQuery` completes.

**3.18.57 Constants**

## Link Types

Constant	Value	Description
kBluetoothACLConnection	1	ACL Connection
kBluetoothESCOConnection	2	ESCO Connection
kBluetoothLinkTypeNone	255	None set
kBluetoothSCOConnection	0	SCO Connection

## Bluetooth Page Scan Modes

Constant	Value	Description
kBluetoothPageScanModeMandatory	0	Mandatory
kBluetoothPageScanModeOptional1	1	Optional 1
kBluetoothPageScanModeOptional2	2	Optional 2
kBluetoothPageScanModeOptional3	3	Optional 3

## Bluetooth Page Scan Period Modes

Constant	Value	Description
kBluetoothPageScanPeriodModeP0	0	P0
kBluetoothPageScanPeriodModeP1	1	P1
kBluetoothPageScanPeriodModeP2	2	P2

## Bluetooth Page Scan Repetition Modes

Constant	Value	Description
kBluetoothPageScanRepetitionModeR0	0	R0
kBluetoothPageScanRepetitionModeR1	1	R1
kBluetoothPageScanRepetitionModeR2	2	R2

## Encryption Modes

Constant	Value	Description
kEncryptionDisabled	0	Encryption Disabled
kEncryptionForBothPointToPointAndBroadcastPackets	2	Encryption for both point to point and broadcast packets.
kEncryptionOnlyForPointToPointPackets	1	Encryption only to point to point packets.

## 3.19 class IOBluetoothDeviceSelectorControllerMBS

### 3.19.1 class IOBluetoothDeviceSelectorControllerMBS

Plugin Version: 18.3, Platform: macOS, Targets: Desktop only.

**Function:** A NSWindowController subclass to display a window to initiate pairing to other bluetooth devices.

**Notes:** Implementation of a window controller to return an array of selected bluetooth devices. This class will handle connecting to the Bluetooth Daemon for the purposes of searches, and displaying the results. This controller will return an array of IOBluetoothDevice objects to the user.

Subclass of the NSWindowControllerMBS class.

#### Blog Entries

- [MBS Xojo Plugins, version 18.3pr4](#)
- [Bluetooth for Xojo](#)

### 3.19.2 Methods

#### 3.19.3 addAllowedUUID(allowedUUID as IOBluetoothSDPUUIDMBS)

Plugin Version: 18.3, Platform: macOS, Targets: Desktop only.

**Function:** Adds a UUID to the list of UUIDs that are used to validate the user's selection.

**Notes:** allowedUUID: UUID that a device may contain to be selected

The user's device selection gets validated against the UUIDs passed to addAllowedUUID or addAllowedUUIDArray. Each call to those methods essentially adds a filter that the selected device gets validated with. If any of the filters match, the device is considered valid. If they all fail, the device is not valid and the user is presented with an error code that the device does not support the required services. The UUID passed to addAllowedUUID is the only UUID that must be present in the device's SDP service records. Alternatively, all of the UUIDs in the UUID array passed to addAllowedUUIDArray must be present.

NOTE: This method is only available in macOS 10.2.4 (Bluetooth v1.1) or later.

#### 3.19.4 addAllowedUUIDArray(allowedUUIDs() as IOBluetoothSDPUUIDMBS)

Plugin Version: 18.3, Platform: macOS, Targets: Desktop only.

**Function:** Adds an array of UUIDs to the list of UUIDs that are used to validate the user's selection.

**Notes:** allowedUUIDArray: An NSArray of UUIDs that all must be present in a device for it to be selectable.

The user's device selection gets validated against the UUIDs passed to `addAllowedUUID` or `addAllowedUUIDArray`. Each call to those methods essentially adds a filter that the selected device gets validated with. If any of the filters match, the device is considered valid. If they all fail, the device is not valid and the user is presented with an error code that the device does not support the required services. The UUID passed to `addAllowedUUID` is the only UUID that must be present in the device's SDP service records. Alternatively, all of the UUIDs in the UUID array passed to `addAllowedUUIDArray` must be present.

NOTE: This method is only available in macOS 10.2.4 (Bluetooth v1.1) or later.

### 3.19.5 `beginSheetModalForWindow(win as DesktopWindow, tag as variant = nil)`

Plugin Version: 22.0, Platform: macOS, Targets: Desktop only.

**Function:** Runs the device selector panel as a sheet on the target window.

**Notes:** `win`: Window to attach the device selector panel to as a sheet.

Returns `kIOReturnSuccess` if the sheet modal session was started.

NOTE: This method is only available in macOS 10.2.4 (Bluetooth v1.1) or later.  
See also:

- 3.19.6 `beginSheetModalForWindow(win as window, tag as variant = nil)` 106

### 3.19.6 `beginSheetModalForWindow(win as window, tag as variant = nil)`

Plugin Version: 18.3, Platform: macOS, Targets: Desktop only.

**Function:** Runs the device selector panel as a sheet on the target window.

**Notes:** `win`: Window to attach the device selector panel to as a sheet.

Returns `kIOReturnSuccess` if the sheet modal session was started.

NOTE: This method is only available in macOS 10.2.4 (Bluetooth v1.1) or later.  
See also:

- 3.19.5 `beginSheetModalForWindow(win as DesktopWindow, tag as variant = nil)` 106

### 3.19.7 `clearAllowedUUIDs`

Plugin Version: 18.3, Platform: macOS, Targets: Desktop only.

**Function:** Resets the controller back to the default state where it will accept any device the user selects.

**Notes:** This method is only available in macOS 10.2.4 (Bluetooth v1.1) or later.

### 3.19.8 Constructor

Plugin Version: 18.3, Platform: macOS, Targets: Desktop only.

**Function:** Creates a new device selector controller.

### 3.19.9 Destructor

Plugin Version: 18.3, Platform: macOS, Targets: Desktop only.

**Function:** The destructor.

### 3.19.10 Results as IOBluetoothDeviceMBS()

Plugin Version: 18.3, Platform: macOS, Targets: Desktop only.

**Function:** Returns the result of the user's selection.

**Notes:** Returns an array of IOBluetoothDevice objects corresponding to the user's selection. If the user cancelled the panel, nil will be returned.

There will only be results if the panel has been run, the user has successfully made a selection and that selection has been validated. If kIOBluetoothUISuccess was returned for the session, there should be valid results. Currently only a single device is allowed to be selected, so the results array will only contain one object. However in the future multiple selection will be supported.

NOTE: This method is only available in macOS 10.2.4 (Bluetooth v1.1) or later.

### 3.19.11 runModal as Integer

Plugin Version: 18.3, Platform: macOS, Targets: Desktop only.

**Function:** Runs the device selector panel in a modal session to allow the user to select a Bluetooth device.

**Notes:** Returns kIOBluetoothUISuccess if a successful, validated device selection was made by the user. Returns kIOBluetoothUIUserCanceledErr if the user cancelled the panel. These return values are the same as NSRunStoppedResponse and NSRunAbortedResponse respectively. They are the standard values used in a modal session.

The controller will use the panel attributes to filter what devices the user sees. The allowed UUIDs will be used to validate the selection the user makes. Only when a selection has been validated (or the panel cancelled), will this method return.

NOTE: This method is only available in macOS 10.2.4 (Bluetooth v1.1) or later.

### 3.19.12 Properties

#### 3.19.13 Cancel as String

Plugin Version: 18.3, Platform: macOS, Targets: Desktop only.

**Function:** The title of the default/cancel button in the device selector panel.

**Notes:** String that appears in the default/cancel button in the device selector panel.

The prompt text should be localized for best user experience.

NOTE: This method is only available in macOS 10.9 or later.

(Read and Write property)

#### 3.19.14 Description as String

Plugin Version: 18.3, Platform: macOS, Targets: Desktop only.

**Function:** The description text that appears in the device selector panel.

**Notes:** String that appears in the description section of the device selector panel.

The description text should be localized for best user experience.

NOTE: This method is only available in macOS 10.2.4 (Bluetooth v1.1) or later.

(Read and Write property)

#### 3.19.15 Header as String

Plugin Version: 18.3, Platform: macOS, Targets: Desktop only.

**Function:** The header text that appears in the device selector panel.

**Notes:** String that appears in the description section of the device selector panel.

The description text should be localized for best user experience.

NOTE: This method is only available in macOS 10.9 or later.

(Read and Write property)

### 3.19.16 Options as Integer

Plugin Version: 18.3, Platform: macOS, Targets: Desktop only.

**Function:** The option bits that control the panel's behavior.

**Notes:** The service browser controller options control the behavior of the panel. Currently `kIOBluetoothServiceBrowserControllerOptionsAutoStartInquiry` is the only supported option. In the future more options will be added to control things like whether the connection to the device is closed when the controller is finished or if multiple selection is allowed.

NOTE: This method is only available in macOS 10.2.4 (Bluetooth v1.1) or later.

(Read and Write property)

### 3.19.17 Prompt as String

Plugin Version: 18.3, Platform: macOS, Targets: Desktop only.

**Function:** The title of the default/select button in the device selector panel.

**Notes:** String that appears in the default/select button in the device selector panel.

The prompt text should be localized for best user experience.

NOTE: This method is only available in macOS 10.2.4 (Bluetooth v1.1) or later.

(Read and Write property)

### 3.19.18 Title as String

Plugin Version: 18.3, Platform: macOS, Targets: Desktop only.

**Function:** The title of the device selector panel.

**Notes:** (Read and Write property)

### 3.19.19 Events

### 3.19.20 SheetDone(returnCode as Integer, tag as Variant)

Plugin Version: 18.3, Platform: macOS, Targets: .

**Function:** Event called when sheet is done.

### 3.19.21 Constants

#### Result Codes

Constant	Value	Description
kIOBluetoothUISuccess	-1000	Return code for success.
kIOBluetoothUIUserCanceledErr	-1001	Return code for Cancelled.

#### Options

Constant	Value	Description
kOptionsAutoStartInquiry	1	Automatically start an inquiry when the panel is displayed. This has been deprecated in 10.5.
kOptionsDisconnectWhenDone	2	Disconnect from the device when UI operations are finished.
kOptionsNone	0	No options set.

## 3.20 class IOBluetoothHostControllerMBS

### 3.20.1 class IOBluetoothHostControllerMBS

Plugin Version: 18.3, Platform: macOS, Targets: Desktop, Console & Web.

**Function:** This class is a representation of a Bluetooth Host Controller Interface that is present on the local computer (either plugged in externally or available internally).

**Notes:** This object can be used to ask a Bluetooth HCI for certain pieces of information, and be used to make it perform certain functions.

#### Blog Entries

- [MBS Xojo Plugins, version 18.3pr4](#)

### 3.20.2 Methods

#### 3.20.3 Constructor

Plugin Version: 18.3, Platform: macOS, Targets: Desktop, Console & Web.

**Function:** Gets the default HCI controller object.

#### 3.20.4 Destructor

Plugin Version: 18.3, Platform: macOS, Targets: Desktop, Console & Web.

**Function:** The destructor.

#### 3.20.5 setClassOfDevice(classOfDevice as Integer, seconds as double)

Plugin Version: 18.3, Platform: macOS, Targets: Desktop, Console & Web.

**Function:** Sets the current class of device value, for the specified amount of time.

**Notes:** Note that the time interval *\*must\** be set and valid. The range of acceptable values is 30-120 seconds. Anything above or below will be rounded up, or down, as appropriate.

Lasterror is set to 0 on success.

### 3.20.6 Properties

#### 3.20.7 addressAsString as String

Plugin Version: 18.3, Platform: macOS, Targets: Desktop, Console & Web.

**Function:** Convenience routine to get the HCI controller's Bluetooth address as an NSString object.

**Notes:** Returns empty string if the address could not be retrieved.

(Read only property)

#### 3.20.8 classOfDevice as Integer

Plugin Version: 18.3, Platform: macOS, Targets: Desktop, Console & Web.

**Function:** Gets the current class of device value.

**Notes:** (Read only property)

#### 3.20.9 Handle as Integer

Plugin Version: 18.3, Platform: macOS, Targets: Desktop, Console & Web.

**Function:** The internal object reference.

**Notes:** (Read and Write property)

#### 3.20.10 nameAsString as String

Plugin Version: 18.3, Platform: macOS, Targets: Desktop, Console & Web.

**Function:** Gets the "friendly" name of HCI controller.

**Notes:** Returns string with the device name, nil if there is not one or it cannot be read.

(Read only property)

#### 3.20.11 powerState as Integer

Plugin Version: 18.3, Platform: macOS, Targets: Desktop, Console & Web.

**Function:** Gets the controller power state

**Notes:** The current controller's power state. This will be 1 for on, or 0 for off. Only Apple Bluetooth adapters support power off

(Read only property)

### 3.20.12 Events

#### 3.20.13 PoweredOff

Plugin Version: 18.3, Platform: macOS, Targets: .

**Function:** Event for power change and new state is off.

#### 3.20.14 PoweredOn

Plugin Version: 18.3, Platform: macOS, Targets: .

**Function:** Event for power change and new state is on.

#### 3.20.15 readLinkQualityForDeviceCompleted(device as IOBluetoothDeviceMBS, HCILinkQuality as Integer, error as Integer)

Plugin Version: 18.3, Platform: macOS, Targets: .

**Function:** This event gets invoked when an read link quality command complete event occurs.

**Notes:** This could occur because you invoked it by issuing an readLinkQualityForDevice command, or someone else did from another app on the same controller.

#### 3.20.16 readRSSIForDeviceCompleted(device as IOBluetoothDeviceMBS, H CIRSSI-Value as Integer, error as Integer)

Plugin Version: 18.3, Platform: macOS, Targets: .

**Function:** This event gets invoked when an RSSI command complete event occurs.

**Notes:** This could occur because you invoked it by issuing an readRSSIForDevice command, or someone else did from another app on the same controller.

## 3.21 class IOBluetoothRFCOMMChannelMBS

### 3.21.1 class IOBluetoothRFCOMMChannelMBS

Plugin Version: 18.3, Platform: macOS, Targets: Desktop, Console & Web.

**Function:** An instance of this class represents an rfcmm channel as defined by the Bluetooth SDP spec.

**Notes:** An RFCOMM channel object can be obtained by opening an rfcmm channel in a device, or by requesting a notification when a channel is created (this is commonly used to provide services).

**Blog Entries**

- [MBS Xojo Plugins, version 18.3pr4](#)
- [Bluetooth for Xojo](#)

### 3.21.2 Methods

#### 3.21.3 closeChannel

Plugin Version: 18.3, Platform: macOS, Targets: Desktop, Console & Web.

**Function:** Close the channel.

**Notes:** Lasterror is set to error code value. 0 if successful.

#### 3.21.4 Constructor

Plugin Version: 18.3, Platform: macOS, Targets: Desktop, Console & Web.

**Function:** The constructor.

#### 3.21.5 Destructor

Plugin Version: 18.3, Platform: macOS, Targets: Desktop, Console & Web.

**Function:** The destructor.

#### 3.21.6 openRFCOMMChannelAsync(device as IOBluetoothDeviceMBS, channelID as Integer) as Boolean

Plugin Version: 18.3, Platform: macOS, Targets: Desktop, Console & Web.

**Function:** Opens a new RFCOMM channel to the target device. Returns immediately.

**Notes:** channelID: The RFCOMM channel ID for the new channel.

Lasterror is set tokIOReturnSuccess if the open process was successfully started (or if an existing RFCOMM channel was found). The channel must be released when the caller is done with it.

This method will begin the process of opening a new RFCOMM channel to the target device. The baseband connection to the device will be opened if it is not open already. The RFCOMM channel open process will not complete until the client has registered an incoming data listener on the new channel. The RFCOMM channel object is already retained when this function returns success; the channel must be released when the caller is done with it.

You should verify that the channel you wish to open exists on the remote device before attempting to open it, by performing an SDP query. This is recommended because the service might have been removed from the, remote device or the channel assignments for the service could have changed (this is rare, but it does happen frequently on some devices). This also works around a bug that existed in early Leopard versions in certain situations where the method would return an error; in these instances, the desired RFCOMM channel could not be opened again until the calling app was restarted.

NOTE: This method is only available in macOS 10.2.5 (Bluetooth v1.2) or later.

### 3.21.7 openRFCOMMChannelSync(device as IOBluetoothDeviceMBS, channelID as Integer) as Boolean

Plugin Version: 18.3, Platform: macOS, Targets: Desktop, Console & Web.

**Function:** Opens a new RFCOMM channel to the target device.

**Notes:** Returns only once the channel is open or failed to open.

channelID: The RFCOMM channel ID for the new channel.

Returns kIOReturnSuccess if the open process was successfully started (or if an existing RFCOMM channel was found). The channel must be released when the caller is done with it.

This method will begin the process of opening a new RFCOMM channel to the target device. The baseband connection to the device will be opened if it is not open already. The RFCOMM channel open process will not complete until the client has registered an incoming data listener on the new channel. The RFCOMM channel object is already retained when this function returns success; the channel must be released when the caller is done with it.

You should verify that the channel you wish to open exists on the remote device before attempting to open it, by performing an SDP query. This is recommended because the service might have been removed from the, remote device or the channel assignments for the service could have changed (this is rare, but it does happen frequently on some devices). This also works around a bug that existed in early Leopard versions

in certain situations where the method would return an error; in these instances, the desired RFCOMM channel could not be opened again until the calling app was restarted.

NOTE: This method is only available in macOS 10.2.5 (Bluetooth v1.2) or later.

### 3.21.8 `sendRemoteLineStatus(lineStatus as Integer)`

Plugin Version: 18.3, Platform: macOS, Targets: Desktop, Console & Web.

**Function:** Sends an error to the remote side.

**Notes:** `lineStatus`: the error type. The error code can be `NoError`, `OverrunError`, `ParityError` or `FramingError`.

`Lasterror` is set to an error code value. 0 if successful.

### 3.21.9 `setSerialParameters(speed as Integer, dataBits as Integer, parity as Integer, stopBits as Integer)`

Plugin Version: 18.3, Platform: macOS, Targets: Desktop, Console & Web.

**Function:** Changes the parameters of the serial connection.

**Notes:** `speed`: the baudrate.

`nBits`: number of data bits.

`parity`: the type of parity can be `NoParity`, `OddParity`, `EvenParity` or `MaxParity`.

`bitStop`: number of stop bits.

See `kParityType*` constants.

`Lasterror` is set to error code value. 0 if successful.

### 3.21.10 `writeAsync(data as MemoryBlock, tag as Variant = nil)`

Plugin Version: 18.3, Platform: macOS, Targets: Desktop, Console & Web.

**Function:** Sends a block of data in the channel asynchronously.

**Notes:** `data`: The data buffer to be sent.

`Lasterror` is set to `kIOReturnSuccess` if the data was buffered successfully.

The number of bytes to be sent must not exceed the channel MTU. If the return value is an error condition none of the data was sent. Once the data has been successfully passed to the hardware to be transmitted,

the WriteCompleted event will be called with the tag that was passed to this method.

NOTE: This method is only available in macOS 10.2.5 (Bluetooth v1.2) or later.

### 3.21.11 writeSync(data as MemoryBlock)

Plugin Version: 18.3, Platform: macOS, Targets: Desktop, Console & Web.

**Function:** Sends a block of data in the channel synchronously.

**Notes:** data The data buffer to be sent.

Lasterror is set to kIOReturnSuccess if the data was written successfully.

Sends data through the channel. The number of bytes to be sent must not exceed the channel MTU. If the return value is an error condition none of the data was sent. This method will block until the data has been successfully sent to the hardware for transmission (or until an error occurs).

NOTE: This method is only available in macOS 10.2.5 (Bluetooth v1.2) or later.

### 3.21.12 Properties

#### 3.21.13 ChannelID as Integer

Plugin Version: 18.3, Platform: macOS, Targets: Desktop, Console & Web.

**Function:** Returns the object rfcomm channel ID.

**Notes:** (Read only property)

#### 3.21.14 Device as IOBluetoothDeviceMBS

Plugin Version: 18.3, Platform: macOS, Targets: Desktop, Console & Web.

**Function:** Returns the Bluetooth Device that carries the rfcomm data.

**Notes:** (Read only property)

#### 3.21.15 Handle as Integer

Plugin Version: 18.3, Platform: macOS, Targets: Desktop, Console & Web.

**Function:** The internal object reference.

**Notes:** (Read and Write property)

### 3.21.16 isIncoming as Boolean

Plugin Version: 18.3, Platform: macOS, Targets: Desktop, Console & Web.

**Function:** Returns the direction of the channel. An incoming channel is one that was opened by the remote device.

**Notes:** Returns true if the channel was opened by the remote device, false if the channel was opened by this object.

(Read only property)

### 3.21.17 isOpen as Boolean

Plugin Version: 18.3, Platform: macOS, Targets: Desktop, Console & Web.

**Function:** Returns the state of the channel.

**Notes:** True if the channel state is open, false otherwise.

note that "not open" means closed, opening and closing.

(Read only property)

### 3.21.18 isTransmissionPaused as Boolean

Plugin Version: 18.3, Platform: macOS, Targets: Desktop, Console & Web.

**Function:** Returns true if flow control is off.

**Notes:** True if the action of sending data will block the current thread, false otherwise.

Returns true if the remote device flow control is stopping out transmission. This is useful because we do not buffer data, we stop the transmitting actor. With this method the transmitter can check if sending data is going to be successful or is going to block.

(Read only property)

### 3.21.19 Lasterror as Integer

Plugin Version: 18.3, Platform: macOS, Targets: Desktop, Console & Web.

**Function:** The last error code.

**Notes:** (Read and Write property)

### 3.21.20 MTU as Integer

Plugin Version: 18.3, Platform: macOS, Targets: Desktop, Console & Web.

**Function:** Returns the channel maximum transfer unit.

**Notes:** Returns the length of the largest chunk of data that this channel can carry. If the caller wishes to use the write:length:sleep: api the length of the data can not be bigger than the channel MTU (maximum transfer unit).

(Read only property)

### 3.21.21 Events

### 3.21.22 Closed

Plugin Version: 18.3, Platform: macOS, Targets: .

**Function:** Channel closed.

### 3.21.23 ControlSignalsChanged

Plugin Version: 18.3, Platform: macOS, Targets: .

**Function:** The control signals changed.

### 3.21.24 DataReceived(data as MemoryBlock, dataLength as Integer)

Plugin Version: 18.3, Platform: macOS, Targets: .

**Function:** Data received.

**Notes:** If you receive text, please use DefineEncoding to tell Xojo about the text encoding you used.

### 3.21.25 FlowControlChanged

Plugin Version: 18.3, Platform: macOS, Targets: .

**Function:** The flow control changed.

### 3.21.26 OpenCompleted(status as Integer)

Plugin Version: 18.3, Platform: macOS, Targets: .

**Function:** The open command finished.

**Notes:** Status is zero for success.

### 3.21.27 QueueSpaceAvailable

Plugin Version: 18.3, Platform: macOS, Targets: .

**Function:** Space is available on queue.

### 3.21.28 WriteCompleted(status as integer, tag as Variant)

Plugin Version: 18.3, Platform: macOS, Targets: .

**Function:** Asynchronous write sent.

### 3.21.29 Constants

Line States

Constant	Value	Description
kLineStatusFramingError	3	Framing Error
kLineStatusNoError	0	No Error
kLineStatusOverrunError	1	Overrun Error
kLineStatusParityError	2	Parity Error

Parity Types

Constant	Value	Description
kParityTypeEvenParity	2	Even Parity
kParityTypeMaxParity	3	Max Parity
kParityTypeNoParity	0	No Parity
kParityTypeOddParity	1	Odd Parity

## 3.22 class IOBluetoothSDPDataElementMBS

### 3.22.1 class IOBluetoothSDPDataElementMBS

Plugin Version: 18.3, Platform: macOS, Targets: Desktop, Console & Web.

**Function:** An instance of this class represents a single SDP data element as defined by the Bluetooth SDP spec.

**Notes:** The data types described by the spec have been mapped onto the base Xojo classes and data types double, Array, Memoryblock as well as IOBluetoothSDPUUID. The number and boolean types (type descriptor 1, 2 and 5) are represented as booleans with the exception of 128-bit numbers which are represented as memoryblock objects in their raw format. The UUID type (type descriptor 3) is represented by IOBluetoothSDPUUID. The string and URL types (type descriptor 4 and 8) are represented by string. The sequence types (type descriptor 6 and 7) are represented by array.

Typically, you will not need to create an IOBluetoothSDPDataElement directly, the system will do that automatically for both client and server operations. However, the current API for adding SDP services to the system does allow the use of an Dictionary based format for creating new services. The purpose for that is to allow a service to be built up completely in a text file (a plist for example) and then easily imported into an app and added to the system without a lot of tedious code to build up the entire SDP service record.

The basis for that dictionary comes from the IOBluetoothSDPDataElement. At its simplest, a data element is made up of three parts: the type descriptor, the size (from which the size descriptor is generated) and the actual value. To provide a complete representation of a data element, an dictionary with three entries can be used. Each of the three entries has a key/value pair representing one of the three attributes of a data element. The first key/value pair has a key 'DataElementType' that contains a number value with the actual type descriptor for the data element. The second pair has a key 'DataElementSize' that contains the actual size of the element in bytes. The size descriptor will be calculated based on the size and type of the element. The third pair is the value itself whose key is 'DataElementValue' and whose type corresponds to the type mapping above.

In addition to this complete description of a data element, there are some shortcuts that can be used for some of the common types and sizes.

If the 'DataElementType' value is one of the numeric types (1, 2), the 'DataElementValue' can be an memoryblock instead of an number. In that case, the numeric data is taken in network byte order (MSB first). Additionally, the 'DataElementSize' parameter may be omitted and the size will be taken from the length of the data object.

If the 'DataElementType' value is the nil type (0), no 'DataElementSize' or 'DataElementValue' entries are needed.

If the 'DataElementType' value is any of the other types, the 'DataElementSize' entry is not needed since the size will be taken directly from the value (data, array, string).

In the case where the element is an unsigned, 32-bit integer (type descriptor 1, size descriptor 4), the value itself may simply be a number (instead of a dictionary as in the previous examples). In the case where the element is a UUID (type descriptor 3), the value itself may be a data object. The UUID type will be inferred and the size taken from the length of the data object.

In the case where the element is a text string (type descriptor 4), the value may be a string object. The text

string type will be inferred and the size taken from the length of the string.

In the case where the element is a data element sequence, the value may be an array object. The type will be inferred and the size taken from the length of the array. Additionally, the array must contain sub-elements that will be parsed out individually.

### Blog Entries

- [MBS Xojo Plugins, version 18.3pr4](#)

## 3.22.2 Methods

### 3.22.3 Constructor(type as Integer, SizeDescriptor as Integer, Size as Integer, value as Variant)

Plugin Version: 18.3, Platform: macOS, Targets: Desktop, Console & Web.

**Function:** Initializes a new IOBluetoothSDPDataElement with the given attributes.

**Notes:** type: The type descriptor for the data element.

sizeDescriptor: The size descriptor for the data element (verify it matches the size parameter).

size: The size of the data element in bytes (make sure it is a valid size for the given size descriptor).

value: The raw value itself. This must be the base string, number, Array or Memoryblock objects. It may not be Dictionary. If a dictionary format is present, use other Constructor.

Warning - be careful using this method. There is next to no error checking done on the attributes. It is entirely possible to construct an invalid data element. It is recommended that other Constructor be used instead of this one.

See also:

- 3.22.4 Constructor(value as Variant)

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### 3.22.4 Constructor(value as Variant)

Plugin Version: 18.3, Platform: macOS, Targets: Desktop, Console & Web.

**Function:** Initializes a new IOBluetoothSDPDataElement with the given value.

**Notes:** value: The data element value of one of the specified types.

The value must follow the format listed above and must be an instance of Memoryblock, string, number, array, dictionary, IOBluetoothSDPUUID.

See also:

- 3.22.3 Constructor(type as Integer, SizeDescriptor as Integer, Size as Integer, value as Variant)

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**3.22.5 containsDataElement(value as IOBluetoothSDPDataElementMBS) as boolean**

Plugin Version: 18.3, Platform: macOS, Targets: Desktop, Console & Web.

**Function:** Checks to see if the target data element is the same as the dataElement parameter or if it contains the dataElement parameter (if its a sequence type).

**Notes:** dataElement: The data element to compare with (and search for).

Returns true if the target either matches the given data element or if it contains the given data element.

If the target data element is not a sequence type, this method simply compares the two data elements. If it is a sequence type, it will search through the sequence (and sub-sequences) for the dataElement parameter.

**3.22.6 containsValue(value as variant) as boolean**

Plugin Version: 18.3, Platform: macOS, Targets: Desktop, Console & Web.

**Function:** Checks to see if the target data element's value is the same as the value parameter or if it contains the value parameter.

**Notes:** value: The value to compare with (and search for).

Returns true if the target's value either matches the given value or if it contains the given value.

This method works just like containsDataElement except that it is comparing the value objects directly.

**3.22.7 withElementValue(value as variant) as IOBluetoothSDPDataElementMBS**

Plugin Version: 18.3, Platform: macOS, Targets: Desktop, Console & Web.

**Function:** Creates a new IOBluetoothSDPDataElement with the given value.

**Notes:** element: The data element value of one of the specified types.

Returns the newly allocated data element object. Returns nil if there was an error parsing the element value. The returned IOBluetoothSDPDataElement object has been autoreleased, so it is not necessary for the caller to release it. If the object is to be referenced and kept around, retain should be called.

The value must follow the format listed above and must be an instance of memory block, String, number, Array, Dictionary, IOBluetoothSDPUUID.

### 3.22.8 withType(type as Integer, SizeDescriptor as Integer, Size as Integer, Value as variant) as IOBluetoothSDPDataElementMBS

Plugin Version: 18.3, Platform: macOS, Targets: Desktop, Console & Web.

**Function:** Creates a new IOBluetoothSDPDataElement with the given attributes.

**Notes:** typeDescriptor: The type descriptor for the data element.

sizeDescriptor: The size descriptor for the data element (verify it matches the size parameter).

size: The size of the data element in bytes (make sure it is a valid size for the given size descriptor).

value: The raw value itself. This must be the base string, number, array or memoryblock objects. It may not be Dictionary. If a dictionary format is present, use other Constructor.

Returns the newly allocated data element object. Returns nil if an error is encountered (not likely due to the limited error checking currently done).

Warning - be careful using this method. There is next to no error checking done on the attributes. It is entirely possible to construct an invalid data element. It is recommended that Constructor be used instead of this one.

### 3.22.9 Properties

#### 3.22.10 DataValue as MemoryBlock

Plugin Version: 18.3, Platform: macOS, Targets: Desktop, Console & Web.

**Function:** If the data element is represented by a data object, it returns the value as an MemoryBlock.

**Notes:** Returns an MemoryBlock representation of the data element if it is a 128-bit number.

The data types represented by a data object are 128-bit versions of 1 (unsigned int) and 2 (signed int). (Read only property)

#### 3.22.11 Handle as Integer

Plugin Version: 18.3, Platform: macOS, Targets: Desktop, Console & Web.

**Function:** The internal object reference.

**Notes:** (Read and Write property)

#### 3.22.12 NumberValue as Double

Plugin Version: 18.3, Platform: macOS, Targets: Desktop, Console & Web.

**Function:** If the data element is represented by a number, it returns the value as a double.

**Notes:** The data types represented by a number are 1 (unsigned int), 2 (signed int) and 5 (boolean) except for 128-bit versions of 1 and 2.

(Read only property)

### 3.22.13 Size as UInt32

Plugin Version: 18.3, Platform: macOS, Targets: Desktop, Console & Web.

**Function:** Returns the size in bytes of the target data element.

**Notes:** The size is valid whether the data element has a fixed or variable size descriptor.

(Read only property)

### 3.22.14 SizeDescriptor as Integer

Plugin Version: 18.3, Platform: macOS, Targets: Desktop, Console & Web.

**Function:** Returns the SDP spec defined data element size descriptor for the target data element.

**Notes:** Returns the size descriptor for the target data element.

(Read only property)

### 3.22.15 StringValue as String

Plugin Version: 18.3, Platform: macOS, Targets: Desktop, Console & Web.

**Function:** If the data element is represented by a string object, it returns the value as a string.

**Notes:** Returns an String representation of the data element if it is a text or URL type.

The data types represented by a string object are 4 (text string) and 8 (URL).

(Read only property)

### 3.22.16 TypeDescriptor as Integer

Plugin Version: 18.3, Platform: macOS, Targets: Desktop, Console & Web.

**Function:** Returns the SDP spec defined data element type descriptor for the target data element.

**Notes:** Returns the type descriptor for the target data element.

(Read only property)

### 3.22.17 UUIDValue as IOBluetoothSDPUUIDMBS

Plugin Version: 18.3, Platform: macOS, Targets: Desktop, Console & Web.

**Function:** If the data element is a UUID (type 3), it returns the value as an IOBluetoothSDPUUID.

**Notes:** Returns an IOBluetoothSDPUUID representation of the data element if it is a UUID.

(Read only property)

### 3.22.18 Value as Variant

Plugin Version: 18.3, Platform: macOS, Targets: Desktop, Console & Web.

**Function:** Returns the object value of the data element.

**Notes:** The value returned may be an Number, String, Data, Array or IOBluetoothSDPDataElement depending on the type of the data element.

(Read only property)

### 3.22.19 Constants

Types

Constant	Value	Description
kTypeBoolean	5	Boolean
kTypeNil	0	Nil
kTypeReservedEnd	31	End of reserved numbers
kTypeReservedStart	9	Begin of reserved numbers.
kTypeSignedInt	2	Signed integer
kTypeString	4	String
kTypeUnsignedInt	1	Unsigned integer
kTypeURL	8	URL
kTypeUUID	3	UUID

DataElement Types

Constant	Value	Description
kTypeDataElementAlternative	7	Alternative
kTypeDataElementSequence	6	Sequence

## 3.23 class IOBluetoothSDPServiceAttributeMBS

### 3.23.1 class IOBluetoothSDPServiceAttributeMBS

Plugin Version: 18.3, Platform: macOS, Targets: Desktop, Console & Web.

**Function:** IOBluetoothSDPServiceAttribute represents a single SDP service attribute.

**Notes:** A service attribute contains two components: an attribute ID and a data element.

**Blog Entries**

- [MBS Xojo Plugins, version 18.3pr4](#)

### 3.23.2 Methods

#### 3.23.3 Constructor(AttributeID as Integer, value as Variant)

Plugin Version: 18.3, Platform: macOS, Targets: Desktop, Console & Web.

**Function:** Initializes a new service attribute with the given ID and data element.

**Notes:** attributeID: The attribute ID of the new service attribute.

attributeElement: The data element value of the new service attribute.

Returns self if successful. Returns nil if there was an error.

#### 3.23.4 withID(AttributeID as Integer, value as Variant) as IOBluetoothSDPServiceAttributeMBS

Plugin Version: 18.3, Platform: macOS, Targets: Desktop, Console & Web.

**Function:** Creates a new service attribute with the given ID and element value.

**Notes:** attributeID: The attribute ID of the new service attribute.

attributeElementValue: The data element value of the new service attribute

Returns the newly allocated service attribute object. Returns nil if there was an error parsing the element value. The returned IOBluetoothSDPDataElement object has been autoreleased, so it is not necessary for the caller to release it. If the object is to be referenced and kept around, retain should be called.

### 3.23.5 Properties

### 3.23.6 AttributeID as Integer

Plugin Version: 18.3, Platform: macOS, Targets: Desktop, Console & Web.

**Function:** Returns the attribute ID for the target service attribute.

**Notes:** (Read only property)

### 3.23.7 DataElement as IOBluetoothSDPDataElementMBS

Plugin Version: 18.3, Platform: macOS, Targets: Desktop, Console & Web.

**Function:** Returns the data element for the target service attribute.

**Notes:** (Read only property)

### 3.23.8 Handle as Integer

Plugin Version: 18.3, Platform: macOS, Targets: Desktop, Console & Web.

**Function:** The internal object reference.

**Notes:** (Read and Write property)

### 3.23.9 IDDataElement as IOBluetoothSDPDataElementMBS

Plugin Version: 18.3, Platform: macOS, Targets: Desktop, Console & Web.

**Function:** Returns the data element representing the attribute ID for the target service attribute.

**Notes:** (Read only property)

## 3.24 class IOBluetoothSDPServiceRecordMBS

### 3.24.1 class IOBluetoothSDPServiceRecordMBS

Plugin Version: 18.3, Platform: macOS, Targets: Desktop, Console & Web.

**Function:** An instance of this class represents a single SDP service record.

**Notes:** As a service record, an instance of this class has an NSDictionary of service attributes. It also has a link to the IOBluetoothDevice that the service belongs to. The service dictionary is keyed off of the attribute ID of each attribute represented as a number.

**Blog Entries**

- [MBS Xojo Plugins, version 18.3pr4](#)

### 3.24.2 Methods

#### 3.24.3 AttributeDataElement(attributeID as Integer) as IOBluetoothSDPDataElementMBS

Plugin Version: 18.3, Platform: macOS, Targets: Desktop, Console & Web.

**Function:** Returns the data element for the given attribute ID in the target service.

**Notes:** attributeID: The attribute ID of the desired attribute.

Returns the data element for the given attribute ID in the target service. If the service does not contain an attribute with the given ID, then nil is returned.

#### 3.24.4 Constructor(dic as Dictionary, device as IOBluetoothDeviceMBS)

Plugin Version: 18.3, Platform: macOS, Targets: Desktop, Console & Web.

**Function:** Returns an initialized IOBluetoothSDPServiceRecord with the attributes specified in the provided service dictionary.

**Notes:** Provide a pointer to an IOBluetoothDevice if you wish to associate the record to a specific IOBluetoothDevice.

#### 3.24.5 hasServiceFromArray(uuids() as IOBluetoothSDPUUIDMBS) as Boolean

Plugin Version: 18.3, Platform: macOS, Targets: Desktop, Console & Web.

**Function:** Returns true if any one of the UUIDs in the given array is found in the target service.

**Notes:** array: An array of IOBluetoothSDPUUID objects to search for in the target service.

Returns true if any of the given UUIDs are present in the service.

The given array should contain IOBluetoothSDPUUID objects. It is currently implemented such that it returns TRUE if any of the UUIDs are found. However in the future, it is likely that this will change to more closely match the functionality in the SDP spec so that it only returns TRUE if all of the given UUIDs are present. That way, both AND and OR comparisons can be implemented. Please make a note of this potential change.

### 3.24.6 matchesSearchArray(uuids() as IOBluetoothSDPUUIDMBS) as Boolean

Plugin Version: 18.3, Platform: macOS, Targets: Desktop, Console & Web.

**Function:** Returns true any of the UUID arrays in the search array match the target service.

**Notes:** array: An Array of NSArray of IOBluetoothSDPUUID objects.

Returns true if any of the UUID arrays match.

The given array should contain NSArray objects. Each sub-NSArray should contain IOBluetoothSDPUUID objects. In turn, each sub-NSArray gets passed to matchesUUIDArray. If any of those returns true, then the search stops and true is returned. Essentially the master array contains the OR operations and each sub-array contains the AND operations.

NOTE: This method is only available in macOS 10.2.4 (Bluetooth v1.1) or later.

### 3.24.7 matchesUUID16(uuid16 as UInt16) as Boolean

Plugin Version: 18.3, Platform: macOS, Targets: Desktop, Console & Web.

**Function:** Returns true the UUID16 is found in the target service.

**Notes:** uuid16: A BluetoothSDPUUID16 to search for in the target service.

Returns true if the UUID16 is present in the service.

NOTE: This method is only available in macOS 10.7 or later.

### 3.24.8 matchesUUIDArray(uuids() as IOBluetoothSDPUUIDMBS) as Boolean

Plugin Version: 18.3, Platform: macOS, Targets: Desktop, Console & Web.

**Function:** Returns true if ALL of the UUIDs in the given array is found in the target service.

**Notes:** array: An Array of IOBluetoothSDPUUID objects to search for in the target service.

Returns true if all of the given UUIDs are present in the service.

The given array should contain IOBluetoothSDPUUID objects. It only returns true if all of the UUIDs are found. This method is like `hasServiceFromArray:` except that it requires that all UUIDs match instead of any of them matching.

NOTE: This method is only available in macOS 10.2.4 (Bluetooth v1.1) or later.

### 3.24.9 `publishedServiceRecordWithDictionary(dic as Dictionary)` as `IOBluetoothSDPServiceRecordMBS`

Plugin Version: 18.3, Platform: macOS, Targets: Desktop, Console & Web.

**Function:** Adds a service to the local SDP server.

**Notes:** serviceDict: A dictionary containing the attributes for the new service

Returns an `IOBluetoothSDPServiceRecord *` with the attributes specified in the provided dictionary.

Each entry in the dictionary representing the service contains the individual attributes. Each attribute in the dict is keyed by a string that must begin with a hex number representing the attribute ID. The key string may contain additional characters if desired as long as they follow a space after the ID hex string. The attribute value must follow the dictionary format described by `IOBluetoothSDPDataElement`. This dictionary format allows a service dict to be created as a plist file and then loaded into the system rather than built up in code. See the example code for an example of how can be done.

If the service record handle, L2CAP PSM or RFCOMM channel ID specified in the dictionary are in use, an alternate one will be assigned.

In addition to attributes that represent the service itself, additional attributes may be specified that control the local behavior of the service. To specify these local attributes, an additional property titled "LocalAttributes" may be added to the root of the service dict. The value of this property must be a dictionary that contains the individual local attributes.

Currently, only two local attributes are supported: "Persistent" and "TargetApplication".

The "Persistent" local attribute must be either a boolean or number representing whether the service should be persistent. A persistent service will be saved off and restored any time the Bluetooth hardware is present. It will persist through reboots and can only be removed by calling `IOBluetoothRemoveServiceWithRecordHandle()`. This attribute is optional. By default, if no "Persistent" local property is present, the service will only exist temporarily. It will be removed either when `IOBluetoothRemoveServiceWithRecordHandle()` is called or when the client application exits.

The "TargetApplication" local attribute is used to specify an application to be launched when a remote device attempts to connect to the service (by opening either an L2CAP or RFCOMM channel of the type specified in the service). This value must be a string representing the absolute path to the target executable (not just

the .app wrapper - i.e. /System/Library/CoreServices/OBEXAgent.app/Contents/MacOS/OBEXAgent). This attribute is optional. If no "TargetApplication" local attribute is specified, no special action will take place when an incoming connection to the service is created. It is up to the client to be monitoring for the connection and to do the right thing when one appears.

The "LocalAttributes" property is optional. If it is not specified, by default the created service is transient and will be removed when the client exits.

Additional local attributes to further control incoming services will be added in the future.

### 3.24.10 removeServiceRecord

Plugin Version: 18.3, Platform: macOS, Targets: Desktop, Console & Web.

**Function:** Removes the service from the local SDP server.

**Notes:** Lasterror is set.

### 3.24.11 RFCOMMChannelID as Integer

Plugin Version: 18.3, Platform: macOS, Targets: Desktop, Console & Web.

**Function:** Allows the discovery of the RFCOMM channel ID assigned to the service.

**Notes:** Returns the location that will get the found RFCOMM channel ID.

Lasterror is set to kIOReturnSuccess if the channel ID is found.

This method will search through the ProtocolDescriptorList attribute to find an entry with the RFCOMM UUID (UUID16: 0x0003). If one is found, it gets the second element of the data element sequence and sets the rfcommChannelID pointer to it. The channel ID only gets set when kIOReturnSuccess is returned.

### 3.24.12 sortedAttributes as IOBluetoothSDPServiceAttributeMBS()

Plugin Version: 18.3, Platform: macOS, Targets: Desktop, Console & Web.

**Function:** Returns a sorted array of SDP attributes.

**Notes:** This method will walk all the elements of the service record and return an array of IOBluetoothSDPServiceAttribute objects sorted by attributeID.

### 3.24.13 withServiceDictionary(dic as Dictionary, device as IOBluetoothDeviceMBS) as IOBluetoothSDPServiceRecordMBS

Plugin Version: 18.3, Platform: macOS, Targets: Desktop, Console & Web.

**Function:** Returns an IOBluetoothSDPServiceRecord \* with the attributes specified in the provided service dictionary.

**Notes:** Provide an IOBluetoothDevice if you wish to associate the record to a specific IOBluetoothDevice.

### 3.24.14 Properties

#### 3.24.15 Device as IOBluetoothDeviceMBS

Plugin Version: 18.3, Platform: macOS, Targets: Desktop, Console & Web.

**Function:** Returns the IOBluetoothDevice that the target service belongs to.

**Notes:** Returns the IOBluetoothDevice that the target service belongs to. If the service is one the local host is vending, then nil is returned.

If the service is a local service (i.e. one the current host is vending out), then nil is returned.

(Read only property)

#### 3.24.16 Handle as Integer

Plugin Version: 18.3, Platform: macOS, Targets: Desktop, Console & Web.

**Function:** The internal object reference.

**Notes:** (Read and Write property)

#### 3.24.17 Lasterror as Integer

Plugin Version: 18.3, Platform: macOS, Targets: Desktop, Console & Web.

**Function:** The lasterror code.

**Notes:** (Read and Write property)

#### 3.24.18 Properties as Dictionary

Plugin Version: 18.3, Platform: macOS, Targets: Desktop, Console & Web.

**Function:** Returns an NSDictionary containing the attributes for the service.

**Notes:** The attribute dictionary is keyed off of the attribute id represented as an NSNumber. The values in the NSDictionary are IOBluetoothSDPDataElement objects representing the data element for the given attribute.

(Read only property)

### 3.24.19 `ServiceName` as String

Plugin Version: 18.3, Platform: macOS, Targets: Desktop, Console & Web.

**Function:** Returns the name of the service.

**Notes:** This is currently implemented to simply return the attribute with an id of 0x0100. In the future, it will be extended to allow name localization based on the user's chosen language or other languages.

(Read only property)

## 3.25 class IOBluetoothSDPUUIDMBS

### 3.25.1 class IOBluetoothSDPUUIDMBS

Plugin Version: 18.3, Platform: macOS, Targets: Desktop, Console & Web.

**Function:** Represents a UUID as defined in the Bluetooth SDP spec.

**Notes:** The IOBluetoothSDPUUID class can represent a UUID of any valid size (16, 32 or 128 bits). It provides the ability to compare two UUIDs no matter what their size as well as the ability to promote the size of a UUID to a larger one.

This is an abstract class. You can't create an instance, but you can get one from various plugin functions.

#### Blog Entries

- [MBS Xojo Plugins, version 18.3pr4](#)

### 3.25.2 Methods

#### 3.25.3 Constructor

Plugin Version: 18.3, Platform: macOS, Targets: Desktop, Console & Web.

**Function:** Private constructor.

#### 3.25.4 isEqualToUUID(other as IOBluetoothSDPUUIDMBS) as Boolean

Plugin Version: 18.3, Platform: macOS, Targets: Desktop, Console & Web.

**Function:** Compares the target IOBluetoothSDPUUID object with the given otherUUID object.

**Notes:** other: The UUID object to be compared with the target.

Returns true if the UUID values of each object are equal. This includes the case where the sizes are different but the data itself is the same when the Bluetooth UUID base is applied.

This method will compare the two UUID values independent of their length.

#### 3.25.5 uuid16(value as UInt16) as IOBluetoothSDPUUIDMBS

Plugin Version: 18.3, Platform: macOS, Targets: Desktop, Console & Web.

**Function:** Creates a new 16-bit IOBluetoothSDPUUID with the given UUID16.

### 3.25.6 `uuid32(value as UInt32)` as `IOBluetoothSDPUUIDMBS`

Plugin Version: 18.3, Platform: macOS, Targets: Desktop, Console & Web.

**Function:** Creates a new 32-bit `IOBluetoothSDPUUID` with the given `UUID32`.

### 3.25.7 `uuidWithData(mem as MemoryBlock)` as `IOBluetoothSDPUUIDMBS`

Plugin Version: 18.3, Platform: macOS, Targets: Desktop, Console & Web.

**Function:** Creates a new `IOBluetoothSDPUUID` object from the given memoryblock.

**Notes:** Returns the new `IOBluetoothSDPUUID` object or `nil` on failure.

If the length of the memoryblock is invalid for a `UUID`, `nil` is returned.

### 3.25.8 `UUIDWithLength(length as Integer)` as `IOBluetoothSDPUUIDMBS`

Plugin Version: 18.3, Platform: macOS, Targets: Desktop, Console & Web.

**Function:** Returns an `IOBluetoothSDPUUID` object matching the target `UUID`, but with the given number of bytes.

**Notes:** Returns an `IOBluetoothSDPUUID` object with the same data as the target but with the given length if it is possible to do so. Otherwise, `nil` is returned.

If the target object is the same length as `newLength`, it returns itself. If `newLength` is greater it creates a new `IOBluetoothSDPUUID` object with the correct value for the given length. If `newLength` is smaller, it will attempt to create a new `IOBluetoothSDPUUID` that is smaller if the data matches the Bluetooth `UUID` base. This downconversion is currently unimplemented.

### 3.25.9 `uuidWithUUID(UUID as String)` as `IOBluetoothSDPUUIDMBS`

Plugin Version: 18.3, Platform: macOS, Targets: Desktop, Console & Web.

**Function:** Creates a new `IOBluetoothSDPUUID` with the given `UUID`

### 3.25.10 Properties

### 3.25.11 Data as `MemoryBlock`

Plugin Version: 18.3, Platform: macOS, Targets: Desktop, Console & Web.

**Function:** Queries data as memoryblock.

**Notes:** (Read only property)

### 3.25.12 Handle as Integer

Plugin Version: 18.3, Platform: macOS, Targets: Desktop, Console & Web.

**Function:** The internal object reference.

**Notes:** (Read and Write property)

### 3.25.13 Length as Integer

Plugin Version: 18.3, Platform: macOS, Targets: Desktop, Console & Web.

**Function:** Queries length of data.

**Notes:** (Read only property)

## 3.26 class IOBluetoothServiceBrowserControllerMBS

### 3.26.1 class IOBluetoothServiceBrowserControllerMBS

Plugin Version: 18.3, Platform: macOS, Targets: Desktop only.

**Function:** A NSWindowController subclass to display a window to search for and perform SDP queries on bluetooth devices within range.

**Notes:** This NSWindowController subclass will bring up a generic Bluetooth search and SDP browsing window allowing the user to find devices within range, perform SDP queries on a particular device, and select a SDP service to connect to. The client application can provide NSArray of valid service UUIDs to allow, and an NSArray of valid device types to allow. The device type filter is not yet implemented. Subclass of the NSWindowControllerMBS class.

#### Blog Entries

- [MBS Xojo Plugins, version 18.3pr4](#)
- [Bluetooth for Xojo](#)

### 3.26.2 Methods

#### 3.26.3 addAllowedUUID(allowedUUID as IOBluetoothSDPUUIDMBS)

Plugin Version: 18.3, Platform: macOS, Targets: Desktop only.

**Function:** Adds a UUID to the list of UUIDs that are used to validate the user's selection.

**Notes:** allowedUUID: UUID that a device may contain to be selected

The user's device selection gets validated against the UUIDs passed to addAllowedUUID or addAllowedUUIDArray. Each call to those methods essentially adds a filter that the selected device gets validated with. If any of the filters match, the device is considered valid. If they all fail, the device is not valid and the user is presented with an error code that the device does not support the required services. The UUID passed to addAllowedUUID is the only UUID that must be present in the device's SDP service records. Alternatively, all of the UUIDs in the UUID array passed to addAllowedUUIDArray must be present.

NOTE: This method is only available in macOS 10.2.4 (Bluetooth v1.1) or later.

#### 3.26.4 addAllowedUUIDArray(allowedUUIDs() as IOBluetoothSDPUUIDMBS)

Plugin Version: 18.3, Platform: macOS, Targets: Desktop only.

**Function:** Adds an array of UUIDs to the list of UUIDs that are used to validate the user's selection.

**Notes:** allowedUUIDArray: An NSArray of UUIDs that all must be present in a device for it to be selectable.

The user's device selection gets validated against the UUIDs passed to `addAllowedUUID` or `addAllowedUUIDArray`. Each call to those methods essentially adds a filter that the selected device gets validated with. If any of the filters match, the device is considered valid. If they all fail, the device is not valid and the user is presented with an error code that the device does not support the required services. The UUID passed to `addAllowedUUID` is the only UUID that must be present in the device's SDP service records. Alternatively, all of the UUIDs in the UUID array passed to `addAllowedUUIDArray` must be present.

NOTE: This method is only available in macOS 10.2.4 (Bluetooth v1.1) or later.

### 3.26.5 `beginSheetModalForWindow(win as DesktopWindow, tag as variant = nil)`

Plugin Version: 22.0, Platform: macOS, Targets: Desktop only.

**Function:** Runs the service browser panel as a sheet on the target window.

**Notes:** `sheetWindow`: `NSWindow` to attach the service browser panel to as a sheet.  
Tag is passed to event.

Sets `lasterror` to `kIOReturnSuccess` if the sheet modal session was started.  
See also:

- 3.26.6 `beginSheetModalForWindow(win as window, tag as variant = nil)`

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### 3.26.6 `beginSheetModalForWindow(win as window, tag as variant = nil)`

Plugin Version: 18.3, Platform: macOS, Targets: Desktop only.

**Function:** Runs the service browser panel as a sheet on the target window.

**Notes:** `sheetWindow`: `NSWindow` to attach the service browser panel to as a sheet.  
Tag is passed to event.

Sets `lasterror` to `kIOReturnSuccess` if the sheet modal session was started.  
See also:

- 3.26.5 `beginSheetModalForWindow(win as DesktopWindow, tag as variant = nil)`

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### 3.26.7 `clearAllowedUUIDs`

Plugin Version: 18.3, Platform: macOS, Targets: Desktop only.

**Function:** Resets the controller back to the default state where it will accept any device the user selects.

**Notes:** This method is only available in macOS 10.2.4 (Bluetooth v1.1) or later.

### 3.26.8 Constructor(options as Integer = 0)

Plugin Version: 18.3, Platform: macOS, Targets: Desktop only.

**Function:** Allocator work Bluetooth Service Browser window controller.

**Notes:** Options: Bit field for options to set in the newly allocated controller. Currently no options are available.

### 3.26.9 Destructor

Plugin Version: 18.3, Platform: macOS, Targets: Desktop only.

**Function:** The destructor.

### 3.26.10 Results as IOBluetoothSDPServiceRecordMBS()

Plugin Version: 18.3, Platform: macOS, Targets: Desktop only.

**Function:** Returns the result of the user's selection.

**Notes:** Returns an NSArray of IOBluetoothSDPServiceRecord objects corresponding to the user's selection. If the user cancelled the panel, nil will be returned.

There will only be results if the panel has been run, the user has successfully made a selection and that selection has been validated. If kIOBluetoothUISuccess was returned for the session, there should be valid results. Currently only a single device is allowed to be selected, so the results array will only contain one object. However in the future multiple selection will be supported.

This method is only available in macOS 10.2.4 (Bluetooth v1.1) or later.

### 3.26.11 runModal as Integer

Plugin Version: 18.3, Platform: macOS, Targets: Desktop only.

**Function:** Runs the service browser panel in a modal session to allow the user to select a service on a Bluetooth device.

**Notes:** Returns kIOBluetoothUISuccess if a successful, validated service selection was made by the user. Returns kIOBluetoothUIUserCanceledErr if the user cancelled the panel. These return values are the same as NSRunStoppedResponse and NSRunAbortedResponse respectively. They are the standard values used in a modal session.

The controller will use the panel attributes to filter what devices the user sees. The allowed UUIDs will be

used to validate the selection the user makes. The user will only be able to select services that match the allowed UUIDs. Only when a selection has been validated (or the panel cancelled), will this method return.

NOTE: This method is only available in macOS 10.2.4 (Bluetooth v1.1) or later.

### 3.26.12 Properties

#### 3.26.13 Description as String

Plugin Version: 18.3, Platform: macOS, Targets: Desktop only.

**Function:** The description text that appears in the device selector panel.

**Notes:** The description text should be localized for best user experience.

This method is only available in macOS 10.2.4 (Bluetooth v1.1) or later.

(Read and Write property)

#### 3.26.14 Options as Integer

Plugin Version: 18.3, Platform: macOS, Targets: Desktop only.

**Function:** The options for the window controller.

**Notes:** This method will set the options for the browser to new values.

(Read and Write property)

#### 3.26.15 Prompt as String

Plugin Version: 18.3, Platform: macOS, Targets: Desktop only.

**Function:** The title of the default/select button in the device selector panel.

**Notes:** The prompt text should be localized for best user experience.

This method is only available in macOS 10.2.4 (Bluetooth v1.1) or later.

(Read and Write property)

#### 3.26.16 Title as String

Plugin Version: 18.3, Platform: macOS, Targets: Desktop only.

**Function:** The title of the device selector panel

**Notes:** The panel title should be localized for best user experience.

This method is only available in macOS 10.2.4 (Bluetooth v1.1) or later.

(Read and Write property)

### 3.26.17 Events

### 3.26.18 SheetDone(returnCode as Integer, tag as Variant)

Plugin Version: 18.3, Platform: macOS, Targets: .

**Function:** The event called when sheet is dismissed.

**Notes:** The returnCode parameter will either be kIOBluetoothUISuccess or kIOBluetoothUIUserCancelledErr as described.

### 3.26.19 Constants

Result Codes

Constant	Value	Description
kIOBluetoothUISuccess	-1000	
kIOBluetoothUIUserCanceledErr	-1001	

Options

Constant	Value	Description
kOptionsAutoStartInquiry	1	Automatically start an inquiry when the panel is displayed. This has been deprecated in 10.5
kOptionsDisconnectWhenDone	2	Disconnect from the device when UI operations are finished.
kOptionsNone	0	No options set.

## 3.27 class WindowsBlueToothDeviceInfoMBS

### 3.27.1 class WindowsBlueToothDeviceInfoMBS

Plugin Version: 18.3, Platform: Windows, Targets: All.

**Function:** This class provides information about a Bluetooth device.

**Blog Entries**

- [MBS Xojo Plugins, version 18.3pr4](#)

### 3.27.2 Methods

### 3.27.3 Devices(SearchParameters as WindowsBlueToothDeviceSearchParameterMBS) as WindowsBlueToothDeviceInfoMBS()

Plugin Version: 18.3, Platform: Windows, Targets: All.

**Function:** Enumerates Bluetooth devices.

**Example:**

```

dim p as new WindowsBlueToothDeviceSearchParameterMBS
p.ReturnAuthenticated = true
p.ReturnConnected = true
p.ReturnRemembered = true
p.ReturnUnknown = true
p.TimeoutMultiplier = 10
p.IssueInquiry = true

```

```

dim devices() as WindowsBlueToothDeviceInfoMBS = WindowsBlueToothDeviceInfoMBS.Devices(p)

```

Break // see in debugger

**Notes:** SearchParameters can define search parameters.

see also:

[https://msdn.microsoft.com/en-us/library/windows/desktop/aa362784\(v=vs.85\).aspx](https://msdn.microsoft.com/en-us/library/windows/desktop/aa362784(v=vs.85).aspx)

### 3.27.4 DisplayDeviceProperties(parentWindow as DesktopWindow) as boolean

Plugin Version: 22.0, Platform: Windows, Targets: Desktop only.

**Function:** Starts Control Panel device information property sheet.

**Notes:** parentWindow: The parent window of the property sheet.

Returns true if the property sheet is successfully displayed. Returns false if the property sheet was not displayed successfully.

See also:

- 3.27.5 DisplayDeviceProperties(parentWindow as window) as boolean 144

### 3.27.5 DisplayDeviceProperties(parentWindow as window) as boolean

Plugin Version: 18.3, Platform: Windows, Targets: Desktop only.

**Function:** Starts Control Panel device information property sheet.

**Notes:** parentWindow: The parent window of the property sheet.

Returns true if the property sheet is successfully displayed. Returns false if the property sheet was not displayed successfully.

See also:

- 3.27.4 DisplayDeviceProperties(parentWindow as DesktopWindow) as boolean 143

### 3.27.6 FirstDevice(SearchParameters as WindowsBlueToothDeviceSearchParameterMBS) as WindowsBlueToothDeviceInfoMBS

Plugin Version: 18.3, Platform: Windows, Targets: All.

**Function:** Queries first device.

**Example:**

```
dim p as new WindowsBlueToothDeviceSearchParameterMBS
p.ReturnAuthenticated = true
p.ReturnConnected = true
p.ReturnRemembered = true
p.ReturnUnknown = true
p.TimeoutMultiplier = 10
p.IssueInquiry = true
```

```
dim device as WindowsBlueToothDeviceInfoMBS = WindowsBlueToothDeviceInfoMBS.FirstDevice(p)
```

Break // see in debugger

**Notes:** SearchParameters can define search parameters.

see also:

[https://msdn.microsoft.com/en-us/library/windows/desktop/aa362784\(v=vs.85\).aspx](https://msdn.microsoft.com/en-us/library/windows/desktop/aa362784(v=vs.85).aspx)

### 3.27.7 Properties

#### 3.27.8 Address as String

Plugin Version: 18.3, Platform: Windows, Targets: All.

**Function:** Address of the device.

**Notes:** (Read only property)

#### 3.27.9 Authenticated as Boolean

Plugin Version: 18.3, Platform: Windows, Targets: All.

**Function:** Specifies whether the device is authenticated, paired, or bonded.

**Notes:** All authenticated devices are remembered.

(Read only property)

#### 3.27.10 ClassofDevice as Integer

Plugin Version: 18.3, Platform: Windows, Targets: All.

**Function:** Class of the device.

**Notes:** (Read only property)

#### 3.27.11 Connected as Boolean

Plugin Version: 18.3, Platform: Windows, Targets: All.

**Function:** Specifies whether the device is connected.

**Notes:** (Read only property)

#### 3.27.12 LastSeen as Date

Plugin Version: 18.3, Platform: Windows, Targets: Desktop, Console & Web.

**Function:** Last time the device was seen, in the form of a date.

**Notes:** Can be before year 2000 to indicate never seen.

(Read only property)

### 3.27.13 LastUsed as Date

Plugin Version: 18.3, Platform: Windows, Targets: Desktop, Console & Web.

**Function:** Last time the device was used, in the form of a date.

**Notes:** Can be before year 2000 to indicate never used.

(Read only property)

### 3.27.14 Name as String

Plugin Version: 18.3, Platform: Windows, Targets: All.

**Function:** Name of the device.

**Notes:** (Read only property)

### 3.27.15 Remembered as Boolean

Plugin Version: 18.3, Platform: Windows, Targets: All.

**Function:** Specifies whether the device is a remembered device.

**Notes:** Not all remembered devices are authenticated.

(Read only property)

## 3.28 class WindowsBlueToothDeviceMBS

### 3.28.1 class WindowsBlueToothDeviceMBS

Plugin Version: 18.3, Platform: Windows, Targets: All.

**Function:** This class stores information about a Bluetooth device.

**Notes:** This is an abstract class. You can't create an instance, but you can get one from various plugin functions.

**Blog Entries**

- [MBS Xojo Plugins, version 18.3pr4](#)

### 3.28.2 Methods

### 3.28.3 Constructor

Plugin Version: 18.3, Platform: Windows, Targets: All.

**Function:** The private constructor.

### 3.28.4 Devices as WindowsBlueToothDeviceMBS()

Plugin Version: 18.3, Platform: Windows, Targets: All.

**Function:** Queries list of devices.

### 3.28.5 Services as WindowsBlueToothServiceMBS()

Plugin Version: 18.3, Platform: Windows, Targets: All.

**Function:** The list of services for this device.

### 3.28.6 Properties

### 3.28.7 Comment as String

Plugin Version: 18.3, Platform: Windows, Targets: All.

**Function:** The comment.

**Notes:** (Read only property)

### 3.28.8 LocalAddress as String

Plugin Version: 18.3, Platform: Windows, Targets: All.

**Function:** The Windows Sockets local address.

**Notes:** In a client application, pass this address to the bind function to obtain access to a network service. In a network service, pass this address to the bind function so that the service is bound to the appropriate local address.

e.g. "(78:4F:12:34:56:78)"  
(Read only property)

### 3.28.9 Name as String

Plugin Version: 18.3, Platform: Windows, Targets: All.

**Function:** The name.

**Notes:** e.g. "Christian Schmitz iPhone"  
(Read only property)

### 3.28.10 RemoteAddress as String

Plugin Version: 18.3, Platform: Windows, Targets: All.

**Function:** Windows Sockets remote address.

**Notes:** There are several uses for this remote address:

- You can use this remote address to connect to the service through the connect function. This is useful if an application performs send/receive operations that involve connection-oriented protocols.
- You can use this remote address with the sendto function when you are communicating over a connectionless (datagram) protocol. If you are using a connectionless protocol, such as UDP, sendto is typically the way you pass data to the remote system.

e.g. "(44:00:12:34:56:78)"  
(Read only property)

### 3.28.11 SocketProtocol as Integer

Plugin Version: 18.3, Platform: Windows, Targets: All.

**Function:** The protocol used.

**Notes:** The possible options for the protocol parameter are specific to the address family and socket type specified.

Name	Value	Meaning
IPPROTO_TCP	6	The Transmission Control Protocol (TCP). This is a possible value when the address family is AF_INET or AF_INET6 and the iSocketType member is SOCK_STREAM.
IPPROTO_UDP	17	The User Datagram Protocol (UDP). This is a possible value when the address family is AF_INET or AF_INET6 and the iSocketType member is SOCK_DGRAM.
IPPROTO_RM	113	The PGM protocol for reliable multicast. This is a possible value when the address family is AF_INET and the iSocketType member is SOCK_RDM. On the Windows SDK released for Windows Vista and later, this value is also called IPPROTO_PGM.

(Read only property)

### 3.28.12 SocketType as Integer

Plugin Version: 18.3, Platform: Windows, Targets: All.

**Function:** The type of Windows socket.

**Notes:**

Name	Value	Meaning
SOCK_STREAM	1	A stream socket. This is a protocol that sends data as a stream of bytes, with no message boundaries. This socket type provides sequenced, reliable, two-way, connection-based byte streams with an OOB data transmission mechanism. This socket type uses the Transmission Control Protocol (TCP) for the Internet address family (AF_INET or AF_INET6).
SOCK_DGRAM	2	A datagram socket. This socket type supports datagrams, which are connectionless, unreliable buffers of a fixed (typically small) maximum length. This socket type uses the User Datagram Protocol (UDP) for the Internet address family (AF_INET or AF_INET6).

Services use recvfrom function to obtain datagrams. The listen and accept functions do not work with datagrams.

(Read only property)

SOCK_RDM	4	A reliable message datagram socket. This socket type preserves message boundaries in data. An example of this type is the Pragmatic General Multicast (PGM) multicast protocol implementation in Windows, often referred to as reliable multicast programming.
SOCK_SEQPACKET	5	A sequenced packet stream socket. This socket type provides a pseudo-stream packet based on datagrams.

## 3.29 class WindowsBlueToothDeviceSearchParameterMBS

### 3.29.1 class WindowsBlueToothDeviceSearchParameterMBS

Plugin Version: 18.3, Platform: Windows, Targets: All.

**Function:** This class specifies search criteria for Bluetooth device searches.

**Blog Entries**

- [MBS Xojo Plugins, version 21.4pr3](#)
- [MBS Xojo Plugins, version 18.3pr4](#)

### 3.29.2 Methods

### 3.29.3 Constructor

Plugin Version: 18.3, Platform: Windows, Targets: All.

**Function:** The constructor.

### 3.29.4 Properties

### 3.29.5 IssueInquiry as Boolean

Plugin Version: 18.3, Platform: Windows, Targets: All.

**Function:** A value that specifies that a new inquiry should be issued.

**Notes:** (Read and Write property)

### 3.29.6 Radio as WindowsBlueToothRadioMBS

Plugin Version: 18.3, Platform: Windows, Targets: All.

**Function:** A handle for the radio on which to perform the inquiry.

**Notes:** Set to nil to perform the inquiry on all local Bluetooth radios.  
(Read and Write property)

### 3.29.7 ReturnAuthenticated as Boolean

Plugin Version: 18.3, Platform: Windows, Targets: All.

**Function:** A value that specifies that the search should return authenticated Bluetooth devices.

**Notes:** (Read and Write property)

### 3.29.8 ReturnConnected as Boolean

Plugin Version: 18.3, Platform: Windows, Targets: All.

**Function:** A value that specifies that the search should return connected Bluetooth devices.

**Notes:** (Read and Write property)

### 3.29.9 ReturnRemembered as Boolean

Plugin Version: 18.3, Platform: Windows, Targets: All.

**Function:** A value that specifies that the search should return remembered Bluetooth devices.

**Notes:** (Read and Write property)

### 3.29.10 ReturnUnknown as Boolean

Plugin Version: 18.3, Platform: Windows, Targets: All.

**Function:** A value that specifies that the search should return unknown Bluetooth devices.

**Notes:** (Read and Write property)

### 3.29.11 TimeoutMultiplier as Integer

Plugin Version: 18.3, Platform: Windows, Targets: All.

**Function:** A value that indicates the time out for the inquiry, expressed in increments of 1.28 seconds.

**Notes:** For example, an inquiry of 12.8 seconds has a `cTimeoutMultiplier` value of 10. The maximum value for this member is 48. When a value greater than 48 is used, the calling function immediately fails and returns `E_INVALIDARG`.

(Read and Write property)

## 3.30 class WindowsBlueToothLECharacteristicMBS

### 3.30.1 class WindowsBlueToothLECharacteristicMBS

Plugin Version: 18.1, Platform: Windows, Targets: All.

**Function:** Describes a Bluetooth Low Energy (LE) generic attribute (GATT) profile characteristic.

**Notes:** This is an abstract class. You can't create an instance, but you can get one from various plugin functions.

### 3.30.2 Methods

### 3.30.3 Constructor

Plugin Version: 18.1, Platform: Windows, Targets: All.

**Function:** The private constructor.

### 3.30.4 Properties

### 3.30.5 AttributeHandle as Integer

Plugin Version: 18.1, Platform: Windows, Targets: All.

**Function:** The handle to the Bluetooth LE GATT profile attributes.

**Notes:** (Read only property)

### 3.30.6 CharacteristicUuid as String

Plugin Version: 18.1, Platform: Windows, Targets: All.

**Function:** The Universally Unique ID (UUID) of the characteristic.

**Notes:** (Read only property)

### 3.30.7 CharacteristicValueHandle as Integer

Plugin Version: 18.1, Platform: Windows, Targets: All.

**Function:** The handle to the Bluetooth LE GATT profile characteristic value.

**Notes:** (Read only property)

### 3.30.8 HasExtendedProperties as Boolean

Plugin Version: 18.1, Platform: Windows, Targets: All.

**Function:** The characteristic has extended properties, which will be presented through a Characteristic Extended Properties descriptor.

**Notes:** (Read only property)

### 3.30.9 IsBroadcastable as Boolean

Plugin Version: 18.1, Platform: Windows, Targets: All.

**Function:** The characteristic can be broadcast.

**Notes:** (Read only property)

### 3.30.10 IsIndicatable as Boolean

Plugin Version: 18.1, Platform: Windows, Targets: All.

**Function:** The characteristic can be updated by the device through Handle Value Indications, and the new value will be returned through the ChangeEvent event.

**Notes:** (Read only property)

### 3.30.11 IsNotifiable as Boolean

Plugin Version: 18.1, Platform: Windows, Targets: All.

**Function:** The characteristic can be updated by the device through Handle Value Notifications, and the new value will be returned through the ChangeEvent event.

**Notes:** (Read only property)

### 3.30.12 IsReadable as Boolean

Plugin Version: 18.1, Platform: Windows, Targets: All.

**Function:** The characteristic can be read.

**Notes:** (Read only property)

### 3.30.13 IsSignedWritable as Boolean

Plugin Version: 18.1, Platform: Windows, Targets: All.

**Function:** The characteristic can be signed writable.

**Notes:** (Read only property)

### 3.30.14 IsWritable as Boolean

Plugin Version: 18.1, Platform: Windows, Targets: All.

**Function:** The characteristic can be written to.

**Notes:** (Read only property)

### 3.30.15 IsWritableWithoutResponse as Boolean

Plugin Version: 18.1, Platform: Windows, Targets: All.

**Function:** The characteristic can be written to without requiring a response.

**Notes:** (Read only property)

### 3.30.16 ServiceHandle as Integer

Plugin Version: 18.1, Platform: Windows, Targets: All.

**Function:** The handle to the Bluetooth LE GATT profile service.

**Notes:** (Read only property)

## 3.31 class WindowsBluetoothLEDescriptorMBS

### 3.31.1 class WindowsBluetoothLEDescriptorMBS

Plugin Version: 18.1, Platform: Windows, Targets: All.

**Function:** Describes a Bluetooth Low Energy (LE) generic attribute (GATT) profile descriptor.

**Notes:** This is an abstract class. You can't create an instance, but you can get one from various plugin functions.

### 3.31.2 Methods

### 3.31.3 Constructor

Plugin Version: 18.1, Platform: Windows, Targets: All.

**Function:** The private constructor.

### 3.31.4 Properties

### 3.31.5 AttributeHandle as Integer

Plugin Version: 18.1, Platform: Windows, Targets: All.

**Function:** The handle to the Bluetooth LE GATT profile attributes.

**Notes:** (Read only property)

### 3.31.6 CharacteristicHandle as Integer

Plugin Version: 18.1, Platform: Windows, Targets: All.

**Function:** The handle to the Bluetooth LE GATT profile characteristic.

**Notes:** (Read only property)

### 3.31.7 DescriptorType as Integer

Plugin Version: 18.1, Platform: Windows, Targets: All.

**Function:** The type of the Bluetooth LE GATT descriptor.

**Notes:** See WindowsBluetoothLEDescriptorValueMBS.kDescriptorType\* constants.

(Read only property)

### 3.31.8 DescriptorUuid as String

Plugin Version: 18.1, Platform: Windows, Targets: All.

**Function:** The Universally Unique ID (UUID) of the Bluetooth LE GATT descriptor.

**Notes:** (Read only property)

### 3.31.9 ServiceHandle as Integer

Plugin Version: 18.1, Platform: Windows, Targets: All.

**Function:** The handle to the Bluetooth LE GATT profile service.

**Notes:** (Read only property)

## 3.32 class WindowsBluetoothLEDescriptorValueMBS

### 3.32.1 class WindowsBluetoothLEDescriptorValueMBS

Plugin Version: 18.1, Platform: Windows, Targets: All.

**Function:** Describes a parent characteristic.

**Notes:** This is an abstract class. You can't create an instance, but you can get one from various plugin functions.

### 3.32.2 Methods

### 3.32.3 Constructor

Plugin Version: 18.1, Platform: Windows, Targets: All.

**Function:** The private constructor.

### 3.32.4 Properties

### 3.32.5 Data as MemoryBlock

Plugin Version: 18.1, Platform: Windows, Targets: All.

**Function:** The descriptor value data.

**Notes:** (Read and Write property)

### 3.32.6 DataSize as Integer

Plugin Version: 18.1, Platform: Windows, Targets: All.

**Function:** The size, in bytes, of the descriptor value.

**Notes:** (Read only property)

### 3.32.7 Description as String

Plugin Version: 18.1, Platform: Windows, Targets: All.

**Function:** The Universally Unique ID (UUID) that describes the format of the parent characteristic value.

**Notes:** Only set if DescriptorType is kDescriptorTypeCharacteristicFormat.

(Read and Write property)

### 3.32.8 DescriptorType as Integer

Plugin Version: 18.1, Platform: Windows, Targets: All.

**Function:** The type of the descriptor value.

**Notes:** See WindowsBlueToothLEDescriptorValueMBS.kDescriptorType\* constants.

(Read and Write property)

### 3.32.9 DescriptorUuid as String

Plugin Version: 18.1, Platform: Windows, Targets: All.

**Function:** The Universally Unique ID (UUID) of the descriptor value.

**Notes:** (Read and Write property)

### 3.32.10 Exponent as Integer

Plugin Version: 18.1, Platform: Windows, Targets: All.

**Function:** The exponent value to use to determine how the value of the characteristic value is further formatted.

**Notes:** Only set if DescriptorType is kDescriptorTypeCharacteristicFormat.

(Read and Write property)

### 3.32.11 Format as Integer

Plugin Version: 18.1, Platform: Windows, Targets: All.

**Function:** The format of the parent characteristic value.

**Notes:** Only set if DescriptorType is kDescriptorTypeCharacteristicFormat.

(Read and Write property)

### 3.32.12 IsAuxiliariesWritable as Boolean

Plugin Version: 18.1, Platform: Windows, Targets: All.

**Function:** The characteristic user description descriptor is writable.

**Notes:** Only set if DescriptorType is kDescriptorTypeCharacteristicExtendedProperties.

(Read and Write property)

### 3.32.13 IsBroadcast as Boolean

Plugin Version: 18.1, Platform: Windows, Targets: All.

**Function:** The parent characteristic value can be broadcast.

**Notes:** Only set if DescriptorType is kDescriptorTypeServerCharacteristicConfiguration.

(Read and Write property)

### 3.32.14 IsReliableWriteEnabled as Boolean

Plugin Version: 18.1, Platform: Windows, Targets: All.

**Function:** The parent characteristic value is reliable write enabled.

**Notes:** Only set if DescriptorType is kDescriptorTypeCharacteristicExtendedProperties.

(Read and Write property)

### 3.32.15 IsSubscribeToIndication as Boolean

Plugin Version: 18.1, Platform: Windows, Targets: All.

**Function:** Whether the characteristic has been registered with the device to receive Handle Value Indications.

**Notes:** True if the characteristic has been registered. Otherwise, false.

Only set if DescriptorType is kDescriptorTypeClientCharacteristicConfiguration.

(Read and Write property)

### 3.32.16 IsSubscribeToNotification as Boolean

Plugin Version: 18.1, Platform: Windows, Targets: All.

**Function:** Whether the characteristic has been registered with the device to receive Handle Value Notifications.

**Notes:** True if the characteristic has been registered. Otherwise, false.

Only set if DescriptorType is kDescriptorTypeClientCharacteristicConfiguration.

(Read and Write property)

**3.32.17 NamespaceValue as Integer**

Plugin Version: 18.1, Platform: Windows, Targets: All.

**Function:** The name-space where the unit is defined in the Assigned Numbers specification.

**Notes:** Only set if DescriptorType is kDescriptorTypeCharacteristicFormat.  
(Read and Write property)

**3.32.18 Unit as String**

Plugin Version: 18.1, Platform: Windows, Targets: All.

**Function:** The unit of the characteristic value as defined in the Assigned Numbers specification.

**Notes:** Only set if DescriptorType is kDescriptorTypeCharacteristicFormat.  
(Read and Write property)

**3.32.19 Constants**

Descriptor Types

Constant	Value	Description
kDescriptorTypeCharacteristicAggregateFormat	5	The format of an aggregated characteristic value.
kDescriptorTypeCharacteristicExtendedProperties	0	The characteristic value has additional properties that describe its use, or how it can be accessed.
kDescriptorTypeCharacteristicFormat	4	The format of the characteristic value.
kDescriptorTypeCharacteristicUserDescription	1	The characteristic value contains a UTF-8 string of variable length textual description.
kDescriptorTypeClientCharacteristicConfiguration	2	The characteristic value may be configured by the client.
kDescriptorTypeCustomDescriptor	6	The characteristic value is customized.
kDescriptorTypeServerCharacteristicConfiguration	3	The characteristic value may be configured for the server.

## 3.33 class WindowsBluetoothLEMBS

### 3.33.1 class WindowsBluetoothLEMBS

Plugin Version: 18.1, Platform: Windows, Targets: All.

**Function:** The class for using Bluetooth LE functions on Windows 8 or newer.

**Blog Entries**

- [MBS Xojo Plugins, version 22.1pr7](#)
- [MBS Xojo Plugins, version 18.3pr4](#)
- [Bluetooth for Xojo](#)

### 3.33.2 Methods

#### 3.33.3 AbortReliableWrite(ReliableWriteContextID as UInt64)

Plugin Version: 18.1, Platform: Windows, Targets: All.

**Function:** Specifies the end of reliable write procedures, and the writes should be aborted.

**Notes:** ReliableWriteContextID: The context describing the reliable write operation returned from a previous call to BeginReliableWrite.

Lasterror and LastErrorMessage properties are set.

see also:

[https://msdn.microsoft.com/en-us/library/windows/hardware/hh450791\(v=vs.85\).aspx](https://msdn.microsoft.com/en-us/library/windows/hardware/hh450791(v=vs.85).aspx)

#### 3.33.4 Available as Boolean

Plugin Version: 18.1, Platform: Windows, Targets: All.

**Function:** Whether this classes are available.

**Notes:** Should return true on Windows 8 and later versions of Windows.

#### 3.33.5 BeginReliableWrite as UInt64

Plugin Version: 18.1, Platform: Windows, Targets: All.

**Function:** Specifies that reliable writes are about to begin.

**Notes:** Returns the ID for the context describing the reliable write operation.

Lasterror and LastErrorMessage properties are set.

see also:

[https://msdn.microsoft.com/en-us/library/windows/hardware/hh450792\(v=vs.85\).aspx](https://msdn.microsoft.com/en-us/library/windows/hardware/hh450792(v=vs.85).aspx)

### 3.33.6 Characteristics(ParentService as WindowsBlueToothLEServiceMBS, Flags as Integer = 0) as WindowsBlueToothLECharacteristicMBS()

Plugin Version: 18.1, Platform: Windows, Targets: All.

**Function:** Gets all the characteristics available for the specified service.

**Notes:** Service: Address of a WindowsBlueToothLEServiceMBS containing the parent service of the included services to be retrieved. This parameter is optional if a service handle was passed to Device, in which case the service specified by the service handle will be treated as the parent.

Flags: Optional flags, currently non defined.

Returned characteristics are cached upon successful retrieval of characteristics from the device directly. Unless a service-change event is received, the list of returned characteristics is not expected to change.

The parent service must be present in the cache, otherwise the function will fail. The parent service must be a service returned by either Services or IncludedServices methods.

Lasterror and LastErrorMessage properties are set.

see also:

[https://msdn.microsoft.com/en-us/library/windows/hardware/hh450795\(v=vs.85\).aspx](https://msdn.microsoft.com/en-us/library/windows/hardware/hh450795(v=vs.85).aspx)

### 3.33.7 Constructor(DevicePath as String)

Plugin Version: 18.1, Platform: Windows, Targets: All.

**Function:** The constructor.

**Notes:** Takes path to device or service on device to connect.

### 3.33.8 Descriptors(Characteristic as WindowsBlueToothLECharacteristicMBS, Flags as Integer = 0) as WindowsBlueToothLEDescriptorMBS()

Plugin Version: 18.1, Platform: Windows, Targets: All.

**Function:** Gets all the descriptors available for the specified characteristic.

**Notes:** Characteristic: The parent characteristic of the descriptors to be retrieved.

Returned characteristics are cached upon successful retrieval of characteristics from the device directly. Unless a service-change event is received, the list of returned characteristics is not expected to change.

The parent characteristic must be present in the cache, otherwise the function will fail. The parent service must be a service returned by either Services or IncludedServices.

Lasterror and LastErrorMessage properties are set.

see also:

[https://msdn.microsoft.com/en-us/library/windows/hardware/hh450797\(v=vs.85\).aspx](https://msdn.microsoft.com/en-us/library/windows/hardware/hh450797(v=vs.85).aspx)

### 3.33.9 DevicePathsForClassGUID(GUID as string) as String()

Plugin Version: 18.1, Platform: Windows, Targets: All.

**Function:** Queries installation database for devices.

**Example:**

```
dim paths() as String = WindowsBlueToothLEMBS.DevicePathsForClassGUID(" { 0000180D-0000-1000-8000-00805F9B34FB } ")
```

```
List.DeleteAllRows
if paths = nil then
list.AddRow "Failed."
else
for each path as string in paths
List.AddRow path
next
end if
```

**Notes:** This is a helper method in MBS Plugin to query setup database to find the paths to devices with a given GUID.

Pass in the GUID of the device, e.g. " { 0000180D-0000-1000-8000-00805F9B34FB } "

### 3.33.10 EndReliableWrite(ReliableWriteContextID as UInt64)

Plugin Version: 18.1, Platform: Windows, Targets: All.

**Function:** Specifies the end of reliable writes, and the writes should be committed.

**Notes:** ReliableWriteContextID: The context describing the reliable write operation returned from a previous call to BeginReliableWrite.

Lasterror and LastErrorMessage properties are set.

see also:

[https://msdn.microsoft.com/en-us/library/windows/hardware/hh450794\(v=vs.85\).aspx](https://msdn.microsoft.com/en-us/library/windows/hardware/hh450794(v=vs.85).aspx)

### 3.33.11 GetCharacteristicValue(Characteristic as WindowsBlueToothLECharacteristicMBS, Flags as Integer = 0) as MemoryBlock

Plugin Version: 18.1, Platform: Windows, Targets: All.

**Function:** Gets the value of the specified characteristic.

**Notes:** Characteristic: the parent characteristic of the characteristic value to be retrieved.

Flags: Flags to modify the behavior of GetCharacteristicValue.

Flag	Description
kFlagNone	The client does not have specific GATT requirements (default).
kFlagConnectionEncrypted	The client requests the data to be transmitted over an encrypted channel.
kFlagConnectionAuthenticated	The client requests the data to be transmitted over an authenticated channel.
kFlagForceReadFromDevice	The characteristic value is to be read directly from the device. This overwrites the one in the cache if one is already present.
kFlagForceReadFromCache	The characteristic value is to be read from the cache (regardless of whether it is present in the cache or not).

The characteristic value is returned from the cache if one is already present. This would be the case most of the time, as all the device attributes are cached at the time of pairing or association. However, if it is not present, the characteristic value is read directly from the device, and will be cached upon successfully reading it from the device. If kFlagForceReadFromCache or kFlagForceReadFromDevice is present, the characteristic value is read using the specified method.

Returned characteristics are cached upon successful retrieval of characteristics from the device directly. Unless a service-change event is received, the list of returned characteristics is not expected to change.

The parent service must be present in the cache, otherwise the function will fail. The parent service must

be a service returned by either `Services` or `IncludedServices`.

`Lasterror` and `LastErrorMessage` properties are set.

see also:

[https://msdn.microsoft.com/en-us/library/windows/hardware/hh450795\(v=vs.85\).aspx](https://msdn.microsoft.com/en-us/library/windows/hardware/hh450795(v=vs.85).aspx)

### 3.33.12 `GetDescriptorValue(Descriptor as WindowsBluetoothLEDescriptorMBS, Flags as Integer = 0) as WindowsBluetoothLEDescriptorValueMBS`

Plugin Version: 18.1, Platform: Windows, Targets: All.

**Function:** Gets the value of the specified descriptor.

**Notes:** `Descriptor`: The parent descriptor of the descriptor value to be retrieved.

`Flags`: Flags to modify the behavior of `GetDescriptorValue`.

Flag	Description
<code>kFlagNone</code>	The client does not have specific GATT requirements (default).
<code>kFlagConnectionEncrypted</code>	The client requests the data to be transmitted over an encrypted channel.
<code>kFlagConnectionAuthenticated</code>	The client requests the data to be transmitted over an authenticated channel.
<code>kFlagForceReadFromDevice</code>	The descriptor value is to be read directly from the device. This overwrites the one in the cache if one is already present.
<code>kFlagForceReadFromCache</code>	The descriptor value is to be read from the cache (regardless of whether it is present in the cache or not).

`Lasterror` and `LastErrorMessage` properties are set.

The descriptor value is returned from the cache if one is already present. This would be the case most of the time, as all the device attributes are cached at the time of pairing or association. However, if it is not present, the descriptor value is read directly from the device, and will be cached upon successfully reading it from the device. If `kFlagForceReadFromCache` or `kFlagForceReadFromDevice` is present, the descriptor value is read using the specified method.

Returned descriptor values are cached upon successful retrieval of descriptor values from the device directly. Unless a service-change event is received, the descriptor values is not expected to change.

The parent service must be present in the cache, otherwise the function will fail. The parent service must be a service returned by either `Services` or `IncludedServices`.

see also:

[https://msdn.microsoft.com/en-us/library/windows/hardware/hh450798\(v=vs.85\).aspx](https://msdn.microsoft.com/en-us/library/windows/hardware/hh450798(v=vs.85).aspx)

### 3.33.13 IncludedServices(ParentService as WindowsBlueToothLEServiceMBS, Flags as Integer = 0) as WindowsBlueToothLEServiceMBS()

Plugin Version: 18.1, Platform: Windows, Targets: All.

**Function:** Gets all the included services available for a given service.

**Notes:** ParentService: Address of a WindowsBlueToothLEServiceMBS object that contains the parent service of the included services to be retrieved. This parameter is optional if a service handle was passed to hDevice, in which case the service specified by the service handle will be treated as the parent.

Flags: Optional flags, currently none defined.

Returned services are cached upon successful retrieval of services from the device directly. Unless a service-change event is received, the list of returned services is not expected to change.

Lasterror and LastErrorMessage properties are set.

see also:

[https://msdn.microsoft.com/en-us/library/windows/hardware/hh450800\(v=vs.85\).aspx](https://msdn.microsoft.com/en-us/library/windows/hardware/hh450800(v=vs.85).aspx)

### 3.33.14 RegisterChangeEvent(Characteristics()) as WindowsBlueToothLECharacteristicMBS)

Plugin Version: 18.1, Platform: Windows, Targets: All.

**Function:** Registers a ChangedEvent event to be called back during a characteristic value change event on the given characteristic identified by its characteristic handle.

**Notes:** Characteristics: List of characteristics to watch for changes.

Lasterror and LastErrorMessage properties are set.

see also:

[https://msdn.microsoft.com/en-us/library/windows/hardware/hh450804\(v=vs.85\).aspx](https://msdn.microsoft.com/en-us/library/windows/hardware/hh450804(v=vs.85).aspx)

### 3.33.15 Services(Flags as Integer = 0) as WindowsBlueToothLEServiceMBS()

Plugin Version: 18.1, Platform: Windows, Targets: All.

**Function:** Gets all the primary services available for a server.

**Notes:** Flags: Currently not used.

Lasterror and LastErrorMessage properties are set.

see also:

[https://msdn.microsoft.com/en-us/library/windows/hardware/hh450795\(v=vs.85\).aspx](https://msdn.microsoft.com/en-us/library/windows/hardware/hh450795(v=vs.85).aspx)

### 3.33.16 SetCharacteristicValue(Characteristic as WindowsBlueToothLECharacteristicMBS, data as MemoryBlock, ReliableWriteContextID as UInt64, Flags as Integer = 0) as Boolean

Plugin Version: 18.1, Platform: Windows, Targets: All.

**Function:** Writes the specified characteristic value to the Bluetooth device.

**Notes:** Characteristic: The object containing the parent characteristic.

CharacteristicValue: The object containing the characteristic value.

ReliableWriteContext: Optionally the context describing the reliable write operation returned from a previous call to BeginReliableWrite.

Flags: Flags to modify the behavior of SetCharacteristicValue.

Flag	Description
kFlagNone	The client does not have specific GATT requirements (default).
kFlagConnectionEncrypted	The client requests the data to be transmitted over an encrypted channel.
kFlagConnectionAuthenticated	The client requests the data to be transmitted over an authenticated channel.
kFlagWriteWithoutResponse	Write without response.
kFlagSignedWrite	Signed write. Profile drivers must use with <code>BLUETOOTH_GATT_FLAG_WRITE_WITHOUT_RESPONSE</code> in order to produce signed write without a response.

Lasterror and LastErrorMessage properties are set.

see also:

[https://msdn.microsoft.com/en-us/library/windows/hardware/hh450806\(v=vs.85\).aspx](https://msdn.microsoft.com/en-us/library/windows/hardware/hh450806(v=vs.85).aspx)

### 3.33.17 SetDescriptorValue(Descriptor as WindowsBlueToothLEDescriptorMBS, DescriptorValue as WindowsBlueToothLEDescriptorValueMBS, Flags as Integer = 0) as Boolean

Plugin Version: 18.1, Platform: Windows, Targets: All.

**Function:** Writes the specified descriptor value to the Bluetooth device.

**Notes:** Descriptor: The parent descriptor.

DescriptorValue: The descriptor's value.

Flags: Flags to modify the behavior of SetDescriptorValue:

Flag	Description
kFlagNone	The client does not have specific GATT requirements (default).
kFlagConnectionEncrypted	The client requests the data to be transmitted over an encrypted channel.
kFlagConnectionAuthenticated	The client requests the data to be transmitted over an authenticated channel.

Lasterror and LastErrorMessage properties are set.

see also:

[https://msdn.microsoft.com/en-us/library/windows/hardware/hh450807\(v=vs.85\).aspx](https://msdn.microsoft.com/en-us/library/windows/hardware/hh450807(v=vs.85).aspx)

### 3.33.18 Properties

#### 3.33.19 Handle as Integer

Plugin Version: 18.1, Platform: Windows, Targets: All.

**Function:** The internal object reference.

**Notes:** Either handle for device or service on a device.  
(Read and Write property)

#### 3.33.20 LastError as Integer

Plugin Version: 18.1, Platform: Windows, Targets: All.

**Function:** The last error code.

**Notes:** (Read and Write property)

#### 3.33.21 LastErrorMessage as String

Plugin Version: 18.1, Platform: Windows, Targets: All.

**Function:** The text message for last error.

**Notes:** (Read and Write property)

### 3.33.22 Path as String

Plugin Version: 18.1, Platform: Windows, Targets: All.

**Function:** The path used to open device.

**Notes:** (Read and Write property)

### 3.33.23 Events

#### 3.33.24 ChangeEvent(ChangedAttributeHandle as Integer, CharacteristicValue as MemoryBlock)

Plugin Version: 18.1, Platform: Windows, Targets: .

**Function:** The event called when a value changed.

**Notes:** Only called if you used RegisterChangeEvent before.

### 3.33.25 Constants

Flags

Constant	Value	Description
kFlagConnectionAuthenticated	&h00000002	The client requests the data to be transmitted over an authenticated channel.
kFlagConnectionEncrypted	&h00000001	The client requests the data to be transmitted over an encrypted channel.
kFlagForceReadFromCache	&h00000008	The descriptor value is to be read from the cache (regardless of whether it is present in the cache or not).
kFlagForceReadFromDevice	&h00000004	The descriptor value is to be read directly from the device. This overwrites one in the cache if one is already present.
kFlagNone	&h00000000	No flag.
kFlagReturnAll	&h00000040	
kFlagSignedWrite	&h00000010	Signed write. Profile drivers must use with kFlagWriteWithoutResponse in order to produce signed write without a response.
kFlagWriteWithoutResponse	&h00000020	Write without response.

## 3.34 class WindowsBlueToothLEServiceMBS

### 3.34.1 class WindowsBlueToothLEServiceMBS

Plugin Version: 18.1, Platform: Windows, Targets: All.

**Function:** The WindowsBlueToothLEServiceMBS class describes a Bluetooth Low Energy (LE) generic attribute (GATT) profile service.

**Notes:** This is an abstract class. You can't create an instance, but you can get one from various plugin functions.

### 3.34.2 Methods

### 3.34.3 Constructor

Plugin Version: 18.1, Platform: Windows, Targets: All.

**Function:** The private constructor.

### 3.34.4 Properties

### 3.34.5 AttributeHandle as Integer

Plugin Version: 18.1, Platform: Windows, Targets: All.

**Function:** The handle to the Bluetooth LE GATT profile attributes.

**Notes:** (Read and Write property)

### 3.34.6 ServiceUUID as String

Plugin Version: 18.1, Platform: Windows, Targets: All.

**Function:** The Universally Unique ID (UUID) of the Bluetooth LE GATT profile service.

**Notes:** (Read and Write property)

## 3.35 class WindowsBluetoothRadioInfoMBS

### 3.35.1 class WindowsBluetoothRadioInfoMBS

Plugin Version: 18.3, Platform: Windows, Targets: All.

**Function:** This class contains information about a Bluetooth radio.

**Notes:** This is an abstract class. You can't create an instance, but you can get one from various plugin functions.

**Blog Entries**

- [MBS Xojo Plugins, version 23.4pr1](#)
- [MBS Xojo Plugins, version 18.3pr4](#)

### 3.35.2 Methods

### 3.35.3 Constructor

Plugin Version: 18.3, Platform: Windows, Targets: All.

**Function:** The private constructor.

### 3.35.4 Properties

### 3.35.5 Address as String

Plugin Version: 18.3, Platform: Windows, Targets: All.

**Function:** Address of the local Bluetooth radio.

**Notes:** (Read only property)

### 3.35.6 ClassofDevice as Integer

Plugin Version: 18.3, Platform: Windows, Targets: All.

**Function:** Device class for the local Bluetooth radio.

**Notes:** (Read only property)

### 3.35.7 Manufacturer as Integer

Plugin Version: 18.3, Platform: Windows, Targets: All.

**Function:** Manufacturer of the Bluetooth radio, expressed as a BTH\_MFG\_Xxx value.

**Notes:** For more information about the Bluetooth assigned numbers document and a current list of values, see the Bluetooth specification at [www.bluetooth.com](http://www.bluetooth.com).

(Read only property)

### 3.35.8 Name as String

Plugin Version: 18.3, Platform: Windows, Targets: All.

**Function:** Name of the local Bluetooth radio.

**Notes:** (Read only property)

### 3.35.9 Subversion as Integer

Plugin Version: 18.3, Platform: Windows, Targets: All.

**Function:** This member contains data specific to individual Bluetooth device manufacturers.

**Notes:** (Read only property)

## 3.36 class WindowsBluetoothRadioMBS

### 3.36.1 class WindowsBluetoothRadioMBS

Plugin Version: 18.3, Platform: Windows, Targets: All.

**Function:** The class for a bluetooth radio.

**Notes:** This is an abstract class. You can't create an instance, but you can get one from various plugin functions.

**Blog Entries**

- [MBS Xojo Plugins, version 18.3pr4](#)

### 3.36.2 Methods

### 3.36.3 Constructor

Plugin Version: 18.3, Platform: Windows, Targets: All.

**Function:** The private constructor.

### 3.36.4 DeviceInfo(Address as String) as WindowsBluetoothDeviceInfoMBS

Plugin Version: 18.3, Platform: Windows, Targets: All.

**Function:** Retrieves information about a remote Bluetooth device.

**Notes:** The Bluetooth device must have been previously identified through a successful device inquiry function call.

Lasterror is set.

### 3.36.5 EnableDiscovery(radio as WindowsBluetoothRadioMBS = nil, enable as boolean = true) as Boolean

Plugin Version: 18.3, Platform: Windows, Targets: All.

**Function:** Changes the discovery state of a local Bluetooth radio or radios.

**Notes:** Enabled: Flag specifying whether discovery is to be enabled or disabled. Set to TRUE to enable discovery, set to FALSE to disable discovery.

Returns true if the discovery state was successfully changed.

Returns false if discovery state was not changed.

Use the `IsDiscoverable` function to determine the current state of a Bluetooth radio. Windows ensures that a discoverable system is connectable, and as such, the radio must allow incoming connections prior to making a radio discoverable. Failure to allow incoming connections results in the `BluetoothEnableDiscovery` function call failing.

When `EnableDiscovery` changes the discovery state, the new state is valid for the lifetime of the calling application. Additionally, if a Bluetooth radio previously made discoverable with this function is disabled and re-enabled via the application, discoverability will not persist. Once the calling application terminates, the discovery state of the specified Bluetooth radio reverts to the state it was in before `EnableDiscovery` was called.

### 3.36.6 `EnableIncomingConnections`(radio as `WindowsBluetoothRadioMBS = nil`, enable as boolean = true) as Boolean

Plugin Version: 18.3, Platform: Windows, Targets: All.

**Function:** Modifies whether a local Bluetooth radio accepts incoming connections.

**Notes:** Flag specifying whether incoming connection acceptance is to be enabled or disabled. Set to true to enable incoming connections, set to false to disable incoming connections.

Returns true if the incoming connection state was successfully changed.

Returns false if incoming connection state was not changed.

A radio that is non-connectable is non-discoverable. The radio must be made non-discoverable prior to making a radio non-connectable. Failure to make a radio non-discoverable prior to making it non-connectable will result in failure of the `EnableIncomingConnections` function call.

### 3.36.7 `FirstRadio` as `WindowsBluetoothRadioMBS`

Plugin Version: 18.3, Platform: Windows, Targets: All.

**Function:** Queries first radio.

**Notes:** `Lasterror` is set.

### 3.36.8 `Radios` as `WindowsBluetoothRadioMBS()`

Plugin Version: 18.3, Platform: Windows, Targets: All.

**Function:** Queries radios.

**Notes:** `Lasterror` is set.

### 3.36.9 RemoveDevice(Address as string) as boolean

Plugin Version: 18.3, Platform: Windows, Targets: All.

**Function:** Removes authentication between a Bluetooth device and the computer and clears cached service information for the device.

**Notes:** Lasterror is set.

### 3.36.10 UpdateDeviceRecord(Address as string, Name as String) as boolean

Plugin Version: 18.3, Platform: Windows, Targets: All.

**Function:** Updates the local computer cache about a Bluetooth device.

**Notes:** Lasterror is set.

When updating a Bluetooth device record, please pass:

Address: Must be a previously found radio address.

Name: Must contain the new name to be stored.

### 3.36.11 Properties

### 3.36.12 Handle as Integer

Plugin Version: 18.3, Platform: Windows, Targets: All.

**Function:** The internal object reference.

**Notes:** (Read and Write property)

### 3.36.13 Info as WindowsBlueToothRadioInfoMBS

Plugin Version: 18.3, Platform: Windows, Targets: All.

**Function:** Obtains information about a Bluetooth radio.

**Notes:** Lasterror is set.

(Read only property)

### 3.36.14 IsConnectable as Boolean

Plugin Version: 18.3, Platform: Windows, Targets: All.

**Function:** Determines whether a Bluetooth radio or radios is connectable.

**Notes:** Returns true if at least one Bluetooth radio is accepting incoming connections. Returns false if no radios are accepting incoming connections.

If multiple Bluetooth radios exist, the first radio to return that it is connectable causes the IsConnectable function to succeed.

(Read only property)

### 3.36.15 IsDiscoverable as Boolean

Plugin Version: 18.3, Platform: Windows, Targets: All.

**Function:** Determines whether a Bluetooth radio or radios is discoverable.

**Notes:** Returns true if at least one Bluetooth radio is discoverable.

Returns false if no Bluetooth radios are discoverable.

(Read only property)

### 3.36.16 Lasterror as Integer

Plugin Version: 18.3, Platform: Windows, Targets: All.

**Function:** The last error code.

**Notes:** (Read and Write property)

### 3.36.17 Constants

Manufacturer Constants

Constant	Value	Description
kManufacturer3Com	5	3Com
kManufacturerAlcatel	36	Alcatel
kManufacturerAtmel	19	Atmel
kManufacturerAvmBerlin	31	AVM Berlin
kManufacturerBandspeed	32	Bandspeed
kManufacturerBroadcom	15	Broadcom
kManufacturerConexant	28	Conexant
kManufacturerCsr	10	Csr
kManufacturerCTechnologies	38	CTechnologies
kManufacturerDigianswer	12	Digianswer
kManufacturerEricsson	0	Ericsson
kManufacturerHitachi	41	Hitachi
kManufacturerIBM	3	IBM
kManufacturerInfineon	9	Infineon
kManufacturerIntel	2	Intel
kManufacturerInternalUse	65535	InternalUse
kManufacturerInventel	30	Inventel
kManufacturerKcTechnology	22	KcTechnology
kManufacturerLucent	7	Lucent
kManufacturerMacronixInternational	44	MacronixInternational
kManufacturerMansella	33	Mansella
kManufacturerMicrosoft	6	Microsoft
kManufacturerMitel	16	Mitel
kManufacturerMitsubishi	20	Mitsubishi
kManufacturerMotorola	8	Motorola
kManufacturerNEC	34	NEC
kManufacturerNewlogic	23	Newlogic
kManufacturerNokia	1	Nokia
kManufacturerOpenInterface	39	OpenInterface
kManufacturerParthus	14	Parthus
kManufacturerPhilipsSemiconductor	37	PhilipsSemiconductor
kManufacturerQualcomm	29	Qualcomm
kManufacturerRfMicroDevices	40	RfMicroDevices
kManufacturerRohdeSchwarz	25	RohdeSchwarz
kManufacturerRtxTelecom	21	RtxTelecom
kManufacturerSignia	27	Signia
kManufacturerSiliconwave	11	Siliconwave
kManufacturerSymbolTechnologies	42	SymbolTechnologies
kManufacturerTenovis	43	Tenovis
kManufacturerTi	13	Ti
kManufacturerToshiba	4	Toshiba
kManufacturerTransilica	24	Transilica
kManufacturerTtpcom	26	Ttpcom
kManufacturerWaveplusTechnologyCo	35	WaveplusTechnologyCo
kManufacturerWidcomm	17	Widcomm
kManufacturerZeevo	18	Zeevo

## 3.37 class WindowsBlueToothSelectDeviceDialogMBS

### 3.37.1 class WindowsBlueToothSelectDeviceDialogMBS

Plugin Version: 18.3, Platform: Windows, Targets: All.

**Function:** This class facilitates and manages the visibility, authentication, and selection of Bluetooth devices and services.

#### Blog Entries

- [MBS Xojo Plugins, version 21.6pr3](#)
- [MBS Xojo Plugins, version 18.3pr4](#)
- [Bluetooth for Xojo](#)

### 3.37.2 Methods

#### 3.37.3 Constructor

Plugin Version: 18.3, Platform: Windows, Targets: All.

**Function:** The constructor.

#### 3.37.4 Devices as WindowsBlueToothDeviceInfoMBS()

Plugin Version: 18.3, Platform: Windows, Targets: All.

**Function:** Queries list of devices.

**Notes:** The list of selected devices after calling ShowDialog method.

#### 3.37.5 ShowDialog as Boolean

Plugin Version: 18.3, Platform: Windows, Targets: All.

**Function:** Enables Bluetooth device selection.

**Notes:** Sets Cancelled and Devices property.

Returns true if a user selected a device.

The ShowDialog function opens a common dialog box for selecting Bluetooth devices. The list of devices displayed to the user is determined by the flags and settings the caller specifies in the WindowsBlueTooth-SelectDeviceDialogMBS object.

If `BluetoothSelectDevices` returns true, the `Devices` member contains selected object. The caller should verify that the `Authenticated` and `Remembered` flags in the `WindowsBluetoothDeviceInfoMBS` objects to determine which devices were successfully authenticated, and which devices are valid selections for the user.

see also

[https://msdn.microsoft.com/en-us/library/windows/desktop/aa362891\(v=vs.85\).aspx](https://msdn.microsoft.com/en-us/library/windows/desktop/aa362891(v=vs.85).aspx)

### 3.37.6 Properties

#### 3.37.7 `AddNewDeviceWizard` as Boolean

Plugin Version: 18.3, Platform: Windows, Targets: All.

**Function:** If true, starts the Add New Device wizard.

**Notes:** (Read and Write property)

#### 3.37.8 `Cancelled` as Boolean

Plugin Version: 18.3, Platform: Windows, Targets: All.

**Function:** Set to true, if dialog was cancelled.

**Notes:** (Read and Write property)

#### 3.37.9 `ClassOfDevices` as Dictionary

Plugin Version: 18.3, Platform: Windows, Targets: All.

**Function:** The dictionary to select classes of devices.

**Notes:** Provided for specification and retrieval of Bluetooth Class Of Device (COD) information.

Key is COD mask and value is description text.

**CODMask:** A mask to compare to determine the class of device. The major and minor codes of `ulCODMask` are used to compare the class of device found. If a major code is provided it must match the major code returned by the remote device, such that `GET_COD_MAJOR(ulCODMask)` is equal to `GET_COD_MAJOR( [ class of device of the remote device ] )`.

(Read and Write property)

### 3.37.10 ForceAuthentication as Boolean

Plugin Version: 18.3, Platform: Windows, Targets: All.

**Function:** If true, forces authentication before returning.

**Notes:** (Read and Write property)

### 3.37.11 Info as String

Plugin Version: 18.3, Platform: Windows, Targets: All.

**Function:** Sets the information text when not "".

**Notes:** (Read and Write property)

### 3.37.12 Parent as Variant

Plugin Version: 18.3, Platform: Windows, Targets: Desktop only.

**Function:** Handle to the parent window.

**Notes:** Set to nil for no parent.

Can reference a Window or DesktopWindow object.

(Read and Write property)

### 3.37.13 ShowAuthenticated as Boolean

Plugin Version: 18.3, Platform: Windows, Targets: All.

**Function:** If true, authenticated devices are shown in the picker.

**Notes:** (Read and Write property)

### 3.37.14 ShowRemembered as Boolean

Plugin Version: 18.3, Platform: Windows, Targets: All.

**Function:** If true, remembered devices are shown in the picker.

**Notes:** (Read and Write property)

### 3.37.15 ShowUnknown as Boolean

Plugin Version: 18.3, Platform: Windows, Targets: All.

**Function:** If true, unknown devices that are not authenticated or remembered are shown in the picker.

**Notes:** (Read and Write property)

### 3.37.16 SkipServicesPage as Boolean

Plugin Version: 18.3, Platform: Windows, Targets: All.

**Function:** If true, skips the Services page in the Add New Device wizard.

**Notes:** (Read and Write property)

### 3.37.17 Events

### 3.37.18 DeviceFilter(device as WindowsBlueToothDeviceInfoMBS) as boolean

Plugin Version: 18.3, Platform: Windows, Targets: .

**Function:** An event to filter devices.

**Notes:** Return true to skip device.

## 3.38 class WindowsBluetoothServiceMBS

### 3.38.1 class WindowsBluetoothServiceMBS

Plugin Version: 18.3, Platform: Windows, Targets: All.

**Function:** The class for details on a bluetooth service.

**Notes:** This is an abstract class. You can't create an instance, but you can get one from various plugin functions.

**Blog Entries**

- [MBS Xojo Plugins, version 18.3pr4](#)

### 3.38.2 Methods

### 3.38.3 Constructor

Plugin Version: 18.3, Platform: Windows, Targets: All.

**Function:** The private constructor.

### 3.38.4 Properties

### 3.38.5 Comment as String

Plugin Version: 18.3, Platform: Windows, Targets: All.

**Function:** The comment for the service.

**Notes:** (Read only property)

### 3.38.6 Name as String

Plugin Version: 18.3, Platform: Windows, Targets: All.

**Function:** The name of the service.

**Notes:** (Read only property)

### 3.38.7 Port as Integer

Plugin Version: 18.3, Platform: Windows, Targets: All.

**Function:** The network port.

**Notes:** e.g. 13

Range from 1 to 31.

(Read only property)

### 3.38.8 Properties as Dictionary

Plugin Version: 18.3, Platform: Windows, Targets: All.

**Function:** Queries properties for the service.

**Notes:** (Read only property)

### 3.38.9 RemoteAddress as String

Plugin Version: 18.3, Platform: Windows, Targets: All.

**Function:** The remote address.

**Notes:** e.g. "(44:00:10:12:56:78):13"

(Read only property)

## 3.39 class WindowsBlueToothSocketMBS

### 3.39.1 class WindowsBlueToothSocketMBS

Plugin Version: 18.1, Platform: Windows, Targets: All.

**Function:** The class for connecting via bluetooth to a device.

#### Blog Entries

- [MBS Xojo Plugins, version 23.4pr2](#)
- [MBS Xojo Plugins, version 18.4pr9](#)
- [MBS Xojo Plugins 18.3](#)
- [MBS Xojo Plugins, version 18.3pr4](#)
- [Bluetooth for Xojo](#)

### 3.39.2 Methods

#### 3.39.3 Accept(byref RemoteAddress as String, byref RemotePort as Integer, NewSocket as WindowsBlueToothSocketMBS) as WindowsBlueToothSocketMBS

Plugin Version: 18.1, Platform: Windows, Targets: All.

**Function:** Accepts a new incoming connection.

**Notes:** Bluetooth uses the accept function to enable incoming connection attempts on a socket.

RemoteAddress and RemotePort are set to address of remote peer.

If you like to pass in your own subclass object for NewSocket, we can use that socket object. Otherwise, we make a new WindowsBlueToothSocketMBS object.

Lasterror is set.

#### 3.39.4 Bind(Port as Integer = -1, BluetoothAddress as string = "")

Plugin Version: 18.1, Platform: Windows, Targets: All.

**Function:** Binds to a port and optional address.

**Notes:** Lasterror is set.

BindAddress and BindPort are set.

BluetoothAddress: When used with the bind function, must be "" or a valid local radio address.

Port: Must be -1 for automatic or valid port from 1 to 30.

On client applications, the port member must be zero to enable an appropriate local endpoint to be assigned. On server applications, the port member must be a valid port number or `kPortAny`; ports automatically assigned using `kPortAny` may be queried subsequently with a call to the `getsockname` function. The valid range for requesting a specific RFCOMM port is 1 through 30. Server channels are global resource, and only 30 server channels are available for RFCOMM on any Bluetooth device, which must be shared by all Windows Sockets that belong to the Bluetooth address family. If no server channel is available, or if the specified server channel is already reserved, the `bind` call fails.

Upon successful return from `bind`, the server channel is reserved until the socket is closed. Use the `getsockname` function to retrieve the channel number for SDP registration.

Applications should use auto-allocation for the server channel.

The `bind` function does not automatically advertise the server application using the Bluetooth SDP; applications must call the `Publish` function.

### 3.39.5 Close

Plugin Version: 18.3, Platform: Windows, Targets: All.

**Function:** Closes socket.

**Notes:** Called by destructor.

Does also `UnpublishRecord` if needed.

### 3.39.6 Connect(BluetoothAddress as string, Port as Integer, ServiceClassGUID as String = "", Blocking as boolean = true)

Plugin Version: 18.1, Platform: Windows, Targets: All.

**Function:** Connects to a bluetooth device.

**Notes:** Valid ports in range 1 to 31.

`Lasterror` is set.

`BluetoothAddress`: Address of the target Bluetooth device. If zero, a valid local Bluetooth device address is assigned when the `connect` or `accept` function is called. When used with the `connect` function, a valid remote radio address must be specified.

`serviceClassId`

Service Class Identifier of the socket. When used with the `bind` function, `serviceClassId` is ignored. Also ignored if the port is specified. For the `connect` function, specifies the unique Bluetooth service class ID of

the service to which it wants to connect. If the peer device has more than one port that corresponds to the service class identifier, the connect function attempts to connect to the first valid service; this mechanism can be used without prior SDP queries.

port: RFCOMM channel associated with the socket.

Added Blocking parameter in v23.4. If true, we block, so connect returns after connection is done. Pass false to return directly and check status later.

### 3.39.7 Constructor

Plugin Version: 18.1, Platform: Windows, Targets: All.

**Function:** Creates a new socket.

**Notes:** Socket address type is always AF\_BTH, type is SOCK\_STREAM and protocol is BTHPROTO\_RFCOMM.

### 3.39.8 Listen(BackLog as Integer = 2)

Plugin Version: 18.1, Platform: Windows, Targets: All.

**Function:** Listens for connections on this socket.

**Notes:** Lasterror is set.

### 3.39.9 Poll

Plugin Version: 18.1, Platform: Windows, Targets: All.

**Function:** Polls for new events.

**Notes:** May call NewConnection or DataAvailable event if data is available.

Calls SendComplete when sending is done.

Calls Error event when an error occurred.

This is normally called automatically by a timer for you.

But if you are in a tight loop, you can call it manually.

### 3.39.10 PublishRecord(SDPRecord as MemoryBlock)

Plugin Version: 18.1, Platform: Windows, Targets: All.

**Function:** Publish service record.

**Notes:** Lasterror is set.  
Sets the SDPRecordID property.

### 3.39.11 Read(size as integer, peek as boolean = false) as String

Plugin Version: 18.1, Platform: Windows, Targets: All.

**Function:** Reads data.

**Notes:** Please pass in size of desired data length to read.

Lasterror is set.

New data is returned (maybe shorter).

If peek is true, data is not removed from buffers.

### 3.39.12 ReadAll(peek as boolean = false) as String

Plugin Version: 18.1, Platform: Windows, Targets: All.

**Function:** Reads all available data.

**Notes:** Lasterror is set.

New data is returned.

If peek is true, data is not removed from buffers.

### 3.39.13 RegisterService(ServiceClassGUID as String, InstanceName as String, Comment as String = "")

Plugin Version: 18.1, Platform: Windows, Targets: All.

**Function:** Registers service.

**Notes:** Lasterror is set.

### 3.39.14 Send(data as MemoryBlock) as Integer

Plugin Version: 18.1, Platform: Windows, Targets: All.

**Function:** Sends data.

**Notes:** Lasterror is set.

Returns number of bytes sent.

Later raises SendComplete event when sending is done.

See also:

- 3.39.15 Send(data as String) as Integer

**3.39.15 Send(data as String) as Integer**

Plugin Version: 18.1, Platform: Windows, Targets: All.

**Function:** Sends data.

**Notes:** Lasterror is set.

Returns number of bytes sent.

Later raises SendComplete event when sending is done.

See also:

- 3.39.14 Send(data as MemoryBlock) as Integer

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**3.39.16 UnpublishRecord**

Plugin Version: 18.1, Platform: Windows, Targets: All.

**Function:** Unpublish service record.

**Notes:** Lasterror is set.

Clears SDPRecordID property.

**3.39.17 Properties****3.39.18 Authenticate as Boolean**

Plugin Version: 18.1, Platform: Windows, Targets: All.

**Function:** Whether to authenticate connection.

**Notes:** For disconnected sockets, the Authenticate options specifies whether authentication is required for a connect or accept operation to complete successfully. Setting this socket option actively initiates authentication during connection establishment, if the two Bluetooth devices were not previously authenticated. The user interface for passkey exchange, if necessary, is provided by the operating system outside the application context.

For outgoing connections that require authentication, the connect operation fails with WSAEACCES if authentication is not successful. In response, the application may prompt the user to authenticate the two Bluetooth devices before connection.

For incoming connections, the connection is rejected if authentication cannot be established and returns a WSAEHOSTDOWN error. For more information about authenticating Bluetooth devices, see BluetoothAuthenticateDevice function.

Lasterror is set.

(Read and Write property)

### 3.39.19 AvailableBytes as Integer

Plugin Version: 18.1, Platform: Windows, Targets: All.

**Function:** Queries available bytes in input buffer.

**Notes:** Lasterror is set.

Returns -1 if unknown.

(Read only property)

### 3.39.20 BindAddress as String

Plugin Version: 18.1, Platform: Windows, Targets: All.

**Function:** The address the socket is bound to.

**Notes:** (Read only property)

### 3.39.21 BindPort as Integer

Plugin Version: 18.1, Platform: Windows, Targets: All.

**Function:** The port the socket is bound to.

**Notes:** (Read only property)

### 3.39.22 Encrypt as Boolean

Plugin Version: 18.1, Platform: Windows, Targets: All.

**Function:** Whether to encrypt connection.

**Notes:** On unconnected sockets, the Encrypt socket option enforces encryption to establish a connection. Encryption is only available for authenticated connections. For incoming connections, a connection for which encryption cannot be established is automatically rejected and returns WSAEHOSTDOWN as the error. For outgoing connections, the connect function fails with WSAEACCES if encryption cannot be established. In response, the application may prompt the user to authenticate the two Bluetooth devices before connection. For more information about authenticating Bluetooth devices, see BluetoothAuthenticateDevice.

Windows XP with SP2: For a socket that is connected and authenticated, SO\_BTH\_ENCRYPT starts encryption.

(Read and Write property)

### 3.39.23 Handle as Integer

Plugin Version: 18.1, Platform: Windows, Targets: All.

**Function:** The internal socket reference number.

**Notes:** (Read only property)

### 3.39.24 Lasterror as Integer

Plugin Version: 18.1, Platform: Windows, Targets: All.

**Function:** The last error code.

**Notes:** (Read only property)

### 3.39.25 LastErrorMessage as String

Plugin Version: 18.3, Platform: Windows, Targets: All.

**Function:** The last error message.

**Notes:** (Read only property)

### 3.39.26 Listening as Boolean

Plugin Version: 18.1, Platform: Windows, Targets: All.

**Function:** Whether we are listening.

**Notes:** Set to true on success by Bind method.

(Read only property)

### 3.39.27 LocalAddress as String

Plugin Version: 18.1, Platform: Windows, Targets: All.

**Function:** Queries local bluetooth address.

**Notes:** Lasterror is set.

Value is empty if not known.

(Read only property)

### 3.39.28 LocalPort as Integer

Plugin Version: 18.1, Platform: Windows, Targets: All.

**Function:** Queries local port.

**Notes:** Value is -1 if not set.

Lasterror is set.

(Read only property)

### 3.39.29 MTU as Integer

Plugin Version: 18.1, Platform: Windows, Targets: All.

**Function:** The MTU property.

**Notes:** The MTU socket option is an advanced option used primarily for validation. The MTU option obtains or sets default RFCOMM MTU (maximum transmission unit) for connection negotiation to a value different than the RFCOMM protocol-default value.

Because MTU is affected by the underlying L2CAP MTU, and protocol and application minimums and maximums, the default value for SO\_BTH\_MTU is only a starting point for negotiation with the remote peer, and the final negotiated MTU is likely to vary from the default. Setting the MTU value may negatively affect throughput, and as such, any modification should be performed with knowledge of the underlying Bluetooth protocol.

The MTU socket option can be performed on connected sockets, but has no effect if the negotiation has already completed. Setting it on the listening (server) socket has no effect.

The amount of data that an application can send or receive in a single socket call is not affected by the MTU; MTU only affects how the underlying Windows Sockets service provider segments packets for transport. Both the proposed MTU and the MTU ultimately negotiated must be between RFCOMM\_MIN\_MTU (&h17) and RFCOMM\_MAX\_MTU (&3F3), as defined in the Ws2bth.h header file.

(Read and Write property)

### 3.39.30 MTUMax as Integer

Plugin Version: 18.1, Platform: Windows, Targets: All.

**Function:** The MTU max property.

**Notes:** The MTUMax socket option is an advanced option used primarily for validation. The MTUMax socket option sets the maximum RFCOMM MTU (maximum transmission unit) for connection negotiation. Connections with an RFCOMM MTU equal to or greater than this value fail during the connect/accept process. While setting this socket option is allowed for a connected socket, it has no effect if the negotiation has completed. Setting this socket option on a listening socket propagates the value for all incoming connections. The MAX MTU value must be between RFCOMM\_MIN\_MTU (&h17) and RFCOMM\_MAX\_MTU (&3F3), as defined in the Ws2bth.h header file.

(Read and Write property)

### 3.39.31 MTU Min as Integer

Plugin Version: 18.1, Platform: Windows, Targets: All.

**Function:** The MTU min property.

**Notes:** The MTU Min socket option is an advanced option used primarily for validation. The MTU Min socket option sets the minimum RFCOMM MTU (maximum transmission unit) for connection negotiation. Connections with an RFCOMM MTU smaller than this value fail during the connect/accept process. While setting this socket option is allowed for a connected socket, it has no effect if the negotiation has completed. Setting this socket option on a listening socket propagates the value for all incoming connections.

Only a listening socket can revise the MTU downward, therefore if the value proposed by the connecting socket is less than the value set for MTU Min on the listening socket, the connection is refused. The minimum MTU must be between RFCOMM\_MIN\_MTU (&h17) and RFCOMM\_MAX\_MTU (&3F3), as defined in the Ws2bth.h header file.

(Read and Write property)

### 3.39.32 RemoteAddress as String

Plugin Version: 18.1, Platform: Windows, Targets: All.

**Function:** Queries remote address.

**Notes:** Lasterror is set.

Value is empty if not known.

(Read only property)

### 3.39.33 RemotePort as Integer

Plugin Version: 18.1, Platform: Windows, Targets: All.

**Function:** Queries remote port.

**Notes:** Lasterror is set.

Value is -1 if not set.

(Read only property)

### 3.39.34 SDPRecordID as Integer

Plugin Version: 18.1, Platform: Windows, Targets: All.

**Function:** The SPF record ID for published service.

**Notes:** (Read only property)

### 3.39.35 Events

#### 3.39.36 DataAvailable

Plugin Version: 18.1, Platform: Windows, Targets: .

**Function:** The data available event.

**Notes:** Called when data is coming in.

#### 3.39.37 Error

Plugin Version: 18.1, Platform: Windows, Targets: .

**Function:** The event called when an error occurred.

#### 3.39.38 NewConnection

Plugin Version: 18.1, Platform: Windows, Targets: .

**Function:** A new connection is needed.

**Notes:** Please call Accept method to accept the new connection and link it to a socket.

#### 3.39.39 SendComplete

Plugin Version: 18.1, Platform: Windows, Targets: .

**Function:** Sending data is complete.

#### 3.39.40 Constants

Constants

Constant	Value	Description
kPortAny	-1	Any port.

## Chapter 4

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# Chapter 5

## The FAQ

### 5.0.1 Can anyone help me convert seconds to time in this format hh:mm:ss?

Plugin Version: all, Platforms: macOS, Linux, Windows.

**Answer:** Sure, here's a routine I use (which has an advantage over the previously-posted Date-based solution in that you don't have to rely on the creation of an object – all that happens is some division and string concatenation):

**Example:**

```
Function SecsToTimeString(timeInSecs as Integer, padHours as boolean, padMinutes as boolean) as string
// Given an amount time (in seconds), generates a string representing that amount
// of time. The padHours and padMinutes parameters determine whether to display
// hours and minutes if their values are zero.
```

```
// Examples:
// timeInSecs = 90, padHours = true; returns "00:01:30"
// timeInSecs = 1, padHours = false, padMinutes = true; returns "00:01"
// timeInSecs = 3601, padMinutes = false; returns "01:00:01"
```

```
dim hours, minutes, seconds as Integer
dim hoursString, minutesString as string
```

```
hours = timeInSecs / 3600
minutes = (timeInSecs mod 3600) / 60
seconds = timeInSecs mod 60
```

```
if hours = 0 then
if padHours then
hoursString = "00:"
else
hoursString = ""
end if
```

```

else
hoursString = Format(hours, "##\:")
end if
if minutes = 0 then
if hours <>0 or padMinutes then
minutesString = "00:"
else
minutesString = ""
end if
else
minutesString = Format(minutes, "00\:")
end if

return hoursString + minutesString + Format(seconds, "00")
End Function

```

**Notes:** (from the rb mailinglist)

### 5.0.2 Do you have plugins for Android?

Plugin Version: all, Platforms: macOS, Linux, Windows.

**Answer:** Since there is no plugin SDK for Android, we have no way to make a plugin for Android.

**Notes:** We support macOS, Windows, Linux and iOS.

### 5.0.3 How do I get the proper highlight color on Mac OS X for active/inactive selection?

Plugin Version: all, Platforms: macOS, Linux, Windows.

**Answer:** You can use functions from NSColor to get proper highlight color in RGB:

**Example:**

```

Function ProperHighlightColor(active as Boolean) As Color
#if TargetCocoa
Dim theColor As NSColorMBS
If active Then
theColor = NSColorMBS.alternateSelectedControlColor
Else
theColor = NSColorMBS.secondarySelectedControlColor
End If

```

```

Dim rgbColor As NSColorMBS = theColor.colorUsingColorSpaceName(NSColorSpaceMBS.NSCalibrate-

```

```

dRGBColorSpace)
If rgbColor <>Nil Then
Dim red as Integer = rgbColor.redComponent * 255.0
Dim green as Integer = rgbColor.greenComponent * 255.0
Dim blue as Integer = rgbColor.blueComponent * 255.0
Return RGB(red, green, blue)
Else
Return HighlightColor
End If
#else
return HighlightColor
#endif
End Function

```

**Notes:** As you see we convert color to Calibrated RGB for best results.  
See also:

- 5.0.4 How to catch delete key? 207
- 5.0.5 How to convert cmyk to rgb? 208
- 5.0.6 How to delete a folder? 209
- 5.0.7 How to detect if CPU is 64bit processor? 210
- 5.0.8 How to query variant type string for a variant? 211
- 5.0.9 How to refresh a htmlviewer on Windows? 212

## 5.0.4 How to catch delete key?

Plugin Version: all, Platforms: macOS, Linux, Windows.

**Answer:** The following is the code in keydown event catches delete or backspace keys.

**Example:**

```

Function KeyDown(Key As String) As Boolean
if asc(key) = 8 or asc(key) = 127 then
MsgBox "Delete"
Return true
end if
End Function

```

See also:

- 5.0.3 How do I get the proper highlight color on Mac OS X for active/inactive selection? 206

- 5.0.5 How to convert cmyk to rgb? 208
- 5.0.6 How to delete a folder? 209
- 5.0.7 How to detect if CPU is 64bit processor? 210
- 5.0.8 How to query variant type string for a variant? 211
- 5.0.9 How to refresh a htmlviewer on Windows? 212

### 5.0.5 How to convert cmyk to rgb?

Plugin Version: all, Platforms: macOS, Linux, Windows.

**Answer:**

The following is the code to convert cmyk values to an RGB color datatype.

It's just a basic estimate of the color values. If you are looking for completely color accurate solution, this is not it. It should work for most people. :)

**Example:**

**Function** CMYKToRGB(c as Integer, m as Integer, y as Integer, k as Integer) As color

// converts c,m,y,k values (0-100) to color data type RGB

// place this in a method. Supply C,M,Y,K values-

// it returns color datatype

```
dim color_RGB as color
```

```
dim r, g, b as Integer
```

```
r=255-round(2.55*(c+k))
```

```
if r<0 then
```

```
r=0
```

```
end if
```

```
g=255-round(2.55*(m+k))
```

```
if g<0 then
```

```
g=0
```

```
end if
```

```
b=255-round(2.55*(y+k))
```

```
if b<0 then
```

```
b=0
```

```
end if
```

```
color_RGB=RGB(r,g,b)
```

```
return color_RGB
```

```
End Function
```

**Notes:**

(from the rb mailinglist)  
See also:

- 5.0.3 How do I get the proper highlight color on Mac OS X for active/inactive selection? 206
- 5.0.4 How to catch delete key? 207
- 5.0.6 How to delete a folder? 209
- 5.0.7 How to detect if CPU is 64bit processor? 210
- 5.0.8 How to query variant type string for a variant? 211
- 5.0.9 How to refresh a htmlviewer on Windows? 212

**5.0.6 How to delete a folder?**

Plugin Version: all, Platforms: macOS, Linux, Windows.

**Answer:** The following is the code that deletes a folder recursively.

**Example:**

```
Sub deletefolder(f as folderitem)
dim files(-1) as FolderItem

if f=nil then Return

// delete single file
if f.Directory=false then
f.Delete
Return
end if

// get a list of all items in that folder
dim i,c as Integer
c=F.Count
for i=1 to c
files.Append f.TrueItem(i)
next

// delete each item
for each fo as FolderItem in files
if fo=nil then
' ignore
elseif fo.Directory then
deletefolder fo
fo.delete
else ' file
```

```
fo.Delete
end if
next
```

```
f.Delete
End Sub
```

See also:

- 5.0.3 How do I get the proper highlight color on Mac OS X for active/inactive selection? 206
- 5.0.4 How to catch delete key? 207
- 5.0.5 How to convert cmyk to rgb? 208
- 5.0.7 How to detect if CPU is 64bit processor? 210
- 5.0.8 How to query variant type string for a variant? 211
- 5.0.9 How to refresh a htmlviewer on Windows? 212

### 5.0.7 How to detect if CPU is 64bit processor?

Plugin Version: all, Platforms: macOS, Linux, Windows.

**Answer:** Via CPUID you can ask CPU:

**Example:**

```
dim c as new CPUIDMBS

if c.Flags(CPUIDMBS.kFeatureLM) then
MsgBox "64-bit CPU"
else
MsgBox "32-bit CPU"
end if
```

**Notes:** Should work on all intel compatible CPUs.

See also:

- 5.0.3 How do I get the proper highlight color on Mac OS X for active/inactive selection? 206
- 5.0.4 How to catch delete key? 207
- 5.0.5 How to convert cmyk to rgb? 208
- 5.0.6 How to delete a folder? 209
- 5.0.8 How to query variant type string for a variant? 211
- 5.0.9 How to refresh a htmlviewer on Windows? 212

## 5.0.8 How to query variant type string for a variant?

Plugin Version: 20.5, Platforms: macOS, Linux, Windows.

**Answer:** The following example function returns type string for variant.

**Example:**

```
Public Function VariantTypeString(v as Variant) as string
// Xojo's VarType doesn't know Unsigned integers
'Dim type As Integer = VarType(v)

// MBS VarType can detect unsigned integer
Dim type As Integer = GetVariantTypeMBS(v)

Dim IsArray As Boolean = BitwiseAnd(type, Variant.TypeArray) = Variant.TypeArray

// type without array
type = BitwiseAnd(type, Bitwise.OnesComplement(Variant.TypeArray))

// build a dictionary to map types on first call
Static TypeMap As Dictionary
If TypeMap = Nil Then
TypeMap = New Dictionary
TypeMap.Value(Variant.TypeBoolean) = "Boolean"
TypeMap.Value(Variant.TypeCFStringRef) = "CFStringRef"
TypeMap.Value(Variant.TypeColor) = "Color"
TypeMap.Value(Variant.TypeCString) = "CString"
TypeMap.Value(Variant.TypeCurrency) = "Currency"
TypeMap.Value(Variant.TypeDate) = "Date"
TypeMap.Value(Variant.TypeDateTime) = "DateTime"
TypeMap.Value(Variant.TypeDouble) = "Double"
TypeMap.Value(Variant.TypeInt32) = "Int32"
TypeMap.Value(Variant.TypeInt64) = "Int64"
TypeMap.Value(Variant.TypeInteger) = "Integer"
TypeMap.Value(Variant.TypeNil) = "Nil"
TypeMap.Value(Variant.TypeObject) = "Object"
TypeMap.Value(Variant.TypeOSType) = "OSType"
TypeMap.Value(Variant.TypePString) = "PString"
TypeMap.Value(Variant.TypePtr) = "Ptr"
TypeMap.Value(Variant.TypeSingle) = "Single"
TypeMap.Value(Variant.TypeString) = "String"
TypeMap.Value(Variant.TypeStructure) = "Structure"
TypeMap.Value(Variant.TypeText) = "Text"
TypeMap.Value(Variant.TypeWindowPtr) = "WindowPtr"
TypeMap.Value(Variant.TypeWString) = "WString"

// MBS extra types
TypeMap.Value(Variant.TypeInt32+100) = "UInt32"
TypeMap.Value(Variant.TypeInt64+100) = "UInt64"
```

End If

```
// lookup type

#if DebugBuild then
If Not TypeMap.HasKey(type) Then
Break // missing type
End If
#endif

If IsArray Then
Return "Array of " + TypeMap.Lookup(type,"?")
Else
Return TypeMap.Lookup(type,"?")
End If
End Function
```

See also:

- 5.0.3 How do I get the proper highlight color on Mac OS X for active/inactive selection? 206
- 5.0.4 How to catch delete key? 207
- 5.0.5 How to convert cmyk to rgb? 208
- 5.0.6 How to delete a folder? 209
- 5.0.7 How to detect if CPU is 64bit processor? 210
- 5.0.9 How to refresh a htmlviewer on Windows? 212

### 5.0.9 How to refresh a htmlviewer on Windows?

Plugin Version: all, Platforms: macOS, Linux, Windows.

**Answer:** You can ask the browser to reload the website with this code line:

**Example:**

```
call htmlViewer1.IERunJavaScriptMBS("javascript:document.location.reload()")
```

See also:

- 5.0.3 How do I get the proper highlight color on Mac OS X for active/inactive selection? 206
- 5.0.4 How to catch delete key? 207
- 5.0.5 How to convert cmyk to rgb? 208

- 5.0.6 How to delete a folder? 213
  - 5.0.7 How to detect if CPU is 64bit processor? 209
  - 5.0.8 How to query variant type string for a variant? 210
- 211

## 5.0.10 Is there an example for vector graphics in Xojo?

Plugin Version: all, Platforms: macOS, Linux, Windows.

**Answer:** Try this example inside the paint event of a window:

**Example:**

```
dim v as Group2D
dim r as RectShape
dim s as StringShape
```

```
const pi=3.14
```

```
s=new StringShape
s.Text="Hello World!"
s.TextFont="Geneva"
s.TextSize=24
s.FillColor=rgb(0,0,255)
s.Italic=true
s.y=5
s.x=0
```

```
r=new RectShape
```

```
r.X=0
r.y=0
r.Height=100
r.Width=180
r.BorderColor=rgb(255,0,0)
r.FillColor=rgb(0,255,0)
r.BorderWidth=5
r.Border=50
```

```
v=new Group2d
v.Append r
v.Append s
v.Rotation=pi*-20.0/180.0
v.x=150
v.y=150
```

```
g.DrawObject v
```

### 5.0.11 Picture functions do not preserve resolution values?

Plugin Version: all, Platforms: macOS, Linux, Windows.

**Answer:** Yes, the picture functions return pictures with no/default resolution values.

**Example:**

```
dim l as Picture = LogoMBS(500)
```

```
l.HorizontalResolution = 300
```

```
l.VerticalResolution = 300
```

```
dim r as Picture = l.Rotate90MBS
```

```
MsgBox str(r.HorizontalResolution)+" x "+str(r.VerticalResolution)
```

```
r.HorizontalResolution = l.HorizontalResolution
```

```
r.VerticalResolution = l.VerticalResolution
```

```
MsgBox str(r.HorizontalResolution)+" x "+str(r.VerticalResolution)
```

**Notes:** So please fix them yourself after calling a function.

Maybe in the future this changes, but currently you can't really set this easily from plugin code.

### 5.0.12 A toolbox call needs a rect - how do I give it one?

Plugin Version: all, Platforms: macOS, Windows.

**Answer:** Fill a memoryblock like this:

**Example:**

```
Dim MB As Memoryblock
```

```
MB = NewMemoryBlock(8)
```

```
MB.Short(0) = window1.Top
```

```
MB.Short(2) = window1.Left
```

```
MB.Short(4) = window1.Height+window1.Top // bottom
```

```
MB.Short(6) = window1.Width+window1.Left // right
```

### 5.0.13 API client not supported?

Plugin Version: all, Platforms: macOS, Linux, Windows.

**Answer:** If you get this exception message on `SQLConnectionMBS.Connect`, we may have a problem.

**Notes:** First case is that the given thing is not supported (e.g. MS SQL directly on Mac).

Second case is that the plugin compilation went wrong and the support for the database was not linked into the plugin. Like MySQL missing or MS SQL on Windows missing. In that case please contact us to fix the plugin.

### 5.0.14 Can I access Access Database with Java classes?

Plugin Version: all, Platform: Windows.

**Answer:** You can use `ucanaccess` to access databases created with Microsoft

**Example:**

```

dim options(-1) as string

// load all the jar files we have in a folder called java:

dim appFolder as FolderItem = GetFolderItem("")

Dim count as Integer = appFolder.Parent.Child("java").Count
dim libjs() as string
For i as Integer = 1 to count
Dim f As FolderItem = appFolder.Parent.Child("java").item(i)
If f <> Nil and f.Exists Then
libjs.append f.NativePath+";"
End If
Next

// now init virtual machine
dim library as string = Join(libjs, "")
dim vm as new JavaVMMBS(library)

if vm.Handle = 0 then
MsgBox "Failed to initialize virtual machine"
else
// now make a new database connection with ucanaccess
dim d as new JavaDatabaseMBS(vm,"net.ucanaccess.jdbc.UcanaccessDriver")
Dim DbFile as FolderItem = appFolder.Parent.Child("Database11.accdb")
dim j as JavaConnectionMBS = d.getConnection("jdbc:ucanaccess://" + DbFile.NativePath)

// select and show values
dim r as JavaResultSetMBS = j.MySelectSQL("Select * From test")
while r.NextRecord
MsgBox r.getString("FirstName") + " " + r.getString("LastName")
wend

end if

```

**Exception** e as JavaExceptionMBS  
MsgBox e.message+" **errorcode:** "+str(e.ErrorNumber)

**Notes:** see website:  
<http://ucanaccess.sourceforge.net/site.html>

### 5.0.15 Can I create PDF from Xojo Report using DynaPDF?

Plugin Version: all, Platforms: macOS, Linux, Windows.

**Answer:** Yes, we have a graphics class integration for DynaPDF.

**Notes:** Since MBS Plugin in version 19.2, we can integrate reports with Xojo.

### 5.0.16 Can I use AppleScripts in a web application?

Plugin Version: all, Platforms: macOS, Linux, Windows.

**Answer:** Yes, but they run on the server, not on the client.

**Example:**

```
dim a as new AppleScriptMBS

// query my application name
a.Compile "tell application ""System Events"" to return name of current application"

// run
a.Execute

// show result
label1.text = a.Result

// shows something like "My Application.fcgi.debug"
```

**Notes:** This can be useful to control the server from remote, if and only if the your sever is running Mac OS X.

### 5.0.17 Can I use graphics class with DynaPDF?

Plugin Version: all, Platforms: macOS, Linux, Windows.

**Answer:** Sorry, no. We can't provide a graphics subclass from plugin.

**Notes:** This is a feature request to allow graphics subclasses:

Feedback case 11391: [feedback://showreport?report\\_id=11391](https://feedback.apple.com/feedback/showreport?report_id=11391)

### 5.0.18 Can I use sockets on a web application?

Plugin Version: all, Platforms: macOS, Linux, Windows.

**Answer:** Yes, but they run on the server, not on the client.

**Notes:** You can use `HTTPSocket`, `SMTPSocket`, `POP3Socket`, `SMTPSecureSocket`, `SecurePOP3Socket`, `EasyTCPSocket`, `EasyUDPSocket`, `AutoDiscovery`, our Bonjour classes or our `CURL*` classes. But all of them work on the server, not on the client.

This means if you search for a printer with Bonjour, you can find the printers in the local network on your server hosting site. Using `SMTPSocket` may be a good idea for sending emails from the server like notifications.

### 5.0.19 Can I use your ChartDirector plugin on a web application?

Plugin Version: all, Platforms: macOS, Linux, Windows.

**Answer:** Yes, our ChartDirector plugin works just fine on the Xojo Web Edition.

**Example:**

```
// The data for the pie chart
dim data(-1) as Double=array(55.0, 18.0, 25.0, 22.0, 18.0, 30.0, 35.0)

// The labels for the pie chart, Words are chosen random to check font!
dim labels(-1) as string=array("Germany", "Italy", "France", "Spain", "UK", "Poland", "Russia")

// The colors to use for the sectors
dim colors(-1) as Integer

colors.Append &h66aaee
colors.Append &heebb22
colors.Append &hbbsbbb
colors.Append &h8844ff

if TargetLinux then
  CDBaseChartMBS.SetFontSearchPath "/usr/share/fonts/truetype/msttcorefonts"
end if

// Create a PieChart object of size 360 x 300 pixels
dim c as new CDPieChartMBS(700, 600)
```

```

c.setBackground(c.linearGradientColor(0, 0, 0, c.getHeight(), &h0000cc, &h000044))
c.setRoundedFrame(&hffffff, 16)
dim tt as CDTextBoxMBS = c.addTitle("ChartDirector Demonstration", "timesbi.ttf", 18)
tt.setMargin(0, 0, 16, 0)
tt.setFontColor(&hFFFFFF)

// Set the center of the pie at (180, 140) and the radius to 100 pixels
c.setPieSize 350,300,150
// Set the sector colors
c.setColors(c.kDataColor, colors)

// Draw the pie in 3D with a pie thickness of 20 pixels
c.set3D(20)

dim t as CDTextBoxMBS = c.setLabelStyle("arialbd.ttf", 10, &h000000)
t.setBackground(CDPieChartMBS.kSameAsMainColor, CDPieChartMBS.kTransparent, CDPieChartMBS.soft-
Lighting(CDPieChartMBS.kRight, 0))
t.setRoundedCorners(8)

// Use local gradient shading for the sectors, with 5 pixels wide
// semi-transparent white (bbffffff) borders
c.setSectorStyle(CDPieChartMBS.kLocalGradientShading, &hbbffffff, 0)

// Set the pie data and the pie labels
c.setData data,labels
call c.setLabelStyle "arialbd.ttf",18

dim pic as picture = c.makeChartPicture
dim wp as new WebPicture(pic, Picture.FormatJPEG) // JPEG makes it smaller and faster

ImageView1.Picture=wp

```

**Notes:** Be aware that our plugin produces pictures for you, which you assign to ImageViews. Transferring those pictures takes time, so you can optimize that with using WebPicture class. There you can decide between different compressions to improve speed (use JPEG instead of PNG).

e.g. if you use ubuntu, you can install the ttf-mscorefonts-installer package and call this method with "/usr/share/fonts/truetype/msttcorefonts" as the path. No backslash on the end of a path, please.

## 5.0.20 Can I use your DynaPDF plugin on a web application?

Plugin Version: all, Platforms: macOS, Linux, Windows.

**Answer:** Yes, our DynaPDF plugin works just fine on the Xojo Web Edition.

**Notes:** PDF files are created on the server. You may want to offer a preview to the user which uses reduced resolution images to reduce the time to download the PDF.

See our Create PDF example for the Xojo Web Edition.

### 5.0.21 Can I use your plugin controls on a web application?

Plugin Version: all, Platforms: macOS, Linux, Windows.

**Answer:** No.

### 5.0.22 Can you get an unique machine ID?

Plugin Version: all, Platforms: macOS, Linux, Windows.

**Answer:** There is nothing like an unique machine ID.

**Notes:** 1:

You can use the MAC IDs of the network interfaces.

This can be changed by the user with software tools.

And the list of network interfaces changes if user reorder the interfaces.

2:

You can use the system folder creation date/time.

This may stay equal after cloning machines or after migration to new PC.

3:

You can use the Mac Serialnumber.

Mac only and it can happen that a Mac does not have a serial number.

4:

You can use the x86 CPU ID.

This is x86 CPU only and does not avoid running on the same CPU in different PCs.

### 5.0.23 ChartDirector: Alignment Specification

Plugin Version: 8.2, Platforms: macOS, Linux, Windows.

**Answer:** ChartDirector: Alignment Specification

**Notes:** In many ChartDirector objects, you may specify the alignment of the object's content relative to its boundary. For example, for a TextBox object, you may specify the text's alignment relative to the box boundary by using TextBox.setAlignment.

The ChartDirector API defines several constants for the alignment options.

ConstantValueDescription

BottomLeft	1	The leftmost point on the bottom line.
BottomCenter	2	The center point on the bottom line.
BottomRight	3	The rightmost point on the bottom line.
Left	4	The leftmost point on the middle horizontal line.
Center	5	The center point on the middle horizontal line.
Right	6	The rightmost point on the middle horizontal line.
TopLeft	7	The leftmost point on the top line.
TopCenter	8	The center point on the top line.
TopRight	9	The rightmost point on the top line.
Bottom	2	The center point on the bottom line. Same as BottomCenter.
Top	8	The center point on the top line. Same as TopCenter.
TopLeft2	10	An alternative top-left position used in Axis.setTitlePos for axis title positioning only. For a vertical axis, TopLeft2 refers to refers to the left of the top side, while TopLeft refers to the top of the left side. The reverse applies for a horizontal axis.
TopRight2	11	An alternative top-right position used in Axis.setTitlePos for axis title positioning only. For a vertical axis, TopRight2 refers to refers to the right of the top side, while TopRight refers to the top of the right side. The reverse applies for a horizontal axis.
BottomLeft2	12	An alternative bottom-left position used in Axis.setTitlePos for axis title positioning only. For a vertical axis, BottomLeft2 refers to refers to the left of the bottom side, while BottomLeft refers to the bottom of the left side. The reverse applies for a horizontal axis.
BottomRight2	13	An alternative bottom-right position used in Axis.setTitlePos for axis title positioning only. For a vertical axis, BottomRight2 refers to refers to the right of the bottom side, while BottomRight refers to the bottom of the right side. The reverse applies for a horizontal axis.

### 5.0.24 ChartDirector: Color Specification

Plugin Version: 8.2, Platforms: macOS, Linux, Windows.

**Answer:** ChartDirector: Color Specification

**Notes:** Many functions in the ChartDirector API accept colors as parameters. ChartDirector supports col-

ors specified in web and HTML compatible ARGB format, in which ARGB refers to the Alpha transparency, Red, Green and Blue components of the color.

In addition to ARGB colors, ChartDirector supports "dynamic" colors. A dynamic color is a color that changes depending on the position of the pixels. The "dynamic" colors that ChartDirector supports include "pattern colors", "metal colors", "gradient colors", "zone colors" and "dash line colors".

ChartDirector supports specifying colors indirectly using "palette colors". When a "palette color" is used, the color is specified as an index to a palette. The actual color is looked up from the palette. ARGB Color ARGB color consists of 4 components - alpha transparency, red, green and blue. The four components are encoded as a 32-bit number, with each component occupying 8 bits. In hexadecimal notation, it is AAR-RGGBB, where AA, RR, GG and BB are the alpha transparency, red, green and blue components.

Each component ranges from 00 - FF (0 - 255), representing its intensity. For example, pure red color is 00FF0000, pure green color is 0000FF00, and pure blue color is 000000FF. White color is 00FFFFFF, and black color is 00000000.

Most programming language requires you to put special prefix in front of hexadecimal characters. For C++, the prefix is "0x". For example, the syntax for the hexadecimal number 00FFFFFF is 0x00FFFFFF, or simply 0xFFFFFF.

For the alpha transparency component, a zero value means the color is not transparent at all. This is equivalent to traditional RGB colors. A non-zero alpha transparency means the color is partially transparent. The larger the alpha transparency, the more transparent the color will be. If a partially transparent color is used to draw something, the underlying background can still be seen.

For example, 80FF0000 is a partially transparent red color, while 00FF0000 is a non-transparent red color.

Note that ChartDirector's ARGB color is web and HTML compatible. For example, red is FF0000, the same as in HTML. There are many resources on the web that provide tables in which you can click a color and it will show its HTML color code. These color codes can be used in ChartDirector.

If alpha transparency is FF (255), the color is totally transparent. That means the color is invisible. It does not matter what the RGB components are. So in ChartDirector, only one totally transparent color is used - FF000000. All other colors of the form FFnnnnnn are reserved to represent palette colors and dynamic colors, and should not be interpreted as the normal ARGB colors.

The totally transparent color FF000000 is often used in ChartDirector to disable drawing something. For example, if you want to disable drawing the border of a rectangle, you can set the border color to totally transparent.

For convenience, ChartDirector defines a constant called Transparent, which is equivalent to FF000000. Pattern Color

A pattern color is a dynamic color that changes according to a 2D periodic pattern. When it is used to fill an area, the area will look like being tiled with a wallpaper pattern.

Pattern colors are created using `BaseChart.patternColor`, `BaseChart.patternColor2`, `DrawArea.patternColor` and `DrawArea.patternColor2`. The `patternColor` method creates pattern colors using an array of colors as a bitmap. The `patternColor2` method creates pattern colors by loading the patterns from image files.

These methods return a 32-bit integer acting as a handle to the pattern color. The handle can be used in any `ChartDirector` API that expects a color as its input.

**Metal Color**  
A metal color is a color of which the brightness varies smoothly across the chart surface as to make the surface look shiny and metallic. `ChartDirector` supports using any color as the base color of the metal color. In particular, using yellow and grey as the base colors will result in metal colors that look gold and silver.

Metal colors are most often used as background colors of charts. They are created using `CDBaseChartMBS.metalColor`, `CDBaseChartMBS.goldColor` and `CDBaseChartMBS.silverColor`. The first method allows you to specify an arbitrary base color. The second and third methods use yellow and grey as the base colors, resulting in gold and silver metal colors.

These methods return a 32-bit integer acting as a handle to the gradient color. The handle can be used in any `ChartDirector` API that expects a color as its input.

**Gradient Color**  
A gradient color is a color that changes progressively across a direction.

Gradient colors are created using `BaseChart.gradientColor`, `BaseChart.gradientColor2`, `DrawArea.gradientColor` and `DrawArea.gradientColor2`. The `gradientColor` method creates a 2-point gradient color that changes from color A to color B. The `gradientColor2` method creates a multi-point gradient colors that changes from color A to B to C ....

These methods return a 32-bit integer acting as a handle to the gradient color. The handle can be used in any `ChartDirector` API that expects a color as its input.

One common use of multi-point gradient colors is to define colors that have metallic look and feel. Please refer to `DrawArea.gradientColor2` for details.

**Dash Line Colors**  
A dash line color is a color that switches on and off periodically. When used to draw a line, the line will appear as a dash line.

Dash line colors are created using `BaseChart.dashLineColor` and `DrawArea.dashLineColor`. They accept a line color and a dash pattern code as arguments, and return a 32-bit integer acting as a handle to the dash line color. The handle can be used in any `ChartDirector` API that expects a color as its input.

**Zone Colors**  
A zone color is for XY charts only. It is a color that automatically changes upon reaching a data threshold value along the x-axis or y-axis. Zone colors are created using `Layer.xZoneColor`, `Layer.yZoneColor`, `XYChart.xZoneColor` or `XYChart.yZoneColor`.

**Palette Colors**  
Palette colors are colors of the format `FFFFnnnn`, where the least significant 16 bits (`nnnn`) are the index to the palette. A palette is simply an array of colors. For a palette color, the actual color is obtained by

looking up the palette using the index. For example, the color FFFF0001 is the second color in the palette (first color is index 0).

The colors in the palette can be ARGB colors or "dynamic" colors (pattern, gradient and dash line colors).

The first eight palette colors have special significance. The first three palette colors are the background color, default line color, and default text color of the chart. The 4th to 7th palette colors are reserved for future use. The 8th color is a special dynamic color that is equal to the data color of the "current data set".

The 9th color (index = 8) onwards are used for automatic data colors. For example, in a pie chart, if the sector colors are not specified, ChartDirector will automatically use the 9th color for the first sector, the 10th color for the second sector, and so on. Similarly, for a multi-line chart, if the line colors are not specified, ChartDirector will use the 9th color for the first line, the 10th color for the second line, and so on.

The ChartDirector API defines several constants to facilitate using palette colors.

#### ConstantValueDescription

Palette	FFFF0000	The starting point of the palette. The first palette color is (Palette + 0). The nth palette color is (Palette + n - 1).
BackgroundColor	FFFF0000	The background color.
LineColor	FFFF0001	The default line color.
TextColor	FFFF0002	The default text color.
[ Reserved ]	FFFF0003 - FFFF0006	These palette positions are reserved. Future versions of ChartDirector may use these palette positions for colors that have special significance.
SameAsMainColor	FFFF0007	A dynamic color that is equal to the data color of the current data set. This color is useful for objects that are associated with data sets. For example, in a pie chart, if the sector label background color is SameAsMainColor, its color will be the same as the corresponding sector color.
DataColor	FFFF0008	The starting point for the automatic data color allocation.

When a chart is created, it has a default palette. You may modify the palette using BaseChart.setColor, BaseChart.setColors, or BaseChart.setColors2.

The advantages of using palette colors are that you can change the color schemes of the chart in one place. ChartDirector comes with several built-in palettes represented by the following predefined constants.

#### ConstantDescription

### 5.0.25 ChartDirector: Font Specification

Plugin Version: 8.2, Platforms: macOS, Linux, Windows.

defaultPalette	An array of colors representing the default palette. This palette is designed for drawing charts on white backgrounds (or lightly colored backgrounds).
whiteOnBlackPalette	An array of colors useful for drawing charts on black backgrounds (or darkly colored backgrounds).
transparentPalette	An array of colors useful drawing charts on white backgrounds (or lightly colored backgrounds). The data colors in this palette are all semi-transparent.

**Answer:** ChartDirector: Font Specification

**Notes:** Font Name

In ChartDirector, the font name is simply the file name that contains the font. For example, under the Windows platform, the "Arial" font is "arial.ttf", while the "Arial Bold" font is "arialbd.ttf".

NOTE: Mac OS X Specific Information

In Mac OS X, in addition to ".ttf", ChartDirector also supports Mac OS X font file formats, such as Font Suitcase files and Datafork files (.dfont). These files often contain multiple fonts. For example, the "GillSans.dfont" file contains 6 fonts.

So in addition to the file name, an index is needed to determine the font. The index is specified by appending a " | " character to the font name, followed by the index number. For example, the third font in "GillSans.dfont" is denoted as "GillSans.dfont | 2". (Note: The first font starts at 0.) If no index number is provided, the first font is assumed.

ChartDirector also supports using Mac OS X Font Manager names. For example, one may use "Gill Sans Light Italic" instead of using "GillSans.dfont | 1" as the font name. However, the Mac OS X Font Manager is active only if someone has logged into the Mac GUI console, so this method is only recommended for developing applications that run on the GUI console.

The sample programs that come with ChartDirector are designed to run on all operating systems, so they use generic font file names (eg. "arial.ttf") instead of Mac OS X specific names. To allow them to run on Mac OS X, ChartDirector on Mac OS X has a built-in table to map common font file names to Mac OS X font names:

"arial.ttf", "arialbd.ttf", "ariali.ttf" and "arialbi.ttf" are mapped to "Arial | 0" (Arial), "Arial | 1" (Arial Bold), "Arial | 2" (Arial Italic) and "Arial | 3" (Arial Bold Italic)

"times.ttf", "timesbd.ttf", "timesi.ttf" and "timesbi.ttf" are mapped to "Times New Roman | 0" (Times New Roman), "Times New Roman | 1" (Times New Roman Bold), "Times New Roman | 2" (Times New Roman Italic) and "Times New Roman | 3" (Times New Roman Bold Italic)

"cour.ttf", "courbd.ttf", "couri.ttf" and "courbi.ttf" are mapped to "Courier New | 0" (Courier New), "Courier New | 1" (Courier New Bold), "Courier New | 2" (Courier New Italic) and "Courier New | 3" (Courier New Bold Italic)

### Font Location

ChartDirector on Windows does not come with any font files. It relies on the operating system's font files in the " [ windows ] \Fonts" directory. To see what fonts are installed in your operating system and their file names, use the File Explorer to view that directory.

ChartDirector on Windows will also search for the font files in the "fonts" subdirectory (if it exists) under the directory where the ChartDirector DLL "chartdir.dll" is installed. This is useful for private fonts. Also, for some especially secure web servers, the web anonymous user may not have access to the " [ windows ] \Fonts" directory. In this case, you may copy the font files to the above subdirectory.

ChartDirector on Mac OS X relies on operating system font files in "/Library/Fonts" and "/System/Library/Fonts".

ChartDirector on Linux, FreeBSD and Solaris assume the fonts files are in the "fonts" subdirectory under the directory where the ChartDirector shared object "libchartdir.so" is installed. ChartDirector on Linux, FreeBSD and Solaris come with a number of font files in the "fonts" subdirectory.

To keep the download size small, ChartDirector on Linux, FreeBSD and Solaris only come with some commonly used fonts. You may download additional fonts from the Internet. In particular, the Microsoft fonts at

[http://sourceforge.net/project/showfiles.php?group\\_id=34153&release\\_id=105355](http://sourceforge.net/project/showfiles.php?group_id=34153&release_id=105355)

is highly recommended. Please refer to

<http://www.microsoft.com/typography/faq/faq8.htm>

on how you could use the fonts legally in your system.

ChartDirector supports True Type fonts (.ttf), Type 1 fonts (.pfa and .pfb) and Windows bitmap fonts (.fon). On Mac OS X, ChartDirector also supports Font Suitcase and Datafork (.dfont) files. On Linux, FreeBSD and Solaris, ChartDirector also supports Portable Compiled Fonts (.pcf fonts).

If you want ChartDirector to search other directories for the font files, you may list the directories in an environment variable called "FONTSPATH".

If you specify an absolute path name for the font file, ChartDirector will use the absolute path name and will not search other directories.

**Artificial Boldening and Italicizing**  
Whereas most popular font comes with different styles for "normal", "bold", "italic" and "bold italic", some fonts only come with one style (the normal style). For example, the Monotype Corsiva font that comes with MS Office only has the normal style (mtcorsva.ttf). For these cases, you may append the "Bold" and/or "Italic" words after the font file name (separated with a space) to ask ChartDirector to artificially bolden and/or italicize the font. For example, you may specify the font name as "mtcorsva.ttf Bold".

**Font List**  
Instead of specifying a single font file as the font name, you may specify a list of font files as the font name, separated by semi-colons. This is useful when using international characters that are only available in some fonts.

For example, if you would like to use the Arial font ("arial.ttf") for western characters, and the MingLiu font "mingliu.ttc" for Chinese characters (since the Arial font does not have Chinese characters), you may specify the font name as "arial.ttf;mingliu.ttc". In this case, ChartDirector will try the Arial font first. If it cannot find a certain character there, it will try the MingLiu font.

#### Indirect Font Names

ChartDirector supports several special keywords for specifying the font name indirectly. When these keywords are used as font names, ChartDirector will look up the actual font names from a font table. The keywords are as follows:

#### KeywordsDescription

"normal"	This default normal font, which is the first font in the font table. This is initially mapped to "arial.ttf" (Arial).
"bold"	The default bold font, which is the second font in the font table. This is initially mapped to "arialbd.ttf" (Arial Bold).
"italic"	The default italic font, which is the third font in the font table. This is initially mapped to "ariali.ttf" (Arial Italic).
"boldItalic"	The default bold-italic font, which is the fourth font in the font table. This is initially mapped to "arialbi.ttf" (Arial Bold Italic).
"fontN"	The (N + 1)th font in the font table (the first font is "font0").

The font table can be modified using `BaseChart.setFontTable` or `DrawArea.setFontTable`.

The advantage of using indirect font names is that you can change the fonts in your charts in one place.

#### Font Index

Most font files contain one font. However, it is possible a font file contains multiple fonts (that is, a font collection). For example, in True Type fonts, font files with extension ".ttc" may represent a font collection.

If a font file contains multiple font, the font index can be used to specify which font to use. By default, the font index is 0, which means the first font in the font file will be used.

#### Font Size

The font size decides how big a font will appear in the image. The font size is expressed in a font unit called points. This is the same unit used in common word processors.

Instead of specifying font size, some ChartDirector API (eg. `TextBox.setFontSize`) allow you to specify font height and font width separately. You may use different point sizes for font height and font width to create special effects.

#### Font Color

This is the color to draw the font. (See Color Specification on how colors are represented in ChartDirector.)

#### Font Angle

This is the angle in degrees by which the font should be rotated anti-clockwise.

#### Vertical Layout

By default, text are laid out horizontally, with characters being drawn from left to right.

ChartDirector also supports vertical layout, with characters being drawn from top to bottom. For example, you may use `BaseChart.addText` to add text that are laid out vertically. Vertical layout is common for

oriental languages such as Chinese, Japanese and Korean.

## 5.0.26 ChartDirector: Mark Up Language

Plugin Version: 8.2, Platforms: macOS, Linux, Windows.

**Answer:** ChartDirector: Mark Up Language

**Notes:** ChartDirector Mark Up Language (CDML) is a language for including formatting information in text strings by marking up the text with tags.

CDML allows a single text string to be rendered using multiple fonts, with different colors, and even embed images in the text. **Font Styles**

You can change the style of the text by using CDML tags. For example, the line:

```
<*font=timesi.ttf,size=16,color=FF0000>Hello <*font=arial.ttf,size=12,color=8000*>world!
```

will result in the following text rendered:

In general, all tags in CDML are enclosed by <\*> and \*>. Attributes within the tags determine the styles of the text following the tags within the same block.

If you want to include <\*> in text without being interpreted as CDML tags, use «\* as the escape sequence.

The following table describes the supported font style attributes in CDML. See **Font Specification** for details on various font attributes.

AttributeDescription

Set the following text to be in superscript style. This attribute does not need to have a value. (You may use "super" as the attribute instead of "super=1".)

Note that unlike HTML tags, no double or single quotes are used in the tags. It is because CDML tags are often embedded as string literals in source code. The double or single quotes, if used, will conflict with the string literal quotes in the source code. Therefore in CDML, no quotes are necessary and they must not be used.

Also, unlike HTML tags, CDML uses the comma character as the delimiter between attributes. It is because certain attributes may contain embed spaces (such as the font file name). So space is not used as the delimiter and the comma character is used instead.

Note the font attribute above starts a new style section, while other attributes just modify the current style

font	Starts a new style section, and sets the font name. You may use this attribute without a value (that is, use "font" instead of "font=arial.ttf") to create a new style section without modifying the font name.
size	The font size.
width	The font width. This attribute is used to set the font width and height to different values. If the width and height are the same, use the size attribute.
height	The font height. This attribute is used to set the font width and height to different values. If the width and height are the same, use the size attribute.
color	The text color in hex format.
bgColor	The background color of the text in hex format.
underline	The line width of the line used to underline the following characters. Set to 0 to disable underline.
sub	Set the following text to be in subscript style. This attribute does not need to have a value. (You may use "sub" as the attribute instead of "sub=1".)
super	Set the following text to be in superscript style.
xoffset	Draw the following the text by shifting the text horizontally from the original position by the specified offset in pixels.
yoffset	Draw the following the text by shifting the text vertically from the original position by the specified offset in pixels.
advance	Move the cursor forward (to the right) by the number of pixels as specified by the value this attribute.
advanceTo	Move the cursor forward (to the right) to the position as specified by the value this attribute. The position is specified as the number of pixels to the right of the left border of the block. If the cursor has already passed through the specified position, the cursor is not moved.

section. You may use `</font*>` to terminate a style section, which will restore the font styles to the state before the style section.

#### Blocks and Lines

In CDML, a text string may contain multiple blocks. A block may contain multiple lines of text by separating them with new line characters ("`\n`") or with `<br*>`. The latter is useful for programming languages that cannot represent new line characters easily.

For example, the line:

```
<*size=15*><*block*><*color=FF*>BLOCK<*br*>ONE<*/*>and <*block*><*color=FF00*>BLOCK<*br*>TWO
```

will result in the following text rendered:

The above example contains a line of text. The line contains two blocks with the characters " and " in between. Each block in turn contains two lines. The blocks are defined using `<*block*>` as the start tag and

`<*/*>` as the end tag.

When a block ends, font styles will be restored to the state before entering the block. Embedding Images  
CDML supports embedding images in text using the following syntax:

```
<*img=my_image_file.png*>
where my_image_file.png is the path name of the image file.
```

For example, the line:

```
<*size=20*>A <*img=sun.png*>day
will result in the following text rendered:
```

ChartDirector will automatically detect the image file format using the file extension, which must either png, jpg, jpeg, gif, wbmp or wmp (case insensitive).

Please refer to `BaseChart.setSearchPath` or `DrawArea.setSearchPath` on the directory that ChartDirector will search for the file.

The `<*img*>` tag may optionally contain width and height attributes to specify its pixel width and height. In this case, ChartDirector will stretch or compress the image if necessary to the required width and height. Blocks Attributes

CDML supports nesting blocks, that is, a block can contain other sub-blocks. Attributes are supported in the `<*block*>` tag to control the alignment and orientation of the sub-blocks. The `<*img=my_image_file.png*>` is treated as a block for layout purposes.

For example, the line:

```
<*block,valign=absmiddle*><*img=molecule.png*><*block*>Hydrazino\nMolecule<*/*><*/*>
will result in the following text rendered:
```

The the above starts `<*block,valign=absmiddle*>` which specifies its content should align with each others in the vertical direction using the absolute middle alignment. The block contains an image, followed by a space characters, and then another block which has two lines of text.

The following table describes the supported attributes inside `<*block*>` tag:

Attribute	Description
-----------	-------------

The value `baseline` means the baseline of sub-blocks should align with the baseline of the block. The `baseline`

width	The width of the block in pixels. By default, the width is automatically determined to be the width necessary for the contents of the block. If the width attribute is specified, it will be used as the width of the block. If the width is insufficient for the contents, the contents will be wrapped into multiple lines.
height	The height of the block in pixels. By default, the height is automatically determined to be the height necessary for the contents of the block. If the height attribute is specified, it will be used as the height of the block.
maxwidth	The maximum width of the block in pixels. If the content is wider than maximum width, it will be wrapped into multiple lines.
truncate	The maximum number of lines of the block. If the content requires more than the maximum number of lines, it will be truncated. In particular, if truncate is 1, the content will be truncated if it exceeds the maximum width (as specified by maxwidth or width) without wrapping. The last few characters at the truncation point will be replaced with "...".
linespacing	The spacing between lines as a ratio to the default line spacing. For example, a line spacing of 2 means the line spacing is two times the default line spacing. The default line spacing is the line spacing as specified in the font used.
bgColor	The background color of the block in hex format.
valign	The vertical alignment of sub-blocks. This is for blocks that contain sub-blocks. Supported values are baseline, top, bottom, middle and absmiddle.

is the underline position of text. This is normal method of aligning text, and is the default in CDML. For images or blocks that are rotated, the baseline is the same as the bottom.

The value top means the top line of sub-blocks should align with the top line of the block.

The value bottom means the bottom line of sub-blocks should align with the bottom line of the block.

The value middle means the middle line of sub-blocks should align with the the middle line of the block. The middle line is the middle position between the top line and the baseline.

The value absmiddle means the absolute middle line of sub-blocks should align with the absolute middle line of the block. The absolute middle line is the middle position between the top line and the bottom line.

**halign** The horizontal alignment of lines. This is for blocks that contain multiple lines. Supported values are left, center and right.

The value left means the left border of each line should align with the left border of the block. This is the default.

The value center means the horizontal center of each line should align with the horizontal center of the block.

The value right means the right border of each line should align with the right border of the block.

**angle** Rotate the content of the block by an angle. The angle is specified in degrees in counter-clockwise direction.

### 5.0.27 ChartDirector: Parameter Substitution and Formatting

Plugin Version: 8.2, Platforms: macOS, Linux, Windows.

**Answer:** ChartDirector: Parameter Substitution and Formatting

**Notes:** ChartDirector charts often contain a lot of text strings. For example, sector labels in pie charts, axis labels for x and y axes, data labels for the data points, HTML image maps, etc, are all text strings.

ChartDirector uses parameter substitution to allow you to configure precisely the information contained in the text and their format.

Format Strings

In parameter substitution, format strings are used to specify the entities to be include into labels and how to format numbers and dates.

For example, when drawing a pie chart with side label layout, the default sector label format string is:

```
" { label } ( { percent } %)"
```

When the sector label is actually drawn, ChartDirector will replace " { label } " with the sector name, and " { percent } " with the sector percentage. So the above label format will result is a sector label similar to "ABC (34.56%)".

You may change the sector label format by changing the format string. For example, you may change it to:

```
" { label } : US$ { value | 2 } K ( { percent } %)"
```

The sector label will then become something like "ABC: US\$ 123.00 (34.56%)".

In general, in ChartDirector parameter substitution, parameters enclosed by curly brackets will be substituted with their actual values when creating the texts.

For parameters that are numbers or dates/times, ChartDirector supports a special syntax in parameter substitution to allow formatting for these values. Please refer to the Number Formatting and Date/Time Formatting sections below for details.

#### Parameter Expressions

ChartDirector supports numeric expressions in format strings. They are denoted by enclosing the expression with curly brackets and using "=" as the first character. For example:

```
"USD { value } (Euro { = { value } *0.9 } )"
```

In the above, " { value } " will be substituted with the actual value of the sector. The expression " { = { value } \*0.9 } " will be substituted with the actual value of the sector multiplied by 0.9.

ChartDirector parameter expressions support operators "+", "-", "\*", "/", "%" (modulo) and "^" (exponentiation). Operators "\*", "/", "%" is computed first, followed by "+" and "-". Operators of the same precedence are computed from left to right). Parenthesis "(" and ")" can be used to change the computation order.

#### Parameters for Pie Charts

The following table describes the parameters available for pie charts.

Parameter	Description
sector	The sector number. The first sector is 0, while the nth sector is (n-1).
dataSet	Same as { sector } . See above.
label	The text label of the sector.
dataSetName	Same as { label } . See above.
value	The data value of the sector.
percent	The percentage value of the sector.
fieldN	The (N + 1)th extra field. For example, { field0 } means the first extra field. An extra field is an array of custom elements added using BaseChart.addExtraField or BaseChart.addExtraField2.

#### Parameters for All XY Chart Layers

The followings are parameters that are apply to all XY Chart layers in general. Some layer types may have additional parameters (see below).

Note that certain parameters are inapplicable in some context. For example, when specifying the aggregate label of a stacked bar chart, the { dataSetName } parameter is inapplicable. It is because a stacked bar is composed of multiple data sets. It does not belong to any particular data set and hence does not have a data set name.

{ fieldN } means the extra field is indexed by the data point number. The Pth data point corresponds to the Pth element of the extra field.

#### Additional Parameters for Line Layers

The followings are parameters that are in additional to the parameters for all XY Chart layers.

#### Additional Parameters for Trend Layers

The followings are parameters that are in additional to the parameters for all XY Chart layers.

#### Additional Parameters for Box-Whisker Layers

The followings are parameters that are in additional to the parameters for all XY Chart layers.

#### Additional Parameters for HLOC and CandleStick Layers

The followings are parameters that are in additional to the parameters for all XY Chart layers.

#### Additional Parameters for Vector Layers

The followings are parameters that are in additional to the parameters for all XY Chart layers.

#### Parameters for All Polar Layers

The followings are parameters that are apply to all Polar Chart layers in general. Some layer types may have additional parameters (see below).

{ fieldN } means the extra field is indexed by the data point number. The Pth data point corresponds to the Pth element of the extra field.

#### Additional Parameters for PolarVector Layers

The followings are parameters that are in additional to the parameters for all Polar Chart layers.

#### Parameters for Axis

The following table describes the parameters available for pie charts.

#### Number Formatting

For parameters that are numbers, ChartDirector supports a number of formatting options in parameter substitution.

For example, if you want a numeric field { value } to have a precision of two digits to the right of the decimal point, use ',' (comma) as the thousand separator, and use '.' (dot) as the decimal point, and you may use { value | 2, . } . The number 123456.789 will then be displayed as 123,456.79.

For numbers, the formatting options are specified using the following syntax:

```
{ [ param ] | [ a ] [ b ] [ c ] [ d ] }
```

where:

If this field starts with "E" or "e", followed by a number, it means formatting the value using scientific notation with the specified number of decimal places. If the "E" or "e" is not followed by a number, 3 is assumed.

For example, { value | E4 } will format the value 10.3 to 1.0300E+1, and { value | e4 } will format the same value to 1.0300e+1.

If this field starts with "G" or "g", followed by a number, it means formatting the value using the scientific notation only if the value is large and requires more than the specified number of digits, or the value is less than 0.001. If scientific notation is used, the number following "G" or "g" also specifies the number of significant digits to use. If the "G" or "g" is not followed by a number, 4 is assumed.

For example, consider the format string { value | G4 } . The value 10 will be formatted to 10. The value 100000 will be formatted to 1.000E+5. Similarly, for { value | g4 } , the value 10 will be formatted to 10, while the value 100000 will be formatted to 1.000e+5.

If you skip this argument, ChartDirector will display the exact value using at most 6 decimal places.

You may skip [ b ] [ c ] [ d ] . In this case, the default will be used.

#### Date/Time Formatting

For parameters that are dates/times, the formatting options can be specified using the following syntax:

```
{ [ param ] | [ datetime_format_string ] }
```

where [ datetime\_format\_string ] must start with an english character (A-Z or a-z) that is not "G", "g", "E" or "e", and may contain any characters except ' ' . (If it starts with "G", "g", "E" or "e", it will be considered as a number format string.)

Certain characters are substituted according to the following table. Characters that are not substituted will be copied to the output.

For example, a parameter substitution format of { value | mm-dd-yyyy } will display a date as something similar to 09-15-2002. A format of { value | dd/mm/yy hh:nn:ss a } will display a date as something similar to 15/09/02 03:04:05 pm.

If you want to include characters in the format string without substitution, you may enclose the characters in single or double quotes.

For example, the format `{ value | mmm '<*color=dd0000*>'yyyy }` will display a date as something like `Jan <*color=dd0000*>2005` (the `<*color=dd0000*>` is a CDML tag to specify red text color). Note that the `<*color=dd0000*>` tag is copied directly without substitution, even it contains "dd" which normally will be substituted with the day of month.

Escaping URL/HTML/CDML characters

Parameter substitution is often used to create HTML image maps. In HTML, some characters has special meanings and cannot be used reliably. For example, the `'>'` is used to represent the end of an HTML tag.

Furthermore, if the field happens to be used as an URL, characters such as `'?'`, `'&'` and `'+'` also have special meanings.

By default, ChartDirector will escape template fields used in URL and query parameters when generating image maps. It will modify URL special characters to the URL escape format `"%XX"` (eg. `"?"` will become `"%3F"`). After that, it will modify HTML special characters to the HTML escape format `"&#nn;"` (eg. `">"` will become `"&#62;"`). Similarly, it will escape other attributes in the image map using HTML escape format (but not URL escape format).

In addition to escaping HTML and URL special characters, ChartDirector will also remove CDML fields in creating image maps. It is because CDML is only interpreted in ChartDirector, should not be useful outside of ChartDirector (such as in browser tool tips).

In some cases, you may not want ChartDirector to escape the special characters. For example, if the parameters have already been escaped before passing to ChartDirector, you may want to disable ChartDirector from escaping them again.

ChartDirector supports the following special fields to control the escape methods - `" { escape_url } "`, `" { noescape_url } "`, `" { escape_html } "`, `" { noescape_html } "`, `" { escape_cdml } "` and `" { noescape_cdml } "`. These fields enable/disable the escape methods used in the template fields that follow them.

## 5.0.28 ChartDirector: Shape Specification

Plugin Version: 8.2, Platforms: macOS, Linux, Windows.

**Answer:** ChartDirector: Shape Specification

**Notes:** Several ChartDirector API accept shape specification as arguments. For example, `BarLayer.setBarShape` and `BarLayer.setBarShape2` can be used to specify shapes of bars in bar charts, while `DataSet.setDataSymbol`, `DataSet.setDataSymbol4`, `PolarLayer.setDataSymbol` and `PolarLayer.setDataSymbol4` can be used to specify shapes for data symbols.

Note that in addition to shapes, in many cases ChartDirector also accepts images or custom draw objects for data representation. For example, see `DataSet.setDataSymbol2`, `DataSet.setDataSymbol3`, `PolarLayer.setDataSymbol2` and `PolarLayer.setDataSymbol3`.

## Built-In Shapes

Built-in shapes are specified as integers. The integers can be explicit constants, or can be generated by a `ChartDirector` method for parameterized shapes. For example, a circle is represented by an explicit constant `CircleShape (=7)`. On the other hand, the number representing a polygon depends on the number of sides the polygon has, so it is generated by using the `PolygonShape` method, passing in the number of sides as argument.

The following table illustrates the various `ChartDirector` shapes:

## Custom Shapes

In `ChartDirector`, custom shapes are specified as an array of integers `x0, y0, x1, y1, x2, y2 ...` representing the coordinates of the vertices of the custom polygonal shape.

The polygon should be defined with a bounding square of 1000 x 1000 units, in which the x-axis is from -500 to 500 going from left to right, and the y-axis is from 0 to 1000 going from bottom to top.

`ChartDirector` will automatically scale the polygon so that 1000 units will become to the pixel size as requested by the various `ChartDirector` API.

As an example, the shape of the standard diamond shape in `ChartDirector` is represented as an array with 8 numbers:

```
0, 0, 500, 500, 0, 1000, -500, 500
```

### 5.0.29 Copy styled text?

Plugin Version: all, Platforms: macOS, Linux, Windows.

**Answer:** How to quickly copy styled text from one textarea to another?

**Example:**

```
#if TargetWin32 then
TextArea1.WinRTFDataMBS = TextArea2.WinRTFDataMBS
#elseif TargetMacOS then
TextArea1.NSTextViewMBS.textStorage.setAttributedString TextArea2.NSTextViewMBS.textStorage
#else
TextArea1.StyledText = TextArea2.StyledText
#endif
```

**Notes:** The code above uses special plugin functions on Mac and Windows and falls back to framework for Linux.

### 5.0.30 Do you have code to validate a credit card number?

Plugin Version: all, Platforms: macOS, Linux, Windows.

**Answer:** You can check the checksum to tell if a credit card number is not valid.

**Example:**

```

Dim strNumber As String
Dim nLength as Integer
Dim nValue as Integer
Dim nChecksum as Integer
Dim nIndex as Integer

strNumber = EditField1.Text
nLength = Len(strNumber)
nChecksum = 0

For nIndex = 0 To nLength - 2
nValue = Val(Mid(strNumber, nLength - (nIndex + 1), 1)) * (2 - (nIndex Mod 2))
If nValue <10 Then
nChecksum = nChecksum + nValue
Else
nChecksum = nChecksum + (nValue - 9)
End If
Next

If Val(Mid(strNumber, Len(strNumber), 1)) = (10 - (nChecksum Mod 10)) Mod 10 Then
MsgBox("The credit card number looks valid")
Else
MsgBox("The credit card number is invalid")
End IF

```

**Notes:** Here's some code that will validate the checksum for a credit card. It works for Visa, MasterCard, American Express and Discover. Not sure about others, but I imagine they use the same basic algorithm. Of course, this doesn't actually mean that the credit card is valid, it's only useful for helping the user catch typos.

The above code doesn't have any error checking and it expects that the credit card number will be entered without spaces, dashes or any other non-numeric characters. Addressing those issues will be an exercise left to the reader. :)

(From Mike Stefanik)

### 5.0.31 Do you have plugins for X-Rite EyeOne, eXact or i1Pro?

Plugin Version: all.

**Answer:** Our EyeOne plugin is available on request for licensees of the X-Rite SDKs.

**Notes:** Please first go to X-Rite and get a SDK license.

Then we can talk about the plugin.

### 5.0.32 Does SQL Plugin handle stored procedures with multiple result sets?

Plugin Version: all, Platforms: macOS, Linux, Windows.

**Answer:** Yes, the plugin can work with multiple recordsets.

**Notes:** You need to use SQLCommandMBS class. When you get back results, you use FetchNext to walk over all records in the first result set. Then you simply start again with FetchNext to get the second record set.

Even the RecordSet functions should work, just use them twice to get all records from both record sets.

### 5.0.33 Does the plugin home home?

Plugin Version: all, Platform: macOS.

**Answer:** Yes, we like to know who is using the plugin, so the plugin may contact our server.

**Example:**

none.

**Notes:** Please note that this does not affect your users as the plugin will only do this in the IDE and the relevant plugin part is never included in your applications.

The plugin if used for some hours, does contact our server to provide statistical data about Xojo version and OS versions. This way we know what versions are used. We can return the version number of the current plugin which may be visible in future versions somehow. And we transmit partial licenses data so we can track use of illegal license keys.

If you do not like to have this, you can block Xojo IDE from contacting our website via your Firewall.

Blocking the transfer will not disable the plugin or change the features.

Or contact us for a plugin version which explicitly does not contain this feature.

### 5.0.34 folderitem.absolutePath is limited to 255 chars. How can I get longer ones?

Plugin Version: all, Platforms: macOS, Linux, Windows.

**Answer:** Paths on a Mac are not unique, so use them only to display them to the user.

**Example:**

```
Function AbsolutePath(f as FolderItem) As String
Dim s as string
Dim nf as FolderItem
nf = f
s = ""
while nf<>nil
s = nf.name + "." + s
nf = nf.parent
wend
Return s
End Function
```

### 5.0.35 Has anyone played round with using CoreImage to do things like add dissolve transitions say when changing from one tab to another within a window?

Platform: macOS.

**Answer:** This code implements animations for a tabpanel change:

**Example:**

*// in a tabpanel.change event:*

```
dim r as CGSTransitionRequestMBS
dim co as new CGSConnectionMBS
dim cw as CGSWindowMBS
dim ct as CGSTransitionMBS
static OldTab as Integer

cw=co.CGSWindow(window1)
If cw = Nil Then
return // 10.3...
End If
r=new CGSTransitionRequestMBS
r.TransitionType=r.CGSFlip
r.HasBackGround=false
r.HasBackColor=false
r.Win=cw
```

```

// watch the value of the clicked tab versus the last tab
if tabpanel1.Value=0 or tabpanel1.Value <OldTab then
r.TransitionOption=r.CGSLeft
ct=co.NewTransition(r)
if ct<>Nil then
Refresh
ct.Invoke(1)
ct.Wait(1)
ct.Release
else
MsgBox "Error creating the transition."
end if
else
r.TransitionOption=r.CGSRight
ct=co.NewTransition(r)
if ct<>Nil then
Refresh
ct.Invoke(1)
ct.Wait(1)
ct.Release
else
MsgBox "Error creating the transition."
end if
end if
// Keep track of the last tab clicked
OldTab = tabpanel1.Value

```

**Notes:** See CGS\* classes for more details.

### 5.0.36 How about Plugin support for older OS X?

Plugin Version: all, Platforms: macOS, Linux, Windows.

**Answer:** We support in general Mac OS X 10.5 and newer.

**Notes:** All the 64-bit plugins on Mac require OS X 10.7.

Intel 32-bit plugins on Mac require OS X 10.5 or newer.

Currently the ChartDirector 6, GraphicsMagick and GameKit plugins requires Mac OS X 10.6. Also for SQL Plugin the built in SQLite library requires 10.6.

### 5.0.37 How can I detect whether an Intel CPU is a 64bit CPU?

Plugin Version: all.

**Answer:** Look on the CPU family returned by sysctl:

**Example:**

Function is64bit() As Boolean

```
#if TargetLittleEndian
```

```
dim m as MemoryBlock = NewMemoryBlock(8)
```

```
dim family as Integer
```

```
dim s as string
```

```
m=SystemControlNameToMIBMBS("hw.cpufamily")
```

```
m=SystemControlMBS(m)
```

```
if m<>nil then
```

```
m.LittleEndian=True
```

```
family=m.Long(0)
```

```
const CPUFAMILY_INTEL_6_14 = &h73d67300 /* "Intel Core Solo" and "Intel Core Duo" (32-bit Pentium-M with SSE3) */
```

```
const CPUFAMILY_INTEL_6_15 = &h426f69ef /* "Intel Core 2 Duo" */
```

```
const CPUFAMILY_INTEL_6_23 = &h78ea4fbc /* Penryn */
```

```
const CPUFAMILY_INTEL_6_26 = &h6b5a4cd2 /* Nehalem */
```

```
Select case family
```

```
case CPUFAMILY_INTEL_6_14
```

```
Return false
```

```
case CPUFAMILY_INTEL_6_15
```

```
Return true
```

```
case CPUFAMILY_INTEL_6_23
```

```
Return true
```

```
case CPUFAMILY_INTEL_6_26
```

```
Return true
```

```
// newer CPUs may be missing here
```

```
end Select
```

```
end if
```

```
#endif
```

```
Return false
```

```
Exception
```

```
Return false
```

```
End Function
```

**Notes:** This code is written for Mac OS X where you only have a limited number of possible CPUs.

### 5.0.38 How can I disable the close box of a window on Windows?

Plugin Version: all, Platform: Windows.

**Answer:** The following code will remove the close item from the system menu of the window.

**Example:**

```
#if TargetWin32 then
Declare Function GetSystemMenu Lib "user32" (hwnd as Integer, bRevert as Integer) as Integer
Declare Function RemoveMenu Lib "user32" (hMenu as Integer, nPosition as Integer, wFlags as Integer) as Integer
Dim hSysMenu as Integer
hSysMenu = GetSystemMenu(me.WinHWND, 0)
RemoveMenu hSysMenu, &HF060, &H0
#endif
```

**Notes:** The window may not be updated directly.

### 5.0.39 How can I get all the environment variables from Windows?

Plugin Version: all, Platform: Windows.

**Answer:** Try this code:

**Example:**

```
#if targetWin32
declare function GetEnvironmentStrings Lib "kernel32" () as ptr
dim m as memoryBlock
dim n as Integer

m=GetEnvironmentStrings()

n=0
do
msgBox m.cstring(n)
while m.byte(n)<>0
n=n+1
wend
n=n+1
```

```
loop until m.byte(n)=0
#endif
```

**Notes:** The MBS Plugin has an EnvironmentMBS class for this.

#### 5.0.40 How can i get similar behavior to Roxio Toast or iTunes where clicking a 'burn' button allows the next inserted blank CD-R to bypass the Finder and be accepted by my application?

Plugin Version: all, Platform: macOS.

**Answer:** You need to get a media reservation.

**Example:**

```
dim d as DRDeviceMBS // get a device
d.AcquireMediaReservation
```

**Notes:** Use the plugin function AcquireMediaReservation and later release it using ReleaseMediaReservation.

See plugin examples on how to use it and check Apples DiscRecording framework documentation for more details.

#### 5.0.41 How can I get text from a PDF?

Plugin Version: all, Platforms: macOS, Linux, Windows.

**Answer:** Crossplatform you can use DynaPDF Pro.

**Notes:** On Mac OS X you can also use PDFKit for the same job.

While DynaPDF Pro gives you each bit of text with rotation, font information and encoding details, PDFKit gives you only the text string for a PDF page.

#### 5.0.42 How can I get text from a Word Document?

Plugin Version: all, Platforms: macOS, Linux, Windows.

**Answer:** to get the text string from a doc file, use the NSAttributedStringMBS class.

**Notes:** The NSAttributedStringMBS class is Mac OS X only and we have currently no solution for Windows or Linux.

Use the `NSAttributedStringMBS.initWithDocFormat(data as string)` as boolean method.

### 5.0.43 How can I get the item string for a given file creator?

Plugin Version: all.

**Answer:** Try this function:

**Example:**

```
Sub pullNativeDocs(aCREA As string)
Dim result as Integer
Dim m, k as memoryBlock
Dim f as folderItem
Dim newType as string
Dim anIcon As picture
Dim ofs as Integer
```

```
Declare Function GetFileTypesThatAppCanNativelyOpen Lib "Carbon" (appVRefNumHint as Short, appSignature as OSType, nativeTypes as Ptr) as Short Inline68K("701CABFC")
Declare Function GetDocumentKindString Lib "Carbon" (docVRefNum as Short, docType as OSType, docCreator as OSType, kindString as ptr) as Short Inline68K("7016ABFC")
```

```
listBox1.deleteAllRows
```

```
m = newMemoryBlock(1024)
result = GetFileTypesThatAppCanNativelyOpen(Volume(0).MacVRefNum, aCREA, m)
if result <> 0 then
listBox1.addRow "<Not found.>"
return
end if
```

```
do
if m.byte(ofs*4) = 0 then
exit
else
newType = m.OSTypeMBS(ofs*4)
listBox1.addRow newType
k = newMemoryBlock(64)
result = GetDocumentKindString(Volume(0).MacVRefNum, newType, aCREA, k)
if result = 0 then
listBox1.cell(ofs,1) = k.pString(0)
ofs = ofs + 1
else
listBox1.cell(ofs,1) = "(unknown)"
end if
end if
```

loop

End Sub

**Notes:** Change "Translation" to "CarbonLib" for Mac OS X.

#### 5.0.44 How can I launch an app using it's creator code?

Plugin Version: all, Platform: macOS.

**Answer:** Send an AppleEvent "odoc" with the creator code to the Finder ("MACS"):

**Example:**

```
Function LaunchByCreator(C As String) As Boolean
Dim A As AppleEvent
A = NewAppleEvent("aevt","odoc","MACS")
A.ObjectSpecifierParam("—") = GetUniqueIDObjectDescriptor("appf",nil,C)
return A.Send
End Function
```

#### 5.0.45 How can I learn what shared libraries are required by a plugin on Linux?

Plugin Version: all, Platform: macOS.

**Answer:** Please use the ldd command in the terminal.

**Notes:** You build an app on any platform, but for Linux.

For the resulting .so files in the libs folder, you can run the ldd command with the library path as parameter. It shows you references lib files and you can make sure you have those installed.

This is a sample run of our graphicsmagick plugin:

```
cs@Ubuntu32:
textasciitilde /MeinProgramm/MeinProgramm Libs$ ldd libMBSGraphicsMagickPlugin17744.so
linux-gate.so.1 =>(0xb76ee000)
libdl.so.2 =>/lib/i386-linux-gnu/libdl.so.2 (0xb6f0e000)
libgtk-x11-2.0.so.0 =>/usr/lib/i386-linux-gnu/libgtk-x11-2.0.so.0 (0xb6aa6000)
libpthread.so.0 =>/lib/i386-linux-gnu/libpthread.so.0 (0xb6a8a000)
libstdc++.so.6 =>/usr/lib/i386-linux-gnu/libstdc++.so.6 (0xb69a5000)
libm.so.6 =>/lib/i386-linux-gnu/libm.so.6 (0xb6979000)
libgcc_s.so.1 =>/lib/i386-linux-gnu/libgcc_s.so.1 (0xb695b000)
libc.so.6 =>/lib/i386-linux-gnu/libc.so.6 (0xb67b1000)
```

```

/lib/ld-linux.so.2 (0xb76ef000)
libgdk-x11-2.0.so.0 =>/usr/lib/i386-linux-gnu/libgdk-x11-2.0.so.0 (0xb6701000)
libpangocairo-1.0.so.0 =>/usr/lib/i386-linux-gnu/libpangocairo-1.0.so.0 (0xb66f4000)
libX11.so.6 =>/usr/lib/i386-linux-gnu/libX11.so.6 (0xb65c0000)
libXfixes.so.3 =>/usr/lib/i386-linux-gnu/libXfixes.so.3 (0xb65ba000)
libatk-1.0.so.0 =>/usr/lib/i386-linux-gnu/libatk-1.0.so.0 (0xb659a000)
libcairo.so.2 =>/usr/lib/i386-linux-gnu/libcairo.so.2 (0xb64ce000)
libgdk_pixbuf-2.0.so.0 =>/usr/lib/i386-linux-gnu/libgdk_pixbuf-2.0.so.0 (0xb64ad000)
libgio-2.0.so.0 =>/usr/lib/i386-linux-gnu/libgio-2.0.so.0 (0xb6356000)
libpangoft2-1.0.so.0 =>/usr/lib/i386-linux-gnu/libpangoft2-1.0.so.0 (0xb632a000)
libpango-1.0.so.0 =>/usr/lib/i386-linux-gnu/libpango-1.0.so.0 (0xb62e0000)
libfontconfig.so.1 =>/usr/lib/i386-linux-gnu/libfontconfig.so.1 (0xb62ab000)
libgobject-2.0.so.0 =>/usr/lib/i386-linux-gnu/libgobject-2.0.so.0 (0xb625c000)
libglib-2.0.so.0 =>/lib/i386-linux-gnu/libglib-2.0.so.0 (0xb6163000)
libXext.so.6 =>/usr/lib/i386-linux-gnu/libXext.so.6 (0xb6151000)
libXrender.so.1 =>/usr/lib/i386-linux-gnu/libXrender.so.1 (0xb6147000)
libXinerama.so.1 =>/usr/lib/i386-linux-gnu/libXinerama.so.1 (0xb6142000)
libXi.so.6 =>/usr/lib/i386-linux-gnu/libXi.so.6 (0xb6132000)
libXrandr.so.2 =>/usr/lib/i386-linux-gnu/libXrandr.so.2 (0xb6129000)
libXcursor.so.1 =>/usr/lib/i386-linux-gnu/libXcursor.so.1 (0xb611e000)
libXcomposite.so.1 =>/usr/lib/i386-linux-gnu/libXcomposite.so.1 (0xb611a000)
libXdamage.so.1 =>/usr/lib/i386-linux-gnu/libXdamage.so.1 (0xb6115000)
libfreetype.so.6 =>/usr/lib/i386-linux-gnu/libfreetype.so.6 (0xb607b000)
libxcb.so.1 =>/usr/lib/i386-linux-gnu/libxcb.so.1 (0xb605a000)
libpixman-1.so.0 =>/usr/lib/i386-linux-gnu/libpixman-1.so.0 (0xb5fc2000)
libpng12.so.0 =>/lib/i386-linux-gnu/libpng12.so.0 (0xb5f98000)
libxcb-shm.so.0 =>/usr/lib/i386-linux-gnu/libxcb-shm.so.0 (0xb5f93000)
libxcb-render.so.0 =>/usr/lib/i386-linux-gnu/libxcb-render.so.0 (0xb5f89000)
libz.so.1 =>/lib/i386-linux-gnu/libz.so.1 (0xb5f73000)
libgmodule-2.0.so.0 =>/usr/lib/i386-linux-gnu/libgmodule-2.0.so.0 (0xb5f6e000)
libselinux.so.1 =>/lib/i386-linux-gnu/libselinux.so.1 (0xb5f4f000)
libresolv.so.2 =>/lib/i386-linux-gnu/libresolv.so.2 (0xb5f36000)
libexpat.so.1 =>/lib/i386-linux-gnu/libexpat.so.1 (0xb5f0c000)
libffi.so.6 =>/usr/lib/i386-linux-gnu/libffi.so.6 (0xb5f05000)
libpcre.so.3 =>/lib/i386-linux-gnu/libpcre.so.3 (0xb5ec9000)
librt.so.1 =>/lib/i386-linux-gnu/librt.so.1 (0xb5ec0000)
libXau.so.6 =>/usr/lib/i386-linux-gnu/libXau.so.6 (0xb5ebb000)
libXdmcp.so.6 =>/usr/lib/i386-linux-gnu/libXdmcp.so.6 (0xb5eb4000)
cs@Ubuntu32:
textasciitilde /MeinProgramm/MeinProgramm Libs$

```

As you see all library have been found and their load address is printed behind the na,e. If a library is missing, you usually see the address missing there or being zero.



```

while theRegexMatch <>nil
theStart = theRegexMatch.subExpressionStartB(0) + len(theRegexMatch.subExpressionString(0))

result = result + theRegexMatch.subExpressionString(1)
infoCharset = theRegexMatch.subExpressionString(2)
encodedPart = theRegexMatch.subExpressionString(4)
if theRegexMatch.subExpressionString(3) = "B" then
encodedPart = DecodeBase64(encodedPart)
elseif theRegexMatch.subExpressionString(3) = "Q" then
encodedPart = DecodeQuotedPrintable(encodedPart)
end if
if right(result, 1) = " " then
result = mid(result, 1, len(result)-1)
end if
encodedPart = encodedPart.DefineEncoding(GetInternetTextEncoding(infoCharset))
result = result + encodedPart

theRegex.SearchStartPosition = theStart
theRegexMatch = theRegex.search()
wend

result = result + mid(src, theStart+1)

else
result = src
end if
// theRegexMatch = theRegex.search

msgbox result

```

**Notes:** May not look nice depending on the controls used.  
This is no longer needed when using MimeEmailMBS class which decodes for you.

### 5.0.48 How do I enable/disable a single tab in a tabpanel?

Plugin Version: all, Platform: macOS.

**Answer:** Use the TabpanelEnabledMBS method.

**Example:**

```
TabpanelEnabledMBS(tabpanel1, 1, false)
```

**Notes:** Use Carbon for MachO and CarbonLib for Mac Carbon and AppearanceLib for Mac OS Classic as

library.

For Cocoa, please use enabled property of NSTabViewItemMBS class.

### 5.0.49 How do I find the root volume for a file?

Plugin Version: all, Platforms: macOS, Linux, Windows.

**Answer:** Try this function:

**Example:**

```
Function GetRootVolume(f as FolderItem) as FolderItem
dim root, dum as folderItem
if f <> nil then
root = f // f might be the volume
do
dum = root.parent
if dum <> nil then
root = dum
end if
loop until dum = nil
return root
end if
End Function
```

### 5.0.50 How do I get the current languages list?

Plugin Version: all, Platform: macOS.

**Answer:** Try this code:

**Example:**

```
dim p as new CFPReferencesMBS
dim a as CFArrayMBS
dim s as CFStringMBS
dim o as CFOBJECTMBS
dim sa(-1) as string

o=p.CopyAppValue("AppleLanguages", ".GlobalPreferences")

if o<>Nil then
a=CFArrayMBS(o)

dim i,c as Integer
```

```
c=a.Count-1
for i=0 to c
o=a.Item(i)

if o isa CFStringMBS then
s=CFStringMBS(o)
sa.Append s.str
end if
next
end if

MsgBox Join(sa,EndOfLine)
```

**Notes:** On Mac OS X you can get the list of current languages like this list:

```
de
en
ja
fr
es
it
pt
pt-PT
nl
sv
nb
da
fi
ru
pl
zh-Hans
zh-Hant
ko
```

Which has German (de) on the top for a German user.  
This code has been tested on Mac OS X 10.5 only.

### 5.0.51 How do I get the Mac OS Version?

Plugin Version: all, Platform: macOS.

**Answer:** Try this code:

**Example:**

```

dim i as Integer
if system.gestalt("sysv", i) then
//do this in an 'If' in case you don't get any value back at all and system.gestalt returns boolean
if i = &h750 then //If OS is 7.5
//do stuff
elseif i = &h761 then //If OS is 7.6.1
//do stuff
end if
end if

```

**Notes:** The MBS Plugin has a function SystemInformationMBS.OSVersionString for this.

### 5.0.52 How do I get the printer name?

Plugin Version: all.

**Answer:** For Mac OS Classic see the code below and for Mac OS X use the Carbon Print Manager Classes from the MBS Plugin.

**Example:**

```

dim s as String
dim i as Integer

s=app.ResourceFork.GetResource("STR ",-8192)
if s<>"" then
i=ascb(leftb(s,1))
s=mid(s,2,i)

MsgBox s
end if

```

**Notes:** A note from Craig Hoyt:

After looking at your example I had a little deja-vu experience. Several years ago I played around with this same code if FutureBasic. I discovered that it did not and still doesn't provide the 'Printer Name', it does return the print driver name. If it returns 'LaserWriter 8' as the print driver you can look into this file and get the 'PAPA' resource #-8192 to get the actual Printer Name. Unfortunately this does not hold true for other printers. My Epson and HP Printers (the Epson has an Ethernet Card and the HP is USB) do not provide this info in their drivers. As far as I can tell it only returns the name by polling the printer itself.

### 5.0.53 How do I make a metal window if RB does not allow me this?

Plugin Version: all, Platform: macOS.

**Answer:** The following declare turns any window on Mac OS X 10.2 or newer into a metal one.

**Example:**

```
declare sub ChangeWindowAttributes lib "Carbon" (win as windowptr, a as Integer, b as Integer)
```

```
ChangeWindowAttributes window1,256,0
```

**Notes:** May not look nice depending on the controls used.

### 5.0.54 How do I make a smooth color transition?

Plugin Version: all, Platforms: macOS, Linux, Windows.

**Answer:**

I'd like to show in a report some bars, which start with color A and end with color B.

The color change should be very smooth.

My problem: If I would start from 255,0,0 and end by 0,0,0, I would have 255 different colors. If the bars are longer than 255 pixels, would this look nice?

**Example:**

```
// Window.Paint:
Sub Paint(g As Graphics)
dim w,w1,x,p as Integer
dim c1,c2,c as color
dim p1,p2 as Double

c1=rgb(255,0,0) // start color
c2=rgb(0,255,0) // end color

w=g.Width
w1=w-1

for x=0 to w1
p1=x/w1
p2=1.0-p1
```

```

c=rgb(c1.red*p1+c2.red*p2, c1.green*p1+c2.green*p2, c1.blue*p1+c2.blue*p2)

g.ForeColor=c
g.DrawLine x,0,x,g.Height

next
End Sub

```

**Notes:**

Try the code above in a window paint event handler.

**5.0.55 How do I read the applications in the dock app?**

Plugin Version: all, Platform: macOS.

**Answer:** Use CFPreferencesMBS class like in this example:

**Example:**

```

// Reads file names from persistent dock applications and puts them into the list

dim pref as new CFPreferencesMBS

dim persistentapps as CFStringMBS = NewCFStringMBS("persistent-apps")
dim ApplicationID as CFStringMBS = NewCFStringMBS("com.apple.dock")
dim tiledata as CFStringMBS = NewCFStringMBS("tile-data")
dim filelabel as CFStringMBS = NewCFStringMBS("file-label")

// get the array of persistent applications from dock preferences
dim o as CObjectMBS = pref.CopyValue(persistentapps, ApplicationID, pref.kCFPreferencesCurrentUser,
pref.kCFPreferencesAnyHost)

if o isa CFArrayMBS then
dim a as CFArrayMBS = CFArrayMBS(o)

// walk over all items in array
dim c as Integer = a.Count-1
for i as Integer = 0 to c

// get dictionary describing item
o = a.Item(i)

if o isa CFDictionaryMBS then
dim d as CFDictionaryMBS = CFDictionaryMBS(o)

```

```

// and pick tile data dictionary
o = d.Value(tiledata)
if o isa CFDictionaryMBS then
d = CFDictionaryMBS(o)

// and pick there the file label
o = d.Value(filelabel)
if o isa CFStringMBS then
// and display it
dim name as string = CFStringMBS(o).str
List.AddRow name
end if
end if
end if

next

else
MsgBox "Failed to read dock preferences."
end if

```

**Notes:** You can use the `CFPreferencesMBS.SetValue` to change a value and `CFPreferencesMBS.Synchronize` to write the values to disc. You may need to restart the `Dock.app` if you modified things.

### 5.0.56 How do I truncate a file?

Plugin Version: all, Platforms: macOS, Linux, Windows.

**Answer:** In a `binarystream` you can set the `length` property to truncate.

### 5.0.57 How do update a Finder's windows after changing some files?

Plugin Version: all, Platform: macOS.

**Answer:** Try this code:

**Example:**

```

dim f as folderitem // some file
dim ae as appleevent
ae=newappleevent("fndr","fupd","MACS")
ae.folderitemparam("—")=f
if not ae.send then
//something went wrong

```

end if

**Notes:** The `folderitem.finderupdate` from the MBS Plugin does something like this.

### 5.0.58 How to access a USB device directly?

Plugin Version: all, Platforms: macOS, Linux, Windows.

**Answer:** First, it depends on the device.

**Notes:** Some devices can be talked directly from user mode code, but some require a kernel driver.

For some devices you can use plugins to access them like:

- Audio and Video sources using the `QTGrabberClassMBS`
- Mass storage devices using the `folderitem` class.
- Serial devices using the `System.SerialPort` function.
- HID USB devices can be used with `MacHIDMBS`, `WinHIDMBS` or `LinuxHIDInterface` class.
- Any USB device may be used with `MacUSBMBS` or `WinUSBMBS` classes.

In general it is always the best to take the most high level access to have others do the work for the details.

### 5.0.59 How to add icon to file on Mac?

Plugin Version: all, Platforms: macOS, Linux, Windows.

**Answer:** You can use `FolderItem.AddCustomIcon` or `NSWorkspaceMBS.setIcon` functions.

**Notes:** Please close any open stream for the file you want to add an icon.

### 5.0.60 How to ask the Mac for the Name of the Machine?

Plugin Version: all, Platform: macOS.

**Answer:** Using Apple Events you can use this code:

**Example:**

**Function** `Computername()` *As string*

```

dim theEvent as AppleEvent
dim err as boolean

theEvent = newAppleEvent("mchn","getd","MACS")

err = theEvent.send

return theevent.ReplyString

End Function

```

**Notes:** Code above is for Mac OS 9!

Also the MBS Plugin has a function for this which may be faster and work also on Macs without Filesharing (which handles this event).

### 5.0.61 How to automatically enable retina in my apps?

Plugin Version: all, Platform: macOS.

**Answer:** You can run a build script on each build with this code:

**Example:**

```

Dim App As String = CurrentBuildLocation + "/" + CurrentBuildAppName + ".app"
Call DoShellCommand("/usr/bin/defaults write " + App + "/Contents/Info ""NSHighResolutionCapable""
YES")

```

**Notes:** This will set the NSHighResolutionCapable flag to YES.

### 5.0.62 How to avoid leaks with Cocoa functions?

Plugin Version: all, Platform: macOS.

**Answer:** You can try this code on Mac OS X:

**Example:**

```

// in a Timer Action event:
Sub Action()
static LastPool as NSAutoreleasePoolMBS = nil
static CurrentPool as NSAutoreleasePoolMBS = nil

```

```

LastPool = CurrentPool
CurrentPool = new NSAutoreleasePoolMBS

```

End Sub

**Notes:** With Xojo 2009r4 the code above should not be needed as Xojo runtime does automatically handle the `NSAutoreleasePools` for you. For older Xojo versions you need to use code with a timer with the action event above to avoid memory leaks.

Please do not use Xojo 2009r4 and newer with plugins before version 9.5. You can get crashes there which typically show a line with a `objc_msgSend` call.

### 5.0.63 How to avoid trouble connecting to oracle database with SQL Plugin?

Plugin Version: all, Platform: macOS.

**Answer:** For oracle the most important thing is to point the plugin to the libraries from oracle.

**Notes:** In environment variables, the paths like `ORACLE_HOME` must be defined.

On Mac OS X you also need to define `DYLD_LIBRARY_PATH` to point to the dylib files from oracle.

For that you need to modify `/etc/launchd.conf` for Mac OS X 10.8 and newer.

In older versions those variables in `.MacOSX/environment.plist` file in user's home.

Another way for the case you bundle things inside your app is to use the `LSEnvironment` key in `info.plist`. In `info.plist` it looks like this:

```
<key>LSEnvironment</key>
<dict>
<key>test</key>
<string>Hello World</string>
</dict>
```

### 5.0.64 How to avoid `___NSAutoreleaseNoPool` console messages in threads?

Plugin Version: all, Platform: macOS.

**Answer:** You need to use your own `NSAutoreleasePool` on a thread like this:

**Example:**

```
sub MyThread.run
dim pool as new NSAutoreleasePoolMBS
// do work here

pool=nil
```

end sub

**Notes:** For more details read here:

[http://developer.apple.com/mac/library/documentation/Cocoa/Reference/Foundation/Classes/NSAutoreleasePool\\_Class/Reference/Reference.html](http://developer.apple.com/mac/library/documentation/Cocoa/Reference/Foundation/Classes/NSAutoreleasePool_Class/Reference/Reference.html)

### 5.0.65 How to bring app to front?

Plugin Version: all, Platforms: macOS, Linux, Windows.

**Answer:** On Mac you can use this code:

**Example:**

```
// First way:  
app.FrontMostMBS = true
```

```
// second way:  
dim p as new ProcessMBS  
p.GetCurrentProcess  
p.FrontProcess = true
```

```
// third way:  
NSApplicationMBS.sharedApplication.activateIgnoringOtherApps(true)
```

```
// for Windows:  
RemoteControlMBS.WinBringWindowToTop
```

**Notes:** This will bring a Mac app to the front layer.

### 5.0.66 How to bring my application to front?

Plugin Version: all, Platform: macOS.

**Answer:** This makes SimpleText (Code txt) to the frontmost application:

**Example:**

```
Dim A As AppleEvent  
A = NewAppleEvent("misc", "actv", "")  
If Not A.Send then  
Beep  
end if
```

**Notes:** (Code is Mac only)

### 5.0.67 How to catch Control-C on Mac or Linux in a console app?

Plugin Version: all, Platforms: macOS, Linux, Windows.

**Answer:** You can use SignalHandlerMBS class for this.

**Example:**

```
// watch for Control-C on Mac
call SignalHandlerMBS.SetFlagHandler(2)

dim ende as boolean = false
do
if SignalHandlerMBS.IsFlagSet(2) then
Print "Flag 2 set. Existing..."
ende = true
end if

DoEvents 1
loop until ende
```

**Notes:** The signal is caught, a flag is set and you can ask later in your normal application flow for the result.

### 5.0.68 How to change name of application menu?

Plugin Version: all, Platforms: macOS, Windows.

**Answer:** Use this code to change the application menu name on Mac OS X:

**Example:**

```
dim mb as new MenubarMBS
dim m as MenuMBS = mb.item(1) // 1 is in my tests the app menu
if m<>Nil then
m.MenuTitle = "Hello World"
end if
```

**Notes:** This code is for Carbon only.

### 5.0.69 How to change the name in the menubar of my app on Mac OS X?

Plugin Version: all, Platform: macOS.

**Answer:**

You mean it screws up if the file name of the bundle itself is different than the name of the executable file in the MacOS folder within the bundle? If so, you should find something like this within your Info.plist file (or the 'plst' resource that the RB IDE builds for you):

```
<key>CFBundleExecutable</key>
<string>Executable file name here</string>
```

Just make sure that file name matches.

However, if your question involves how you can change the name of the app that appears in the menu and the dock, that's different. You can make this name different from the file name by changing the CFBundleName key:

```
<key>CFBundleName</key>
<string>Name for menu here</string>
```

Note that if you use my free AppBundler program, this second part is taken care of for you – just fill in a custom name in the right field. You can find AppBundler (from Thomas Reed) at <http://www.bitjuggler.com/products/appbundler/>.

### 5.0.70 How to check if a folder/directory has subfolders?

Plugin Version: all, Platforms: macOS, Linux, Windows.

**Answer:** You can use code like this to check all items in a folder:

**Example:**

```
Function HasSubFolder(folder as FolderItem) As Boolean
dim c as Integer = folder.Count
```

```
for i as Integer = 1 to c
dim item as FolderItem = folder.TrueItem(i)
```

```
if item<>Nil and item.Directory then
Return true
end if
```

```
next
```

```
End Function
```

**Notes:** We use `trueitem()` here to avoid resolving alias/link files. Also we check for `nil` as we may not have permission to see all items. And if one is a directory, we return without checking the rest.

### 5.0.71 How to check if Macbook runs on battery or AC power?

Plugin Version: all, Platform: macOS.

**Answer:** Please use our `IOPowerSourcesMBS` class like this:

**Example:**

```
Function PowerSourceState() as Integer
dim p as new IOPowerSourcesMBS

// check all power sources
dim u as Integer = p.Count-1
for i as Integer = 0 to u
dim d as CFDictionaryMBS = p.Item(i)
if d<>nil then
// check if they have a power source state key:
dim o as CFObjectMBS = d.Value(NewCFStringMBS("Power Source State"))
if o isa CFStringMBS then
dim s as string = CFStringMBS(o).str

'MsgBox s

if s = "AC Power" then
Return 1
elseif s = "Battery Power" then
Return 2
end if
end if
end if
next
Return 0 // unknown
End Function
```

**Notes:** If you want to check the `CFDictionaryMBS` content, simply use a line like `"dim x as dictionary = d.dictionary"` and check the contents in the debugger.

### 5.0.72 How to check if Microsoft Outlook is installed?

Plugin Version: all, Platforms: macOS, Linux, Windows.

**Answer:** If you need Outlook for Scripting, you should simply check registry for the required Outlook.Application class:

**Example:**

```
Function OutlookInstalled() As Boolean
    #if TargetWin32 then

    try
    dim r as new RegistryItem("HKEY_CLASSES_ROOT\Outlook.Application\CLSID", false)

    Return true

    catch r as RegistryAccessErrorException
    // not installed
    Return false

    end try

    #else

    // Windows only, so false on other platforms
    Return false

    #endif

End Function
```

### 5.0.73 How to check on Mac OS which country or language is currently selected?

Plugin Version: all, Platform: macOS.

**Answer:** The code below returns a country value.

**Example:**

```
dim result as Integer

IF TargetMacOS THEN

CONST smScriptLang = 28
```

```

CONST smSystemScript = -1

DECLARE FUNCTION GetScriptManagerVariable LIB "Carbon" ( selector as Integer) as Integer
DECLARE FUNCTION GetScriptVariable LIB "Carbon" ( script as Integer, selector as Integer) as Integer

result=GetScriptVariable(smSystemScript, smScriptLang)

END IF

```

**Notes:** Returns values like:

For more values, check "Script.h" in the frameworks.

### 5.0.74 How to code sign my app with plugins?

Plugin Version: all, Platform: macOS.

**Answer:** When you try to code sign the application with plugin dylibs on Mac OS X, you may see error message that there is actually a signature included.

**Notes:** Please use the -f command line parameter with codesign utility to overwrite our MBS signature. We sign our plugins for MacOS, iOS and Windows to make sure they have not been modified.

In terminal, you do like this:

```
cd <Path to folder of app>
```

```

xattr -cr <Appname>.app
codesign -f -s "Developer ID Application: <Your Name>" <Appname>.app/Contents/Frameworks/*.dylib
codesign -f -s "Developer ID Application: <Your Name>" <Appname>.app/Contents/Frameworks/*.framework
codesign -f -s "Developer ID Application: <Your Name>" <Appname>.app

```

Please use the name of your certificate (See keychain), the name of your app and the path to the app folder. If you have helper apps you need to sign them first.

You can use a build step to automatically sign your app on build.

### 5.0.75 How to collapse a window?

Plugin Version: all, Platform: macOS.

**Answer:** Use this function (Mac only):

**Example:**

```
Sub CollapseRBwindow(w as window, CollapseStatus as boolean)
dim state, err as Integer
dim wh as MemoryBlock
```

```
Declare Function CollapseWindow Lib "Carbon" (window as Integer, collapse as Integer) as Integer
```

```
IF CollapseStatus THEN
state = 1
ELSE
state = 0
END IF
```

```
err = CollapseWindow(w.MacWindowPtr, state)
```

```
End Sub
```

**Notes:** Also the MBS Plugin has a window.collapsedmbs property you can set. For Windows the MBS Plugin has a window.isiconicmbs property.

### 5.0.76 How to compare two pictures?

Plugin Version: all, Platforms: macOS, Linux, Windows.

**Answer:** You can try this code:

**Example:**

```
Function ComparePictures(p as picture,q as picture) as Integer
dim r,u as RGBSurface
dim x,y,n,m,h,w as Integer
dim w1,w2,h1,h2,d1,d2 as Integer
dim c1,c2 as color
```

```
h1=p.Height
h2=q.Height
w1=p.Width
w2=q.Width
d1=p.Depth
d2=q.Depth
```

```
if d1<>d2 then
Return 1
elseif w1<>w2 then
```

```

return 2
elseif h1<>h2 then
Return 3
else
r=p.RGBSurface
u=q.RGBSurface

if r=nil or u=nil then
Return -1
else
h=h1-1
w=w1-1
m=min(w,h)

for n=0 to m
c1=r.Pixel(n,n)
c2=u.Pixel(n,n)
if c1<>c2 then
Return 4
end if
next

for y=0 to h
for x=0 to w
c1=r.Pixel(x,y)
c2=u.Pixel(x,y)
if c1<>c2 then
Return 5
end if
next
next

// 0 for equal
// -1 for error (no RGBsurface)
// 1 for different depth
// 2 for different width
// 3 for different height
// 4 for different pixels (fast test)
// 5 for different pixels (slow test)
end if
end if

Exception
Return -1
End Function

```

**Notes:** Remember that this only works on bitmap pictures, so the `picture.BitmapMBS` function may be useful.

### 5.0.77 How to compile PHP library?

Plugin Version: all, Platform: macOS.

**Answer:** You have to download the source code and compile a static version of the library.

**Notes:** This instructions were written based on PHP 5.2.6 on Mac OS X:

- Best take a new Mac with current Xcode version installed.
- Download the source code archive. e.g. "php-5.2.6.tar.bz2"
- Expand that archive on your harddisc.
- Open terminal window
- change directory to the php directory. e.g. "cd /php-5.2.6"
- execute this two lines to define the supported CPU types and the minimum Mac OS X version:
- export CFLAGS="-arch ppc -arch i386 -mmacosx-version-min=10.3"
- export CXXFLAGS="-arch ppc -arch i386 -mmacosx-version-min=10.3"
- the command "./configure help" does show the configure options.
- use configure with a line like this:
- ./configure --enable-embed --with-curl --enable-ftp --enable-zip --enable-sockets --enable-static --enable-soap --with-zlib --with-bz2 --enable-exif --enable-bcmath --enable-calendar
- start the compilation with "make all"
- other option is to use "make install" which first does the same as "make all" and than does some installation scripts.
- you may get an error about a duplicate symbole \_\_yytext. Search the file "zend\_ini\_scanner.c", search a line with "char \*yytext;" and change it to "extern char \*yytext;"
- On the end you get a lot of error messages, but you have a working library (named libphp5.so) file in the invisible ".libs" folder inside your php source folder.

Possible problems and solutions:

- If the path to your files has spaces, you can get into trouble. e.g. "/RB Plugins/PHP" is bad as files will be searched sometimes in "/RB".

- If you have in /usr/local/lib libraries which conflict with the default libraries, you can get into trouble.
- If you installed some open source tools which compiled their own libraries, you can get into conflicts.
- if you have to reconfigure or after a problem, you may need to use "make clean" before you start "make all" again.

Feel free to install additional libraries and add more packages to the configure line.

### 5.0.78 How to convert a `BrowserType` to a `String` with `WebSession.Browser`?

Plugin Version: all, Platforms: macOS, Linux, Windows.

**Answer:** Use code like this:

**Example:**

```
Function GetBrowserName(s as WebSession.BrowserType) As string
Select case s
case WebSession.BrowserType.Android
Return "Andriod"
case WebSession.BrowserType.Blackberry
Return "Blackberry"
case WebSession.BrowserType.Chrome
Return "Chrome"
case WebSession.BrowserType.ChromeOS
Return "ChromeOS"
case WebSession.BrowserType.Firefox
Return "Firefox"
case WebSession.BrowserType.InternetExplorer
Return "InternetExplorer"
case WebSession.BrowserType.Opera
Return "Opera"
case WebSession.BrowserType.Safari
Return "Safari"
case WebSession.BrowserType.SafariMobile
Return "SafariMobile"
case WebSession.BrowserType.Unknown
Return "Unknown"
else
Return "Unkown: "+str(integer(s))
end Select

End Function
```

### 5.0.79 How to convert a EngineType to a String with WebSession.Engine?

Plugin Version: all, Platforms: macOS, Linux, Windows.

**Answer:** Use code like this:

**Example:**

```
Function GetRenderingEngineName(s as WebSession.EngineType) As string
Select case s
case WebSession.EngineType.Gecko
Return "Gecko"
case WebSession.EngineType.Presto
Return "Presto"
case WebSession.EngineType.Trident
Return "Trident"
case WebSession.EngineType.Unknown
Return "Unknown"
case WebSession.EngineType.WebKit
Return "WebKit"
else
Return "Unkown: "+str(integer(s))
end Select

End Function
```

### 5.0.80 How to convert a PlatformType to a String with WebSession.Platform?

Plugin Version: all, Platforms: macOS, Linux, Windows.

**Answer:** Use code like this:

**Example:**

```
Function GetPlatformName(s as WebSession.PlatformType) As string
Select case s
case WebSession.PlatformType.Blackberry
Return "Blackberry"
case WebSession.PlatformType.iPad
Return "iPad"
case WebSession.PlatformType.iPhone
Return "iPhone"
case WebSession.PlatformType.iPodTouch
Return "iPodTouch"
case WebSession.PlatformType.Linux
Return "Linux"
case WebSession.PlatformType.Macintosh
Return "Macintosh"
```

```

case WebSession.PlatformType.PS3
Return "PS3"
case WebSession.PlatformType.Unknown
Return "Unknown"
case WebSession.PlatformType.WebOS
Return "WebOS"
case WebSession.PlatformType.Wii
Return "Wii"
case WebSession.PlatformType.Windows
Return "Windows"
else
Return "Unkown: "+str(integer(s))
end Select

```

End Function

### 5.0.81 How to convert a text to iso-8859-1 using the TextEncoder?

Plugin Version: all, Platforms: macOS, Linux, Windows.

#### Answer:

This code can help you although it's not perfect.  
You need to set lc to the current color you use.

#### Example:

```

dim outstring as string
dim theMac, thePC as textencoding
dim Mac2PC as textconverter

theMac = getTextEncoding(0) // MacRoman
thePC = getTextEncoding(&h0201) // ISOLatin1

Mac2PC = getTextConverter(theMac, thePC)
// if you wanted to do the opposite just create a converter
// PC2Mac = getTextConverter(thePC, theMac)

outstring = Mac2PC.convert("Bj√rn, this text should be converted")
Mac2PC.clear

```

#### Notes:

You have to call Mac2PC.clear after every conversion to reset the encoding engine.  
See also newer TextConverterMBS class.

### 5.0.82 How to convert ChartTime back to Xojo date?

Plugin Version: all, Platforms: macOS, Linux, Windows.

**Answer:** We have this example code:

**Example:**

```
Function ChartTimeToDate(ChartTime as Double) As date
static diff as Double = 0.0
```

```
if diff = 0.0 then
dim d2 as Double = CDBaseChartMBS.chartTime(2015, 1, 1)
dim da as new date(2015, 1, 1)
dim ts as Double = da.TotalSeconds
```

```
diff = ts - d2
end if
```

```
dim d as new date
d.TotalSeconds = diff + ChartTime
```

```
Return d
End Function
```

**Notes:** As you see we calculate the difference in base date from Date and ChartTime and later use difference to convert.

### 5.0.83 How to convert line endings in text files?

Plugin Version: all, Platform: macOS.

**Answer:** You can simply read file with TextInputStream and write with new line endings using TextOutputStream class.

**Example:**

```
dim inputfile as FolderItem = SpecialFolder.Desktop.Child("test.txt")
dim outputfile as FolderItem = SpecialFolder.Desktop.Child("output.txt")
dim it as TextInputStream = TextInputStream.Open(inputfile)
dim ot as TextOutputStream = TextOutputStream.Create(outputfile)
```

```
ot.Delimiter = EndOfLine.Windows // new line ending
while not it.EOF
ot.WriteLine it.ReadLine
wend
```

**Notes:** `TextInputStream` will read any input line endings and with `delimiter` property in `TextOutputStream` you can easily define your new delimiter.

### 5.0.84 How to convert picture to string and back?

Plugin Version: all, Platforms: macOS, Linux, Windows.

**Answer:** Use this plugin functions:

**Notes:** JPEG:

`JPEGStringToPictureMBS(buf as string)` as picture  
`JPEGStringToPictureMBS(buf as string,allowdamaged as Boolean)` as picture  
`PictureToJPEGStringMBS(pic as picture,quality as Integer)` as string

PNG:

`PictureToPNGStringMBS(pic as picture, gamma as single)` as string  
`PictureToPNGStringMBS(pic as picture, mask as picture, gamma as single)` as string  
`PictureToPNGStringMBS(pic as picture, gamma as single, Interlace as Boolean, FilterType as Integer)` as string  
`PictureToPNGStringMBS(pic as picture, mask as picture, gamma as single, Interlace as Boolean, FilterType as Integer)` as string  
`PNGStringToPictureMBS(data as string, gamma as single)` as picture  
`PNGStringToPNGPictureMBS(data as string, gamma as single)` as PNGpictureMBS

Tiff:

`TIFFStringToPictureMBS(data as string)` as picture  
`TIFFStringToTiffPictureMBS(data as string)` as TiffPictureMBS

BMP:

`BMPStringtoPictureMBS(data as string)` as picture  
`Picture.BMPDataMBS(ResolutionValueDPI as Integer=72)` as string

GIF:

`GifStringToGifMBS(data as string)` as GIFMBS  
`GifStringToPictureMBS(data as string)` as Picture

### 5.0.85 How to copy an array?

Plugin Version: all, Platform: macOS.

**Answer:** You can use a function like this to copy an array:

**Example:**

```
Function CopyArray(a() as Double) as Double()
dim r() as Double
for each v as Double in a
r.Append v
next
Return r
End Function
```

**Notes:** If needed make several copies of this method with different data types, not just double.  
For a deep copy of an array of objects, you need to change code to also make a copy of those objects.

### 5.0.86 How to copy a dictionary?

Plugin Version: all, Platform: macOS.

**Answer:** You can use a function like this to copy a dictionary:

**Example:**

```
Function CopyDictionary(d as Dictionary) As Dictionary
dim r as new Dictionary
for each key as Variant in d.keys
r.Value(key) = d.Value(key)
next
Return r
End Function
```

**Notes:** If needed make several copies of this method with different data types, not just double.  
For a deep copy of a dictionary of objects, you need to change code to also make a copy of those objects.

### 5.0.87 How to copy parts of a movie to another one?

Plugin Version: all, Platforms: macOS, Windows.

**Answer:** The code below copies ten seconds of the snowman movie to the dummy movie starting at the 5th second.

**Example:**

```

dim f as FolderItem
dim md as EditableMovie
dim ms as EditableMovie

f=SpecialFolder.Desktop.Child("Our First Snowman.mov")
ms=f.OpenEditableMovie

ms.SelectionStartMBS=5
ms.SelectionLengthMBS=10

f=SpecialFolder.Desktop.Child("dummy.mov")
md=f.CreateMovie

msgbox str(md.AddMovieSelectionMBS(ms))

```

**Notes:** If result is not 0, the method fails.

**5.0.88 How to create a birthday like calendar event?**

Plugin Version: all, Platform: macOS.

**Answer:** Try this code:

**Example:**

```

// start a connection to the calendar database
dim s as new CalCalendarStoreMBS

// needed for the error details
dim e as NSErrorMBS

dim r as CalRecurrenceRuleMBS = CalRecurrenceRuleMBS.initYearlyRecurrence(1, nil) // repeat every
year without end

dim a as new CalAlarmMBS // add alarm
a.action = a.CalAlarmActionDisplay
a.relativeTrigger = -3600*24 // 24 Hours before

// create a new calendar
dim c as new CalEventMBS

dim d as new date(2011, 04, 20) // the date

dim calendars() as CalCalendarMBS = s.calendars

```

```

// set properties
c.Title="Test Birthday"
c.startDate=d
c.recurrenceRule = r
c.calendar=calendars(0) // add to first calendar
c.addAlarm(a)
c.endDate = d
c.isAllDay = true

// save event
call s.saveEvent(c,s.CalSpanAllEvents, e)
if e<>nil then
MsgBox e.localizedDescription
else
MsgBox "New event was created."
end if

```

**Notes:** This adds an event to iCal for the given date with alarm to remember you and repeats it every year.

### 5.0.89 How to create a GUID?

Plugin Version: all, Platforms: macOS, Linux, Windows.

**Answer:** Use the UUIDMBS class for this.

### 5.0.90 How to create a Mac picture clip file?

Plugin Version: all, Platform: Windows.

**Answer:** You can use code like this one.

**Example:**

```

dim f As FolderItem
dim p As Picture

f=SpecialFolder.Desktop.Child("Test.pictClipping")
if f=nil then Return

p=new Picture(300,200,32) 'Make a sample picture
p.Graphics.ForeColor=RGB(0,255,255)
p.Graphics.FillOval 0,0,99,99

```

```
p.Graphics.ForeColor=RGB(255,0,0)
p.Graphics.DrawOval 0,0,99,99
```

```
dim r As ResourceFork 'ResourceFork is needed for a clip file
```

```
// Please define a file type Any
r=f.CreateResourceFork("Any")
```

```
// get PICT data using plugin function
dim pictdata as string = p.PicHandleDataMBS
r.AddResource(pictdata,"PICT",256,"Picture")
```

```
dim m as new MemoryBlock(8)
```

```
m.LittleEndian = false
m.Int16Value(0) = 0
m.Int16Value(2) = 0
m.Int16Value(4) = p.Width
m.Int16Value(6) = p.Height
```

```
r.AddResource(m,"RECT",256,"")
```

```
'Values taken from a sample file and irrelevant to the problem
```

```
dim data as string = DecodeBase64("AQAAAAAAAAAAAAAAAAACAFRDRVIAAABAAAAAAAAAAAAAAAAABUQ0IQAAAAA")
r.AddResource(data,"drag",128,"") 'ditto
r.Close
```

**Notes:** In general Apple has deprecated this, but a few application still support clippings.

### 5.0.91 How to create a PDF file in Xojo?

Plugin Version: all, Platforms: macOS, Linux, Windows.

**Answer:** Check our DynaPDF plugin and the examples.

**Notes:** An alternative can be to use the CoreGraphics and Cocoa functions on Mac OS X. For Windows, we can only suggest our DynaPDF plugin.

### 5.0.92 How to create EmailAttachment for PDF Data in memory?

Plugin Version: all, Platform: macOS.

**Answer:** You can use code like the one below:

**Example:**

**Function** EmailAttachmentFromPDFData(PDFData as string, filename as string) As EmailAttachment  
 dim a as new EmailAttachment

```
a.data = EncodeBase64(PDFData, 76)
a.ContentEncoding = "base64"
a.MIMETYPE = "application/pdf"
a.MacType = "PDF "
a.MacCreator = "prvw"
a.Name = filename
```

Return a

End Function

**Notes:** Compared to sample code from Xojo documentation, we set the mime type correct for PDF. The MacType/MacCreator codes are deprecated, but you can still include them for older Mac email clients. "prvw" is the creator code for Apple's preview app.

### 5.0.93 How to create PDF for image files?

Plugin Version: all, Platforms: macOS, Linux, Windows.

**Answer:** You can use DynaPDF like this:

**Example:**

```
Function CreatePrintPDF(jpgFiles() as folderitem, pdfFile as FolderItem, PageWidth as Integer, PageHeight as Integer) As Boolean
  // have files?
  If pdfFile = Nil Then Return False
  If jpgFiles = Nil Then Return False

  If jpgFiles.Ubound < 0 Then Return False

  // new DynaPDF
  Dim pdf As New MyDynapdfMBS

  // page width/height in MilliMeter
  Dim pdfWidth as Integer = PageWidth * 72 / 25.4
  Dim pdfHeight as Integer = PageHeight * 72 / 25.4

  // put your license here
  Call pdf.SetLicenseKey "Starter"

  // create pdf
  Call pdf.CreateNewPDF pdfFile
```

```

// set a couple of options
Call pdf.SetPageCoords(MyDynaPDFMBS.kpcTopDown)
Call pdf.SetResolution(300)
Call pdf.SetUseTransparency(False)
Call pdf.SetSaveNewImageFormat(False)
Call pdf.SetGStateFlags(MyDynaPDFMBS.kgfUseImageColorSpace, False)
Call pdf.SetJPEGQuality(100)

// set page size
Call pdf.SetBBox(MyDynaPDFMBS.kpbMediaBox, 0, 0, pdfWidth, pdfHeight)
Call pdf.SetPageWidth(pdfWidth)
Call pdf.SetPageHeight(pdfHeight)

// append pages with one image per page
For i as Integer = 0 To jpgFiles.Ubound
Call pdf.Append
Call pdf.InsertImageEx(0, 0, pdfWidth, pdfHeight, jpgFiles(i), 1)
Call pdf.EndPage
Next

// close
Call pdf.CloseFile

Return True
End Function

```

**Notes:** This is to join image files in paper size to a new PDF.  
e.g. scans in A4 into an A4 PDF.

### 5.0.94 How to CURL Options translate to Plugin Calls?

Plugin Version: all, Platforms: macOS, Linux, Windows.

**Answer:** Below a few tips on how to translate command line CURL calls to plugin calls.

**Notes:** `curl -vX PUT http://localhost:5984/appserials/78569238475/DocumentRegister.docx?rev=3-25634563456 -data-binary @DocumentRegister.docx -H "Content-Type: application/msword"`

- The option `-v` means verbose. You can use `OptionVerbose` and listen for messages in the `DebugMessage` event.
- The option `-X PUT` means we want to do a HTTP PUT Request. So set `OptionPut` to true. Also you will want to set `OptionUpload` to true as you upload data.
- We have the URL which you put into `OptionURL` property.

- The `-data-binary` option tells CURL to pass the given data. With the `@` before the data, it is interpreted as a file name, so the data is read from the given file. You'll need to open this file and pass data with the Read event as needed. (See CURLS ftp file upload example project)
- The last option `-H` specifies an additional header for the upload. Pass this additional header with the `SetOptionHTTPHeader` method.

```
curl -X PUT http://127.0.0.1:5984/appserials/f2f4e540bf8bb60f61cfc4328001c59 -d '{ "type": "Product", "description": "Application Serial", "acronym": "AppSerial", "dateAdded": "2011-03-21 14:57:36" } '
```

- Option `-X PUT` like above.
- Pass the URL again in `OptionURL`
- This time data is passed in command line for CURL. You'd put this data in the quotes into a string and make it available in the Read event. (See CURLS ftp upload example project)

### 5.0.95 How to delete file with ftp and curl plugin?

Plugin Version: all, Platforms: macOS, Linux, Windows.

**Answer:** You can set post/pre quotes to have ftp commands executed before or after the download/upload.

**Example:**

```
dim d as CURLMBS // your curl object
```

```
// delete file
```

```
dim ws() As String
```

```
ws.Append "DELE Temp.txt"
```

```
d.SetOptionPostQuote(ws)
```

**Notes:** Use `SetOptionPostQuote`, `SetOptionPreQuote` or `SetOptionQuote`.

The ftp commands you pass here are native ftp commands and not the commands you use with ftp applications. To delete use `DELE` and the file path.

### 5.0.96 How to detect display resolution changed?

Plugin Version: all, Platforms: macOS, Linux, Windows.

**Answer:** On Mac OS X simply listen for display changed notifications.

**Notes:** Use the "Distribution Notification Center.rbp" example project as a base and use it to listen to notifications with the name "O3DeviceChanged".

### 5.0.97 How to detect retina?

Plugin Version: all, Platforms: macOS, Linux, Windows.

**Answer:** Please use `Window.BackingScaleFactorMBS` to query the factor.

**Example:**

```
msgbox str(window1.BackingScaleFactorMBS)
```

### 5.0.98 How to disable force quit?

Plugin Version: all, Platform: macOS.

**Answer:**

Please visit this website and get the control panel for Mac OS 9 there:

<http://www3.sk.sympatico.ca/tinyjohn/DFQ.html>

For Mac OS X use the MBS Plugin with the `SetSystemUIModeMBS` method.

**Notes:**

Please use `presentationOptions` in `NSApplicationMBS` for Cocoa applications.

### 5.0.99 How to disable the error dialogs from Internet Explorer on javascript errors?

Plugin Version: all, Platform: Windows.

**Answer:** You can use this code in the `htmlviewer` open event:

**Example:**

```
if targetwin32 then
htmlviewer1._ole.Content.value("Silent") = True
end if
```

**Notes:** This disables the error dialogs from Internet Explorer.

### 5.0.100 How to display a PDF file in Xojo?

Plugin Version: all, Platforms: macOS, Linux, Windows.

**Answer:** On Mac OS X you can use CoreGraphics or PDFKit to display a PDF.

**Notes:** An alternative can be to load the PDF into a htmlviewer so the PDF plugin can display it. On Windows you may need to use the Acrobat ActiveX control from Adobe or launch Acrobat Reader.

### 5.0.101 How to do a lottery in RB?

Plugin Version: all, Platforms: macOS, Linux, Windows.

**Answer:** Try this function:

**Example:**

```

Sub Lotto(max as Integer,count as Integer,z() as Integer)
// Lotto count numbers of max put into the array z beginning at index 0
dim n(0) as Integer ' all the numbers
dim m as Integer ' the highest field in the current array
dim i,a,b,d as Integer ' working variables

'fill the array with the numbers
m=max-1
redim n(m)

for i=0 to m
n(i)=i+1
next

' unsort them by exchanging random ones
m=max*10
for i=1 to m
a=rnd*max
b=rnd*max

d=n(a)
n(a)=n(b)
n(b)=d
next

' get the first count to the dest array
m=count-1
redim z(m)
for i=0 to m
z(i)=n(i)
next

'sort the result
z.sort
End Sub

```

```

Sub Open()
// Test it

dim za(0) as Integer ' the array of the numbers

lotto 49,6,za ' 6 of 49 in Germany

' and display them
staticText1.text=str(za(0))+chr(13)+str(za(1))+chr(13)+str(za(2))+chr(13)+str(za(3))+chr(13)+str(za(4))+chr(13)+str(za(5))+chr(13)+str(za(6))+chr(13)+str(za(7))+chr(13)+str(za(8))+chr(13)+str(za(9))+chr(13)+str(za(10))+chr(13)+str(za(11))+chr(13)+str(za(12))+chr(13)+str(za(13))+chr(13)+str(za(14))+chr(13)+str(za(15))+chr(13)+str(za(16))+chr(13)+str(za(17))+chr(13)+str(za(18))+chr(13)+str(za(19))+chr(13)+str(za(20))+chr(13)+str(za(21))+chr(13)+str(za(22))+chr(13)+str(za(23))+chr(13)+str(za(24))+chr(13)+str(za(25))+chr(13)+str(za(26))+chr(13)+str(za(27))+chr(13)+str(za(28))+chr(13)+str(za(29))+chr(13)+str(za(30))+chr(13)+str(za(31))+chr(13)+str(za(32))+chr(13)+str(za(33))+chr(13)+str(za(34))+chr(13)+str(za(35))+chr(13)+str(za(36))+chr(13)+str(za(37))+chr(13)+str(za(38))+chr(13)+str(za(39))+chr(13)+str(za(40))+chr(13)+str(za(41))+chr(13)+str(za(42))+chr(13)+str(za(43))+chr(13)+str(za(44))+chr(13)+str(za(45))+chr(13)+str(za(46))+chr(13)+str(za(47))+chr(13)+str(za(48))+chr(13)+str(za(49))+chr(13)+str(za(50))+chr(13)+str(za(51))+chr(13)+str(za(52))+chr(13)+str(za(53))+chr(13)+str(za(54))+chr(13)+str(za(55))+chr(13)+str(za(56))+chr(13)+str(za(57))+chr(13)+str(za(58))+chr(13)+str(za(59))+chr(13)+str(za(60))+chr(13)+str(za(61))+chr(13)+str(za(62))+chr(13)+str(za(63))+chr(13)+str(za(64))+chr(13)+str(za(65))+chr(13)+str(za(66))+chr(13)+str(za(67))+chr(13)+str(za(68))+chr(13)+str(za(69))+chr(13)+str(za(70))+chr(13)+str(za(71))+chr(13)+str(za(72))+chr(13)+str(za(73))+chr(13)+str(za(74))+chr(13)+str(za(75))+chr(13)+str(za(76))+chr(13)+str(za(77))+chr(13)+str(za(78))+chr(13)+str(za(79))+chr(13)+str(za(80))+chr(13)+str(za(81))+chr(13)+str(za(82))+chr(13)+str(za(83))+chr(13)+str(za(84))+chr(13)+str(za(85))+chr(13)+str(za(86))+chr(13)+str(za(87))+chr(13)+str(za(88))+chr(13)+str(za(89))+chr(13)+str(za(90))+chr(13)+str(za(91))+chr(13)+str(za(92))+chr(13)+str(za(93))+chr(13)+str(za(94))+chr(13)+str(za(95))+chr(13)+str(za(96))+chr(13)+str(za(97))+chr(13)+str(za(98))+chr(13)+str(za(99))
End Sub

```

### 5.0.102 How to do an asycron DNS lookup?

Plugin Version: all, Platform: Windows.

**Answer:** use CFHostMBS class (Mac OS X only).

**Notes:** Xojo internal functions and plugin DNS functions are sycronized.

You can use DNSLookupThreadMBS class for doing them asycron.

### 5.0.103 How to draw a dushed pattern line?

Plugin Version: all, Platforms: macOS, Linux, Windows.

**Answer:** You can try this code:

**Example:**

```
// call like this: DrawDushedPatternLine g,0,0,width,height,10
```

```

Sub DrawDushedPatternLine(g as graphics,x1 as Integer,y1 as Integer,x2 as Integer,y2 as Integer, partlen
as Integer)
dim x,y,ox,oy as Double
dim dx,dy as Double
dim w,h,d as Double
dim b as Boolean

w=x2-x1
h=y2-y1

d=sqrt(w*w+h*h)

dx=w/d*partlen
dy=h/d*partlen

```

```

b=true
x=x1
while (x<x2) and (y<y2)
  ox=x
  oy=y

  x=x+dx
  y=y+dy

  if b then
    g.DrawLine ox,oy,x,y
  end if

  b=not b
wend

```

End Sub

**Notes:** It would be possible to add this to the plugin, but I think it's better if you do it in plain Xojo code, so it even works on Windows.

#### 5.0.104 How to draw a nice antialiased line?

Plugin Version: all, Platforms: macOS, Linux, Windows.

**Answer:**

This code can help you although it's not perfect.  
You need to set lc to the current color you use.

**Example:**

```

Sub drawLine(xs as Integer, ys as Integer, xe as Integer, ye as Integer, face as RGBSurface, lineColor as
color)
  dim intX, intY, count, n, xDiff, yDiff as Integer
  dim v, v1, floatX, floatY, xx, yy, xStep, yStep as Double
  dim c as color

  const st=1.0

  xDiff=xe-xs
  yDiff=ye-ys
  count=max(abs(xDiff), abs(yDiff))
  xStep=xDiff/count
  yStep=yDiff/count

```

```

xx=xs
yy=ys
for n=1 to count
intX=xx
intY=yy
floatX=xx-intX
floatY=yy-intY

v=(1-floatX)*(1-floatY)*st
v1=1-v
c=face.pixel(intX, intY)
face.pixel(intX, intY)=rgb(v*lineColor.red+v1*c.red, v*lineColor.green+v1*c.green, v*lineColor.blue+v1*c.blue)
v=floatX*(1-floatY)*st
v1=1-v
c=face.pixel(intX+1, intY)
face.pixel(intX+1, intY)=rgb(v*lineColor.red+v1*c.red, v*lineColor.green+v1*c.green, v*lineColor.blue+v1*c.blue)
v=(1-floatX)*floatY*st
v1=1-v
c=face.pixel(intX, intY+1)
face.pixel(intX, intY+1)=rgb(v*lineColor.red+v1*c.red, v*lineColor.green+v1*c.green, v*lineColor.blue+v1*c.blue)
v=floatX*floatY*st
v1=1-v
c=face.pixel(intX+1, intY+1)
face.pixel(intX+1, intY+1)=rgb(v*lineColor.red+v1*c.red, v*lineColor.green+v1*c.green, v*lineColor.blue+v1*c.blue)

xx=xx+xStep
yy=yy+yStep
next

End Sub

```

**Notes:**

PS: st should be 1 and face should be a RGBSurface or a Graphics object.

**5.0.105 How to dump java class interface?**

Plugin Version: all, Platforms: macOS, Linux, Windows.

**Answer:** In terminal you can use "javap -s <classname>" to display the class with the method names and parameters.

**Notes:** For example show ResultSet class: javap -s java.sql.ResultSet

**5.0.106 How to duplicate a picture with mask or alpha channel?**

Plugin Version: all, Platforms: macOS, Linux, Windows.

**Answer:** You can use code like this function:

**Example:**

```
Function Duplicate(extends p as Picture) As Picture
#if RBVersion >= 2011.04 then
if p.HasAlphaChannel then

// create nw picture and copy content:
dim q as new Picture(p.Width, p.Height)
q.Graphics.DrawPicture p,0,0

Return q

end if
#endif

// create new picture
dim q as new Picture(p.Width, p.Height, 32)

// get mask
dim oldMask as Picture = p.mask(false)
if oldMask = nil then
// no mask, so simple copy
q.Graphics.DrawPicture p,0,0
Return q
end if

// remove mask
p.mask = nil

// copy picture and mask
q.Graphics.DrawPicture p, 0, 0
q.mask.Graphics.DrawPicture oldMask,0,0

// restore mask
p.mask = oldmask

Return q
End Function
```

**Notes:** Simply copy it to a module and call it like this: `q = p.duplicate`.

The code above works with old Xojo versions because of the `#if` even if your RS version does not support alpha channel pictures. This way it's future proof.

### 5.0.107 How to enable assistive devices?

Plugin Version: all, Platform: macOS.

**Answer:** You can use AppleScript code like below:

**Notes:** tell application "System Events"  
activate

```
set UI elements enabled to true
```

```
return UI elements enabled
end tell
```

You can run this with AppleScriptMBS class.

### 5.0.108 How to encrypt a file with Blowfish?

Plugin Version: all, Platforms: macOS, Linux, Windows.

**Answer:** You can use code like this:

**Example:**

```
dim fi as FolderItem = SpecialFolder.Desktop.Child("test.xojo_binary_project")
dim fo as FolderItem = SpecialFolder.Desktop.Child("test.encrypted")
```

```
// read input
```

```
dim bi as BinaryStream = BinaryStream.Open(fi)
```

```
dim si as string = bi.Read(bi.Length)
```

```
bi.Close
```

```
// encrypt
```

```
dim so as string = BlowfishMBS.Encrypt("MyKey",si)
```

```
// write output
```

```
dim bo as BinaryStream = BinaryStream.Create(fo)
```

```
bo.Write so
```

```
bo.Close
```

**Notes:** Of course you can decrypt same way, just use Decrypt function and of course swap files.

**5.0.109 How to extract text from HTML?**

Plugin Version: all, Platforms: macOS, Linux, Windows.

**Answer:** Use both RemoveHTMLTagsMBS and DecodingFromHTMLMBS like this:

**Example:**

```
dim html as string = "<p><B>Gr&uuml;&szlig;e</B></P>"
dim htmltext as string = RemoveHTMLTagsMBS(html)
dim text as string = DecodingFromHTMLMBS(htmltext)
```

MsgBox text // shows: Gr√üë

**Notes:** You can use it together with RemoveHTMLTagsMBS to remove html tags. What you get will be the text without tags.

DecodingFromHTMLMBS turns HTML escapes back to unicode characters. Like &auml; to √§.

**5.0.110 How to find empty folders in a folder?**

Plugin Version: all, Platforms: macOS, Linux, Windows.

**Answer:** Try this code:

**Example:**

```
dim folder as folderitem // your folder

dim c as Integer = folder.count
for i as Integer = 1 to c
dim item as folderitem = folder.trueitem(i)
if item = nil then
// ignore
elseif item.directory then
// folder
if item.count = 0 then
// found empty folder
end if
end if
next
```

**5.0.111 How to find iTunes on a Mac OS X machine fast?**

Plugin Version: all, Platform: macOS.

**Answer:** You can try Launch Services.

**Example:**

```
dim f as FolderItem

f=LaunchServicesFindApplicationForInfoMBS("hook","com.apple.iTunes","iTunes.app")

MsgBox f.NativePath
```

### 5.0.112 How to find network interface for a socket by it's name?

Plugin Version: all, Platform: macOS.

**Answer:** You can use our plugin to build a lookup table.

**Example:**

```
Function FindNetworkInterface(name as string) As NetworkInterface
name = name.trim

if name.len = 0 then Return nil

// search by IP/MAC
dim u as Integer = System.NetworkInterfaceCount-1
for i as Integer = 0 to u
dim n as NetworkInterface = System.GetNetworkInterface(i)
if n.IPAddress = name or n.MACAddress = name then
Return n
end if
next

// use MBS Plugin to build a mapping
dim interfaces() as NetworkInterfaceMBS = NetworkInterfaceMBS.AllInterfaces
dim map as new Dictionary

for each n as NetworkInterfaceMBS in interfaces
dim IPv4s() as string = n.IPv4s
dim IPv6s() as string = n.IPv6s

for each IPv4 as string in IPv4s
map.Value(IPv4) = n.Name
next
for each IPv6 as string in IPv6s
map.Value(IPv6) = n.Name
next
if n.MAC<>>" then
map.Value(n.MAC) = n.Name
```

```

end if
next

// now search interfaces by name, IPv4 or IPv6
for i as Integer = 0 to u
dim n as NetworkInterface = System.GetNetworkInterface(i)
if map.Lookup(n.IPAddress, "") = name then
Return n
end if

if map.Lookup(n.MACAddress, "") = name then
Return n
end if
next

End Function

```

**Notes:** The code above uses a lookup table build using NetworkInterfaceMBS class to find the network interface by name.

### 5.0.113 How to find version of Microsoft Word?

Plugin Version: all, Platforms: macOS, Linux, Windows.

**Answer:** You can use code like this:

**Example:**

```

// find Word
dim f as FolderItem = LaunchServicesFindApplicationForInfoMBS("", "com.microsoft.Word", "")

// open bundle
dim c as new NSBundleMBS(f)

// read info
dim d as Dictionary = c.infoDictionary

// show version
MsgBox d.Lookup("CFBundleVersion", "")

```

**Notes:** Older versions of Word can be found with creator code "MSWD".

### 5.0.114 How to fix CURL error 60/53 on connecting to server?

Plugin Version: all, Platform: macOS.

**Answer:** You probably connect with SSL and you have no valid certificate.

**Example:**

```
dim d as new CURLSMBS

// Disable SSL verification
d.OptionSSLVerifyHost = 0 // don't verify server
d.OptionSSLVerifyPeer = 0 // don't proofs certificate is authentic

// With SSL Verification:
dim cacert as FolderItem = Getfolderitem("cacert.pem")
d.OptionCAInfo = cacert.NativePath
d.OptionSSLVerifyHost = 2 // verify server
d.OptionSSLVerifyPeer = 1 // proofs certificate is authentic
```

**Notes:** You can either use the code above to disable the SSL verification and have no security. Or you use the cacert file and enable the verification. Than you only get a connection if the server has a valid certificate.

see also:

<http://curl.haxx.se/ca/>

### 5.0.115 How to format double with n digits?

Plugin Version: all, Platform: macOS.

**Answer:** You can use the FormatMBS function for this.

**Example:**

```
dim d as Double = 123.4567890
listbox1.AddRow FormatMBS("%f", d)
listbox1.AddRow FormatMBS("%e", d)
listbox1.AddRow FormatMBS("%g", d)

listbox1.AddRow FormatMBS("%5.5f", d)
listbox1.AddRow FormatMBS("%5.5e", d)
listbox1.AddRow FormatMBS("%5.5g", d)

d = 0.000000123456
listbox1.AddRow FormatMBS("%f", d)
listbox1.AddRow FormatMBS("%e", d)
```

```
listbox1.AddRow FormatMBS("%g", d)

listbox1.AddRow FormatMBS("%5.5f", d)
listbox1.AddRow FormatMBS("%5.5e", d)
listbox1.AddRow FormatMBS("%5.5g", d)
```

**Notes:** see FormatMBS for details.

In general %f is normal style, %e is scientific and %g is whichever gives best result for given space.

### 5.0.116 How to get a time converted to user time zone in a web app?

Plugin Version: all, Platforms: macOS, Linux, Windows.

**Answer:** Use the WebSession.GMTOffset property.

**Example:**

```
Sub Open()
// current date on server
dim d as new date
dim s as string = d.LongTime

// adjust to client GMT offset
d.GMTOffset = d.GMTOffset + Session.GMTOffset

dim t as string = D.LongTime

MsgBox s+EndOfLine+t
End Sub
```

### 5.0.117 How to get an handle to the frontmost window on Windows?

Plugin Version: all, Platform: Windows.

**Answer:** This function returns a handle for the frontmost window:

**Example:**

```
Function GetForegroundWindowHandle() as Integer
#if targetwin32 then
declare function GetForegroundWindow Lib "user32.dll" as Integer
Return GetForegroundWindow()
#endif
End Function
```

### 5.0.118 How to get CFAbsoluteTime from date?

Plugin Version: all, Platforms: macOS, Windows.

**Answer:** Use code like this:

**Example:**

```
dim d as new date
dim t as CFTimeZoneMBS = SystemCFTimeZoneMBS
dim g as new CFGregorianCalendarMBS
g.Day = d.Day
g.Month = d.Month
g.Year = d.Year
g.Minute = d.Minute
g.Hour = d.Hour
g.Second = d.Second

dim at as CFAbsoluteTimeMBS = g.AbsoluteTime(t)
dim x as Double = at.Value
```

```
MsgBox str(x)
```

**Notes:** As you see we need a timezone and put the date values in a gregorian date record. Now we can query absolute time for the given timezone.

### 5.0.119 How to get client IP address on web app?

Plugin Version: all, Platforms: macOS, Linux, Windows.

**Answer:** Use the WebSession.RemoteAddress property.

**Example:**

```
Sub Open()
Title = Session.RemoteAddress
End Sub
```

### 5.0.120 How to get fonts to load in charts on Linux?

Plugin Version: all, Platforms: macOS, Linux, Windows.

**Answer:** Please use the `SetFontSearchPath` method in the `CDBaseChartMBS` class to specify where your fonts are.

**Example:**

```
if TargetLinux then
CDBaseChartMBS.SetFontSearchPath "/usr/share/fonts/truetype;/usr/share/fonts/truetype/msttcorefonts"
else
// on Mac and Windows we use system fonts.
end if

// also you can later switch default fonts:

dim Chart as CDBaseChartMBS // your chart

#If TargetARM And TargetLinux Then
// use specific fonts on Linux on Raspberry Pi
Call Chart.setDefaultFonts("/usr/share/fonts/truetype/piboto/PibotoLt-Regular.ttf", "/usr/share/fonts/truetype/piboto/Pi
#EndIf
```

**Notes:** On macOS, iOS and Windows, the fonts are loaded from the system's font folder.

e.g. if you use ubuntu, you can install the `ttf-mscorefonts-installer` package and call this method with `"/usr/share/fonts/truetype/msttcorefonts"` as the path. No backslash on the end of a path, please.

### 5.0.121 How to get fonts to load in DynaPDF on Linux?

Plugin Version: all, Platforms: macOS, Linux, Windows.

**Answer:** Please use the `AddFontSearchPath` method in the `DynaPDFMBS` class to specify where your fonts are.

**Example:**

```
dim d as new DynaPDFMBS
if TargetLinux then
call d.AddFontSearchPath "/usr/share/fonts/truetype", true
else
// on Mac and Windows we use system fonts.
end if
```

**Notes:** On Mac OS X and Windows, the fonts are loaded from the system's font folder.

e.g. if you use ubuntu, you can install the `ttf-mscorefonts-installer` package and call this method with `"/usr/share/fonts/truetype/msttcorefonts"` as the path. No backslash on the end of a path, please.

### 5.0.122 How to get GMT time and back?

Plugin Version: all, Platform: macOS.

**Answer:** You can use the date class and the GMTOffset property.

**Example:**

```
// now
dim d as new date

// now in GMT
dim e as new date
e.GMTOffset = 0

// show
MsgBox str(d.TotalSeconds,"0.0")+ " " +str(e.TotalSeconds, "0.0")

dim GMTTimeStamp as Double = e.TotalSeconds

// restore
dim f as new date

// add GMT offset here
f.TotalSeconds = GMTTimeStamp + f.GMTOffset*3600
// because here it's removed
f.GMTOffset = f.GMTOffset

MsgBox d.ShortTime+" (" +str(d.GMTOffset)+") " +str(d.TotalSeconds,"0.0")+EndOfLine+_
e.ShortTime+" (" +str(e.GMTOffset)+") " +str(e.TotalSeconds,"0.0")+EndOfLine+_
f.ShortTime+" (" +str(f.GMTOffset)+") " +str(f.TotalSeconds,"0.0")
```

**Notes:** It's sometimes a bit tricky with the date class as setting one property often changes the others.

### 5.0.123 How to get good crash reports?

Plugin Version: all, Platforms: macOS, Linux, Windows.

**Answer:** Check this website from the webkit website:

**Notes:** <http://webkit.org/quality/crashlogs.html>

**5.0.124 How to get list of all threads?**

Plugin Version: all, Platforms: macOS, Linux, Windows.

**Answer:** You can use the runtime module like in this function:

**Example:**

```
Function Threads() As Thread()
#pragma DisableBackgroundTasks
dim t() as Thread

Dim o as Runtime.ObjectIterator=Runtime.IterateObjects
While o.MoveNext
if o.Current isa Thread then
t.Append thread(o.current)
end if
Wend

Return t
End Function
```

**Notes:** This returns an array of all thread objects currently in memory.

The pragma is important here as it avoids thread switches which may cause a thread to be created or deleted.

**5.0.125 How to get parameters from webpage URL in Xojo Web Edition?**

Plugin Version: all, Platforms: macOS, Linux, Windows.

**Answer:** Use the Webpage.ParametersReceived event.

**Example:**

```
Sub ParametersReceived(Variables As Dictionary)
for each key as Variant in Variables.keys
MsgBox key+" ->" +Variables.Value(key)
next
End Sub
```

**Notes:** The text encodings of this strings is not defined in Xojo 2010r5. Please use DefineEncoding.

**5.0.126 How to get the color for disabled textcolor?**

Plugin Version: all, Platform: macOS.

**Answer:** Ask the appearance manager:

**Example:**

```
Function GetThemeTextColor(inColor as Integer, inDepth as Integer, inColorDev as Boolean) As Color
declare function GetThemeTextColor lib "Carbon" (inColor as Integer, inDepth as Integer, inColorDev as
Boolean, outColor as Ptr) as Integer
```

```
dim i as Integer
```

```
dim col as MemoryBlock
```

```
col = newMemoryBlock(6)
```

```
i = GetThemeTextColor(inColor, inDepth, inColorDev, col)
```

```
return RGB(col.UShort(0)\256, col.UShort(2)\256, col.UShort(4)\256)
```

```
End Function
```

**Notes:** The color for this is:

```
const kThemeTextColorDialogInactive = 2.
```

```
c = GetThemeTextColor(kThemeTextColorDialogInactive, Screen(0).Depth, true)
```

For Mac OS X you should use "CarbonLib" instead of "AppearanceLib" ...

### 5.0.127 How to get the current free stack space?

Plugin Version: all, Platform: macOS.

**Answer:** You can something like the code below:

**Example:**

```
Sub ShowStackSize()
```

```
dim threadid as Integer
```

```
dim size as Integer
```

```
declare function GetCurrentThread lib "Carbon" (byref threadid as Integer) as short
```

```
declare function ThreadCurrentStackSize lib "Carbon" (threadid as Integer, byref size as Integer) as short
```

```
if GetCurrentThread(threadid)=0 then
```

```
if 0=ThreadCurrentStackSize(threadid,size) then
```

```
MsgBox str(size)
```

```
end if
```

```
end if
```

End Sub

**Notes:** For Mac OS 9, use "ThreadLib" instead of "CarbonLib". You can use #if if you like for that.

### 5.0.128 How to get the current timezone?

Plugin Version: all, Platforms: macOS, Windows.

**Answer:**

You can use the TimeZoneMBS class or the CFTimeZoneMBS class.  
Or code like below:

**Example:**

```
Function GMTOffsetInMinutes() as Integer
// Returns the offset of the current time to GMT in minutes.
// supports Mac OS and Windows, but not Linux yet (let me know if
// you have code for that, please)
//
// Note that the offset is not always an even multiple of 60, but
// there are also half hour offsets, even one 5:45h offset

// This version by Thomas Tempelmann (rb@tempel.org) on 25 Nov 2005
// with a fix that should also make it work with future Intel Mac targets.
//
// Using code from various authors found on the RB NUG mailing list

dim result, bias, dayLightbias as Integer
dim info as memoryBlock
dim offset as Integer

#if targetMacOS then

Declare Sub ReadLocation lib "Carbon" (location As ptr)

info = NewMemoryBlock(12)
ReadLocation info
if false then
// bad, because it does not work on Intel Macs:
'offset = info.short(9) * 256 + info.byte(11)
else
offset = BitwiseAnd (info.long(8), &hFFFFFF)
end

offset = info.short(9) * 256 + info.byte(11)
```

```

offset = offset \60
return offset

#endif

#if targetWin32 then

Declare Function GetTimeZoneInformation Lib "Kernel32" ( tzInfoPointer as Ptr ) as Integer
// returns one of
// TIME_ZONE_ID_UNKNOWN 0
// - Note: e.g. New Delhi (GMT+5:30) and Newfoundland (-3:30) return this value 0
// TIME_ZONE_ID_STANDARD 1
// TIME_ZONE_ID_DAYLIGHT 2

info = new MemoryBlock(172)
result = GetTimeZoneInformation(info)

bias = info.Long(0)
// note: the original code I found in the NUG archives used Long(84) and switched to Long(0)
// only for result=1 and result=2, but my tests found that Long(0) is also the right value for result=0

if result = 2 then
daylightBias = info.long(168)
end if
offset = - (bias + dayLightbias)
return offset

#endif

End Function

```

### 5.0.129 How to get the current window title?

Plugin Version: all, Platform: macOS.

**Answer:** The code below returns the current window title for the frontmost window on Mac OS X if Accessibility services are

**Example:**

```

Function CurrentWindowTitle() As string
// your application needs permissions for accessibility to make this work!

dim SystemWideElement,FocusedApplicationElement,FocusedWindowElement as AXUIElementMBS
dim FocusedApplication,FocusedWindow,Title as AXValueMBS
dim s as String
dim cs as CFStringMBS

```

```

SystemWideElement=AccessibilityMBS.SystemWideAXUIElement
if SystemWideElement<>nil then
FocusedApplication=SystemWideElement.AttributeValue(AccessibilityMBS.kAXFocusedApplicationAttribute)
if FocusedApplication.Type=AccessibilityMBS.kAXUIElementMBSTypeID then
FocusedApplicationElement=new AXUIElementMBS
FocusedApplicationElement.Handle=FocusedApplication.Handle
FocusedApplicationElement.RetainObject

FocusedWindow=FocusedApplicationElement.AttributeValue(AccessibilityMBS.kAXFocusedWindowAttribute)

if FocusedWindow<>nil and AccessibilityMBS.kAXUIElementMBSTypeID=FocusedWindow.Type then

FocusedWindowElement=new AXUIElementMBS
FocusedWindowElement.Handle=FocusedWindow.Handle
FocusedWindowElement.RetainObject

Title=FocusedWindowElement.AttributeValue(AccessibilityMBS.kAXTitleAttribute)
if Title<>nil and Title.Type=kCFStringMBSTypeID then
cs=new CFStringMBS
cs.handle=Title.Handle
cs.RetainObject
Return cs.str
end if
end if
end if
end if
End Function

```

### 5.0.130 How to get the cursor blink interval time?

Plugin Version: all, Platform: macOS.

**Answer:** On Mac OS you can use GetCaretTime from the toolbox.

**Example:**

```
declare function GetCaretTime lib "Carbon" () as Integer
```

```
MsgBox str(GetCaretTime()+ " ticks")
```

**Notes:** 60 ticks make one second.

### 5.0.131 How to get the list of the current selected files in the Finder?

Plugin Version: all, Platform: macOS.

**Answer:**

Use the AppleScript like this one:

```
tell application "finder"
return selection
end tell
```

Which translates into this AppleEvent:

```
Process("Finder").SendAE "core,getd,'—':obj { form:prop, want:type(prop), seld:type(sele), from:'null'() }
"
```

and as Xojo code it looks like this:

**Example:**

```
dim ae as appleevent
dim o1 as appleeventObjectSpecifier
dim f as folderItem
dim alist as appleeventdescList
dim i as Integer
dim dateiname as string

// setup the AppleEvent
o1=getpropertyObjectDescriptor( nil, "sele")
ae= newappleEvent("core", "getd", "MACS")
ae.objectSpecifierParam("—")=o1

// send it
if ae.send then
// got the list
alist=ae.replyDescList

// now show the list of filename into an editfield:

for i=1 to alist.count
f=alist.folderItemItem(i)

dateiname=f.name
// editfield1 with property "multiline=true"!
editfield1.text=editfield1.text + dateiname + chr(13)
next
```

end if

### 5.0.132 How to get the Mac OS system version?

Plugin Version: all, Platform: macOS.

**Answer:** The following code queries the value and displays the version number:

**Example:**

```

dim first as Integer
dim second as Integer
dim third as Integer
dim l as Integer

if System.Gestalt("sysv",l) then

Third=Bitwiseand(l,15)
second=Bitwiseand(l\16,15)
first=Bitwiseand(l\256,15)+10*Bitwiseand(l\256\16,15)
end if

if First>=10 then
msgbox "Mac OS X "+str(First)+" "+str(Second)+" "+str(third)
else
msgbox "Mac OS "+str(First)+" "+str(Second)+" "+str(third)
end if

```

### 5.0.133 How to get the Mac OS Version using System.Gestalt?

Plugin Version: all, Platform: macOS.

**Answer:** Try this code:

**Example:**

```

Dim s As String
Dim b As Boolean
Dim i, resp as Integer

// Systemversion
b = System.Gestalt("sysv", resp)
If b then
s = Hex(resp)

```

```

For i =Len(s)-1 DownTo 1
s=Left(s,i)+””+Mid(s,i+1)
Next
MsgBox ”Systemversion: Mac OS ” + s
end if

```

**Notes:** The MBS Plugin has a SystemInformationMBS.OSVersionString function for this.

### 5.0.134 How to get the screensize excluding the task bar?

Plugin Version: all, Platform: Windows.

**Answer:** Try this code:

**Notes:** Use the Screen class with the available\* properties.

### 5.0.135 How to get the size of the frontmost window on Windows?

Plugin Version: all, Platform: Windows.

**Answer:** Try this code:

**Notes:** Make yourself a class for the WindowRect with four properties:

```

Bottom as Integer
Left as Integer
Right as Integer
Top as Integer

```

Add the following method to your class:

```

Sub GetWindowRect(windowhandle as Integer)
dim err as Integer
dim mem as memoryBlock
#if targetwin32 then
Declare Function GetWindowRect Lib ”user32.dll” (hwnd as Integer, ipRect As Ptr) as Integer

mem = newmemoryBlock(16)
err = GetWindowRect(windowhandle, mem)
Left = mem.long(0)
Top = mem.Long(4)
Right = mem.Long(8)
Bottom = mem.Long(12)

```

```
#endif  
End Sub
```

Good to use for the MDI Master Window!

### 5.0.136 How to get the source code of a HTMLViewer?

Plugin Version: all, Platform: macOS.

**Answer:** Try this code:

**Example:**

```
// for Windows:
```

```
msgbox HTMLViewer1.IEHTMLTextMBS
```

```
// for MacOS with WebKit 2.x:
```

```
msgbox HTMLViewer1.WKWebViewMBS.HTMLText
```

### 5.0.137 How to get Xojo apps running Linux?

Plugin Version: all, Platforms: macOS, Linux, Windows.

**Answer:** You need to install some require packages.

**Notes:** You need CUPS as well as GTK packages. On 64 bit systems also the ia32-libs package.

Please note that you need a x86 compatible Linux. So no PPC, Power, ARM or other CPUs.

### 5.0.138 How to handle really huge images with GraphicsMagick or ImageMagick?

Plugin Version: all, Platforms: macOS, Linux, Windows.

**Answer:** Sometimes it may be better to use an extra application to process images.

**Notes:** A typical 32 bit app made with Xojo can use around 1.8 GB on Windows and 3 GB on Mac OS X. Some images may be huge, so that processing them causes several copies of the image to be in memory. With a 500 MB image in memory, doing a scale or rotation may require a temp image. So with source, temp and dest images with each 500 MB plus your normal app memory usage, you may hit the limit of Windows with 1.8 GB.

In that case it may be worth running a tool like gm in the shell class. gm is the command line version of GraphicsMagick. There you can run the 64 bit version which is not limited in memory like your own application. Also you can monitor progress and keep your app responsive.

### 5.0.139 How to handle tab key for editable cells in listbox?

Plugin Version: all, Platforms: macOS, Linux, Windows.

**Answer:** Use code like this function:

**Example:**

```
Function HandleTabInList(list as listbox, row as Integer, column as Integer, key as String) As Boolean
// Handle tab character in Listbox.CellKeyDown event
```

```
Select case asc(key)
case 9
if Keyboard.AsyncShiftKey then
// back

// look for column left
for i as Integer = column-1 downto 0
if list.ColumnType(i) >= list.TypeEditable then
list.EditCell(row, i)
Return true
end if
next

// not found, so look in row before
row = row - 1
if row >= 0 then
for i as Integer = list.ColumnCount-1 downto 0
if list.ColumnType(i) >= list.TypeEditable then
list.EditCell(row, i)
Return true
end if
next
end if
else
// forward

// look for column right
for i as Integer = column+1 to list.ColumnCount-1
if list.ColumnType(i) >= list.TypeEditable then
list.EditCell(row, i)
Return true
end if
next
```

```

// not found, so look in row below
row = row + 1
if row <list.ListCount then
for i as Integer = 0 to list.ColumnCount-1
if list.ColumnType(i) >= list.TypeEditable then
list.EditCell(row, i)
Return true
end if
next
end if
end if
end Select
End Function

```

**Notes:** You call it from CellKeyDown event like this:

```

EventHandler Function CellKeyDown(row as Integer, column as Integer, key as String) As Boolean
if HandleTabInList(me, row, column, key) then Return true
End EventHandler

```

As you see in the code, we handle tab and shift + tab for moving back and forward. Also we wrap to previous/next row if needed. Feel free to extend this to wrap from last to first row or create a new row for editing.

### 5.0.140 How to hard link MapKit framework?

Plugin Version: all, Platforms: macOS, Linux, Windows.

**Answer:** Our MapKit classes weak link the framework. If you need hard linking it for the App Store, you can add this method to a class:

**Example:**

```

Sub ReferenceMapKit()
// just put this in window or app class

#if TargetMachO and Target64Bit then
Declare sub testing Lib "MapKit" Selector "test" (id as ptr)
testing(nil)
#endif

End Sub

```

**Notes:** No need to call the method.

Just having it in a window or app, will cause the compiler to hard link the framework.

### 5.0.141 How to have a PDF downloaded to the user in a web application?

Plugin Version: all, Platforms: macOS, Linux, Windows.

**Answer:** You can use a WebHTMLViewer control and load the PDF file with the PDF plugin from the browser.

**Example:**

```
dim CurrentFile as WebFile // a property of the WebPage

// define the PDF file
CurrentFile = new WebFile
CurrentFile.Filename = "test.pdf"
CurrentFile.MIMEType = "application/pdf"
CurrentFile.Data = "some pdf data" // MyDynaPDF.GetBuffer
CurrentFile.ForceDownload = true

// start the download
showurl(CurrentFile.url)
```

**Notes:** See our Create PDF example for the Xojo Web Edition.

### 5.0.142 How to hide all applications except mine?

Platform: macOS.

**Answer:** The code below will on Mac OS hide all applications except your one:

**Example:**

```
dim p as new ProcessMBS

p.GetFirstProcess
do
if not p.FrontProcess then
p.Visible=false
end if
loop until not p.GetNextProcess
```

### 5.0.143 How to hide script errors in HTMLViewer on Windows?

Plugin Version: all, Platform: Windows.

**Answer:** Set Internet Explorer to silent mode with code like this:

**Example:**

```
htmlviewer1._ole.Content.value("Silent") = True
```

**Notes:** Simply put this code in the open event of your htmlviewer control (using me instead of htmlviewer1).

### 5.0.144 How to hide the grid/background/border in ChartDirector?

Plugin Version: all, Platforms: macOS, Linux, Windows.

**Answer:** If you want to hide something in a chart, simply assign the kTransparent constant as color.

### 5.0.145 How to hide the mouse cursor on Mac?

Plugin Version: all, Platform: macOS.

**Answer:** Try this declare:

**Example:**

```
Declare Sub HideCursor Lib "Carbon" () Inline68K("A852")
```

```
HideCursor
```

**Notes:** The MBS Plugin has this function and supports it on Windows, too.

### 5.0.146 How to insert image to NSTextView or TextArea?

Plugin Version: all, Platforms: macOS, Linux, Windows.

**Answer:** With NSTextViewMBS you can use this code to insert file:

**Example:**

```
// insert a file to textview
```

```
Public Sub InsertFile(textview as NSTextViewMBS, f as FolderItem)
```

```
// read to file
```

```

dim b as BinaryStream = BinaryStream.Open(f)
dim s as string = b.Read(b.Length)

// build wrapper
dim fileWrapper as NSFileWrapperMBS = NSFileWrapperMBS.initRegularFileWithContents(s)
fileWrapper.preferredFilename = f.name

// make attachment
dim fileAttachment as new NSTextAttachmentMBS(fileWrapper)
dim attributedString as NSAttributedStringMBS = NSAttributedStringMBS.attributedStringWithAttachment(fileAttachment)

// add to a NSTextViewMBS
textview.insertText attributedString

End Sub

```

**Notes:** For TextArea you can query the underlying NSTextViewMBS object via TextArea.NSTextViewMBS method.

### 5.0.147 How to jump to an anchor in a htmlviewer?

Plugin Version: all, Platforms: macOS, Windows.

**Answer:** You can use javascript to change the current window's location.

**Example:**

```

// load website
htmlviewer1.LoadURL "http://www.monkeybreadsoftware.net/addressbook-abpersonmbs.shtml"

// later jump to anchor named "16":

if TargetWin32 then
call HTMLViewer1.IERunJavaScriptMBS "window.location = ""#16""
end if

```

### 5.0.148 How to keep a movieplayer unclickable?

Plugin Version: all, Platforms: macOS, Linux, Windows.

**Answer:** To keep the user away from clicking on a playing Movie you can just drop a Canvas in front of the Movieplayer and take the clicks there.

**Example:**

```
Function Canvas1.MouseDown(X as Integer, Y as Integer) as boolean
return true // take it and do nothing
End Function
```

### 5.0.149 How to keep my web app from using 100% CPU time?

Plugin Version: all, Platforms: macOS, Linux, Windows.

**Answer:** On Linux and MacOS you can use renice command in the terminal. On Windows use the task manager to reduce priority.

**Notes:** If you launch your app with nohup on Linux or Mac OS X like this from the terminal or a script:

```
nohup /webapps/MyApp/MyApp &
```

you can simply have a second line saying this:

```
renice 20 $ !
```

which tells the system to lower priority to lowest value for the latest background process.

### 5.0.150 How to kill a process by name?

Plugin Version: all, Platforms: macOS, Linux, Windows.

**Answer:** You can kill a process (or application) by name if you loop over all the processes and kill the one you need.

**Example:**

```
dim p as new ProcessMBS
p.GetfirstProcess ' get first
do
if p.name = "TextEdit" then
call p.KillProcess
Return
end if
loop until not p.GetNextProcess
```

**Notes:** You may want to check the result of killProcess function. Not every user is allowed to kill every application.

### 5.0.151 How to know how many CPUs are present?

Plugin Version: all, Platform: macOS.

**Answer:** Try this function:

**Example:**

```
Function GetCPUCount() as Integer
Declare Function MPPProcessors Lib "Carbon" () as Integer
```

```
Return MPPProcessors()
End Function
```

**Notes:** Your app will than need that library to launch on Classic. To avoid this the MBS plugin checks if this library is available and return 1 if it's not available.

### 5.0.152 How to know the calling function?

Plugin Version: all, Platforms: macOS, Linux, Windows.

**Answer:** On Mac you can use a helper function like this this code:

**Example:**

```
Public Function CallingFunction() as string
// Query name of calling function of a function
```

```
#Pragma BreakOnExceptions false
```

```
try
```

```
// raise a dummy exception
dim r as new NilObjectException
raise r
```

```
catch x as NilObjectException
```

```
// get stack
dim stack() as string = x.Stack
```

```
// pick function name and return
dim name as string = stack(2)
Return name
```

```
end try
End Function
```

**Notes:** You need to include function names in your application.

### 5.0.153 How to launch an app using it's creator code?

Plugin Version: all, Platform: macOS.

**Answer:** Send an AppleEvent "oapp" with the creator code to the Finder ("MACS"):

**Example:**

```
Dim a as AppleEvent
dim creator as string

creator = "MSIE" ' here the Internet Explorer

a = NewAppleEvent("aevt", "odoc", "MACS")
a.Timeout = -1

a.ObjectSpecifierParam("—") = GetUniqueIDObjectDescriptor("appf", nil, creator)

if not a.send then
msgBox "An error has occured"
else

end if
```

### 5.0.154 How to launch disc utility?

Plugin Version: all, Platforms: macOS, Linux, Windows.

**Answer:** You can use this code:

**Example:**

```
dim f as FolderItem = LaunchServicesFindApplicationForInfoMBS("", "com.apple.DiskUtility", "")

if f<>Nil then
f.Launch
end if
```

**Notes:** This works even if people renamed the disc utility or moved it to another folder.

### 5.0.155 How to make a lot of changes to a REAL SQL Database faster?

Plugin Version: all, Platforms: macOS, Linux, Windows.

**Answer:** You may try to embed your changes to the database between two transaction calls.

**Example:**

```
dim db as Database // some database

db.SQLiteExecute "BEGIN TRANSACTION"
// Do some Stuff
db.SQLiteExecute "END TRANSACTION"
```

**Notes:** This can increase speed by some factors.

### 5.0.156 How to make a NSImage object for my retina enabled app?

Plugin Version: all, Platform: macOS.

**Answer:** You can use code like this:

**Example:**

```
Function NewRetinaImage(pic as Picture, mask as Picture = nil) As NSImageMBS
// first make a NSImageMBS from it
dim n as new NSImageMBS(pic, mask)

// now set to half the size, so we have 2x pixels for the image
n.size = new NSSizeMBS(n.width/2, n.height/2)

// and return
Return n
End Function
```

**Notes:** The thing to do is to have 2x the pixels, but assign a size to the image which gives it the right size in points.

You can pass the NSImageMBS from here to NSMenuItemMBS. For Retina displays, the full resolution is used. For others it will be reduced.

### 5.0.157 How to make a window borderless on Windows?

Plugin Version: all, Platform: Windows.

**Answer:** Try this declares:

**Example:**

```
// Sets window to borderless popup type, and sets its initial dimensions.
// Call this method, then Win32SetBorderlessPos, and then RB's Show
// method. Use RB Frame type 7 (Global Floating Window).

Const SWP_NOMOVE = &H2
Const SWP_FRAMECHANGED = &H20
Const HWND_TOPMOST = -1
Const GWL_STYLE = -16
Const WS_POPUPWINDOW = &H80880000

Dim styleFlags as Integer

#If TargetWin32 Then

Declare Function SetWindowLong Lib "user32" Alias "SetWindowLongA" (hwnd as Integer, nIndex as Integer, dwNewLong as Integer) as Integer
Declare Function SetWindowPos Lib "user32" (hwnd as Integer, hWndInstertAfter as Integer, x as Integer, y as Integer, cx as Integer, cy as Integer, flags as Integer) as Integer

styleFlags = SetWindowLong( w.WinHWND, GWL_STYLE, WS_POPUPWINDOW )
styleFlags = BitwiseOr( SWP_FRAMECHANGED, SWP_NOMOVE )
styleFlags = SetWindowPos( w.WinHWND, HWND_TOPMOST, 0, 0, wd, ht, styleFlags )

#EndIf
```

### 5.0.158 How to make an alias using AppleEvents?

Plugin Version: all, Platform: macOS.

**Answer:** Try this code:

**Example:**

```
Sub MakeAlias(folder as folderitem, target as folderitem, aliasname as string)
dim ev as AppleEvent
dim myResult as boolean
dim properties as AppleEventRecord

ev = NewAppleEvent("core", "crel", "MACS")
ev.MacTypeParam("kocl") = "alis"
ev.FolderItemParam("to ") = target
ev.FolderItemParam("insh") = folder

properties=new AppleEventRecord
```

```

properties.StringParam("pnam")=aliasname

ev.RecordParam("prdt")=properties

myResult = ev.send
// true on success, false on error
End Sub

```

**Notes:** Call it like this:

```
MakeAlias SpecialFolder.Desktop, SpecialFolder.Desktop.Child("Gif Copy.rb"), "test.rb alias"
```

Seems to not work on Mac OS X 10.6

### 5.0.159 How to make AppleScripts much faster?

Plugin Version: all, Platform: macOS.

**Answer:** use "ignoring application responses" like in this example:

```

Notes: on run { fn,fpx,fpy }
ignoring application responses
tell app "Finder" to set the position of folder fn to fpx,fpy
end ignoring
end run

```

### 5.0.160 How to make double clicks on a canvas?

Plugin Version: all, Platform: macOS.

**Answer:**

Update: Newer Xojo versions support DoubleClick event, so you don't need this code.

Here's my tip from the tips list on how to add a double-click event to the Canvas control. The technique could easily be used for a window or any Rectcontrol:

Because of its built-in drawing methods, the Canvas control is often used to create custom interface controls. But while the Canvas control has event handlers for most mouse events, it doesn't have an event handler for DoubleClick events. Fortunately, you can add a double-click event handler to a Canvas control easily. Basically, you're going to create a new class based on Canvas and add a double-click event to that. You can then use the new class anytime you need a Canvas with a double-click event.

To create a new Canvas class with a DoubleClick event handler, do this:

1. Add a new class to your project.
2. Set the Super property of the new class to "Canvas".
3. Change the name of this new class to "DoubleClickCanvas".

A double-click occurs when two clicks occur within the users double-click time (set in the Mouse control panel on both Macintosh and Windows) and within five pixels of each other. So, you'll need a few properties to store when and where the last click occurred.

4. Add a new property with the following declaration and mark it as private: lastClickTicks as Integer
5. Add a new property with the following declaration and mark it as private: lastClickX as Integer
6. Add a new property with the following declaration and mark it as private: lastClickY as Integer

Since the Canvas control doesn't have a DoubleClick event, you will need to add one.

7. Add a new event to your class by choosing New Event from the Edit menu and enter "DoubleClick" as the event name.

Double-clicks occur on MouseUp. In order for the mouseUp event to fire, you must return True in the MouseDown event.

8. In the MouseDown event, add the following code:  
Return True

In the MouseUp event, you will need to determine what the users double-click time is. This value is represented on both the Mac and Windows in ticks. A tick is 1/60th of a second. Since there isn't a built-in function for this, you'll need to make a toolbox call. The mouseUp event code below makes the appropriate toolbox call for both Macintosh and Windows. It then compares the time of the users last click to the time of the current click and compares the location of the users last click to the location of the current click.

9. Add the following code to the MouseUp event:

```
dim doubleClickTime, currentClickTicks as Integer

#if targetMacOS then
Declare Function GetDbtTime Lib "Carbon" () as Integer
doubleClickTime = GetDbtTime()
#endif

#if targetWin32 then
Declare Function GetDoubleClickTime Lib "User32.DLL" () as Integer
```

```

doubleClickTime = GetDoubleClickTime()/60 // convert to ticks from milliseconds
#endif

currentClickTicks = ticks
//if the two clicks happened close enough together in time
if (currentClickTicks - lastClickTicks) <= doubleClickTime then
//if the two clicks occurred close enough together in space
if abs(X - lastClickX) <= 5 and abs(Y - LastClickY) <= 5 then
DoubleClick //a double click has occurred so call the event
end if
end if
lastClickTicks = currentClickTicks
lastClickX = X
lastClickY = Y

```

10. Now to test out your new DoubleClickCanvas, drag the class from the Project window to a window in your project to create an instance of it.

11. Double-click on the canvas you just added to your window to open the Code Editor. Notice that the canvas has a DoubleClick event handler. In this event handler, add the following code:  
BEEP

### 5.0.161 How to make my Mac not sleeping?

Plugin Version: all, Platform: macOS.

**Answer:** Just inform the Mac OS about some system activity with code like this:

**Example:**

```

Sub UpdateSystemActivity()

#if TargetCarbon
declare function myUpdateSystemActivity lib "Carbon" alias "UpdateSystemActivity" (activity as Integer)
as short

const OverallAct = 0 // Delays idle sleep by small amount */
const UsrActivity = 1 // Delays idle sleep and dimming by timeout time */
const NetActivity = 2 // Delays idle sleep and power cycling by small amount */
const HDAActivity = 3 // Delays hard drive spindown and idle sleep by small amount */
const IdleActivity = 4 // Delays idle sleep by timeout time */

dim e as Integer

e=myUpdateSystemActivity(UsrActivity)

```

```
// you may react on an error if e is not 0 after the call.
```

```
#endif
End Sub
```

**Notes:** You may use another constant if you prefer some different behavior. Call it maybe every second.

### 5.0.162 How to make my own registration code scheme?

Plugin Version: all, Platform: Windows.

**Answer:** There are excellent articles about how to make a registration code scheme, but you can also simply use our RegistrationEngineMBS class.

**Notes:** If you need a license text, why not use the one from Xojo as a starting point?

### 5.0.163 How to make small controls on Mac OS X?

Plugin Version: all, Platform: macOS.

**Answer:** You can try this code on Mac OS X:

**Example:**

```

'/*
** Use the control's default drawing variant. This does not apply to
** Scroll Bars, for which Normal is Large.
**/
const kControlSizeNormal = 0

'/*
** Use the control's small drawing variant. Currently supported by
** the Check Box, Combo Box, Radio Button, Scroll Bar, Slider and Tab
** controls.
**/
const kControlSizeSmall = 1

'/*
** Use the control's small drawing variant. Currently supported by
** the Indeterminate Progress Bar, Progress Bar and Round Button
** controls.
**/
const kControlSizeLarge = 2

```

```

'/*
' * Control drawing variant determined by the control's bounds. This
' * ControlSize is only available with Scroll Bars to support their
' * legacy behavior of drawing differently within different bounds.
' */
const kControlSizeAuto = &hFFFF

const kControlSizeTag = "size"

declare function SetControlData lib "Carbon" (controlhandle as Integer, part as short, tagname as OS-
Type, size as Integer, data as ptr) as short

dim m as MemoryBlock

m=NewMemoryBlock(2)
m.UShort(0)=kControlSizeSmall

Title=str(SetControlData(CheckBox1.Handle, 0, kControlSizeTag, 2, m))

```

### 5.0.164 How to mark my Mac app as background only?

Plugin Version: all, Platform: macOS.

**Answer:** You can run a build script on each build with this code:

**Example:**

```

Dim App As String = CurrentBuildLocation + "/" + CurrentBuildAppName + ".app"
Call DoShellCommand("/usr/bin/defaults write " + App + "/Contents/Info ""NSUIElement"" YES")

```

**Notes:** This will set the NSUIElement flag to YES.

### 5.0.165 How to move a file or folder to trash?

Plugin Version: all, Platforms: macOS, Linux, Windows.

**Answer:** Use code like below:

**Example:**

```

Function MoveToTrash(f as FolderItem) As Boolean
#if TargetMacOS then
dim r as FolderItem
dim e as Integer = MacFileOperationMBS.MoveObjectToTrashSync(f, r, MacFileOperationMBS.kFSFile-
OperationDefaultOptions)

```

```

if e = 0 then
Return true // Ok
end if

#elseif TargetWin32 then
dim w as new WindowsFileCopyMBS

dim flags as Integer = w.FileOperationAllowUndo + w.FileOperationNoErrorUI + w.FileOperationSilent
+ w.FileOperationNoConfirmation
if w.FileOperationDelete(f, flags) then
Return true // OK
end if

flags = w.FileOperationNoErrorUI + w.FileOperationSilent + w.FileOperationNoConfirmation
if w.FileOperationDelete(f, flags) then
Return true // OK
end if
#else
// Target not supported
break
Return false
#endif
End Function

```

**Notes:** If you want to move a file to trash, you could use `f.movefileto f.trashfolder`, but that will overwrite existing files in the trash. You can use our `MacFileOperationMBS` class to move a file on Mac to the trash. And it uses the same code as the Finder, so files are renamed when the same name is already in use in the trash:

On Windows we use `WindowsFileCopyMBS` class.  
Requires Mac OS X 10.5.

### 5.0.166 How to move an application to the front using the creator code?

Plugin Version: all, Platform: macOS.

**Answer:** This makes SimpleText (Code ttxt) to the frontmost application:

**Example:**

```

dim a as appleevent

a=newappleEvent("misc","actv","ttxt")

```

```
if a.send then
end if
```

**Notes:** (Code is Mac only)

### 5.0.167 How to move file with ftp and curl plugin?

Plugin Version: all, Platforms: macOS, Linux, Windows.

**Answer:** You can set post/pre quotes to have ftp commands executed before or after the download/upload.

**Example:**

```
dim d as CURLMBS // your curl object

// rename/move file
dim ws() As String
ws.Append "RNFR Temp.txt"
ws.append "RNTO MyFile.txt"

d.SetOptionPostQuote(ws)
```

**Notes:** Use SetOptionPostQuote, SetOptionPreQuote or SetOptionQuote.

The ftp commands you pass here are native ftp commands and not the commands you use with ftp applications. So rename is two commands. First RNFR to tell where to rename from and second RNTD with the new file name. To delete use DELE and the file path.

### 5.0.168 How to normalize string on Mac?

Plugin Version: all, Platforms: macOS, Linux, Windows.

**Answer:** Use code like below:

**Example:**

```
Function Normalize(t as string) As string
const kCFStringNormalizationFormD = 0 // Canonical Decomposition
const kCFStringNormalizationFormKD = 1 // Compatibility Decomposition
const kCFStringNormalizationFormC = 2 // Canonical Decomposition followed by Canonical Composition
const kCFStringNormalizationFormKC = 3 // Compatibility Decomposition followed by Canonical Composition

dim s as CFStringMBS = NewCFStringMBS(t)
dim m as CFMutableStringMBS = s.Normalize(kCFStringNormalizationFormD)
```

```
Return m.str  
End Function
```

**Notes:** This uses Apple's CFString functions to normalize unicode variants.

### 5.0.169 How to obscure the mouse cursor on Mac?

Plugin Version: all, Platform: macOS.

**Answer:** Try this declare:

**Example:**

```
Declare Sub ObscureCursor Lib "Carbon" ()
```

```
ObscureCursor
```

**Notes:** The MBS Plugin has this function, but it's not supported for Windows.

### 5.0.170 How to open icon file on Mac?

Plugin Version: all, Platform: macOS.

**Answer:** Use the NSImageMBS class like this:

**Example:**

```
dim f as FolderItem = SpecialFolder.Desktop.Child("test.ico")  
dim n as new NSImageMBS(f)
```

```
window1.Backdrop = n.CopyPictureWithMask
```

### 5.0.171 How to open PDF in acrobat reader?

Plugin Version: all, Platform: macOS.

**Answer:** Try this code:

**Example:**

```
dim pdf as FolderItem = SpecialFolder.Desktop.Child("test.pdf")
```

```

// open PDF in Acrobat Reader on Mac:

// find app
dim bundleID as string = "com.adobe.Reader"
dim app as FolderItem = LaunchServicesFindApplicationForInfoMBS("", bundleID, "")

if app<>nil then

// launch app with parameters

dim docs() as FolderItem
docs.Append pdf

dim param as new LaunchServicesLaunchParameterMBS
param.Defaults = true
param.Application = app

dim x as FolderItem = LaunchServicesOpenXMBS(docs, param)

// on failure, simply launch it
if x = nil then
pdf.Launch(true)
end if

else
pdf.Launch(true)
end if

```

**Notes:** On Windows, simply use pdf.launch or WindowsShellExecuteMBS.

### 5.0.172 How to open printer preferences on Mac?

Plugin Version: all, Platform: macOS.

**Answer:** You can use our OpenMacOSXPreferencesPaneMBS function like this:

**Example:**

```

dim e as Integer = OpenMacOSXPreferencesPaneMBS("PrintAndFax")
if 0 = e then
MsgBox "OK"
elseif e = -43 then
MsgBox "File not found."
else
MsgBox "Error: "+str(e)
end if

```

### 5.0.173 How to open special characters panel on Mac?

Plugin Version: all, Platforms: macOS, Linux, Windows.

**Answer:** We have functions for that in Cocoa and Carbon.

**Example:**

```
dim a as new NSApplicationMBS
a.orderFrontCharacterPalette
```

**Notes:** For Cocoa, you can use `orderFrontCharacterPalette` method in `NSApplicationMBS` class.

Or simply for Carbon and Cocoa the `ShowCharacterPaletteMBS` method.

### 5.0.174 How to optimize picture loading in Web Edition?

Plugin Version: all, Platforms: macOS, Linux, Windows.

**Answer:** Use the `WebPicture` class.

**Notes:** Take your picture and create a `WebPicture` object. Store this `WebPicture` in a property of the `WebPage`, `Session` or `app` (as global as possible). On the first time you use this picture on an user session, the browser will load it. Second time you use it, the browser will most likely pick it from the cache.

Having pictures in `App` or some module reuses the same picture for all sessions which reduces memory footprint.

This does not work well with pictures you change very often or use only for one webpage on one user.

If you like to see an example, check our `Map` example.

### 5.0.175 How to parse XML?

Plugin Version: all, Platforms: macOS, Linux, Windows.

**Answer:** You can use code like this:

**Example:**

```
dim s as string = "<test><test /></test>"
```

```
try
```

```

dim x as new XmlDocument(s)
MsgBox "OK"
catch xe as XmlException
MsgBox "invalid XML"
end try

```

**Notes:** If you got an exception, you have a parse error.

### 5.0.176 How to play audio in a web app?

Plugin Version: all, Platforms: macOS, Linux, Windows.

**Answer:** You can use the HTML5 audio tag and control it with javascript.

**Notes:** This is just another example app I made today. It plays a christmas song. The audio file is provided by the application to the server, so no external web server is needed and this application can run stand alone. To compile and run you need Xojo 2010r5.

In the open event we search the audio files and open them as binarystreams. We create the two webfile objects. Those webfiles are part of the app class, so we have them globally. There we set the data with the content of our streams. We also define file names and mime types. They are needed so browser know what we have here:

```

audioFileM4V = new WebFile
audioFileM4V.Data = bM.Read(BM.Length)
audioFileM4V.Filename = "music.m4a"
audioFileM4V.MIMEType = "audio/m4a"

```

```

audioFileOGG = new WebFile
audioFileOGG.Data = bO.Read(BO.Length)
audioFileOGG.Filename = "music.ogg"
audioFileOGG.MIMEType = "audio/ogg"

```

Next in the open event of the webpage we have a PageSource control. The location is set to be before content. In the open event we define the html code for this. First we pick the URLs for the audio files. Than we build the html to use the audio tag. As you see, we give it an ID for later use and have it preload automatically. If you add an autoplay tag, you can have the audio play right away. Inside the audio tag we have two sources so we provide audio for both Firefox (OGG) and Safari (MPEG4). Finally we have a text to display if HTML5 audio tag is not supported.

You can set the source in the EditSource event:

```
dim urlO as string = app.audioFileOGG.URL
dim urlM as string = app.audioFileM4V.URL
me.Source = "<audio id=""mymusic"" preload=""auto""><source src="""+urlO+""" type=""audio/ogg""
/><source src="""+urlM+""" type=""audio/mpeg"" />Your browser does not support the audio ele-
ment.</audio>"
```

Next in the Play button we execute code to play the audio. This is a short javascript code which searches in the html document for the element with the ID "mymusic" which is the ID of our audio tag above. Once we got the object, we call it's play method to start playback.

```
me.ExecuteJavaScript("document.getElementById('mymusic').play();")
```

same for pause:

```
me.ExecuteJavaScript("document.getElementById('mymusic').pause();")
```

and finally for changing volume:

```
me.ExecuteJavaScript("document.getElementById('mymusic').volume="+str(me.Value/100.0)+"");")
```

### 5.0.177 How to pretty print xml?

Plugin Version: all, Platforms: macOS, Linux, Windows.

**Answer:** Use the XML Transform method with the right XLS.

**Notes:** Learn more here:

<http://docs.xojo.com/index.php/XMLDocument.Transform>

### 5.0.178 How to print to PDF?

Plugin Version: all, Platforms: macOS, Linux, Windows.

**Answer:** This code below shows how to redirect printing to a PDF file on Mac OS X.

**Example:**

```
// get Xojo printer setup
dim p as new PrinterSetup

// now put it into NSPrintInfo to manipulate
dim n as new NSPrintInfoMBS
n.SetupString = p.SetupString
```

```

// change destination to file
dim f as FolderItem = SpecialFolder.Desktop.Child("test.pdf")
n.SetSaveDestination(f)

// move back
p.SetupString = n.SetupString

// and print as usual
dim g as Graphics = OpenPrinter(p)
g.DrawString "Hello World", 20, 20

```

**Notes:** And you can use normal graphics class for that.

### 5.0.179 How to query Spotlight's Last Open Date for a file?

Plugin Version: all, Platform: macOS.

**Answer:** You can use a MDItemMBS objec to query this value:

**Example:**

```

Function LastOpenedDate(Extends F As FolderItem, DefaultOtherDates As Boolean = True) As Date
#If TargetMacOS Then
Dim xMDItem as New MDItemMBS(F)
Dim xDate as Variant

If xMDItem <>Nil Then
xDate = xMDItem.GetAttribute(xMDItem.kMDItemLastUsedDate).DateValue
If xDate IsA Date Then Return xDate
Else
If xDate <>Nil Then Break
End If
#EndIf

If DefaultOtherDates Then
If F.ModificationDate <>Nil Then Return F.ModificationDate
If F.CreationDate <>Nil Then Return F.CreationDate
End If
End Function

```

**Notes:** Thanks for Josh Hoggan for this example code.

**5.0.180 How to quit windows?**

Plugin Version: all, Platform: Windows.

**Answer:** Try this code:

**Example:**

```
#if targetwin32 then
dim i1,i2,r as Integer
declare function ExitWindowsEx lib "user32" (uFlags as Integer, dwReserved as Integer) as Integer
i1 = 2
i2 = 0
r = ExitWindowsEx(i1,i2)
if r<>0 then
' Error()
end if

#endif
```

**Notes:** uFlags parameters:

```
'4 = EWX_Force
'0 = EWX_Logoff
'2 = EWX_Reboot
'1 = EWX_shutdown, should shut down computer
```

Also check the ExitWindowsMBS method.

**5.0.181 How to read a CSV file correctly?**

Plugin Version: all, Platforms: macOS, Linux, Windows.

**Answer:** With all the rules for quotes and delimiters, you can simply use the SplitCommaSeparatedValuesMBS method in our plugins like this:

**Example:**

```
dim f as FolderItem = SpecialFolder.Desktop.Child("test.csv")
dim t as TextInputStream = f.OpenAsTextFile

while not t.EOF
dim s as string = t.ReadLine(encodings.ASCII)

dim items() as string = SplitCommaSeparatedValuesMBS(s, ";", """")
```

```
List.AddRow """
dim u as Integer = UBound(items)
for i as Integer = 0 to u
List.Cell(List.LastIndex,i) = items(i)
next

wend
```

**Notes:** Please make sure you choose the right text encoding.

### 5.0.182 How to read the command line on windows?

Plugin Version: all, Platform: Windows.

**Answer:** Try this code:

**Example:**

```
#if targetwin32 then
dim line as string
Dim mem as MemoryBlock

Declare Function GetCommandLineA Lib "kernel32" () As Ptr

mem=GetCommandLineA()
s=mem.cstring(0)

#endif
```

**Notes:** Newer Xojo versions have a system.commandline property.

### 5.0.183 How to render PDF pages with PDF Kit?

Plugin Version: all, Platform: Windows.

**Answer:** Try this code:

**Example:**

```
// choose a file
dim f as FolderItem = SpecialFolder.Desktop.Child("test.pdf")

// open it as PDF Document
dim sourceFile as New PDFDocumentMBS(f)
```

```

if sourceFile.handle <>0 then // it is a PDF file

// get upper bound of pages
dim c as Integer = sourceFile.pageCount-1

// from first to last page
for n as Integer = 0 to c

// pick that page
dim page as PDFPageMBS = sourceFile.pageAtIndex(n)

// render to image
dim p as NSImageMBS = page.Render

// and convert to RB picture and display
Backdrop = p.CopyPictureWithMask

next

end if

```

**Notes:** PDFKit works only on Mac OS X.

### 5.0.184 How to restart a Mac?

Plugin Version: all, Platform: macOS.

**Answer:** Ask the Finder via Apple Events:

**Example:**

```

dim ae as appleevent
ae=newappleEvent("FNDR","rest","MACS")
if not ae.send then
msgBox "The computer couldn't be restarted."
end if

```

### 5.0.185 How to resume ftp upload with curl plugin?

Plugin Version: all, Platforms: macOS, Linux, Windows.

**Answer:** CURL supports that and you simply need to set the right options.

**Notes:** First of course OptionUpload must be true. Second OptionFTPAppend must be true so the OptionResumeFrom is used. Store there (or in OptionResumeFromLarge) your start value. Don't forget to implement the read event and return data there as requested.

### 5.0.186 How to rotate a PDF page with CoreGraphics?

Plugin Version: all, Platforms: macOS, Linux, Windows.

**Answer:** This code opens a PDF and draws the first page into a new PDF with 90–∞ rotation.

**Example:**

```
// Rotate a PDF page

// our files
dim sourcefile as FolderItem = SpecialFolder.Desktop.Child("test.pdf")
dim destfile as FolderItem = SpecialFolder.Desktop.Child("rotated.pdf")

// open PDF
dim pdf as CGPDFDocumentMBS = sourcefile.OpenAsCGPDFDocumentMBS

// query media size of first page
dim r as CGRectMBS = pdf.MediaBox(1)

// create new PDF
dim c as CGContextMBS = destfile.NewCGPDFDocumentMBS(r,"title","Author","Creator")

// create rotated rectangle
dim nr as new CGRectMBS(0,0,r.Height,r.Width)

// create new page
c.BeginPage nr
c.SaveGState

const pi = 3.14159265

// rotate by 90–∞
c.RotateCTM pi*1.5

// fix origin
c.TranslateCTM -r.width,0

// draw PDF
c.DrawCGPDFDocument pdf,r,1

// cleanup
c.RestoreGState
c.EndPage
```

```
c = nil

// show in PDF viewer
destfile.Launch
```

**Notes:** This code is Mac only as it needs CoreGraphics.

### 5.0.187 How to rotate image with CoreImage?

Plugin Version: all, Platform: macOS.

**Answer:** Use the code like the one below:

**Example:**

```
// Rotate image with CoreImage

// load image
dim f as FolderItem = SpecialFolder.Desktop.Child("test.png")
dim image as new CIImageMBS(f)

// rotate 45 degree
dim n as new NSAffineTransformMBS
n.rotateByDegrees(45)

dim TransformFilter as new CIFilterAffineTransformMBS
TransformFilter.inputImage = image
TransformFilter.inputTransform = n

// get result
dim resultImage as CIImageMBS = TransformFilter.outputImage

// for saving to file
dim outputImage as NSImageMBS = resultImage.RenderNSImage(false)

f = SpecialFolder.Desktop.Child("output.png")
dim b as BinaryStream = BinaryStream.Create(f, true)
b.Write outputImage.PNGRepresentation

// as Xojo picture object for display
dim pic as Picture = outputImage.CopyPictureWithMask

Backdrop = pic
```

### 5.0.188 How to run a 32 bit application on a 64 bit Linux?

Plugin Version: all, Platforms: macOS, Linux, Windows.

**Answer:** Install 32 bit compatibility libraries.

**Notes:** The package is called ia32-libs for ubuntu (and others).

Some applications need to be run on a 32 bit system as they need some hardware related libraries. Like libUSB or libHID for USB devices.

### 5.0.189 How to save HTMLViewer to PDF with landscape orientation?

Plugin Version: all, Platform: macOS.

**Answer:** You can use NSPrintInfoMBS to change the options for PrintToPDFFile function.

**Example:**

```
// make it landscape
dim n as NSPrintInfoMBS = NSPrintInfoMBS.sharedPrintInfo
n.orientation = n.NSLandscapeOrientation

// save html to file
dim f as FolderItem = SpecialFolder.Desktop.Child("test.pdf")
call HTMLViewer1.PrintToPDFFileMBS(f,10,30,10,30)
```

**Notes:** You may want to reset options later.  
This code is only for Mac OS X.

### 5.0.190 How to save RTFD?

Plugin Version: all, Platforms: macOS, Linux, Windows.

**Answer:** With NSTextViewMBS you can use this code to save to RTFD:

**Example:**

```
// save text as RTFD including image attachments
dim f as FolderItem = GetSaveFolderItem(FileTypes1.ApplicationRtfd, "test.rtf")

if f = nil then Return

dim a as NSAttributedStringMBS = textView.textStorage
dim w as NSFileWrapperMBS = a.RTFDFileWrapperFromRange(0, a.length, DocumentAttributes)

dim e as NSErrorMBS
if w.writeToFile(f, e) then
```

```

else
MsgBox e.LocalizedDescription
end if

```

**Notes:** For TextArea you can query the underlying NSTextViewMBS object via TextArea.NSTextViewMBS method.

### 5.0.191 How to save RTFD?

Plugin Version: all, Platforms: macOS, Linux, Windows.

**Answer:** How to load PDF to htmlviewer on desktop?

**Example:**

```

Public Sub LoadPDFData(viewer as HTMLViewer, PDFData as string)
Dim base64string As String = EncodeBase64(PDFData)

// remove line endings to make it a big line
base64string = ReplaceLineEndings(base64string, "")

// build data URL
// https://en.wikipedia.org/wiki/Data_URI_scheme
Dim dataURL As String = "data:application/pdf;base64," + base64string

// show in webviewer
HTMLViewer1.LoadURL(dataURL)

// may not work everywhere due to URL length limit
// for Web projects, use WebFile instead!
End Sub

```

**Notes:** This avoids a temporary file, which may also work.  
For Web Apps, please use WebFile.

### 5.0.192 How to scale a picture proportionally with mask?

Plugin Version: all, Platforms: macOS, Linux, Windows.

**Answer:** For a proportional scaling, we calculate the new picture size relative to the target maximum size.

**Example:**

```

Function ProportionalScaledWithMask(extends pic as Picture, Width as Integer, Height as Integer) As Picture
// Calculate scale factor

dim faktor as Double = min( Height / Pic.Height, Width / Pic.Width)

// Calculate new size
dim w as Integer = Pic.Width * faktor
dim h as Integer = Pic.Height * faktor

// create new picture
dim NewPic as new Picture(w,h,32)

// check if we have a mask and clear it
dim m as picture = pic.mask(False)
pic.mask = nil

// draw picture in the new size
NewPic.Graphics.DrawPicture Pic, 0, 0, w, h, 0, 0, Pic.Width, Pic.Height

if m <>nil then
// restore mask and scale it
pic.mask = m
NewPic.mask.Graphics.DrawPicture m, 0, 0, w, h, 0, 0, Pic.Width, Pic.Height
end if

// return result
Return NewPic
End Function

```

**Notes:** This version handles mask. As you see we actually have to remove mask in order to copy the picture part correctly.

### 5.0.193 How to scale a picture proportionally?

Plugin Version: all, Platforms: macOS, Linux, Windows.

**Answer:** For a proportional scaling, we calculate the new picture size relative to the target maximum size.

**Example:**

```

Function ProportionalScaled(extends pic as Picture, Width as Integer, Height as Integer) As Picture
// Calculate scale factor

dim faktor as Double = min( Height / Pic.Height, Width / Pic.Width)

```

```

// Calculate new size
dim w as Integer = Pic.Width * faktor
dim h as Integer = Pic.Height * faktor

// create new picture
dim NewPic as new Picture(w,h,32)

// draw picture in the new size
NewPic.Graphics.DrawPicture Pic, 0, 0, w, h, 0, 0, Pic.Width, Pic.Height

// return result
Return NewPic
End Function

```

**Notes:** This does not handle mask, but you can scale the mask the same way and assign it to the new picture.  
(see other FAQ entry with mask)

### 5.0.194 How to scale/resize a CIIImageMBS?

Plugin Version: all, Platform: Windows.

**Answer:** Use the CIFilterLanczosScaleTransform filter to scale down a picture to a specific size.

**Example:**

```

Dim pic As Picture = LogoMBS(500)
Dim image As CIIImageMBS = CIIImageMBS.imageWithPicture(pic)

Dim filter As New CIFilterLanczosScaleTransformMBS

Const targetWidth = 600.0
Const targetHeight = 400.0

Dim scale As Double = targetHeight / image.Extent.Height
Dim aspect As Double = targetWidth / (image.Extent.Width * scale)

filter.inputImage = image
filter.inputScale = scale
filter.inputAspectRatio = aspect

Dim result As Picture = filter.outputImage.RenderPicture

Backdrop = result

```

**Notes:** This is same code as our scaleTo convenience method.

### 5.0.195 How to scale/resize a picture?

Plugin Version: all, Platform: Windows.

**Answer:** There are several ways to scale or resize a picture. The easiest way may be the ScaleMBS function in the Picture class.

**Example:**

```
dim Original,Scaled as Picture
```

```
Original=LogoMBS(500)
Scaled=Original.ScaleMBS(100,100,true)
```

**Notes:** The plugin ways:

- GraphicsMagick can scale/resize.
- CoreImage scale filter may result in the fastest and best images on Mac OS X 10.4.
- NSImageMBS can scale, but is Mac OS X only.
- CGImageMBS can scale, but is Mac OS X only.
- CIImageMBS can scale, but is Mac OS X only.
- QuickTime Graphics exporter and importer can be connected to scale. (this was used more often a few years ago)
- ImageMagick can scale very nice and crossplatform. But the ImageMagick libraries are big.
- The picture.ScaleMBS function is self written and results in equal output on Mac, Windows and Linux without any additional libraries installed.
- Picture.ScalingMBS does crossplatform scaling with several modes.

with pure Xojo:

- make a new picture and draw the old one with new size inside.

### 5.0.196 How to search with regex and use unicode codepoints?

Plugin Version: all, Platforms: macOS, Linux, Windows.

**Answer:** You can specify unicode characters in search string with backslash x and digits.

**Example:**

```
dim r as RegExMbs
dim s as string
dim c as Integer
```

```

s="123 √$√√° ABC 456"

r=new RegExMBS
if r.Compile("√") then
c=r.Execute(s,0)
MsgBox str(c)+" "+str(r.Offset(0))+" "+str(r.Offset(1))
// shows: 1 4 10
// 1 for ubound of the offset array
// 4 for 4 bytes before the matched pattern
// 10 for the 10 bytes before the end of the matched pattern
end if

r=new RegExMBS
if r.Compile("\xF6") then // finds √ using Unicode codepoint
c=r.Execute(s,0)
MsgBox str(c)+" "+str(r.Offset(0))+" "+str(r.Offset(1))
// shows: 1 4 10
// 1 for ubound of the offset array
// 4 for 4 bytes before the matched pattern
// 10 for the 10 bytes before the end of the matched pattern
end if

```

### 5.0.197 How to see if a file is invisible for Mac OS X?

Plugin Version: all, Platform: macOS.

**Answer:** Try this function:

**Example:**

```

Function Invisible(F As FolderItem) As Boolean
Dim TIS As TextInputStream
Dim S,All As String
Dim I as Integer
dim g as folderitem

If Left(F.Name,1)="." or not f.visible Then
Return True
End If

g=F.Parent.Child(".hidden")
If g.Exists Then
TIS=g.OpenAsTextFile
if tis<>Nil then
All=TIS.ReadAll
For I=1 to CountFields(All,Chr(11))
S=NthField(All, Chr(11), I)

```

```

If S=F.name Then
Return True
End If
Next
end if
End if
End Function

```

### 5.0.198 How to set cache size for SQLite or REALSQLDatabase?

Plugin Version: all, Platforms: macOS, Linux, Windows.

**Answer:** You use the pragma cache\_size command on the database.

**Example:**

```

// set cache size to 20000 pages which is about 20 MB for default page size
dim db as REALSQLDatabase
db.SQLExecute "PRAGMA cache_size = 20000"

```

**Notes:** Default cache size is 2000 pages which is not much.

You get best performance if whole database fits in memory.

At least you should try to have a cache big enough so you can do queries in memory.

You only need to call this pragma command once after you opened the database.

### 5.0.199 How to set the modified dot in the window?

Plugin Version: all, Platform: macOS.

**Answer:** Try this declares:

**Example:**

```

window1.ModifiedMBS=true

```

### 5.0.200 How to show a PDF file to the user in a Web Application?

Plugin Version: all, Platforms: macOS, Linux, Windows.

**Answer:** You can use a WebHTMLViewer control and load the

**Example:**

```

dim CurrentFile as WebFile // a property of the WebPage

// define the PDF file
CurrentFile = new WebFile
CurrentFile.Filename = "test.pdf"
CurrentFile.MIMEType = "application/pdf"
CurrentFile.Data = "some pdf data" // MyDynaPDF.GetBuffer

// load into html viewer
HTMLViewer1.URL = CurrentFile.URL

```

**Notes:** See our Create PDF example for the Xojo Web Edition.

### 5.0.201 How to show Keyboard Viewer programmatically?

Platform: macOS.

**Answer:** Use Xojo or AppleScript to launch the KeyboardViewerServer.app.

**Example:**

```

dim a as new AppleScriptMBS
dim text as string
dim lines(-1) as string

lines.append "set theApplication to ""KeyboardViewerServer""
lines.append "set thePath to ""/System/Library/Components/KeyboardViewer.component/Contents/Shared-
Support/KeyboardViewerServer.app""
lines.append ""
lines.append "set POSIXPath to ((POSIX file thePath) as string)"
lines.append "tell application ""System Events"" to set isRunning to 0 <(count (application processes whose
name is theApplication))"
lines.append "if isRunning then tell application POSIXPath to quit"
lines.append "delay 0.15"
lines.append ""
lines.append "ignoring application responses"
lines.append " tell application POSIXPath to run"
lines.append "end ignoring"

text=join(lines,EndOfLine.macintosh)

a.Compile text
a.Execute

```

**Notes:** AppleScript code:

```
set theApplication to "KeyboardViewerServer"
set thePath to "/System/Library/Components/KeyboardViewer.component/Contents/SharedSupport/KeyboardViewerServer.app"
```

```
set POSIXPath to ((POSIX file thePath) as string)
tell application "System Events" to set isRunning to 0 <(count (application processes whose name is theApplication))
if isRunning then tell application POSIXPath to quit
delay 0.15
```

```
ignoring application responses
tell application POSIXPath to run
end ignoring
```

### 5.0.202 How to show the mouse cursor on Mac?

Plugin Version: all, Platform: macOS.

**Answer:** Try this declare:

**Example:**

```
Declare Sub ShowCursor Lib "Carbon" ()
```

```
ShowCursor
```

**Notes:** The MBS Plugin has this function and supports it on Windows, too.

### 5.0.203 How to shutdown a Mac?

Plugin Version: all, Platform: macOS.

**Answer:** Ask the Finder via Apple Events:

**Example:**

```
dim ae as appleevent
ae=newappleEvent("FNDR","shut","MACS")
if not ae.send then
msgBox "The computer couldn't be shutdown."
end if
```

**Notes:** Or toolbox call (Attention: This method will stop the computer immediatly: No document asked to be saved, all applications quitting without knowing).

```
Declare Sub ShutDwnPower Lib "Carbon" ()
ShutDwnPower
```

### 5.0.204 How to sleep a Mac?

Plugin Version: all, Platform: macOS.

**Answer:** Ask the Finder via Apple Events:

**Example:**

```
dim ae as appleevent
ae=newappleEvent("FNDR","slep","MACS")
if not ae.send then
msgBox "The computer doesn't want to sleep."
end if
```

### 5.0.205 How to speed up rasterizer for displaying PDFs with DynaPDF?

Plugin Version: all, Platforms: macOS, Linux, Windows.

**Answer:** Here a few speed tips:

**Notes:**

- Use the DynaPDFRasterizerMBS function instead of our render functions.
- Reuse DynaPDFRasterizerMBS as long as the target picture size doesn't change.
- Import only the PDF pages you want to display.
- Let DynaPDF do zooming, rotating or other effects instead of you change it.

### 5.0.206 How to use PDFLib in my RB application?

Plugin Version: all, Platforms: macOS, Linux, Windows.

**Answer:** The PDFlib plugin was discontinued in favor of our DynaPDF plugin.

**Notes:** If you need help to move, please contact us.

### 5.0.207 How to use quotes in a string?

Plugin Version: all, Platforms: macOS, Linux, Windows.

**Answer:** Just double them.

**Example:**

```
msgbox "This String contains ""quotes"""
```

### 5.0.208 How to use Sybase in Web App?

Plugin Version: all, Platforms: macOS, Linux, Windows.

**Answer:** Please use our MBS Xojo SQL Plugin to connect to a Sybase Database in your web application.

**Notes:** If you see db.Connect giving the error message "cs\_ctx\_alloc ->CS\_MEM\_ERROR", than some things are not setup right for Sybase.

The Apache process may not have all the SYBASE environment variables being set when the CGI was launched.

Adding these lines to /etc/httpd/conf/httpd.conf stopped the faux memory errors for us:

```
SetEnv LD_LIBRARY_PATH /opt/sybase/OCS-15_0/lib:/opt/sybase/OCS-15_0/lib3p64:/opt/sybase/OCS-15_0/lib3p:
SetEnv SYBROOT /opt/sybase
SetEnv SYBASE_OCS /opt/sybase
SetEnv SYBASE /opt/sybase
```

### 5.0.209 How to use the Application Support folder?

Plugin Version: all, Platform: macOS.

**Answer:**

I was saving a registration code for an app to the Preference folder. People on the list have suggested that it would be better in the ApplicationSupportFolder. How do I save the file called CWWPrefs into that folder using MBS?

I have checked for examples and the docs but can't see how to apply it

```
//f = SpecialFolder.Preferences.child("CWWPrefs")
f = ApplicationSupportFolderMBS(-32768)
```

**Example:**

```

dim folder,file as FolderItem

folder = createApplicationSupportFolderMBS(-32763)

if folder=nil then
// Some very old Mac OS Versions may not support it
// or the plugin may fail for any reason
folder=SpecialFolder.Preferences
end if

file=folder.Child("CWWPrefs")

MsgBox file.NativePath

```

**Notes:**

You may not be able to write there with a normal user account!

**5.0.210 How to use the IOPMCopyScheduledPowerEvents function in Xojo?**

Plugin Version: all, Platform: macOS.

**Answer:** You can use the following code which does this using the SoftDeclareMBS class.

**Example:**

```

Sub Open()
dim c as CFDateMBS
dim t as CFAbsoluteTimeMBS

// get current date
c=NewCFDateMBS

// in absolute time (seconds since x)
t=c.AbsoluteTime

// add 600 seconds (= 10 Minutes)
t.Value=t.Value+600

// Make a Date from it
c=t.Date

// Schedule the event
// 0 on success
// E00002C1 for missing root rights

```

```

Title=hex(schedulePowerEvent(c, "wake"))

// Just for information, display the scheduled stuff
CFShowMBS CopyScheduledPowerEvents
End Sub

Function CopyScheduledPowerEvents() As carrayMBS
dim s as SoftDeclareMBS
dim m as MemoryBlock

s=new SoftDeclareMBS

if s.LoadLibrary("IOKit.framework") then
if s.LoadFunction("IOPMCopyScheduledPowerEvents") then
if s.CallFunction(0,nil) then
Return NewCFArrayMBSHandle(s.Result,true)
else
MsgBox "Failed to Call IOPMCopyScheduledPowerEvents."
end if
else
MsgBox "Failed to load IOPMCopyScheduledPowerEvents."
end if
else
MsgBox "Failed to load IOKit."
end if

Return nil
End Function

Function SchedulePowerEvent(time_to_wake as CFDateMBS, Type as CFStringMBS) as Integer
dim s as SoftDeclareMBS
dim m as MemoryBlock

'/*
'* Types of power event
'* These are potential arguments to IOPMSchedulePowerEvent().
'* These are all potential values of the kIOPMPowerEventTypeKey in the CFDictionaryes
'* returned by IOPMCopyScheduledPowerEvents().
'*/
'/*!
'@define kIOPMAutoWake
'@abstract Value for scheduled wake from sleep.
'*/
'#define kIOPMAutoWake "wake"
,
'/*!
'@define kIOPMAutoPowerOn
'@abstract Value for scheduled power on from off state.

```

```

*/
#define kIOPMAutoPowerOn "poweron"
,
/*!
#define kIOPMAutoWakeOrPowerOn
@abstract Value for scheduled wake from sleep, or power on. The system will either wake OR
power on, whichever is necessary.
*/
,
#define kIOPMAutoWakeOrPowerOn "wakepoweron"
/*!
#define kIOPMAutoSleep
@abstract Value for scheduled sleep.
*/
,
#define kIOPMAutoSleep "sleep"
/*!
#define kIOPMAutoShutdown
@abstract Value for scheduled shutdown.
*/
,
#define kIOPMAutoShutdown "shutdown"

s=new SoftDeclareMBS

if s.LoadLibrary("IOKit.framework") then
if s.LoadFunction("IOPMSchedulePowerEvent") then

m=NewMemoryBlock(12)
m.Long(0)=time_to_wake.handle
m.Long(4)=0 // nil
m.Long(8)=type.Handle

if s.CallFunction(3,m) then
Return s.Result
end if
end if
end if

End Function

```

**Notes:** Requires Mac OS X and to execute root rights.

### 5.0.211 How to validate a GUID?

Plugin Version: all, Platforms: macOS, Linux, Windows.

**Answer:** You can use this function below which uses a regular expression to verify that the string is a valid UUID/GUID:

**Example:**

Function IsGUID(guid as string) As Boolean

dim r as new RegEx

```
r.SearchPattern = "^(\{ { 0,1 } ( [ 0-9a-fA-F ] ) { 8 } -( [ 0-9a-fA-F ] ) { 4 } -( [ 0-9a-fA-F ] ) { 4 } -( [ 0-9a-fA-F ] ) { 4 } -( [ 0-9a-fA-F ] ) { 12 } \} { 0,1 } )$ "
```

Return r.Search(guid)<>nil

End Function

**Notes:** Simply parsing the GUID with CFUUIDMBS does not give the same result as CFUUIDMBS will also take a string like "DDDD".

### 5.0.212 How to walk a folder hierarchie non recursively?

Plugin Version: all, Platforms: macOS, Linux, Windows.

**Answer:** Use code like this one:

**Example:**

Sub Walk(folder as FolderItem)

dim folders() as FolderItem

folders.Append folder

while UBound(folders)>=0

dim currentFolder as FolderItem = folders.pop

dim c as Integer = currentFolder.Count

for i as Integer = 1 to c

dim item as FolderItem = currentFolder.TrueItem(i)

if item = Nil then

// no permission

elseif item.Visible then // only visible

if item.Directory then

folders.Append item

```
else
// work with file here
end if

end if

next

wend
End Sub
```

**Notes:** As you see we go with a long loop which runs until we don't have more folders to process. We ignore items we can't access due to permission limits. And we only work visible items. If you like, check `folderitem.isBundleMBS` on item to handle packages and applications better on Mac OS X.

#### 5.0.213 I got this error: PropVal, QDPictMBS.Name (property value), Type mismatch error. Expected CGDataProviderMBS, but got Variant, Name:QDPictMBS

Plugin Version: all, Platform: macOS.

**Answer:** The plugins MacOSX and MacOSXCF belong together. If you use one part, please also install the other part.

**Notes:** We splitted the plugin because the Xojo IDE on Windows crashed on compilation.

#### 5.0.214 I registered the MBS Plugins in my application, but later the registration dialog is shown.

Plugin Version: all, Platforms: macOS, Linux, Windows.

**Answer:** There are two main reasons.

**Notes:** 1. you may use the plugin before registering them. This is often the case if you register in a window open event and use the plugin in a control open event.

On the console on Mac OS X or Windows, you may see a message like this "MBS Plugins were used by the application before the RegisterMBSPlugin function was called. Please fix this in your code!".

2. you may have mixed different plugin versions which are not compatible.

In this case you can see a message "Internal plugin registration error." on the console on Mac OS X. Newer plugins may show a message dialog reporting this. Older version simply think they are not registered.

If the installer just merges old and new applications, users may have libraries of older and newer plugin versions in the libs folder. If your application loads the wrong version, the registration fails.

If you use remote debugging, make sure you clear the temporary files there, too. Otherwise you may have old DLLs on your hard disc which may disturb your application.

You can run into issues if you use your registration code on different places of your app. Please register only once in app.open (or app Constructor). If you have several codes, simply call them one after the other.

Also check that you only call RegisterMBSPlugin with valid serial number. If you later call RegisterMBSPlugin with Demo like in example code above, you remove the license.

Next check if you can clear the Xojo caches and that helps. This includes the Xojo Scratch folder and the Plugins & Project caches. Simply locate those folders and delete them. For Windows look in hidden AppData folder in your user folder. For Mac, please check textasciitilde /Library/Caches and your temp folders.

Finally make sure you use the right serial number. Not an older one or a misspelled one.

### 5.0.215 I want to accept Drag & Drop from iTunes

Plugin Version: all, Platform: macOS.

**Answer:** You need to accept AcceptMacDataDrop "itun" and Handle the DropObject.

**Example:**

```
Sub Open()
window1.AcceptMacDataDrop "itun"
End Sub
```

```
Sub DropObject(obj As DragItem)
dim s as string
dim f as folderItem
dim d as CFDictionaryMBS
dim o as CFObjectMBS
dim key as CFStringMBS
dim dl as CFDictionaryListMBS
dim i,c as Integer
dim u as CFURLMBS
dim file as FolderItem
```

```
if obj.MacDataAvailable("itun") then
s = obj.MacData("itun")
```

```
// Parse XML
o=NewCFOBJECTMBSFromXML(NewCFBinaryDataMBS(s))

// Make dictionary
if o isa CFDictionaryMBS then
d=CFDictionaryMBS(o)

// get Tracks Dictionary
key=NewCFStringMBS("Tracks")
o=d.Value(key)

if o isa CFDictionaryMBS then
d=CFDictionaryMBS(o)
dl=d.List

// Walk over all entries in the Tracks dictionary
c=dl.Count-1
for i=0 to c
o=dl.Value(i)

if o isa CFDictionaryMBS then
d=CFDictionaryMBS(o)

key=NewCFStringMBS("Location")
o=d.Value(key)
if o isa CFStringMBS then
u=NewCFURLMBS(CFStringMBS(o),nil)

file=u.file
if file<>nil then
MsgBox file.NativePath
end if
end if
end if
next
end if
end if
end if
End Sub
```

**Notes:** The code above inside a window on Xojo 5.5 with MBS Plugin 5.3 will do it nice and show the paths.

### 5.0.216 I'm drawing into a listbox but don't see something.

Plugin Version: all.

**Answer:** If you draw this in a listbox cellbackground, you need to draw on the correct position

**Example:**

```
Function CellBackgroundPaint(g As Graphics, row as Integer, column as Integer) As Boolean
dim f as FolderItem
f=SpecialFolder.Desktop
f.DrawWideIconMBS(g,listbox1.left,listbox1.top+row*20,16)
Return true
End Function
```

**Notes:** Try this in a listbox. The Graphics object there has a clipping and an offset which the plugin doesn't know about.

### 5.0.217 I'm searching for a method or so to move a window from position x.y to somewhere else on the screen.

Platform: macOS.

**Answer:**

The code I produced in RB isn't smooth enough. Is there a call in MBS, if not, can it be done? The speed of it has to be like the show of a DrawerWindow.

Try the declare below for Carbon. With WindowLib it will work on Mac OS 8.5 and newer.

**Notes:**

See Window.Transition functions.

### 5.0.218 If I use one of your plug-ins under windows, would this then impose the use of dll after compilation or my would my compiled soft still be a stand-alone single file software?

Platforms: macOS, Linux, Windows.

**Answer:** Stand alone.

**Notes:** Xojo compiles all used plugins into the application binary.

Some plugin parts need external dlls but you will find that in the documentation. (e.g. pdfiib for some classes)

**5.0.219 Is the fn key on a powerbook keyboard down?**

Plugin Version: all, Platform: macOS.

**Answer:** I am unable to figure out how or if it is possible to detect if the fn key is down on a powerbook keyboard. Is it possible?

**Example:**

' Window.Open Event of a blank project:

```
dim i as Integer

for i=0 to 127
if keyboard.asynckeydown(i) then
title=str(i) // found
return
end if
next
title="" // not found
```

**Notes:** This test application shows the keycode (decimal) 63 for the fn key.

**5.0.220 Is there a case sensitive Dictionary?**

Plugin Version: all.

**Answer:** The MBS Plugin has several classes which can work as a replacement.

**Notes:** First you could use VariantToVariantHashMapMBS or VariantToVariantOrderedMapMBS.

If you know that all keys are Strings or Integers only, you can use the specialized classes which are a little bit faster due to avoiding variants:

```
IntegerToIntegerHashMapMBS class
IntegerToIntegerOrderedMapMBS class
IntegerToStringHashMapMBS class
IntegerToStringOrderedMapMBS class
IntegerToVariantHashMapMBS class
IntegerToVariantOrderedMapMBS class
StringToStringHashMapMBS class
StringToStringOrderedMapMBS class
StringToVariantHashMapMBS class
StringToVariantOrderedMapMBS class
```

### 5.0.221 Is there a way to use the MBS plugin to get only the visible item and folder count on a volume?

Plugin Version: all, Platforms: macOS, Linux, Windows.

**Answer:** You can use the DirectorySizeMBS class for this as in the example below:

**Example:**

```
dim d as DirectorySizeMBS

d=new DirectorySizeMBS

// volume(1) as my boot volume is very full
if d.update(volume(1),true,0) then
MsgBox str(d.VisibleItemCount)+" visible items, "+str(d.HiddenItemCount)+" invisible items."
end if
```

**Notes:** Complete Question: Is there a way to use the MBS plugin to get only the visible item and folder count on a volume? The FileCount and FolderCount properties of VolumeInformationMBS seem to provide the total # of items including invisible items such as .DS\_Store and more importantly .Trashes which is causing me a great amount of difficulty during a recursive scan of a volume. I've got a progress bar which uses the total of the filecount and foldercount properties as the maximum value, but my routine needs to filter out all invisible items, as it is creating a catalog of a volume for archiving purposes. Any thoughts how I could get accurate number.

### 5.0.222 Is there an easy way I can launch the Displays preferences panel?

Plugin Version: all, Platform: macOS.

**Answer:** Use the code below:

**Example:**

```
dim error as Integer

error=OpenMacOSXPreferencesPaneMBS("Displays")
if error<>0 then
MsgBox "Failed to launch QuickTime System Preferences panel."
end if
```

### 5.0.223 List of Windows Error codes?

Plugin Version: all, Platforms: macOS, Linux, Windows.

**Answer:** We have a list of windows error codes on our website.

**Notes:** <http://www.monkeybreadsoftware.de/xojo/winerror.shtml>

### 5.0.224 Midi latency on Windows problem?

Plugin Version: all, Platforms: macOS, Linux, Windows.

**Answer:** The issue is system related, not a problem with RB or the plugin.

**Notes:** Two things will adversely affect the timing:

(1) latency of the software synthesizer output driver. The default Windows wavetable synthesizer has considerable latency. I don't know how many milliseconds, but it is noticeable.

(2) latency of the digital audio output driver. Different systems have different drivers for different audio hardware. My Dell laptop has a minimum 15ms latency in the audio driver.

These two things put together were causing a very sluggish MIDI response. I was able to verify these as the culprits by routing MIDI directly out of RB into a sample player, which only introduces the latency of (2) and does not include latency of (1).

I don't know how widely known are these facts, if not then you may want to add this information to the documentation, since Windows programmers using the MIDI plugin may not know those problems, and might mistakenly blame your plugin, as I did :) Sorry about that!

(From Aaron Andrew Hunt)

### 5.0.225 My Xojo Web App does not launch. Why?

Plugin Version: all, Platform: macOS.

**Answer:** Here is a list of checks to do for linux apache installations with Xojo or Xojo Web applications:

**Notes:** Just a list of checks to do for linux apache installations:

- You have 64bit linux? Than you need 32 bit compatibility libraries.
- The folder of your app is writable? Set permissions to 777.
- The cgi script is executable? Set permissions to 755.

- The app file itself is executable? Set permissions to 755.
- You uploaded cgi file as text, so it has unix line endings? (this often gives error "Premature end of script headers" in apache log)
- You uploaded config.cfg file and made it writable? Set permissions to 666.
- Your apache allows execution of cgi scripts? You enabled cgi for apache and uncommented addhandler command for CGI on a new apache installation?
- You uploaded the app file and libraries as binary files? Upload as text breaks them.
- You did upload the libs folder?
- You don't have code in app.open, session.open and other events which crashes app right at launch?
- You don't have a print command in your app.open event? (see feedback case 23817)
- You allowed htaccess file to overwrite permissions?

### 5.0.226 SQLiteDatabase not initialized error?

Plugin Version: all, Platforms: macOS, Linux, Windows.

**Answer:** Before you can use SQLiteDatabaseMBS, it must be initialized.

**Example:**

```
dim d as new SQLiteDatabaseMBS
```

**Notes:** This happens normally when you use "new SQLiteDatabaseMBS".

But if you just have a SQLConnectionMBS and get a recordset there, the initialization may not have happened, yet.

So please simply add a line "dim d as new SQLiteDatabaseMBS" to your app.open code after registration, so the plugin part can initialize and late provide recordsets.

### 5.0.227 Textconverter returns only the first x characters. Why?

Plugin Version: all, Platforms: macOS, Linux, Windows.

**Answer:**

Some older Xojo versions limit the Textconverter to around 1024 characters in input and output. This should be fixed with RB5.

**Notes:**

Xojo seems not to support Textconverters at all on Windows.

### 5.0.228 The type translation between CoreFoundation/Foundation and Xojo data types.

Plugin Version: all, Platform: macOS.

**Answer:** The plugin does conversion between Cocoa/Carbon data types and native Xojo data types. The following list help you knowing what the current plugins support:

**Notes:** Cocoa NSObject to Variant:

```

nil ->nil
NSDictionary ->Dictionary
NSData ->MemoryBlock
NSString ->String
NSAttributedString ->NSAttributedStringMBS
NSDate ->Date
NSNumber ->double/integer/Int64/UInt64/UInt32/Boolean
NSURL ->String
NSValue with NSRect ->NSRectMBS
NSValue with NSPoint ->NSPointMBS
NSValue with NSSize ->NSSizeMBS
NSValue with NSRange ->NSRangeMBS
NSValue with QTTime ->QTTimeMBS
NSValue with QTTimeRange ->QTTimeRangeMBS
NSArray ->Array of Variant
QuartzFilter ->QuartzFilterMBS

```

- ->\*MBS

Variant to Cocoa NSObject:

```

nil ->nil
Dictionary ->NSDictionary
Boolean ->NSNumber
Integer ->NSNumber
Color ->NSColor
Int64 ->NSNumber
Single ->NSNumber
Double ->NSNumber
Date ->NSDate
MemoryBlock ->NSData
String ->NSString
NSImageMBS ->NSImage
NSAttributedStringMBS ->NSAttributedString
NSColorMBS ->NSColor
NSRectMBS ->NSValue with NSRect
NSSizeMBS ->NSValue with NSSize

```

NSPointMBS ->NSValue with NSPoint  
 NSRangeMBS ->NSValue with NSRange  
 NSBurnMBS ->NSBurn  
 NSViewMBS ->NSView  
 NSFontMBS ->NSFont  
 NSParagraphStyleMBS ->NSParagraphStyle  
 NSAttributedStringMBS ->NSAttributedString  
 WebPolicyDelegateMBS ->WebPolicyDelegate  
 WebUIDelegateMBS ->WebUIDelegate  
 WebFrameLoadDelegateMBS ->WebFrameLoadDelegate  
 WebResourceLoadDelegateMBS ->WebResourceLoadDelegate  
 NSIndexSetMBS ->NSIndexSet  
 QTTimeMBS ->QTTime  
 QTTimeRangeMBS ->QTTimeRange  
 Array of Variant ->NSArray  
 Array of String ->NSArray  
 CFStringMBS ->NSString  
 CFNumberMBS ->NSNumber  
 CFDataMBS ->NSData  
 CFURLMBS ->NSURL  
 CFArrayMBS ->NSArray  
 CFDictionaryMBS ->NSDictionary  
 CFBinaryDataMBS ->NSData

Carbon CTypeRef to Variant:

CFDictionaryRef ->Dictionary  
 CFStringRef ->String  
 CFDataRef ->String  
 CFURL ->String  
 CFNumber ->Integer/Double/Int64  
 CFArray ->Array  
 CFDate ->date  
 nil ->nil  
 CGColorSpace ->CGColorSpaceMBS  
 CGColor ->CGColorMBS  
 CGImage ->CGImageMBS  
 CF\* ->CF\*MBS

Variant to Carbon CTypeRef:

Dictionary ->CFDictionaryRef  
 Boolean ->CFBooleanRef  
 Color ->CFNumberRef  
 Integer ->CFNumberRef

Int64 ->CFNumberRef  
 Single ->CFNumberRef  
 Double ->CFNumberRef  
 String ->CFStringRef  
 Color ->CGColorRef  
 Date ->CFDateRef  
 nil ->nil  
 Memoryblock ->CFDataRef  
 FolderItem ->CFURLRef  
 Dictionary ->CFDictionaryRef  
 Array of Variant/String/Date/Double/Single/Int64/Integer ->CFArray  
 CGRectMBS ->CGRect as CFDataRef  
 CGSizeMBS ->CGSize as CFDataRef  
 CGPointMBS ->CGPoint as CFDataRef  
 CGColorMBS ->CGColor  
 CGColorSpaceMBS ->CGColorSpace  
 CGImageMBS ->CGImage  
 CGDataConsumerMBS ->CGDataConsumer  
 CGDataProviderMBS ->CGDataProvider  
 CF\*MBS ->CF\*

Strings without encodings should be put into dictionaries as memoryblocks.

### 5.0.229 Uploaded my web app with FTP, but it does not run on the server!

Plugin Version: all, Platform: Windows.

**Answer:** If you see errors like a simple "Segmentation Fault" on Linux or some other wired errors, you may want to check your FTP upload mode. It must be binary for web apps. ASCII mode corrupts the application.

### 5.0.230 What classes to use for hotkeys?

Plugin Version: all, Platforms: macOS, Linux, Windows.

**Answer:** Please use CarbonHotKeyMBS class on Mac and WindowsKeyFilterMBS on Windows.

**Notes:** CarbonHotKeyMBS will also work fine in Cocoa apps.

### 5.0.231 What do I need for Linux to get picture functions working?

Plugin Version: all, Platforms: macOS, Linux, Windows.

**Answer:** In order to get our plugins working on Linux systems without GUI, the plugin loads graphics

libraries dynamically.

**Notes:** To get it working, the plugin tries to load gtk with this paths:

- libgtk-x11-2.0.so”
- libgtk-x11-2.0.so.0”
- /usr/lib/libgtk-x11-2.0.so”
- /usr/lib32/libgtk-x11-2.0.so”
- /usr/lib/libgtk-x11-2.0.so.0”
- /usr/lib32/libgtk-x11-2.0.so.0”

gdk is loaded with this paths:

- libgdk-x11-2.0.so”
- libgdk-x11-2.0.so.0”
- /usr/lib/libgdk-x11-2.0.so”
- /usr/lib32/libgdk-x11-2.0.so”
- /usr/lib/libgdk-x11-2.0.so.0”
- /usr/lib32/libgdk-x11-2.0.so.0”

For the paths without explicit path, the system will search in /lib, /usr/lib and all directories in the LD\_LIBRARY\_PATH environment variable.

### 5.0.232 What does the NAN code mean?

Plugin Version: all, Platforms: macOS, Linux, Windows.

**Answer:**

### 5.0.233 What font is used as a 'small font' in typical Mac OS X apps?

Plugin Version: all, Platform: macOS.

**Answer:**

Xojo 4.5 has a constant "SmallSystem" to use for a font name.

For older versions try this code:

**Example:**

```

Sub GetThemeFont(fontType as Integer, ByRef fontName as String, ByRef fontSize as Integer, ByRef
fontName as Integer)
dim err as Integer
dim theFont, theFontSize, theFontStyle as MemoryBlock

const smSystemScript = -1

Declare Function GetThemeFont Lib "Carbon" (inFontID as Integer, inScript as Integer, outFontName
as Ptr, outFontSize as Ptr, outStyle as Ptr) as Integer

theFont = NewMemoryBlock(256) //Str255
theFontSize = NewMemoryBlock(2) //SInt16
theFontStyle = NewMemoryBlock(1) //Style

err = GetThemeFont(fontType, smSystemScript, theFont, theFontSize, theFontStyle)

if err = 0 then
fontName = theFont.PString(0)
fontSize = theFontSize.UShort(0)
fontStyle = theFontStyle.Byte(0)
else
fontName = ""
fontSize = 0
fontStyle = 0
end if
End Sub

```

### 5.0.234 What is last plugin version to run on Mac OS X 10.4?

Plugin Version: all, Platform: Windows.

**Answer:** Last Version with 10.4 support is version 15.4.

**Notes:** With version 15.4 you can build applications for OS X 10.4 and newer.

For Version 16.0 we disabled 10.4 and moved minimum to 10.5. We may be able to enable it again to build a version of 16.x, but may need to charge for this by hour.

### 5.0.235 What is last plugin version to run on PPC?

Plugin Version: all, Platform: Windows.

**Answer:** Last Version with PPC is 15.4.

**Notes:** With version 15.4 you can build PPC applications for OS X 10.4 and newer.

For Version 16.0 we disabled PPC. We may be able to enable it again to build a PPC version of 16.x, but may need to charge for this by hour.

### 5.0.236 What is last version of the plugins for macOS 32-bit?

Plugin Version: all, Platforms: macOS, Linux, Windows.

**Answer:** Please use version 23.0 or older.

**Notes:** We stopped including 32-bit code for macOS in version 23.1. Please use older versions if you use an old Xojo.

Xojo 2017r3 and newer load our 64-bit plugins.

### 5.0.237 What is the difference between Timer and WebTimer?

Plugin Version: all, Platforms: macOS, Linux, Windows.

**Answer:** Timer is server side and WebTimer client side.

**Notes:** Timer is the normal timer class in Xojo. It runs on the server. On the side the WebTimer runs on the client. It triggers a request to the server to perform the action. So a WebTimer is good to keep the connection running and the website updated regularly. A timer on the server is good to make regular jobs like starting a database backup every 24 hours.

### 5.0.238 What is the list of Excel functions?

Plugin Version: all, Platforms: macOS, Linux, Windows.

**Answer:** Below a list of function names known by LibXL.

**Notes:** LibXL parses the functions and writes tokens to the excel file. So even if Excel can do more functions, we can only accept the ones known by LibXL.

ABS, ABSREF, ACOS, ACOSH, ACTIVE.CELL, ADD.BAR, ADD.COMMAND, ADD.MENU, ADD.TOOLBAR, ADDRESS, AND, APP.TITLE, AREAS, ARGUMENT, ASC, ASIN, ASINH, ATAN, ATAN2, ATANH, AVEDEV, AVERAGE, AVERAGEA, BAHTTEXT, BETADIST, BETAINV, BINOMDIST, BREAK, CALL, CALLER, CANCEL.KEY, CEILING, CELL, CHAR, CHECK.COMMAND, CHIDIST, CHIINV, CHITEST, CHOOSE, CLEAN, CODE, COLUMN, COLUMNS, COMBIN, CONCATENATE, CONFIDENCE, CORREL, COS, COSH, COUNT, COUNTA, COUNTBLANK, COUNTIF, COVAR, CREATE.OBJECT, CRITBINOM, CUSTOM.REPEAT, CUSTOM.UNDO, DATE, DATEDIF, DATESTRING, DATEVALUE, DAVERAGE, DAY, DAYS360, DB, DBCS, DCOUNT, DCOUNTA, DDB, DEGREES, DELETE.BAR, DELETE.COMMAND, DELETE.MENU, DELETE.TOOLBAR, Deref, DEVSQ, DGET, DIALOG.BOX, DIRECTORY, DMAX, DMIN, DOCUMENTS, DOLLAR, DPRODUCT, DSTDEV, DSTDEVP, DSUM, DVAR, DVARP, ECHO, ELSE, ELSE.IF, ENABLE.COMMAND, ENABLE.TOOL, END.IF, ERROR, ERROR.TYPE, EVALUATE, EVEN, EXACT, EXEC, EXECUTE, EXP, EXPONDIST, FACT, FALSE, FCLOSE, FDIST, FILES, FIND, FINDB, FINV, FISHER, FISHERINV, FIXED, FLOOR, FOPEN, FOR, FOR.CELL, FORECAST,

FORMULA.CONVERT, FPOS, FREAD, FREADLN, FREQUENCY, FSIZE, FTEST, FV, FWRITE, FWRITELN, GAMMADIST, GAMMAINV, GAMMALN, GEOMEAN, GET.BAR, GET.CELL, GET.CHART.ITEM, GET.DEF, GET.DOCUMENT, GET.FORMULA, GET.LINK.INFO, GET.MOVIE, GET.NAME, GET.NOTE, GET.OBJECT, GET.PIVOT.FIELD, GET.PIVOT.ITEM, GET.PIVOT.TABLE, GET.TOOL, GET.TOOLBAR, GET.WINDOW, GET.WORKBOOK, GET.WORKSPACE, GETPIVOTDATA, GOTO, GROUP, GROWTH, HALT, HARMEAN, HELP, HLOOKUP, HOUR, HYPERLINK, HYPGEOMDIST, IF, INDEX, INDIRECT, INFO, INITIATE, INPUT, INT, INTERCEPT, IPMT, IRR, ISBLANK, ISERR, ISERROR, ISLOGICAL, ISNA, ISNONTEXT, ISNUMBER, ISPMT, ISREF, ISTEXT, ISTHAIDIGIT, KURT, LARGE, LAST.ERROR, LEFT, LEFTB, LEN, LENB, LINEST, LINKS, LN, LOG, LOG10, LOGEST, LOGINV, LOGNORMDIST, LOOKUP, LOWER, MATCH, MAX, MAXA, MDETERM, MEDIAN, MID, MIDB, MIN, MINA, MINUTE, MINVERSE, MIRR, MMULT, MOD, MODE, MONTH, MOVIE.COMMAND, N, NA, NAMES, NEGBINOMDIST, NEXT, NORMDIST, NORMINV, NORMSDIST, NORMSINV, NOT, NOTE, NOW, NPER, NPV, NUMBERSTRING, ODD, OFFSET, OPEN.DIALOG, OPTIONS.LISTS.GET, OR, PAUSE, PEARSON, PERCENTILE, PERCENTRANK, PERMUT, PHONETIC, PI, PIVOT.ADD.DATA, PMT, POISSON, POKE, POWER, PPMT, PRESS.TOOL, PROB, PRODUCT, PROPER, PV, QUARTILE, RADIANS, RAND, RANK, RATE, REFTTEXT, REGISTER, REGISTER.ID, RELREF, RENAME.COMMAND, REPLACE, REPLACEB, REPT, REQUEST, RESET.TOOLBAR, RESTART, RESULT, RESUME, RETURN, RIGHT, RIGHTB, ROMAN, ROUND, ROUNDBAHTDOWN, ROUNDBAHTUP, ROUNDDOWN, ROUNDUP, ROW, ROWS, RSQ, RTD, SAVE.DIALOG, SAVE.TOOLBAR, SCENARIO.GET, SEARCH, SEARCHB, SECOND, SELECTION, SERIES, SET.NAME, SET.VALUE, SHOW.BAR, SIGN, SIN, SINH, SKEW, SLN, SLOPE, SMALL, SPELLING.CHECK, SQRT, STANDARDIZE, STDEV, STDEVA, STDEVP, STDEVPA, STEP, STEYX, SUBSTITUTE, SUBTOTAL, SUM, SUMIF, SUMPRODUCT, SUMSQ, SUMX2MY2, SUMX2PY2, SUMXMY2, SYD, T, TAN, TANH, TDIST, TERMINATE, TEXT, TEXT.BOX, TEXTREF, THAIDAYOFWEEK, THAIDIGIT, THAIMONTHOFYEAR, THAINUMSOUND, THAINUMSTRING, THAISTRINGLENGTH, THAIYEAR, TIME, TIMEVALUE, TINV, TODAY, TRANSPOSE, TREND, TRIM, TRIMMEAN, TRUE, TRUNC, TTEST, TYPE, UNREGISTER, UPPER, USDOLLAR, USERDEFINED, VALUE, VAR, VARA, VARP, VARPA, VDB, VIEW.GET, VLOOKUP, VOLATILE, WEEKDAY, WEIBULL, WHILE, WINDOW.TITLE, WINDOWS, YEAR and ZTEST.

### 5.0.239 What is the replacement for PluginMBS?

Plugin Version: all, Platform: macOS.

**Answer:** Use the SoftDeclareMBS class to load libraries dynamically.

### 5.0.240 What to do on Xojo reporting a conflict?

Plugin Version: all, Platforms: macOS, Linux, Windows.

**Answer:**

I get an error like "This item conflicts with another item of the same name" when using one of the plugin functions.

Xojo just wants to tell you that you dropped something in the plugins folder what is not a plugin.

**Notes:**

Some users dropped the examples, the documentation or other files into the plugins folder. Don't do it.

### 5.0.241 What to do with a NSImageCacheException?

Plugin Version: all, Platforms: macOS, Windows.

**Answer:** You need to add exception handlers for NSExcptionMBS in order to catch this exception.

**Notes:** You may also add code to write the stack of the exception into a log file for later locating the error source.

A NSImage has several image representations in memory. So basicly you pass in the base image and for whatever size an image is needed, the NSImage class will create a cache image representation of the requested size so on the next query it can use that cache for the same requested size.

### 5.0.242 What to do with MySQL Error 2014?

Plugin Version: all, Platforms: macOS, Linux, Windows.

**Answer:** You can get this error on MySQL if you have a recordset open while you create another one.

### 5.0.243 What to do with SQL Plugin reporting Malformed string as error?

Plugin Version: all, Platform: macOS.

**Answer:** Please make sure the table and/or database fields have a text encoding set.

**Notes:** For Firebird our plugin tries to use UTF-8 encoding if possible and to correctly convert between various tables, the tables and their fields need to have a text encoding defined.

e.g. if the text field in the table is windows-1252 and the other ISO 8859-5, then the Firebird database can convert them to UTF-8 and deliver texts to the plugin.

If encoding is set to none, it may get confused for non-ascii text.

### 5.0.244 Where is CGGetActiveDisplayListMBS?

Plugin Version: all, Platform: Windows.

**Answer:** This is now CGDisplayMBS.GetActiveDisplayList.

**5.0.245 Where is CGGetDisplaysWithPointMBS?**

Plugin Version: all, Platform: Windows.

**Answer:** This is now CGDisplayMBS.GetDisplaysWithPoint.

**5.0.246 Where is CGGetDisplaysWithRectMBS?**

Plugin Version: all, Platform: Windows.

**Answer:** This is now CGDisplayMBS.GetDisplaysWithRect.

**5.0.247 Where is CGGetOnlineDisplayListMBS?**

Plugin Version: all, Platform: Windows.

**Answer:** This is now CGDisplayMBS.GetOnlineDisplayList.

**5.0.248 Where is GetObjectClassNameMBS?**

Plugin Version: all, Platforms: macOS, Linux, Windows.

**Answer:** Please use this replacement method:

**Example:**

```
Function GetObjectClassNameMBS(o as Object) As string
dim t as Introspection.TypeInfo = Introspection.GetType(o)
Return t.FullName
End Function
```

**Notes:** GetObjectClassNameMBS was removed from the plugins.

**5.0.249 Where is NetworkAvailableMBS?**

Plugin Version: all, Platforms: macOS, Linux, Windows.

**Answer:** We removed NetworkAvailableMBS some versions ago. It was not working right and basically it's not useful. If you want to check whether you have a network, than do a DNS resolve:

**Example:**

```

// two independent domain names
const domain1 = "www.google.com"
const domain2 = "www.macs.w.de"

// resolve IPs
dim ip1 as string = DNSNameToAddressMBS(Domain1)
dim ip2 as string = DNSNameToAddressMBS(Domain2)

// if we got IPs and not the same IPs (error/login pages)
if len(ip1)=0 or len(ip2)=0 or ip1=ip2 then
MsgBox "no connection"
else
MsgBox "have connection"
end if

```

**Notes:** This way you can detect whether you got something from DNS. And you can make sure that a DNS redirection to a login page won't catch you.

### 5.0.250 Where is StringHeight function in DynaPDF?

Plugin Version: all, Platform: Windows.

**Answer:** Use the function GetFTextHeight or GetFTextHeightEx.

**Notes:** Be aware that GetFTextHeight works with format commands and you may want to escape your text if you don't use them.

### 5.0.251 Where is XLSDocumentMBS class?

Plugin Version: all, Platform: macOS.

**Answer:** This class has been removed in favor of XLBookMBS class.

**Notes:** These classes have been removed: XLSCellMBS, XLSDocumentMBS, XLSFormatRecordMBS, XLSMergedCellsMBS, XLSRowMBS and XLSSheetMBS.

### 5.0.252 Where to get information about file formats?

Plugin Version: all, Platforms: macOS, Linux, Windows.

**Answer:**

Please visit this web page:

<http://www.wotsit.org>

### 5.0.253 Where to register creator code for my application?

Plugin Version: all, Platform: macOS.

**Answer:**

Register at Apple:

<http://developer.apple.com/dev/cftype/information.html>

### 5.0.254 Which Mac OS X frameworks are 64bit only?

Plugin Version: all, Platform: macOS.

**Answer:** Some frameworks from Mac OS X do not support 32 bit applications, so we can't provide plugins for Xojo until 64bit target is available.

**Notes:** For Mac OS X 10.8:

- Accounts
- EventKit
- GLKit
- Social

and in 10.9:

- Accounts
- AVKit
- EventKit
- GameController
- GLKit
- MapKit
- MediaLibrary
- Social
- SpriteKit

In general Apple makes all new frameworks being 64 bit only.

### 5.0.255 Which plugins are 64bit only?

Plugin Version: all, Platform: macOS.

**Answer:** Some of our plugins work only in 64 bit modes as operation systems do not provide 32 bit code.

**Notes:** This effects currently: EventKit, Accounts, Social frameworks from Apple and our matching plugins.

### 5.0.256 Why application doesn't launch because of a missing ddraw.dll!?

Plugin Version: all, Platform: Windows.

**Answer:** Some RB versions require that you install DirectX from Microsoft on your Windows.

### 5.0.257 Why application doesn't launch because of a missing shlwapi.dll!?

Plugin Version: all, Platform: Windows.

**Answer:** Some RB versions require that you install the Internet Explorer from Microsoft on your Windows.

**Notes:** This bug is for several older Windows 95 editions.

### 5.0.258 Why do I hear a beep on keydown?

Plugin Version: all, Platform: Windows.

**Answer:** When the user presses a key, RB goes through all keydown event handlers till on returns true.

**Notes:** If no keydown event handler returns true for the key, a beep is performed.

### 5.0.259 Why does folderitem.item return nil?

Plugin Version: all, Platforms: macOS, Linux, Windows.

**Answer:** Because Xojo fails to make a folderitem for you. Reason may be an alias file which can't be resolved or simply that you don't have enough access rights to read the folder content.

**Notes:** A more rarely reason is that the directory changed and the file with the given index or name does no longer exist.

### 5.0.260 Why doesn't showurl work?

Plugin Version: all, Platforms: macOS, Linux, Windows.

**Answer:**

There are three main reasons:

1. showurl is not supported by Xojo in 68k applications.
2. there is now application defined for the protocol (e.g. http) in the Internet Control panel.
3. You don't have Internet Config installed.

You can use the InternetConfigMBS class to check for this stuff.

**5.0.261 Why don't the picture functions not work on Linux?**

Plugin Version: all, Platform: macOS.

**Answer:** Please make sure libcairo is installed.

**Notes:** For accessing pictures on Linux, the MBS Plugin relays on the cairo library.

Please install the package if you don't have it already.

Our plugin looks for library called libcairo.so or libcairo.so.2.

**5.0.262 Why have I no values in my chart?**

Plugin Version: all, Platforms: macOS, Windows.

**Answer:** You have no data points visible, there may be several reasons:

**Notes:** For example one of the data values may be infinite or invalid.

Or the scaling may be out of range, so you simply see nothing.

**5.0.263 Will application size increase with using plugins?**

Plugin Version: all, Platform: Windows.

**Answer:** All plugins used by your application will be included in the application.

**Notes:** If you use no plugins, your application will not change size.

And if you use one class from the plugins, your application size will increase by a few kilobytes.

The documentation of the plugins include a list of all plugin parts and their sizes for the different platforms.

**5.0.264 XLS: Custom format string guidelines**

Plugin Version: all, Platform: macOS.

**Answer:** You have to download the source code and compile a static version of the library.

**Notes:** Up to four sections of format codes can be specified. The format codes, separated by semicolons, define the formats for positive numbers, negative numbers, zero values, and text, in that order. If only two sections are specified, the first is used for positive numbers and zeros, and the second is used for negative numbers. If only one section is specified, it is used for all numbers. Four sections example:

```
#,###.00_); [ Red ] (,###.00);0.00;"sales "@
```

The following table describes the different symbols that are available for use in custom number formats.

#### Specify colors

To set the text color for a section of the format, type the name of one of the following eight colors in square brackets in the section. The color code must be the first item in the section.

Instead of using the name of the color, the color index can be used, like this [ Color3 ] for Red. Valid numeric indexes for color range from 1 to 56, which reference by index to the legacy color palette.

#### Specify conditions

To set number formats that will be applied only if a number meets a specified condition, enclose the condition in square brackets. The condition consists of a comparison operator and a value. Comparison operators include: = Equal to; >Greater than; <Less than; >= Greater than or equal to, <= Less than or equal to, and <>Not equal to. For example, the following format displays numbers that are less than or equal to 100 in a red font and numbers that are greater than 100 in a blue font.

```
[ Red ] [ <=100 ] ; [ Blue ] [ >100 ]
```

If the cell value does not meet any of the criteria, then pound signs ("##") are displayed across the width of the cell.

#### Dates and times

#### Examples

### 5.0.265 Xojo doesn't work with your plugins on Windows 98.

Plugin Version: all, Platform: Windows.

**Answer:** Please upgrade your Windows version.

**5.0.266 Xojo or my RB application itself crashes on launch on Mac OS Classic.  
Why?**

Plugin Version: all.

**Answer:**

You may check if the application has enough memory to be loaded.

RB should have on Mac OS Classic more than 20 MB of RAM.

I preferred to use 50 MB and for an application a 10 MB partition is a good way to start.

Parameter	Description
x	The x value of the data point. For an enumerated x-axis (see <code>Axis.setLabels</code> on what is an enumerated axis), the first data point is 0, and the nth data point is (n-1).
xLabel	The bottom x-axis label of the data point.
x2Label	The top x-axis label of the data point.
value	The value of the data point.
accValue	The sum of values of all data points that are in the same x position and same data group as the current data point, and with data set number less than or equal to the current data point. This is useful for stacked charts, such as stacked bar chart and stacked area chart.
totalValue	The sum of values of all data points that are in the same x position and same data group as the current data point. This is useful for stacked charts, such as stacked bar chart and stacked area chart.
percent	The percentage of the data point based on the total value of all data points that are in the same x position and same data group as the current data point. This is useful for stacked charts, such as stacked bar chart and stacked area chart.
accPercent	The accumulated percentage of the data point based on the total value of all data points that are in the same x position and same data group as the current data point. This is useful for stacked charts, such as stacked bar chart and stacked area chart.
gpercent	The percentage of the data point based on the total value of all data points in a layer.
dataSet	The data set number to which the data point belongs. The first data set is 0. The nth data set is (n-1).
dataSetName	The name of the data set to which the data point belongs.
dataItem	The data point number within the data set. The first data point is 0. The nth data point is (n-1).
dataGroup	The data group number to which the data point belongs. The first data group is 0. The nth data group is (n-1).
dataGroupName	The name of the data group to which the data point belongs.
layerId	The layer number to which the data point belongs. The first layer is 0. The nth layer is (n-1).
fieldN	The (N + 1)th extra field. For example, { field0 } means the first extra field. An extra field is an array of custom elements added using <code>Layer.addExtraField</code> , <code>Layer.addExtraField2</code> , <code>BaseChart.addExtraField</code> or <code>BaseChart.addExtraField2</code> .

diFieldN	Same as fieldN. See above.
dsFieldN	Similar to fieldN, except that dsFieldN means the extra field is indexed by data set number. The Pth data set corresponds to the Pth element of the extra field.
dsdiFieldN	Similar to fieldN, except that dsdiFieldN means the extra fields are indexed by both the data set number and data point number. The Pth data item of the Qth data set corresponds to the Pth element of the (N + Q)th extra field.

Parameter	Description
zx	The symbol scale in the x dimension. Applicable for layers with symbol scales set by <code>LineStyle.setSymbolScale</code> .
zy	The symbol scale in the y dimension. Applicable for layers with symbol scales set by <code>LineStyle.setSymbolScale</code> .
z	The symbol scale without distinguishing the dimension to use. Applicable for layers with symbol scales set by <code>LineStyle.setSymbolScale</code> .

Parameter	Description
slope	The slope of the trend line.
intercept	The y-intercept of the trend line.
corr	The correlation coefficient in linear regression analysis.
stderr	The standard error in linear regression analysis.

Parameter	Description
top	The value of the top edge of the box-whisker symbol.
bottom	The value of the bottom edge of the box-whisker symbol.
max	The value of the maximum mark of the box-whisker symbol.
min	The value of the minimum mark of the box-whisker symbol.
med	The value of the median mark of the box-whisker symbol.

Parameter	Description
high	The high value.
low	The low value.
open	The open value.
close	The close value.

Parameter	Description
dir	The direction of the vector.
len	The length of the vector.

Parameter	Description
radius	The radial value of the data point.
value	Same as { radius } . See above.
angle	The angular value of the data point.
x	Same as { angle } . See above.
label	The angular label of the data point.
xLabel	Same as { label } . See above.
name	The name of the layer to which the data point belongs.
dataSetName	Same as { name } . See above.
i	The data point number. The first data point is 0. The nth data point is (n-1).
dataItem	Same as { i } . See above.
z	The symbol scale. Applicable for layers with symbol scales set by Polar-Layer.setSymbolScale.
fieldN	The (N + 1)th extra field. For example, { field0 } means the first extra field. An extra field is an array of custom elements added using Layer.addExtraField, Layer.addExtraField2, BaseChart.addExtraField or BaseChart.addExtraField2.
diFieldN	Same as fieldN. See above.
dsFieldN	Similar to fieldN, except that dsFieldN means the extra field is indexed by layer index. The Pth layer corresponds to the Pth element of the extra field.
dsdiFieldN	Similar to fieldN, except that dsdiFieldN means the extra fields are indexed by both the data set number and data point number. The Pth data item of the Qth layer corresponds to the Pth element of the (N + Q)th extra field.
Parameter	Description
dir	The direction of the vector.
len	The length of the vector.
Parameter	Description
value	The axis value at the tick position.
label	The axis label at the tick position.
Parameter	Description
[ param ]	The name of the parameter
[ a ]	If this field a number, it specifies the number of decimal places (digits to the right of the decimal point).

[ b ]	The thousand separator. Should be a non-alphanumeric character (not 0-9, A-Z, a-z). Use '.
textasciitilde ' for no thousand separator. The default is 'textasciitilde ', which can be modified using BaseChart.setNumberFormat.	
[ c ]	The decimal point character. The default is '.', which can be modified using BaseChart.setNumberFormat.
[ d ]	The negative sign character. Use '-'
textasciitilde ' for no negative sign character. The default is '-', which can be modified using BaseChart.setNumberFormat.	

Parameter	Description
yyyy	The year in 4 digits (e.g. 2002)
yyy	The year showing only the least significant 3 digits (e.g. 002 for the year 2002)
yy	The year showing only the least significant 2 digits (e.g. 02 for the year 2002)
y	The year showing only the least significant 1 digits (e.g. 2 for the year 2002)
mmm	The month formatted as its name. The default is to use the first 3 characters of the english month name (Jan, Feb, Mar ...). The names can be configured using BaseChart.setMonthNames.
mm	The month formatted as 2 digits from 01 - 12, adding leading zero if necessary.
m	The month formatted using the minimum number of digits from 1 - 12.
MMM	The first 3 characters of the month name converted to upper case. The names can be configured using BaseChart.setMonthNames.
MM	The first 2 characters of the month name converted to upper case. The names can be configured using BaseChart.setMonthNames.
M	The first character of the month name converted to upper case. The names can be configured using BaseChart.setMonthNames.
dd	The day of month formatted as 2 digits from 01 - 31, adding leading zero if necessary.
d	The day of month formatted using the minimum number of digits from 1 - 31.
w	The name of the day of week. The default is to use the first 3 characters of the english day of week name (Sun, Mon, Tue ...). The names can be configured using BaseChart.setWeekDayNames.
hh	The hour of day formatted as 2 digits, adding leading zero if necessary. The 2 digits will be 00 - 23 if the 'a' option (see below) is not specified, otherwise it will be 01 - 12.
h	The hour of day formatted using the minimum number of digits. The digits will be 0 - 23 if the 'a' option (see below) is not specified, otherwise it will be 01 - 12.
nn	The minute formatted as 2 digits from 00 - 59, adding leading zero if necessary.
n	The minute formatted using the minimum number of digits from 00 - 59.
ss	The second formatted as 2 digits from 00 - 59, adding leading zero if necessary.
s	The second formatted using the minimum number of digits from 00 - 59.
a	Display either 'am' or 'pm', depending on whether the time is in the morning or afternoon. The text 'am' and 'pm' can be modified using BaseChart.setAMPM.

Shape Id	Value	Description
SquareShape	1	Square shape. See (1, 1) above.
DiamondShape	2	Diamond shape. See (2, 1) above.
TriangleShape	3	Triangle shape pointing upwards. See (3, 1) above.
RightTriangleShape	4	Triangle shape pointing rightwards. See (4, 1) above.
LeftTriangleShape	5	Triangle shape pointing leftwards. See (5, 1) above.
InvertedTriangleShape	6	Triangle shape pointing downwards. See (1, 2) above.
CircleShape	7	Circle shape. See (2, 2) above.
StarShape	[ Method ]	Star shapes of various points. See (2, 3), (2, 4), (2, 5), (3, 1), (3, 2), (3, 3), (3, 4), (3, 5) above for stars with 3 to 10 points.
PolygonShape	[ Method ]	Polygon shapes symmetrical about a vertical axis with a vertex at the top center position. See (4, 1), (4, 3), (4, 5), (5, 1) for polygons of 5 to 8 sides.
Polygon2Shape	[ Method ]	Polygon shapes symmetrical about a vertical axis but without any vertex at the top center position. See (4, 2), (4, 4) for polygons of 5 and 6 sides.
CrossShape	[ Method ]	'+' shapes. See (5, 2), (5, 3), (5, 4), (5, 5), (6, 1), (6, 2), (6, 3) for '+' shape with arm width of 0.1 - 0.7.
Cross2Shape	[ Method ]	'X' shapes. See (6, 4), (6, 5), (7, 1), (7, 2), (7, 3), (7, 4), (7, 5) for 'X' shapes with arm width of 0.1 - 0.7.

langEnglish	0	Roman script
langFrench	1	Roman script
langGerman	2	Roman script
langItalian	3	Roman script
langDutch	4	Roman script
langSwedish	5	Roman script
langSpanish	6	Roman script
langDanish	7	Roman script
langPortuguese	8	Roman script
langNorwegian	9	Roman script
langHebrew	10	Hebrew script
langJapanese	11	Japanese script
langArabic	12	Arabic script
langFinnish	13	Roman script
langGreek	14	Greek script using smRoman script code
langIcelandic	15	modified smRoman/Icelandic script
langMaltese	16	Roman script
langTurkish	17	modified smRoman/Turkish script
langCroatian	18	modified smRoman/Croatian script
langTradChinese	19	Chinese (Mandarin) in traditional characters
langUrdu	20	Arabic script
langHindi	21	Devanagari script
langThai	22	Thai script
langKorean	23	Korean script

Nan	Meaning
1	Invalid square root (negative number, usually)
2	Invalid addition (indeterminate such as infinity + (-infinity))
4	Invalid division (indeterminate such as 0/0)
8	Invalid multiplication (indeterminate such as 0*infinity)
9	Invalid modulo such as (a mod 0)
17	Try to convert invalid string to a number like val("x7")
33	Invalid argument in a trig function
34	Invalid argument in an inverse trig function
36	Invalid argument in a log function
37	Invalid argument in Pow function
38	Invalid argument in toolbox financial function
40	Invalid argument in hyperbolic function
42	Invalid argument in a gamma function

Symbol	Description and result
0	Digit placeholder. For example, if the value 8.9 is to be displayed as 8.90, use the format #.00
#	Digit placeholder. This symbol follows the same rules as the 0 symbol. However, the application shall not display extra zeros when the number typed has fewer digits on either side of the decimal than there are # symbols in the format. For example, if the custom format is #.##, and 8.9 is in the cell, the number 8.9 is displayed.
?	Digit placeholder. This symbol follows the same rules as the 0 symbol. However, the application shall put a space for insignificant zeros on either side of the decimal point so that decimal points are aligned in the column. For example, the custom format 0.0? aligns the decimal points for the numbers 8.9 and 88.99 in a column.
. (period)	Decimal point.
%	Percentage. If the cell contains a number between 0 and 1, and the custom format 0% is used, the application shall multiply the number by 100 and add the percentage symbol in the cell.
, (comma)	Thousands separator. The application shall separate thousands by commas if the format contains a comma that is enclosed by number signs (#) or by zeros. A comma that follows a placeholder scales the number by one thousand. For example, if the format is #.0,, and the cell value is 12,200,000 then the number 12.2 is displayed.
E- E+ e- e+	Scientific format. The application shall display a number to the right of the "E" symbol that corresponds to the number of places that the decimal point was moved. For example, if the format is 0.00E+00, and the value 12,200,000 is in the cell, the number 1.22E+07 is displayed. If the number format is #0.0E+0, then the number 12.2E+6 is displayed.
\$ -+/( ):space	Displays the symbol. If it is desired to display a character that differs from one of these symbols, precede the character with a backslash (\). Alternatively, enclose the character in quotation marks. For example, if the number format is (000), and the value 12 is in the cell, the number (012) is displayed.
\	Display the next character in the format. The application shall not display the backslash. For example, if the number format is 0\!, and the value 3 is in the cell, the value 3! is displayed.
*	Repeat the next character in the format enough times to fill the column to its current width. There shall not be more than one asterisk in one section of the format. If more than one asterisk appears in one section of the format, all but the last asterisk shall be ignored. For example, if the number format is 0*x, and the value 3 is in the cell, the value 3xxxxxx is displayed. The number of x characters that are displayed in the cell varies based on the width of the column.
_ (underline)	Skip the width of the next character. This is useful for lining up negative and positive values in different cells of the same column. For example, the number format _(0.0_);(0.0) aligns the numbers 2.3 and -4.5 in the column even though the negative number is enclosed by parentheses.
"text"	Display whatever text is inside the quotation marks. For example, the format 0.00 "dollars" displays 1.23 dollars when the value 1.23 is in the cell.
@	Text placeholder. If text is typed in the cell, the text from the cell is placed in the format where the at symbol (@) appears. For example, if the number format is "Bob "@ Smith" (including quotation marks), and the value "John" is in the cell, the value Bob John Smith is displayed.

[ Black ] [ Green ] [ White ] [ Blue ] [ Magenta ] [ Yellow ] [ Cyan ] [ Red ]

To display	As	Use this code
Months	1-12	m
Months	01-12	mm
Months	Jan-Dec	mmm
Months	January-December	mmmm
Months	J-D	mmmmm
Days	1-31	d
Days	01-31	dd
Days	Sun-Sat	ddd
Days	Sunday-Saturday	dddd
Years	00-99	yy
Years	1900-9999	yyyy
Hours	0-23	h
Hours	00-23	hh
Minutes	0-59	m
Minutes	00-59	mm
Seconds	0-59	s
Seconds	00-59	ss
Time	4 AM	h AM/PM
Time	4:36 PM	h:mm AM/PM
Time	4:36:03 P	h:mm:ss A/P
Time	4:36:03.75	h:mm:ss.00
Elapsed time	1:02	[ h ] :mm
Elapsed time	62:16	[ mm ] :ss
Elapsed time	3735.80	[ ss ] .00

To display	As	Use this code
1234.59	1234.6	#####.#
8.9	8.900	#.000
.631	0.6	0.#
12	12.0	#.0#
1234.568	1234.57	#.0#
44.398	44.398	???.???
102.65	102.65	???.???
2.8	2.8	???.???
5.25	5 1/4	# ??/??
5.3	5 3/10	# ??/??
12000	12,000	#,###
12000	12	#,
12400000	12.4	0.0,,