# AnalogIO

Toolbox for general analog IO functionality.

The Analog IO tool is used for simple analog input and output using analog data acquisition devices.

The Analog IO tool defines two different device entities:

Analog Input

Analog Output

The two entity types are also available on virtual devices.

The tool can use any Value Converter in the system to make it very easy to convert between the electrical signal value (volts or current) and the physical unit of the signal (temperature, pressure).

## Supported Devices

The Analog IO tool currently supports the following devices, but new devices can be added on request.

- National Instruments
  - Almost all NI devices are supported through the DAQmx driver.
- Measurement Computing
  - Most MCC DAQ devices are supported by the Universal Library driver. It might be necessary to open the InstaCal tool when new devices are connected to a PC.
- BMC Messsysteme

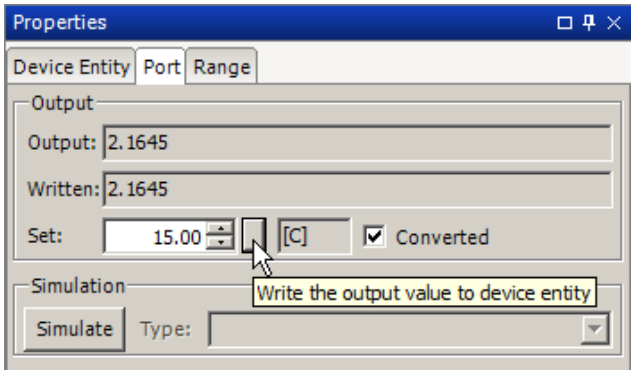
## AnalogIO

Toolbox for general analog IO functionality.

### Entities

#### *Analog Input*

### *Analog Output*




## Methods

### *GetAnalogInput*

Get the value of an analog input port.

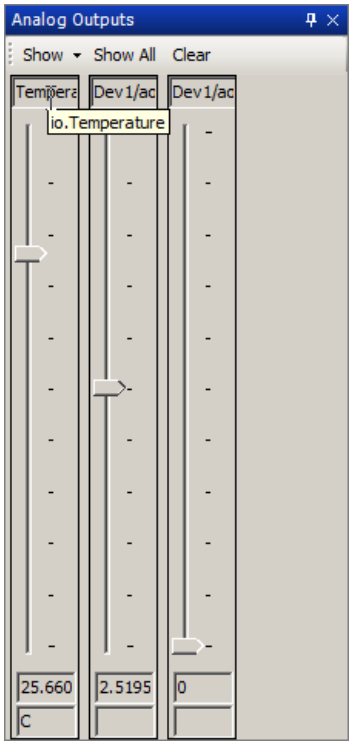
### *SetAnalogOutput*

Set the value of an analog output port.

## Panels

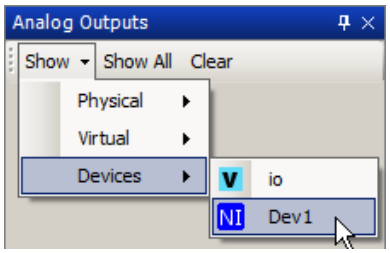
### *Analog Outputs*

Monitor and control all analog outputs.




By clicking the “Show All” button, all the analog outputs connected to the PC, including any virtual, are added to the panel.

It is also possible to only add specific outputs by using the “Show” menu.




It is also possible to change analog output entities with a value converted attached to show the “raw” value instead of the converted value.

# Appium Toolbox

Allows automation of iOS and Android Apps, as well as iOS and Android browsers.

# Appium

## Introduction

Appium is a implementation of the WebDriver Wire Protocol, but geared towards automating user interface on mobile devices rather than web browsers.

As such the Appium tool is a specialization of the WebDriver tool in SeqZap, and the documentation of that tool is required reading.

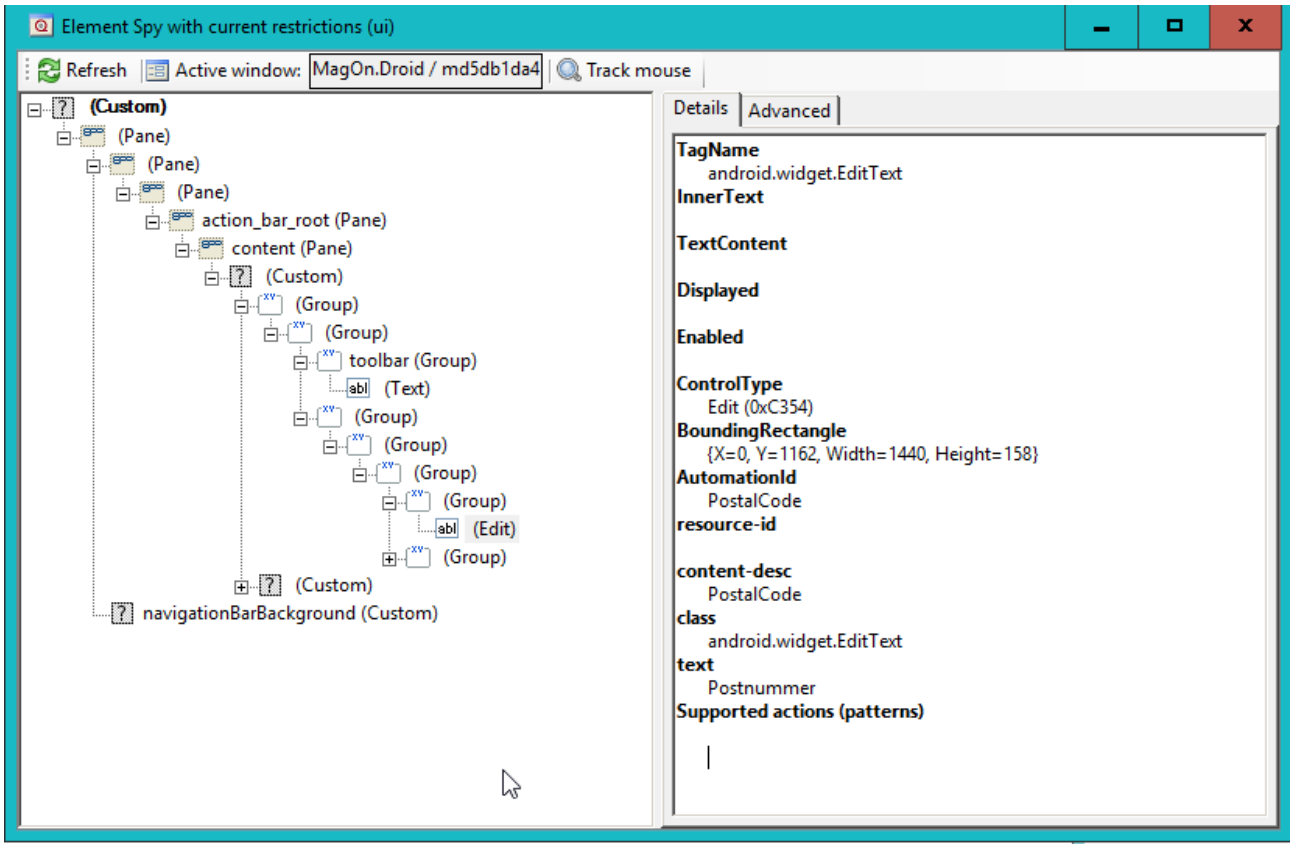
Appium can automate iOS and Android devices, and both emulators/simulators and real devices.

### *Running the same test case on both Android and iOS*

If an app is designed for both Android and iOS – and have a sufficiently similar UIs the same Test Case can test both the Android and the iOS version of the app.

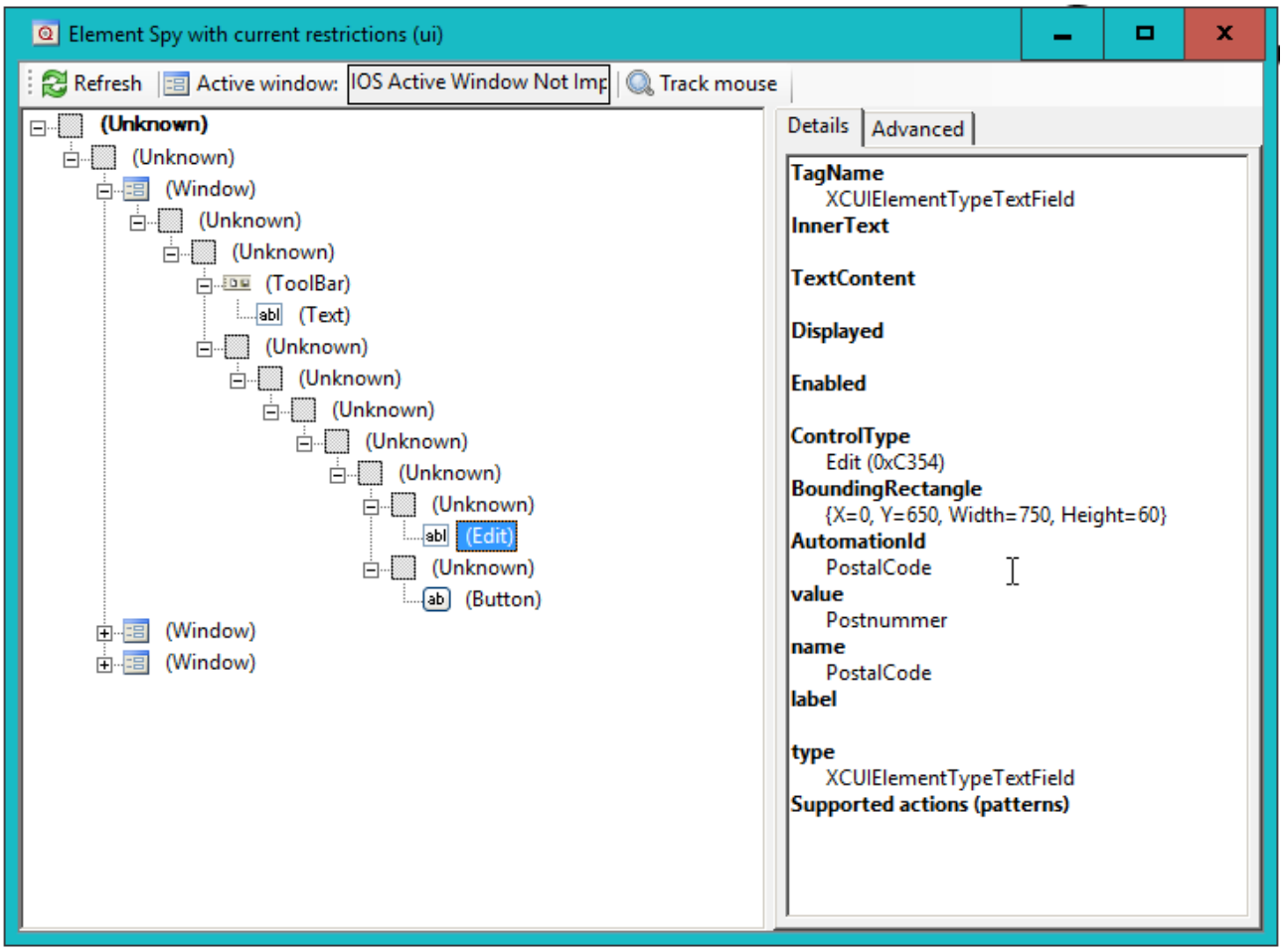
The key to making this happen is to have selectors which are independent of the underlying platform.

If the UI of an app is inspected, we can see a lot of identifiers which are specific to that particular platform, for instance in this demo app, the PostalCode edit field is shown in the Element Spy panel:



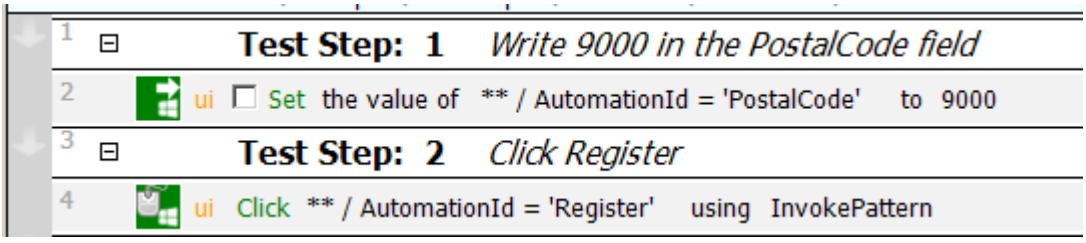

The “content-desc” attribute is an Android specific identifier, but the attribute is also exposed as AutomationId – this is purely something SeqZap does to make it easier to write cross platform test cases.

If we take a look at the same PostalCode text field on the iOS version of the same demo app, then we can see that many of the attributes have changed – the Android specific ones – but the AutomationId is still the same.




This is because on iOS the AutomationId attribute is mapped to the “name” attribute.

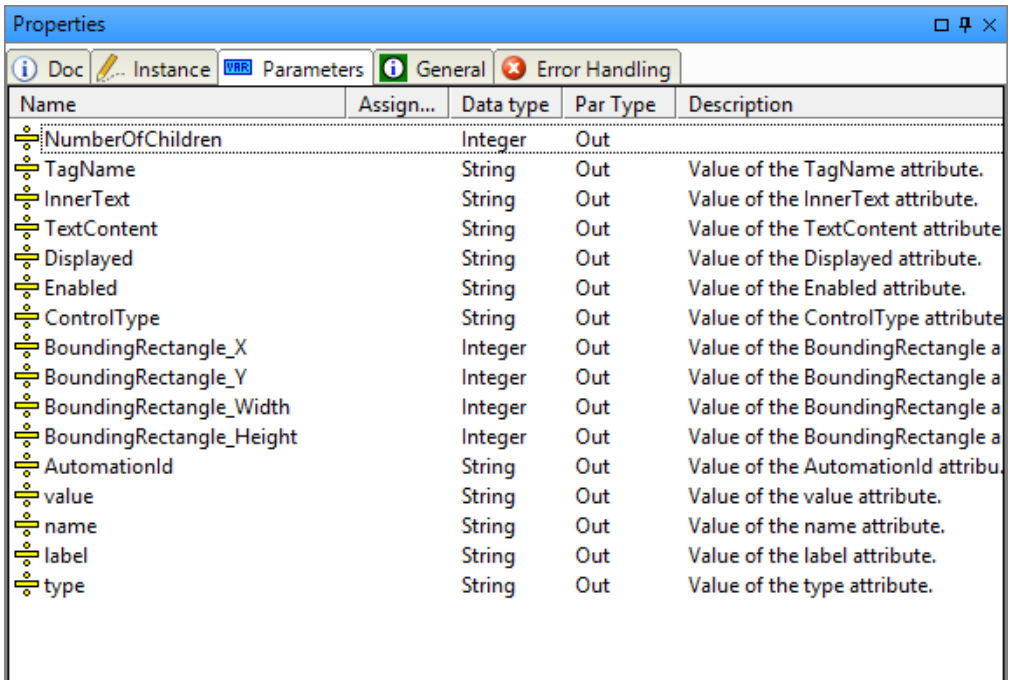
This means that to write cross platform test cases, the test should rely on only the AutomationId as the identifier in the selector, for instance:




This also has the added benefit of making the test run much faster, since using the AutomationId to identify UI elements has special handling in Appium which run much faster.

Please note that the use of the Get Information step will break cross-app testing since the Get Information step changes based on the iOS and Android, more specifically the output parameters change based on the

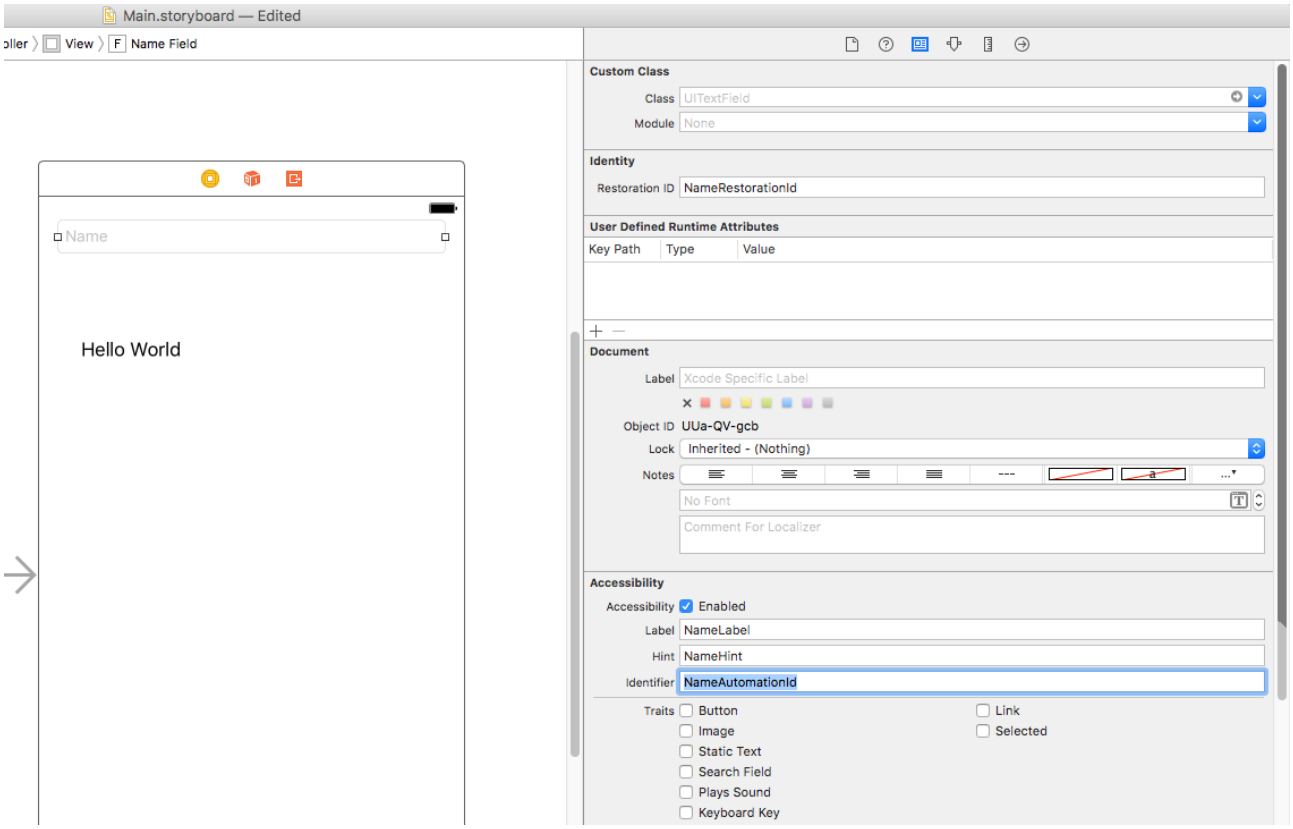
plarform.




| Name | Assign... | Data type | Par Type | Description |
|---|---|---|---|---|
| NumberOfChildren | | Integer | Out | |
| TagName | | String | Out | Value of the TagName attribute. |
| InnerText | | String | Out | Value of the InnerText attribute. |
| TextContent | | String | Out | Value of the TextContent attribute |
| Displayed | | String | Out | Value of the Displayed attribute. |
| Enabled | | String | Out | Value of the Enabled attribute. |
| ControlType | | String | Out | Value of the ControlType attribute |
| BoundingRectangle_X | | Integer | Out | Value of the BoundingRectangle a |
| BoundingRectangle_Y | | Integer | Out | Value of the BoundingRectangle a |
| BoundingRectangle_Width | | Integer | Out | Value of the BoundingRectangle a |
| BoundingRectangle_Height | | Integer | Out | Value of the BoundingRectangle a |
| AutomationId | | String | Out | Value of the AutomationId attribu. |
| value | | String | Out | Value of the value attribute. |
| name | | String | Out | Value of the name attribute. |
| label | | String | Out | Value of the label attribute. |
| type | | String | Out | Value of the type attribute. |

### Setting the AutomationId on iOS using XCode

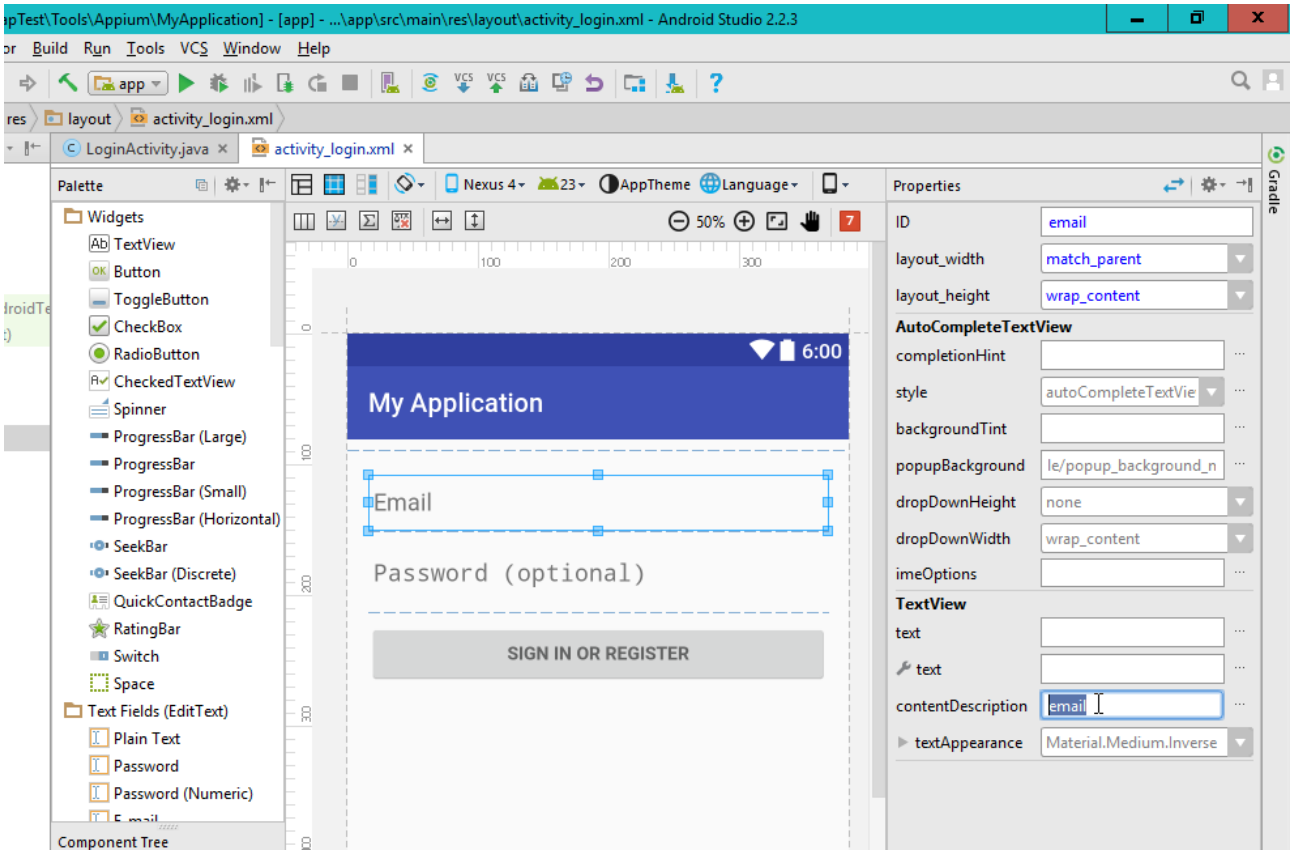
Setting the AutomationId on iOS is done by setting the “Identifier” Accessiblity property by selecting the UI element in the editor and using the Identity inspector in XCode.




In the screenshot above the “Name” text field’s AutomationId is set to NameAutomationId.

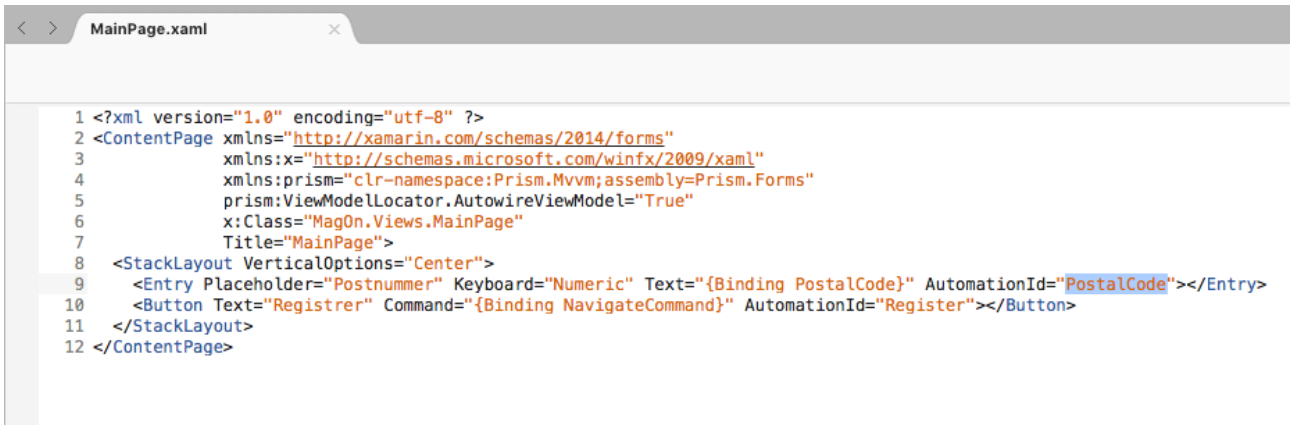
## Setting the AutomationId on Android using Android Studio

Setting the AutomationId on Android is done by setting the “contentDescription” property using the Layout editor’s Properties view.




## Setting the AutomationId on Xamarin using Visual Studio

Setting the AutomationId when developing apps using the Xamarin.Forms framewok is even easier since the AutomationId attribute in Xamarin already maps to the corresponding attribute on Android/iOS.




This means that the AutomationId set during development can be used during testing also.

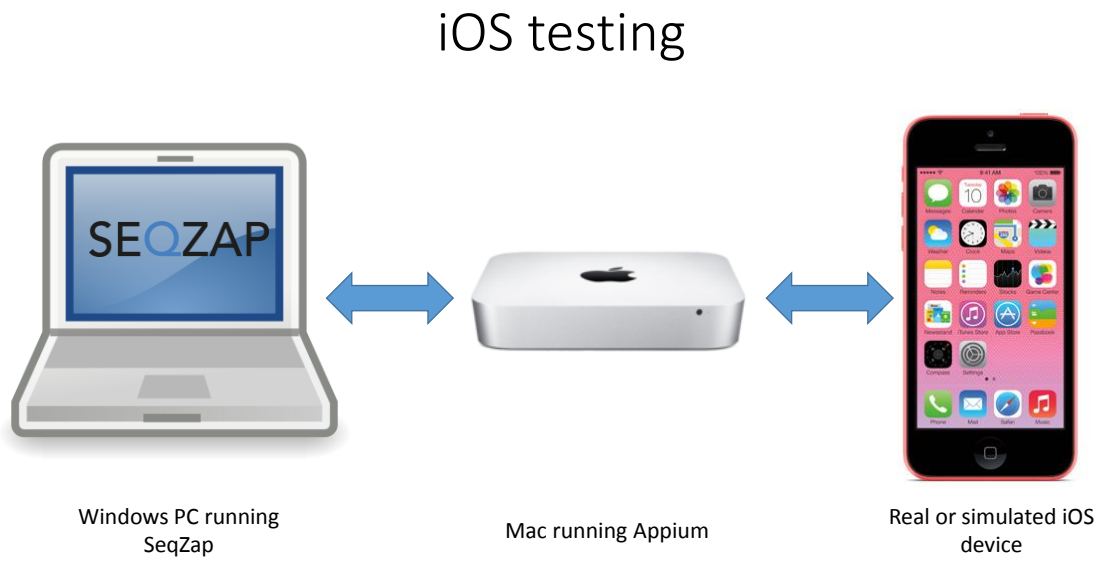
## *Architecture*

Appium is running on the PC and is responsible for starting the emulator, or connecting to the real device

using USB.

Android devices can be automated on the same PC, which is also running SeqZap.

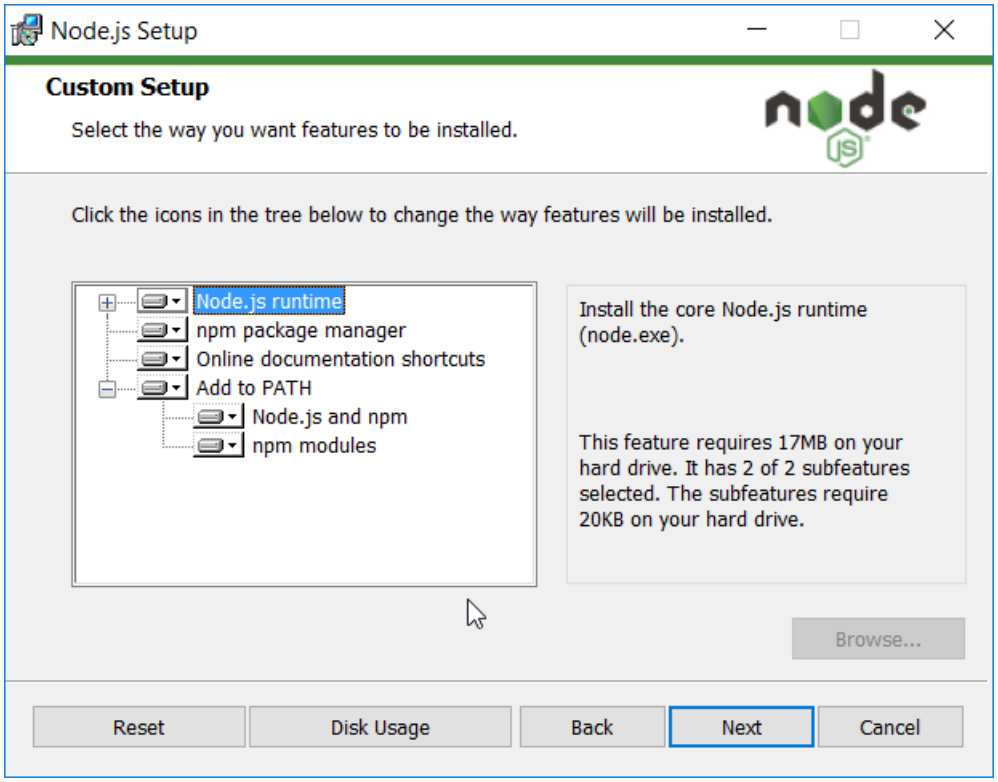

While iOS can only be automated using a real Mac device running Appium.




### *Installing Appium on Windows*

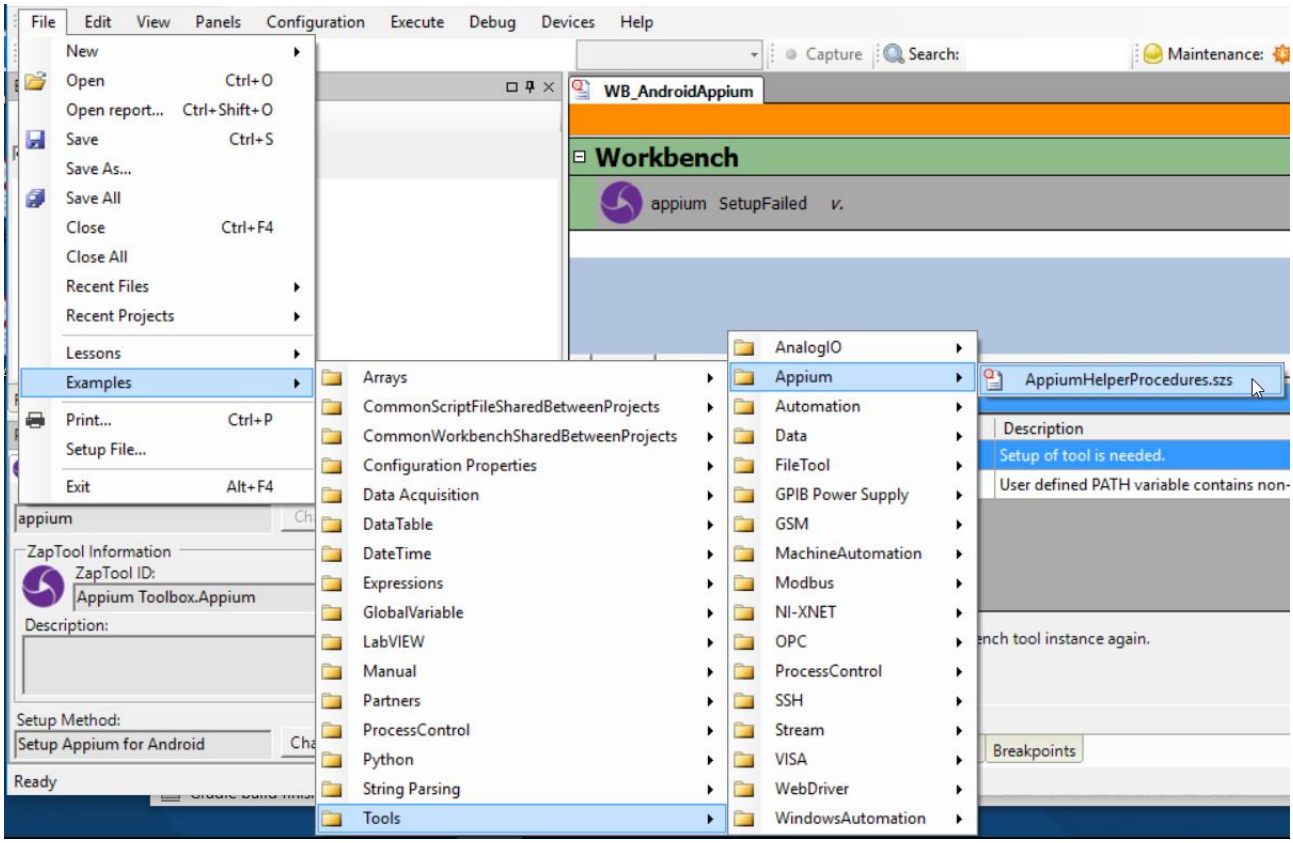
Appium is a Node.js based application, and therefore Node.js must be installed.

When installing Node.js, use the LTS installer and remember to add Node.js to the path.

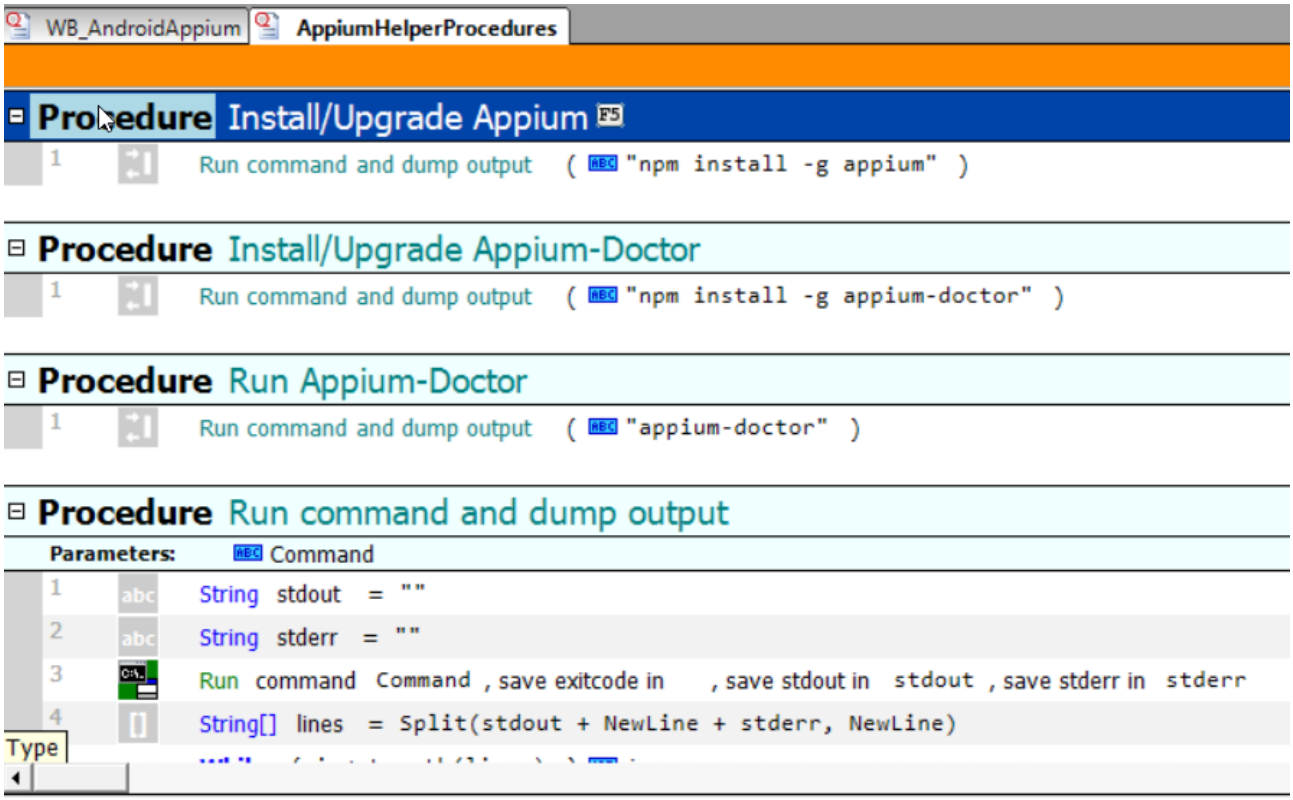



After installing node.js, Appium can be installed using the Node.js package manager “npm”.

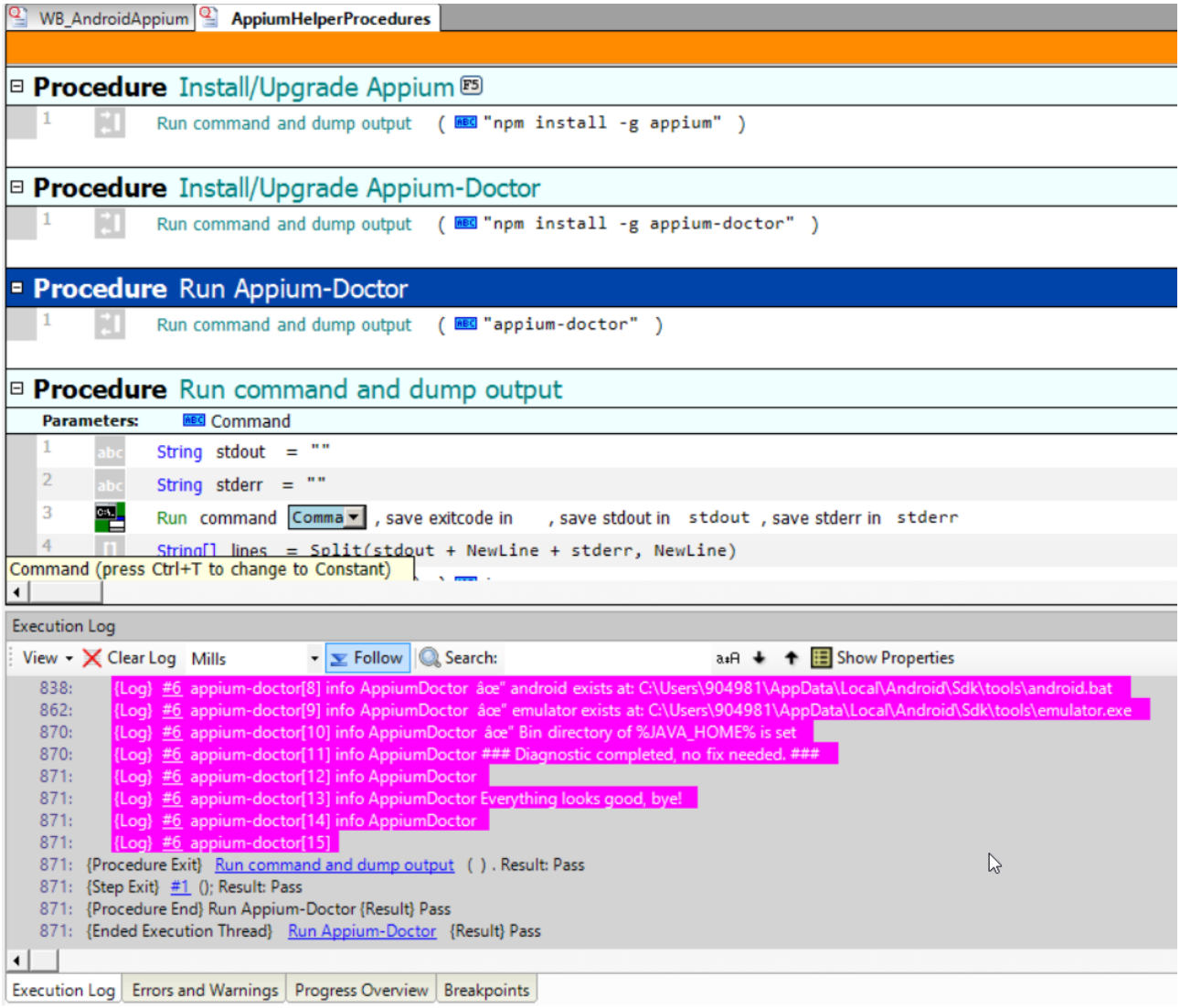
SeqZap comes with a script file to make it easier to install Appium on Windows, it can be accessed by opening the File->Examples->Tools->Appium->AppiumHelperProcedures.szs example




The first two procedures will use npm to install Appium and the diagnostics tool Appium-Doctor using the Node.js package manager.




After installing Appium and Appium-Doctor, Appium-Doctor can be used to diagnose whether the installation of Appium is correct. The procedure “Run Appium-Doctor” will run the diagnostics utility and echo the output to the execution log.



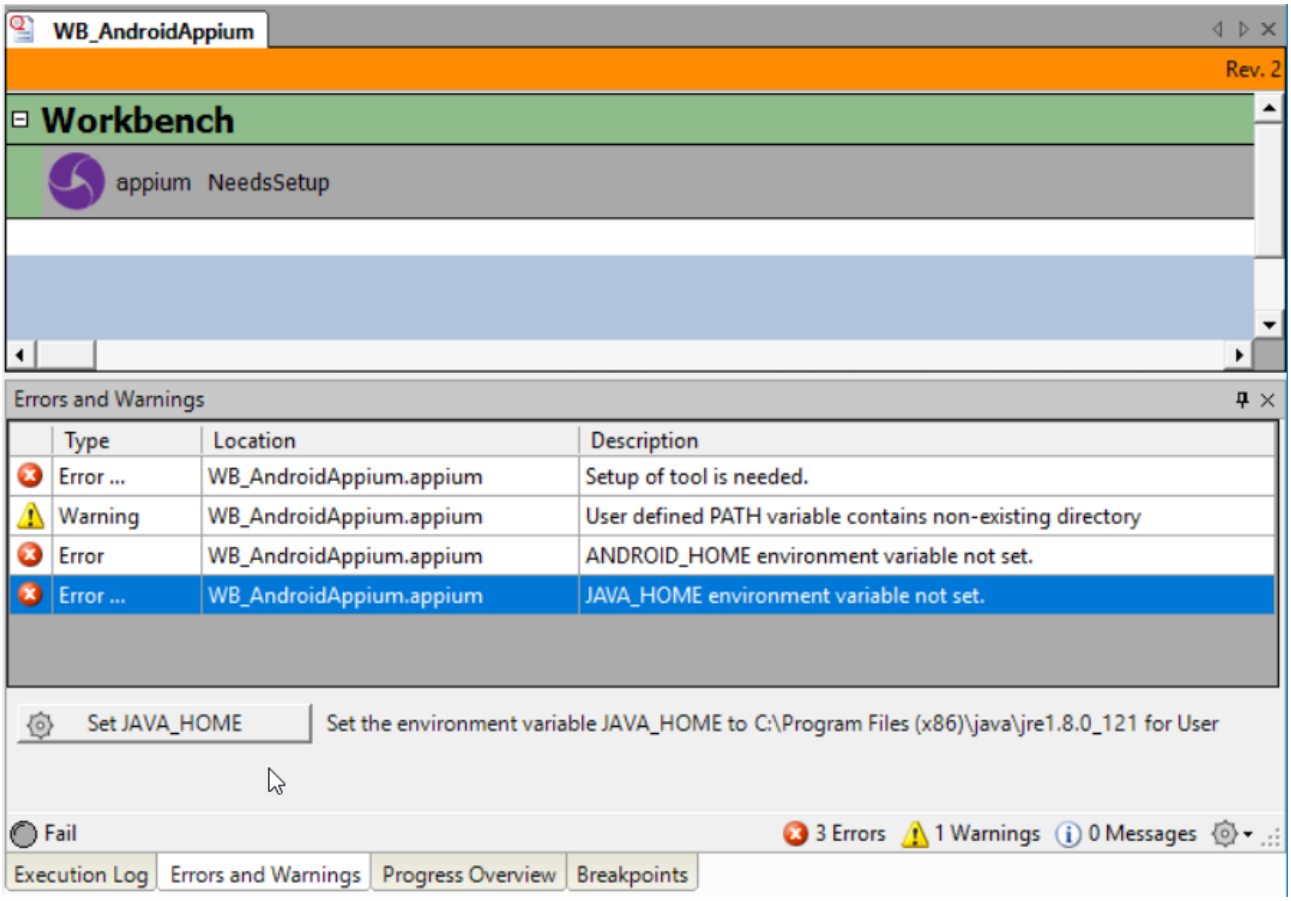

After having successfully having installing Appium, the diagnostics tool should report that “Everything looks good, bye!”.

## *Configuring Appium for Android testing*

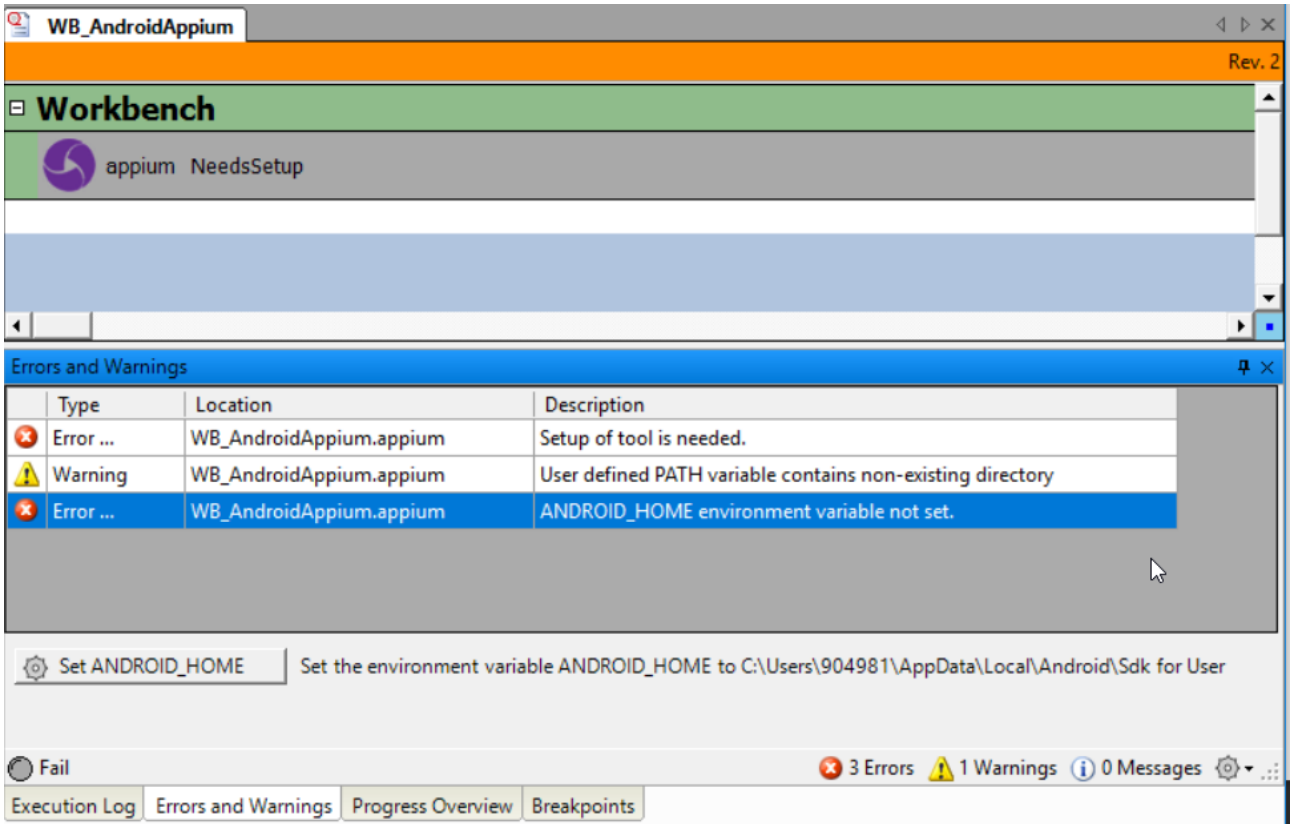
Windows needs to be configured to find the Android SDK and related tools in order for Appium, and hence SeqZap, to be able to test Android applications.

When adding the Appium tool to a workbench, the tool will report parse errors with “auto-fix” buttons to set the relevant environment variables.

When first adding Appium to the workbench it will report several errors:




If you have Java installed on the PC, SeqZap should show an auto-fix button to set the JAVA_HOME environment variable, otherwise Java can be installed from [the java.com website](http://java.com).




The ANDROID_HOME environment variable needs to point to the Android SDK, the easiest way to install the SDK is by installing the Android Studio IDE.

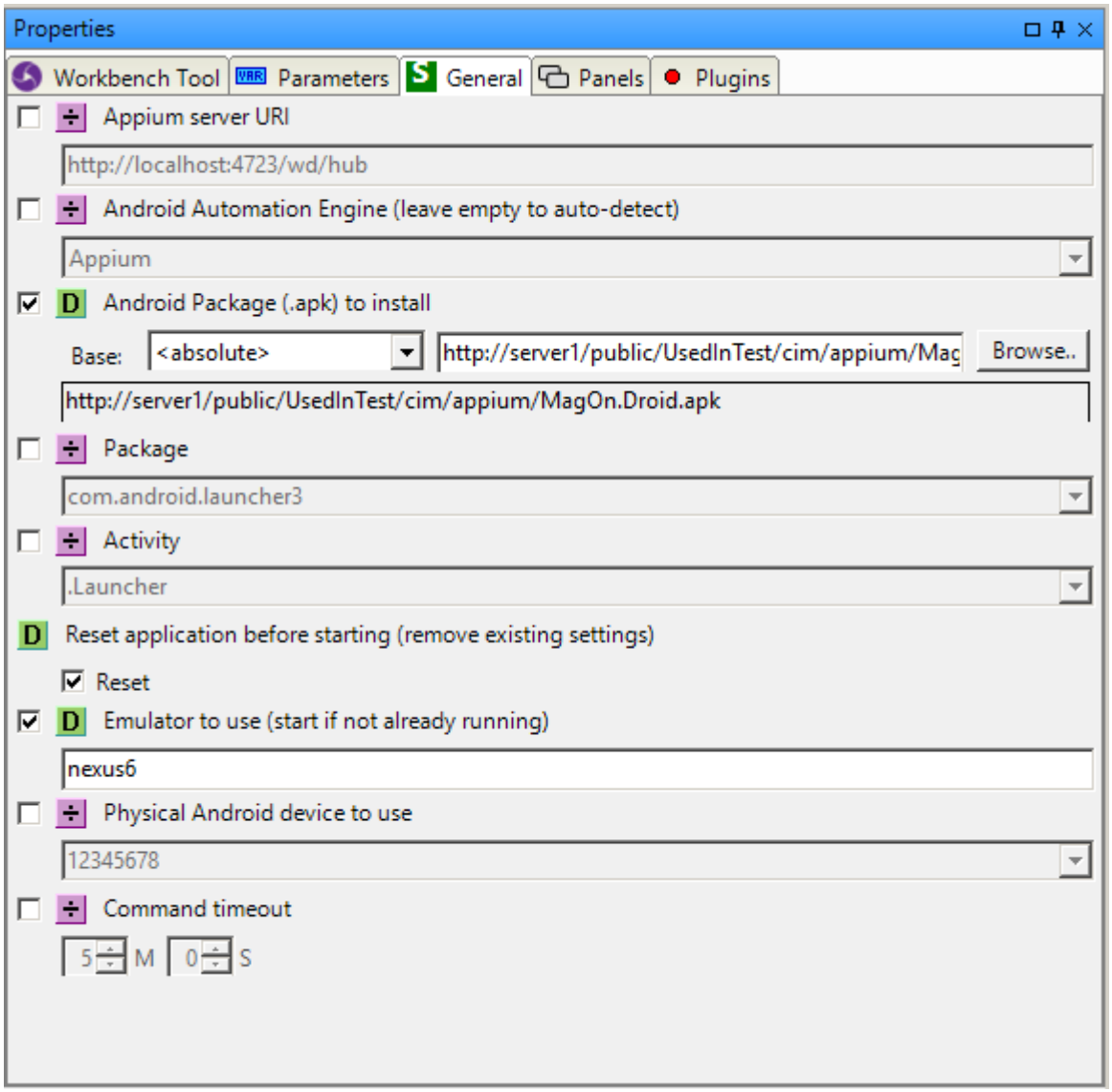
Please note that you may need to restart the PC for the new settings to be registered and the reported Errors & Warnings to be fixed.

### *Installing Appium on Mac*

## Methods

### *Setup Appium for Android*

Use Appium to automate an Android device (real or emulated)




It is possible to specify the address of the Appium server to use, but leaving the checkbox unchecked will make Appium use the local Appium server, or start one if needed.

The specific Android automation engine can also be specified, but it is also possible to just un-check the value and let Appium select the appropriate one.

Next, either the Android package to install and run or the package and activity of an already installed app to run must be specified.

The settings of the app can optionally be reset before starting the test to get a clean and well-defined start point for the test.

After this the name of the real emulator or device to use must be specified, and optionally the ID of the Android device to use.

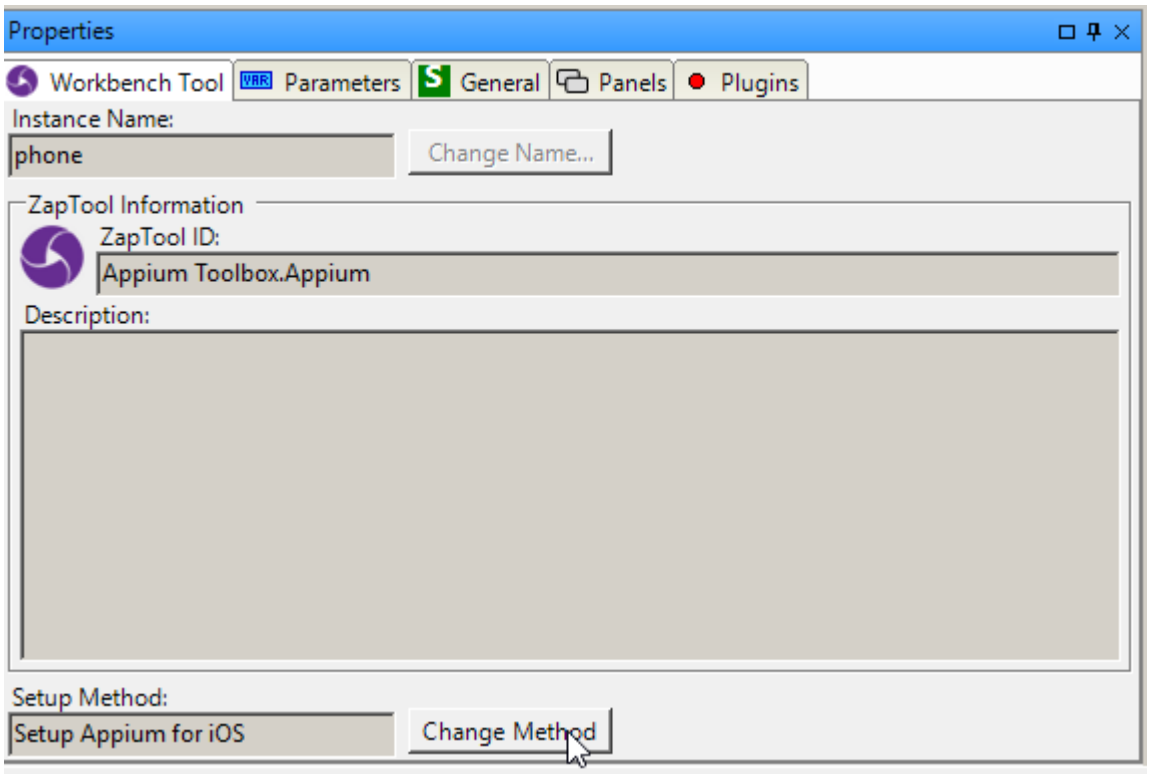
Finally, the command timeout is set, to allow for slow simulator and Appium startup times we recommend

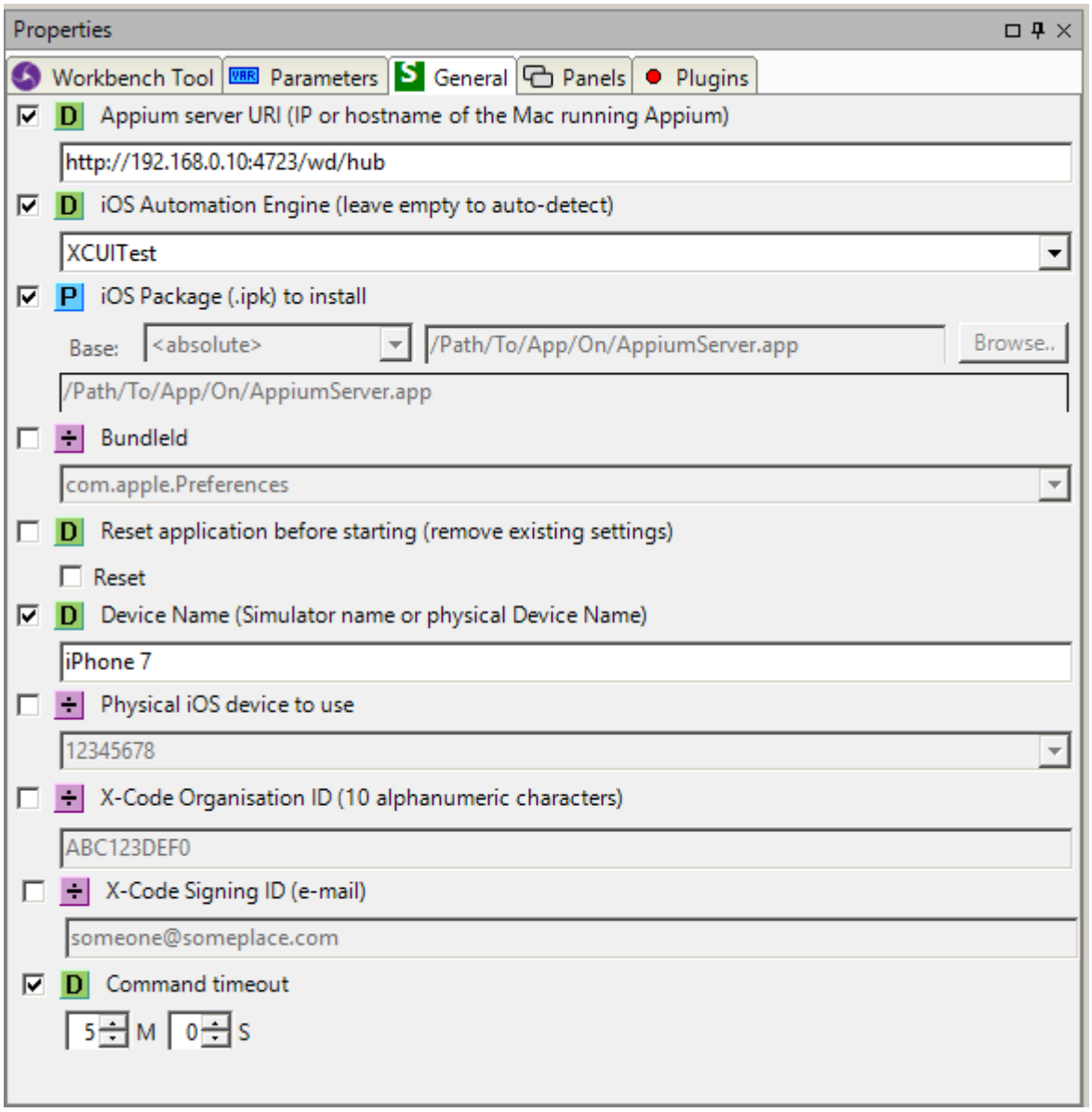
leaving this setting at the default 5 minutes.

### *Setup Appium for iOS*

Use Appium to automate an iOS device (real or simulated)

Please note that to change to this Setup Method from the default Android Setup Method, the “Change Method” button on the Appium workbench instance must be clicked:






Because the Appium server is running remotely on a Mac, the IP address or hostname of the Mac must be specified.

The specific iOS automation engine can also be specified, but it is also possible to just un-check the value and let Appium select the appropriate one.

As a rule of thumb iOS versions before version 10 use the Appium engine, while version 10 and later use the XCUITest engine.

Next, either the iOS package to install and run or the BundleId of the already installed app to run must be specified.

Please note that the iOS package for a real iOS device is different than the iOS package for an iOS simulator, this is because the simulator is running x86 code while the iOS device is running ARM code.

The iOS package can also be a zipped archive instead of a complete .app “directory”.

The settings of the app can optionally be reset before starting the test to get a clean and well-defined start point for the test.

When running on a simulator it is sufficient to supply the name of the simulator to run on, but to run on a real iOS device the ID of the physical device must also be supplied.

This ID can be seen in the iTunes application by navigating to the device summary and clicking the serial number. The ID is a 40 character hexadecimal string.


Because Appium needs to compile and sign the WebDriverAgent which will ultimately driver test on the physical device, the X-Code Organisation ID and X-Code Signing ID needs to be specified.

Finally, the command timeout is set, to allow for slow simulator and Appium startup times we recommend leaving this setting at the default 5 minutes.

### *Switch Activity*

Change the current activity on an Android device.

### *Execute Command*

Execute an Appium HTTP request.

This requires expect knowledge of Appium and is almost never used.

### *Press Key*

Press a button on the connected phone.

### *Swipe*

Swipe an element to scroll it.

### *Pull File*

Retrive a file from the connected device.

### *Push File*

Save/Upload a file to the connected device.

### *Set Location*

Set the physical locaion (GPS) of the device (only works on simulators).

## Properties

### *PlatformName*

The name of the platform which Appium is connected to, usually Android to iOS.

### *PlatformVersion*

The version of the platform which Appium is connected to.

### *Android*
True, if the connected platform is Android.

### *DeviceID*
Get the unique ID of the connected device.

### *CurrentActivity*
On Android this will return the activity of the currently focused app.

### *CurrentPackage*
On Android this will return the package of the currently focused app.

### *DeviceTime*
Get the time of the connected device.

### *NetworkConnection*
Get or set the current network connection status (setting it is only possible on simulators/emulators).

### *ScreenOrientation*
Get or set the current orientation of the screen.

# AutomationToolBox

Generic interface for automation protocols.

This ZapTool is a client for the *sequanto-automation protocol*.

The sequanto-automation protocol is a simple text-based protocol which Sequanto has developed to make interfacing with other systems easier.

The standard implementation is licensed under the Apache license, which means that you can pretty much

do what you want with it, even include it in your finished product if you desire that.

Many of our customers use the interface to make their systems testable (enabling white box testing).

# Arduino

The standard implementation of the sequanto-automation protocol can easily be integrated with the Arduino Software and it is common to use the Arduino as a simple low-cost data acquisition or data generation device.

Both the 1.6.x and 1.0.x releases of the Arduino IDE works with the Sequanto Automation Arduino Tool.

## Installing the Sequanto Automation Arduino Tool

The first thing to do is install the Python interpreter on the machine. Any version of Python should work, but it is recommended to use a Python 2.x version, it can be downloaded from here:

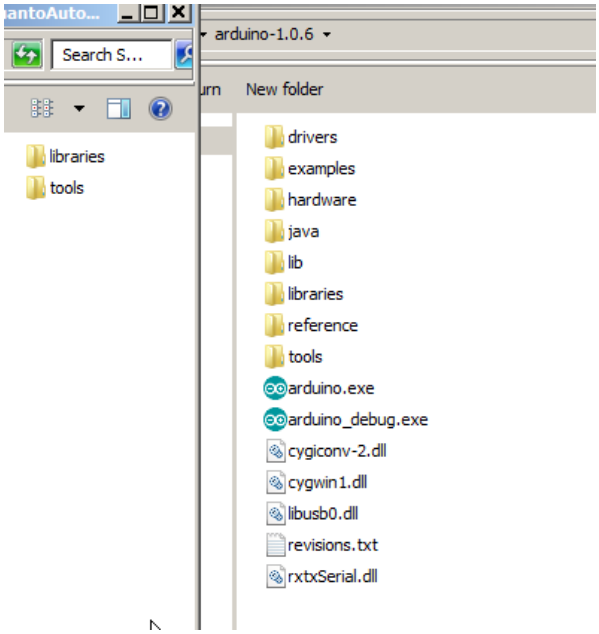
https://www.python.org/downloads/

After that is installed, the folder where Arduino is run from should be found, Arduino is usually just run directly from where it was installed.

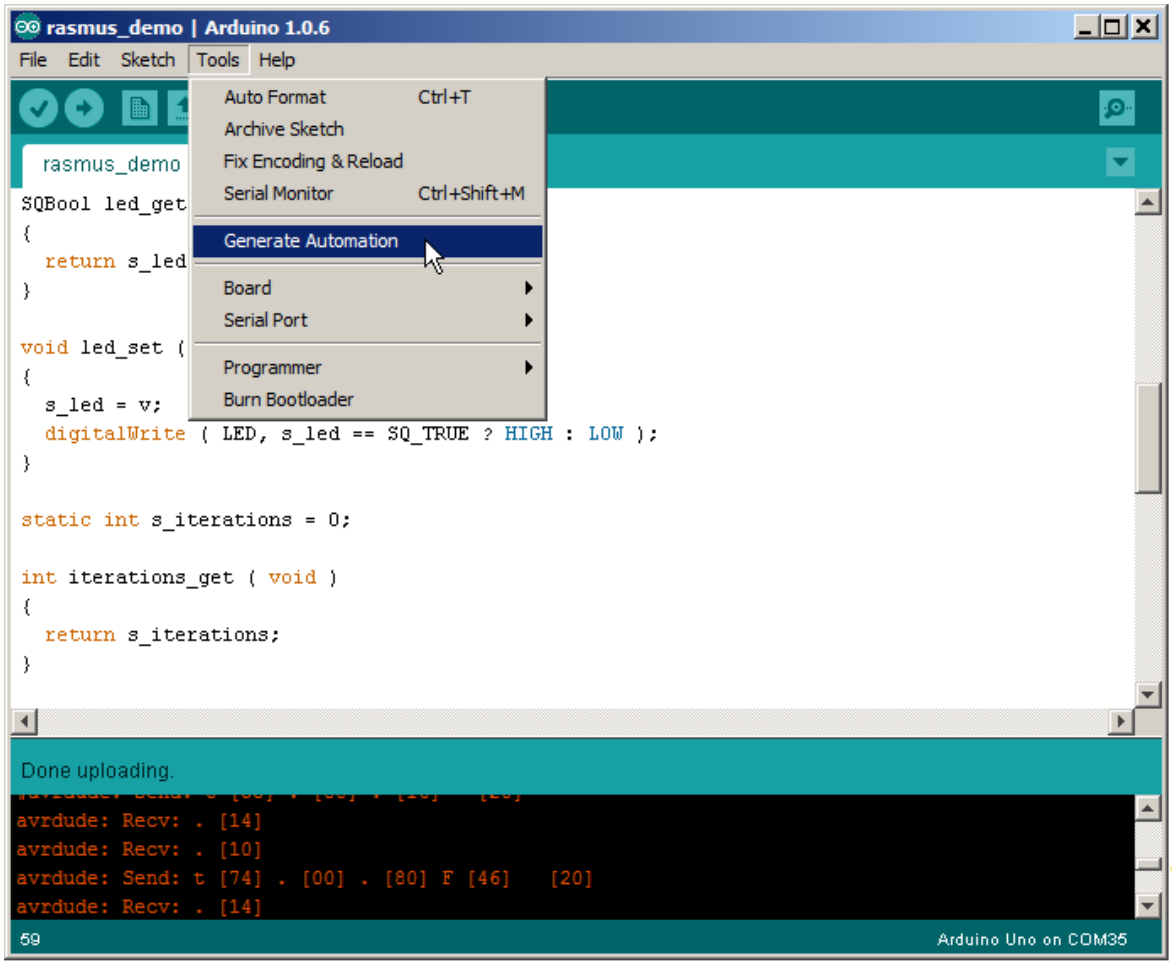
To install the Sequanto Automation Arduino Tool in the Arduino Software all that is needed is to extract the SequantoAutomationTool.zip file in the root of the Arduino Software, the .zip file can be downloaded from:

http://www.seqzap.com/downloads/arduino/

The contents (tools and libraries directories) should simply be copied to the Arduino Software folder here:

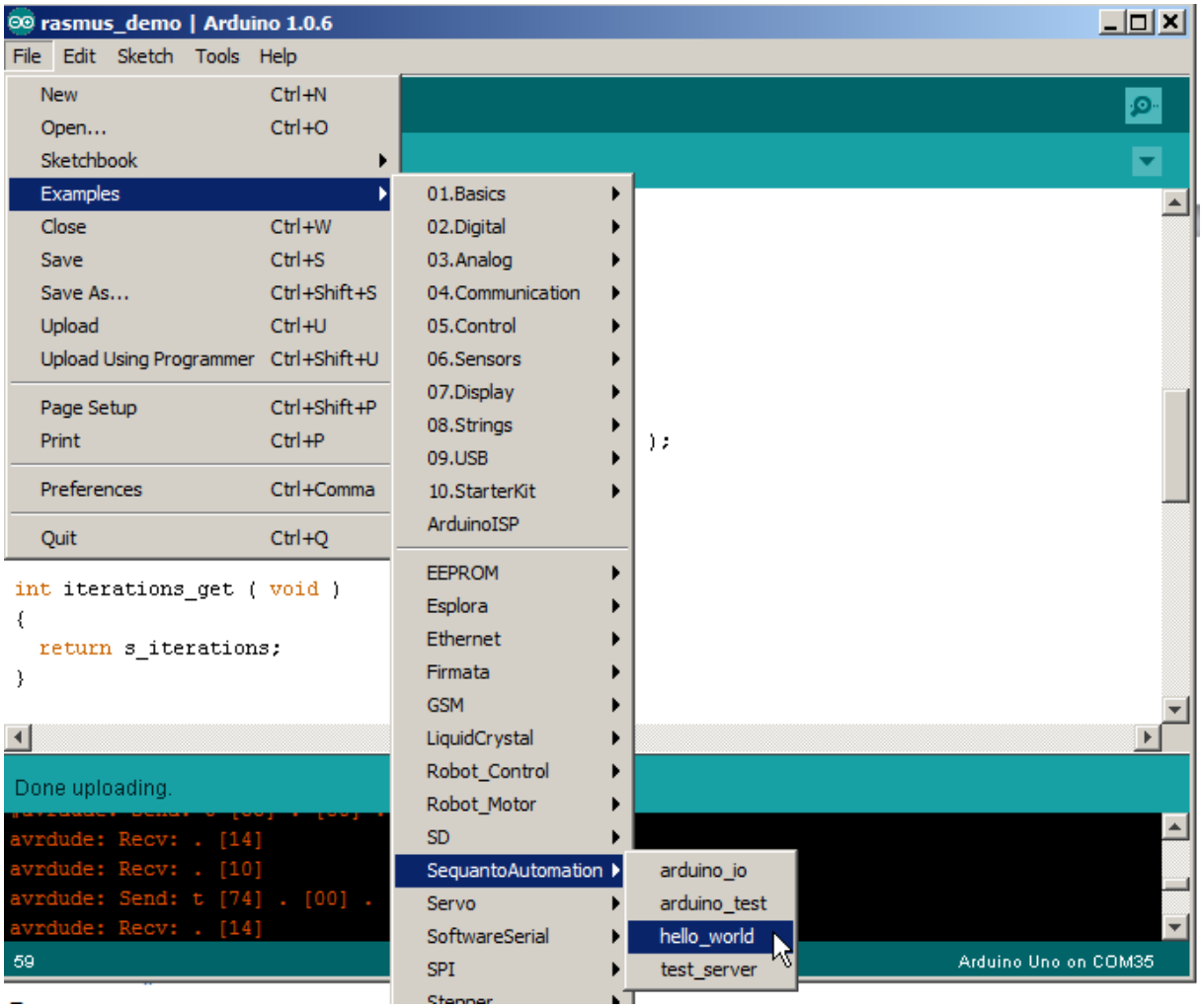



After that is done the Arduino Software should now contain a menu item called Tools -> Generate Automation:

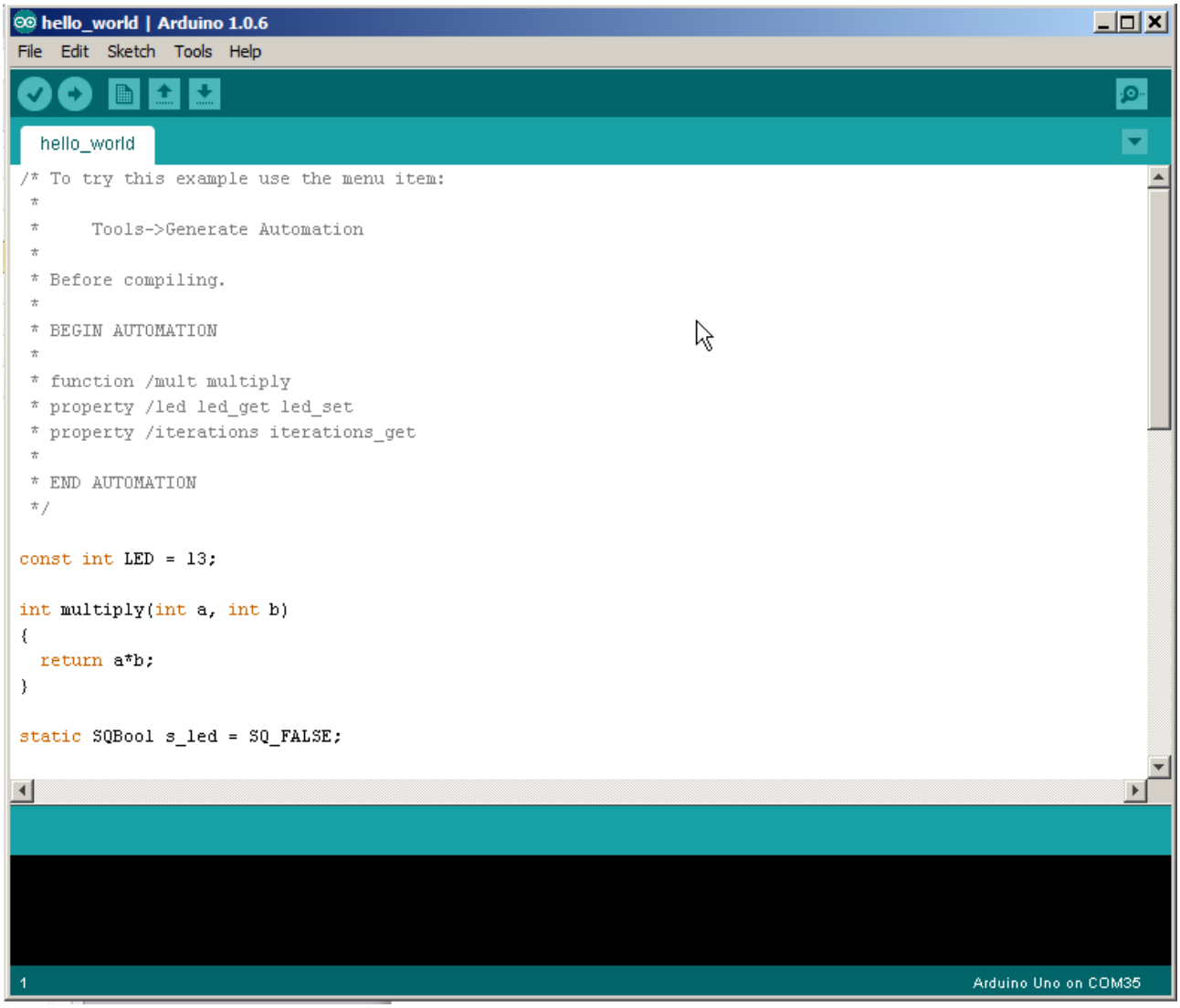



## Using the Sequanto Automation Arduino Tool

The easiest way to get started is to start with one of the included examples, for instance the “hello_world” example:

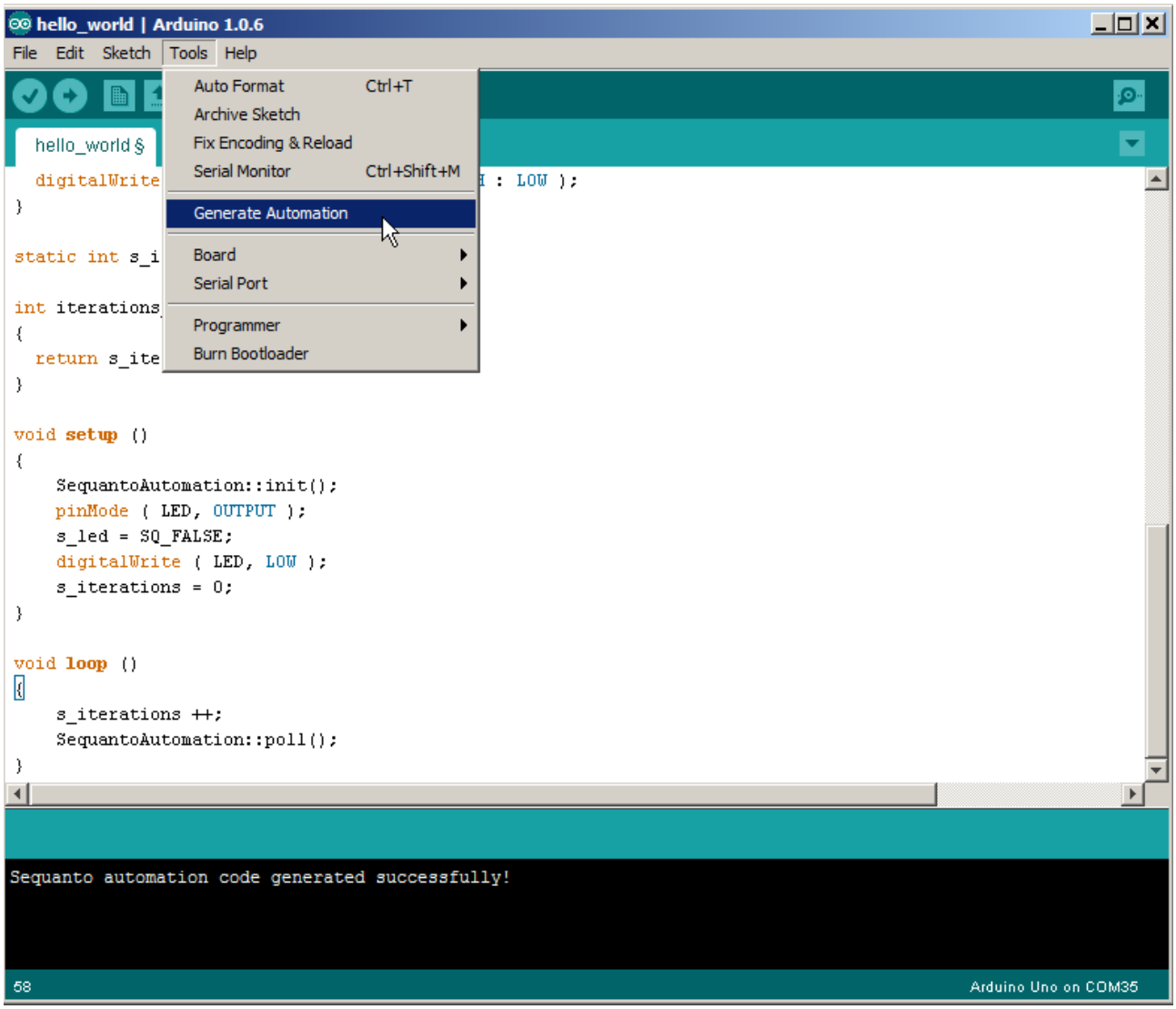



After the example is loaded Arduino looks like this:



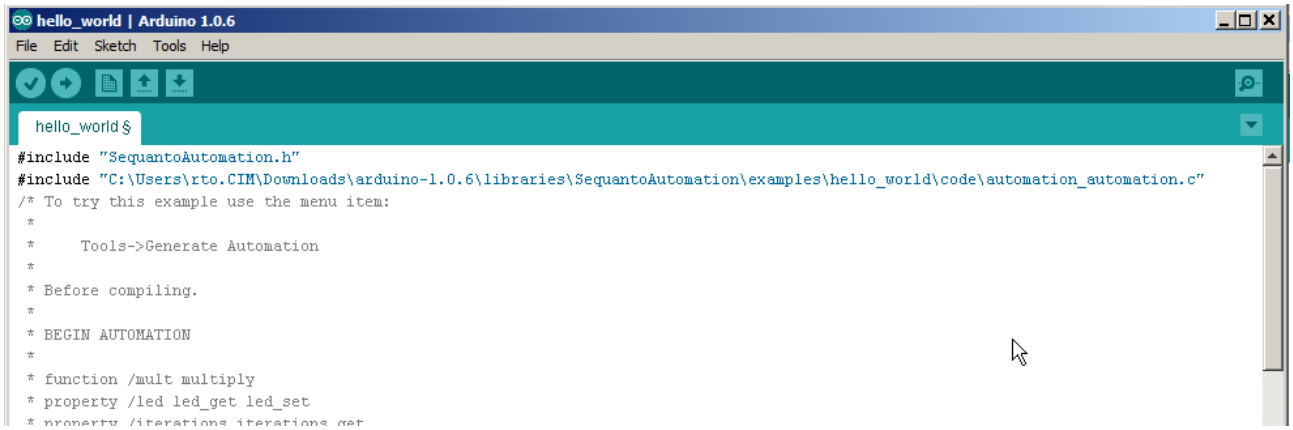

The information that is normally written in the sequanto-automation .automation file is written in a comment between the BEGIN AUTOMATION and END AUTOMATION markers.

Before compiling the example, the automation code needs to be generated by selecting Tools->Generate Automation:



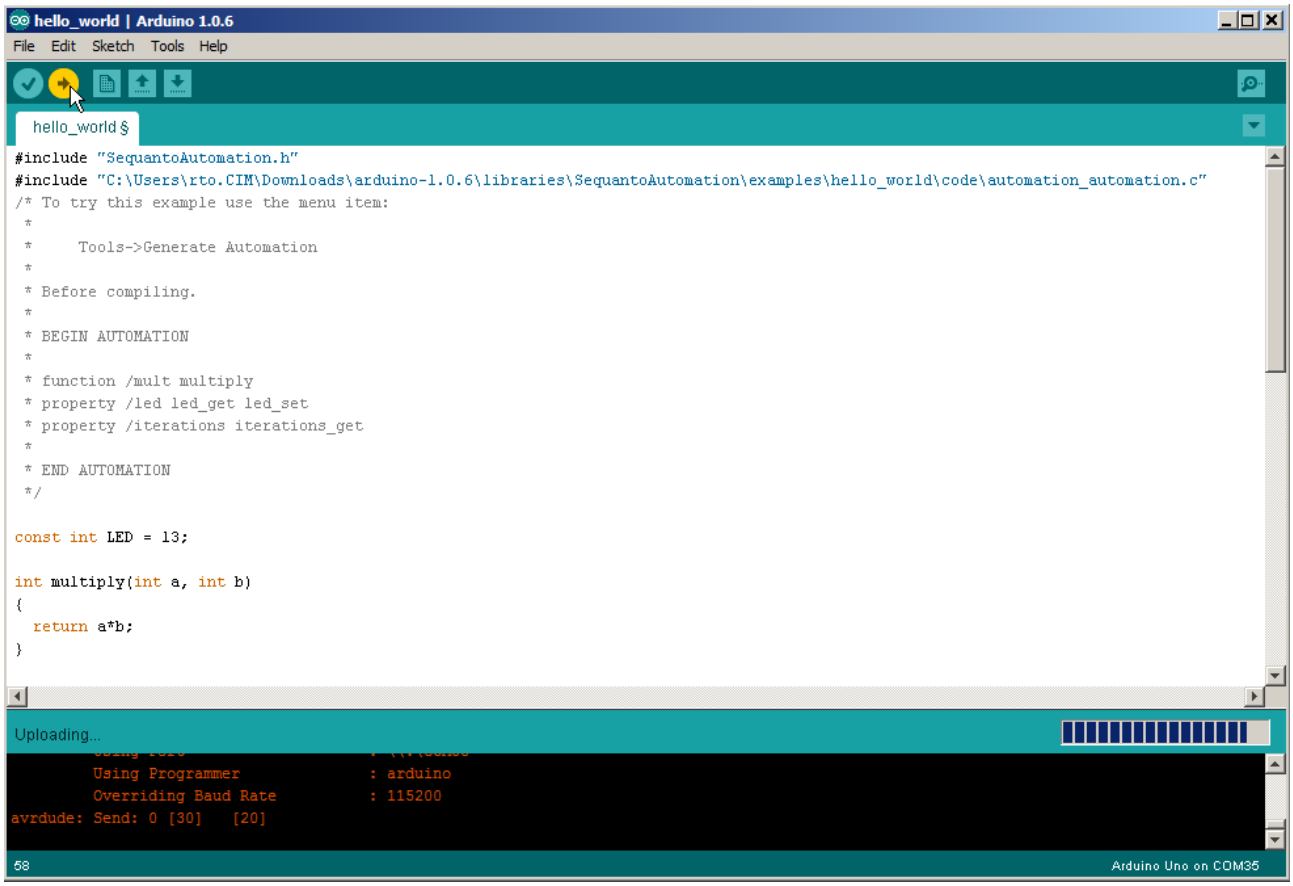

This should run without errors, and the “Sequanto automation code generated successfully!” string should be written in the output window.

Please note that two new #include directives where added to the top of the file:



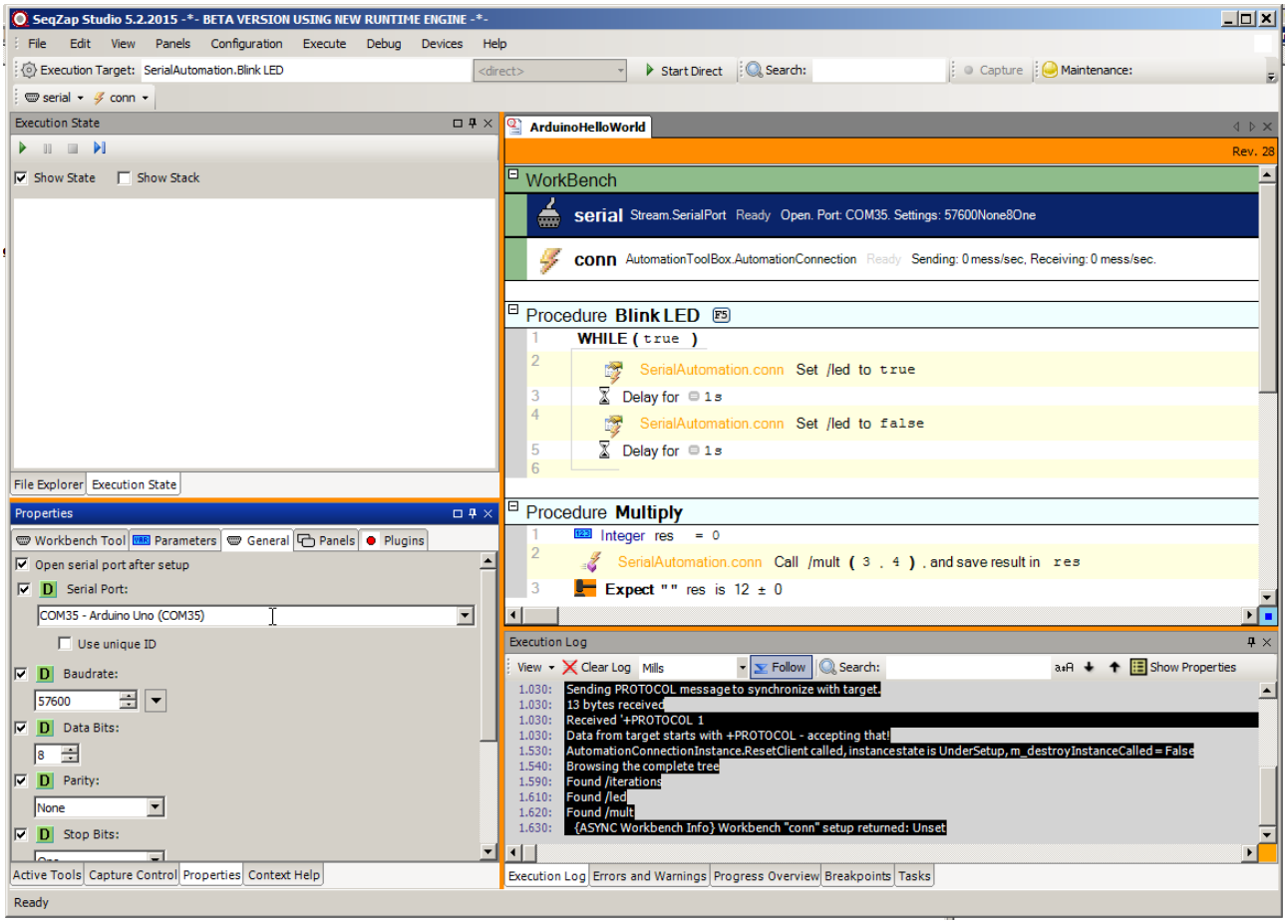
The first directive includes the SequantoAutomation library, the next includes the generated automation code.

After this, it should be possible to upload the Sketch to an Arduino board:

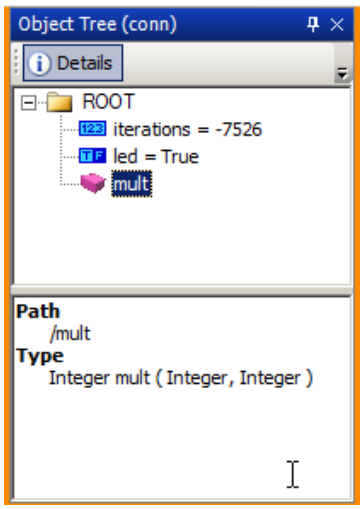



After the Arduino Software is done uploading, SeqZap can be used to inspect the automation tree.

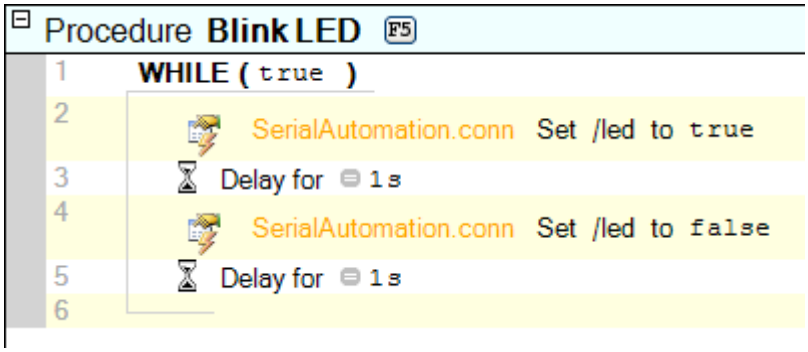
SeqZap includes a simple example script which can be used to verify the connection to the Arduino hello world example.




If the tree panel is opened it should show the following:




To verify that SeqZap can also control the Arduino, run the “Blink LED” procedure, this should make the LED on the Arduino blink.




## AutomationConnection

Automation connection.

## Methods

### *Open*

Open the automation connection.

### *Close*

Close the automation connection.

### *Setup*

Create new automation connection

### *Get Property*

Get the value of a property.

### *Set Property*

Set the value of a property.

### *Call*
Call a method.

### *SaveTree*
Save the automation tree to XML file.

### *DumpTree*
Save the automation tree to Sequanto Automation Tree Dump file.

## Properties

### *IsOpen*

### *Stream*

## Panels

### *Command Prompt*
Interactivate automation terminal

### *Object Tree*
Interactivate navigate the automatable objects

### *Filtered Log*
Filter the messages sent/received on the automation interface.

# CANTool

General CAN Interface Tool

This tool is for communication using the CAN (Controller Area Network) protocol via a connected CAN device.

The tool can be used directly in scripts to send and receive binary packets, but more importantly it can be used by custom tools to communicate using a custom protocol.

At the moment CANOpen is not supported, but can be implemented on request.

The tool defines a *CAN Connection* device entity, and therefore supports devices with more than one CAN port.

## Supported Devices

Currently the following devices are supported.

- IXXAT CAN interfaces
    - The USB-to-CAN interfaces are verified to work, but others should also work.

Other devices can quite easily be supported on request.

## CanConnection

Lowlevel CAN connection instance.

### Methods

#### *Setup*

Setup CAN Connection.

#### *Open*

Open CAN connection.

#### *Close*

Close CAN connection.

#### *Write Binary Data from string*

Write binary data to the CAN connection. The data is taken from a string listing the birary values. To decode

the data string a decoder for the specific format must be selected.

### *Read CAN message*

.

## Properties

### *IsOpen*

Indicates whether the CAN connection is open (connected or active).

## Panels

### *CAN Traffic Packet Sniffer*

Logging traffic through the CAN connection.

# Data ToolBox

File data access and data convertion.

Provides access to data sources, all the way from simple CSV files to large database servers.

## CSV Tool

Read/write comma separated files.

The CSV tool is used to read and write Csv Files.

The methods are static, so they can be called directly, e.g. without the use of a workbench instance.

CSV data is represented as 2 dimensional string arrays in SeqZap, so if a column contains integers it will have to be converted from a string using the integer(string) expression function.

## Methods

### *ReadCsvFile*

Read all lines and fields of a CSV file.

Read a CSV file as a 2D string array.

### *WriteCsvFile*

Write a 2D array to a CSV file.

Write a 2D string array as a CSV file.

## DbConnection

The DbConnection tool provides access to data sources such as SQL Server, PostgreSQL and MySQL relational databases.

SeqZap uses the standard .net data providers to access databases, which means that almost all databases are supported out of the box.

### Methods

#### *Setup*

Connect to a database

#### *Query*

Query the database

### Panels

#### *Query Viewer*

## DataTree

Provides generic access to static tree data

### Methods

### *List Children*
Return the names of the children of a particular children

### *Get Node Type*
Get the type of a given node

### *Get Value*
Get the value of a given node

### *Convert Tree To Text Lines*
Convert tree to text lines and optionally dump to the log/report.

## Panels

### *Data Trees*
Investigate the created data tree tool instances.

# INI Tool
Read .ini files.

The INI can read values from an INI file, there is no write support.

The methods are static, so they can be called directly, e.g. without the use of a workbench instance.

## What is INI files?
An INI file is a basic configuration file, commonly used by windows-based applications. It is written as plain text so any text editor can be used to read and write INI files.

The file consists of one or more sections, and each section consists of zero or more key/value pairs.

```
[Section1]
Key1=Value1
Key2=Value2

[Section2]
Key1=Value3
```

```
Key2=Value4

[Section3]
Key1=Value5
Key2=Value6
```

The INI file above contains three sections (Section1, Section2 and Section3), each section contains two keys.

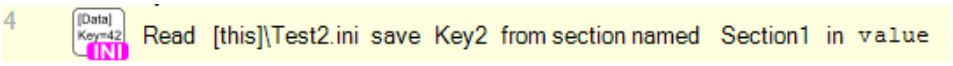
As can be seen the keys does not have to be globally unique, the only have to be unique within the section.

## Methods

### *Read Ini File*

Read a key in a specific section of a .ini file.

Read a single value from an INI file.




It is easiest to edit the INI step using the file editor. When you have selected which file to read from, the section and key selection becomes easier because they are auto-completed:


# Data Device Tool

Simple data entities on devices.

This tool contains methods for accessing simple data device entities. Different device entities defined in other tools are derived from Simple

## Virtual Device Entities

This tool defines some virtual device entity types with simple single-value read and write functionality. The virtual entities can be used for abstract access to device entities of different device types. The nine available virtual entities are:

- Simple Boolean Data
- Simple Boolean Data Input

- Simple Boolean Output
- Simple Integer Data
- Simple Integer Data Input
- Simple Integer Output
- Simple Decimal Data
- Simple Decimal Data Input
- Simple Decimal Output

When adding entities to a virtual device configuration they are all available from the Add menu in the virtual device setup dialog. Refer to the documentation on the Virtual Device Tool for more information.

Some of the device entities that can be used as source entities for these virtual device entities are:

- Analog input and output (Analog IO Tool)
- Digital input and output ports and channels (Digital IO Tool)
- OPC Client variables (OPC Client Tool)

All decimal data entities can have a Value Converter attached to convert one type of value to another, for example voltage to temperature.

## Methods

### *Get Entity Value*

Get the value of a simple data device entity.

This method gets the input value of a data entity. The value type is the data type of the selected data entity.

### *Set Entity Value*

Set the value of a simple data device entity.

This method sets the output value of a data entity. The value must be of the same type as the selected data entity data type.

# DeviceManager

SeqZap Device Toolbox.

The device manager toolbox is built into SeqZap and allows tools to extend and use SeqZap's device system.

For a general description of the device system please refer to the SeqZap Reference manual in the Devices section.

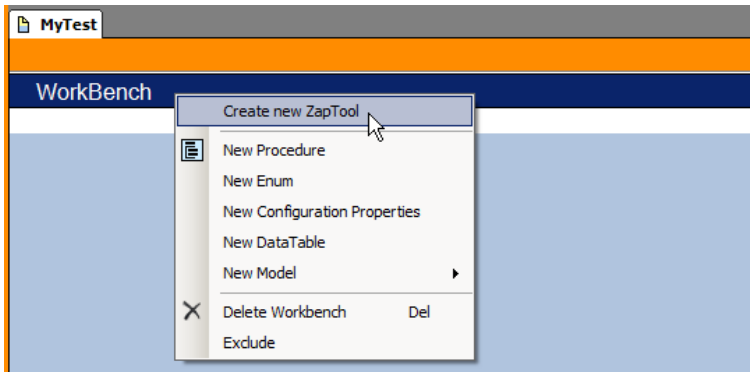
# Virtual Device Tool

Defines a virtual device.

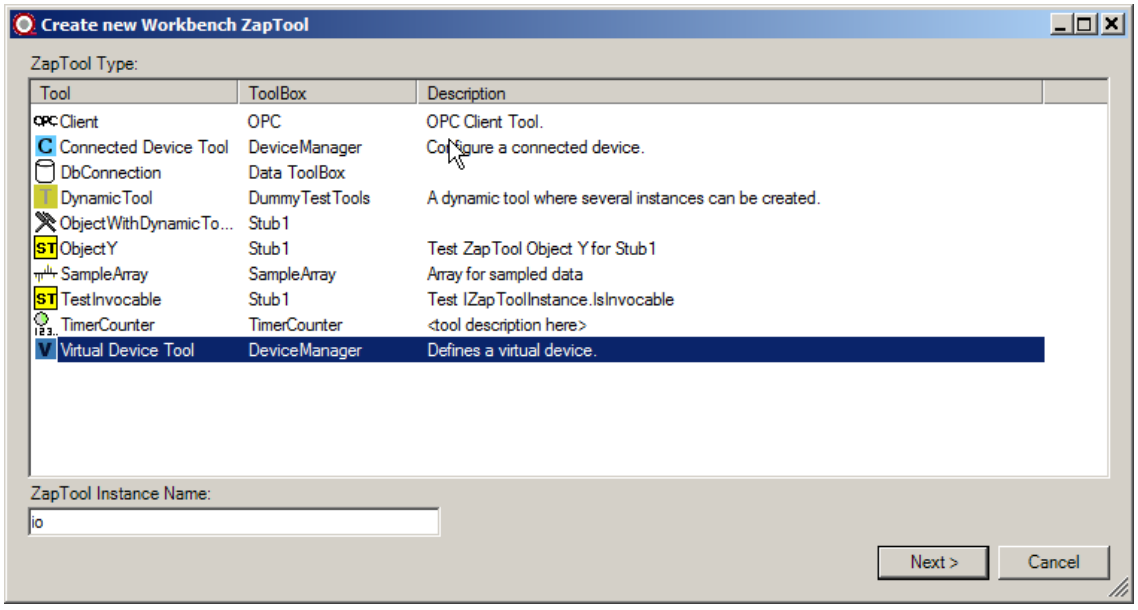
The dynamic Virtual Device Tool is used to create a virtual device in the workbench of a script file. The created virtual device will get the same name as the tool instance.

A virtual device is used to make scripts which use device methods independent of the actual devices used, in other words the virtual device creates an abstract view of the device entities used in a test script.

To create a virtual device, right click a workbench and select 'Create new ZapTool'.




Select 'Virtual Device Tool' in the dialog and type the name of the tool instance.




## Methods

### *Setup*

Setup virtual device including mappings to physical device entities.

This method is used to setup the list of device entities on the virtual device and to setup the configurations

for the linked source device entities.

In each configuration, the source device entity for each virtual device entity must be selected and the setup for each source device entity must also be selected.

It is possible to only use a single configuration or to use multiple configurations. Using multiple configurations allows having several configurations to choose between, but only one configuration can be used at a time.

## Using a single configuration

The setup method of the Virtual Device Tool supports any number of configurations. For simple usage the “Single Configuration” option can be selected (default).

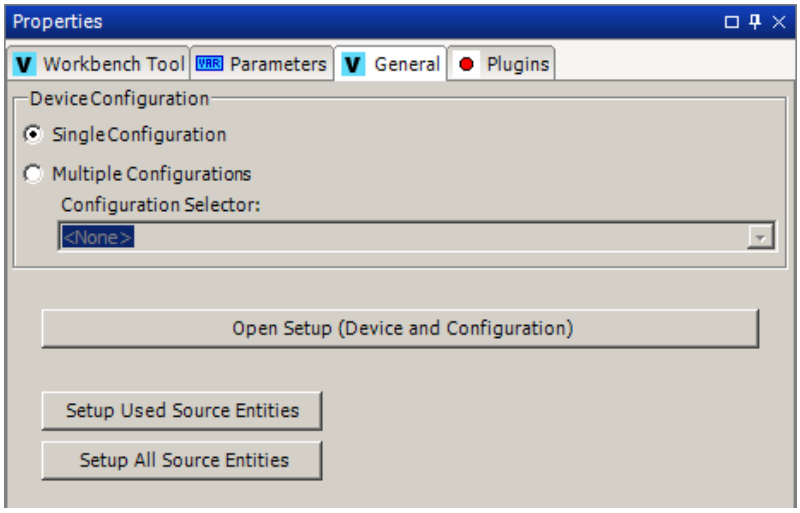


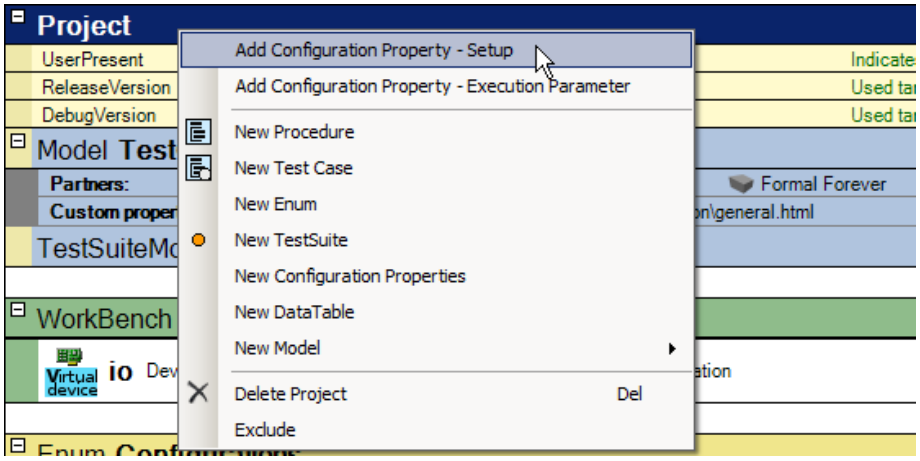

**Figure 1; Single Configuration chosen**

## Using multiple configurations

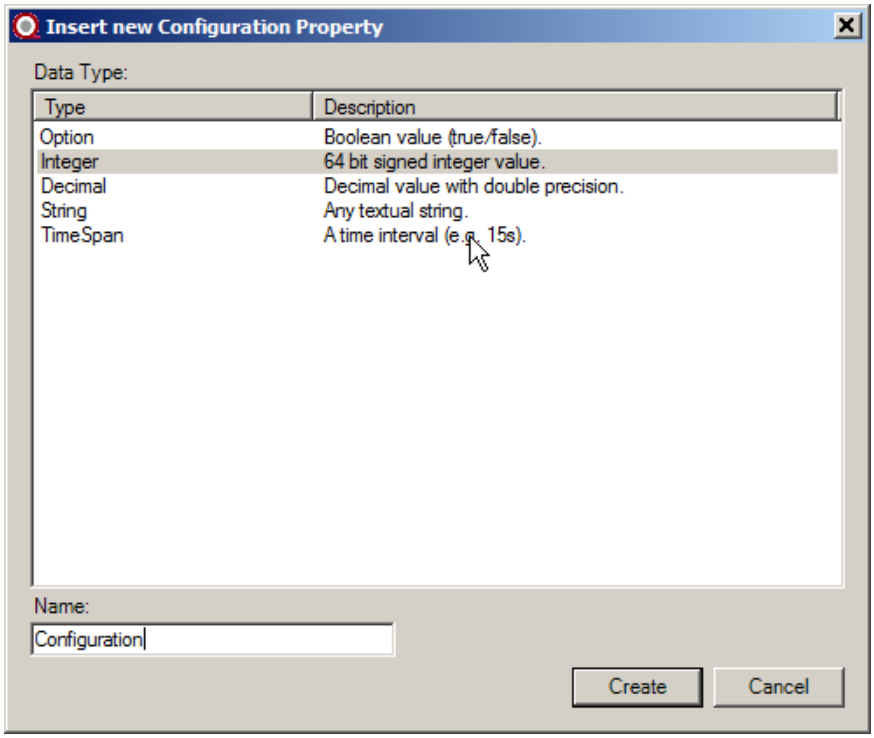
If more than one configuration should be created, the “Multiple Configurations” option can be selected.

When using multiple configurations, a Configuration Property (CP) of an enumeration type must be selected. The selected CP will be used to select which configuration to use for the virtual device. The virtual device will then have one configuration for each value in the enum type of the used CP. Each configuration in the virtual device will have the same name as the associated enum value.

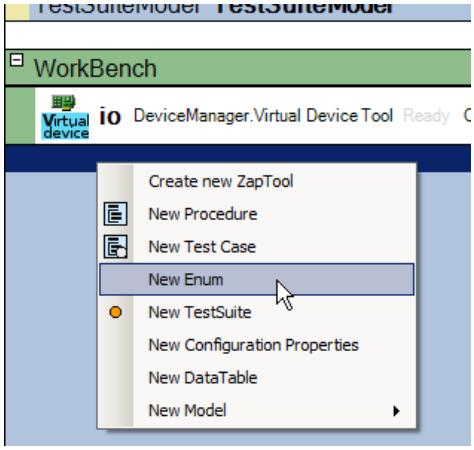
Create a CP for configuration selection by right clicking the project header line and selecting ‘Add Configuration Property - Setup’.



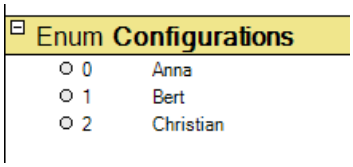

Choose Integer type (will be changed later) and type the name for the CP and press ‘Create’.



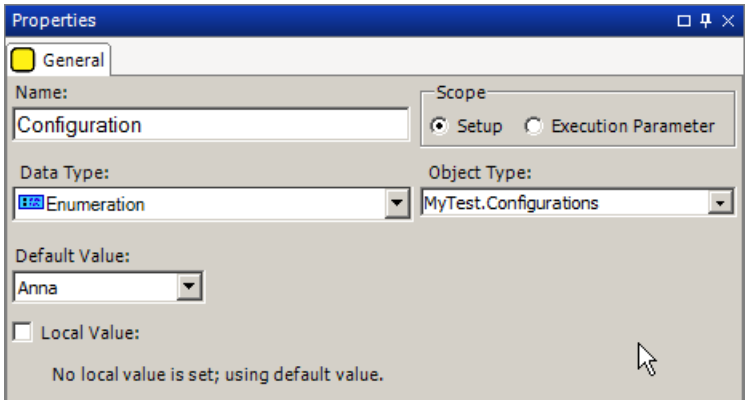

Create a ‘Script Enum’ in the file to enumerate each configuration. Right click the empty line below the workbench and select ‘New Enum’.



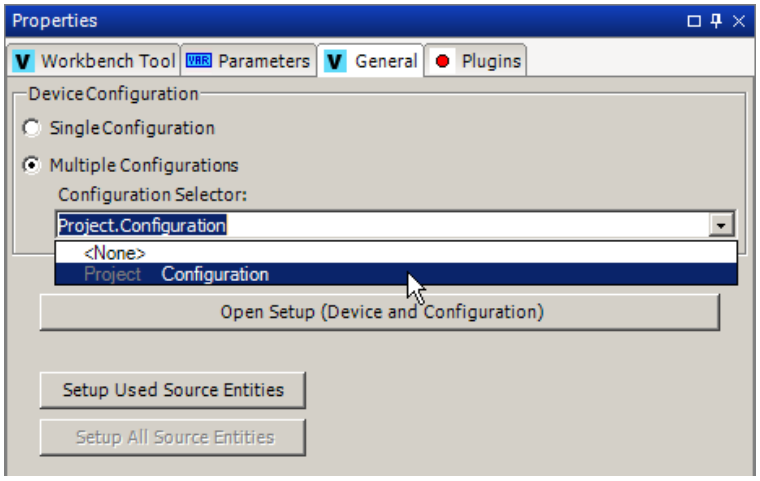

Select a name for the enum and add a value for each configuration.




Select the previously created CP in the file view and change the data type to the new enum. Select also the default configuration by setting the 'Default Value' of the CP to one of the values.



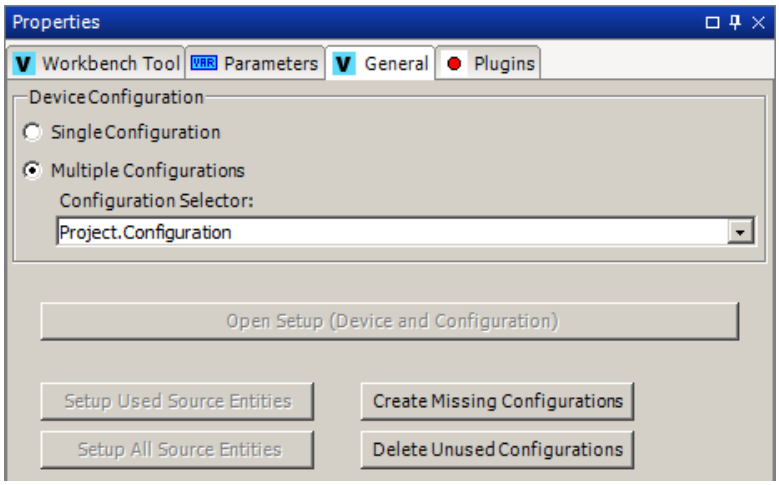

The CP can now be selected in the 'Configuration Selector' on the virtual device setup page:




## Creating the configurations

Both when using a single configuration or multiple configurations, the right configurations must be created in the setup data, and any non-used configurations must be removed before the configurations can be edited.

On the setup page there are two buttons for that.



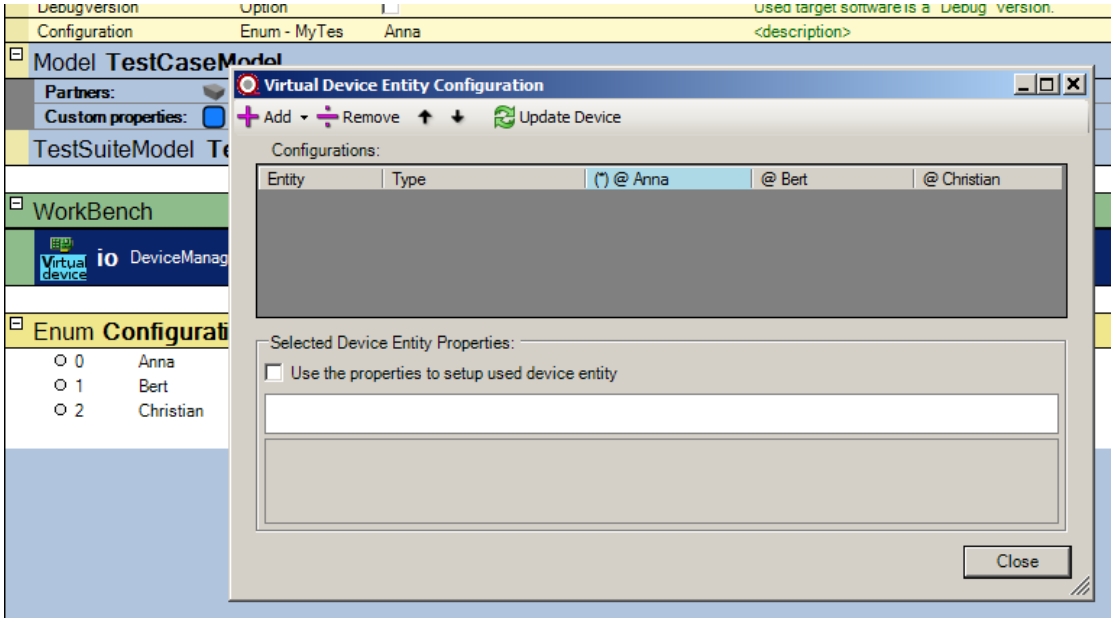

The ‘Create Missing Configurations’ is used to ensure either the single configuration or all configurations in the Multiple Configurations are created.
When switching between ‘Single Configuration’ and ‘Multiple Configurations’ it is necessary to create the configurations that was not created before.
When using multiple configurations it is also necessary to create the missing configurations when adding values to the enum type used by the configuration selector CP.

Likewise the ‘Delete Unused Configurations’ is used when switching between ‘Single Configuration’ and ‘Multiple Configurations’ or when removing values from the enum type used by the configuration selector CP.

## Configuration Setup

In each configuration, the source entity for each virtual device entity must be chosen and the setup for the source entity must be selected. The setup of the source entity is thereby controlled by the selected configuration of the virtual device.

Press the ‘Open Setup (Device and Configuration)’ button on the setup page to open the ‘Virtual Device Entity Configuration’ dialog.



### *GetAnalogInput*

Please see the documentation in the Analog IO Tool manual.

### *SetAnalogOutput*

Please see the documentation in the Analog IO Tool manual.

### *Get Entity Value*

Please see the documentation in the Data Tool manual.

### *Set Entity Value*

Please see the documentation in the Data Tool manual.

### *SetChannelDirection*

Please see the documentation in the Digital IO Tool manual.

### *GetChannel*

Please see the documentation in the Digital IO Tool manual.

### *SetChannel*

Please see the documentation in the Digital IO Tool manual.

### *SetPortDirection*

Please see the documentation in the Digital IO Tool manual.

### *GetPort*

Please see the documentation in the Digital IO Tool manual.

### *SetPort*

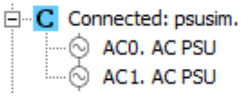
Please see the documentation in the Digital IO Tool manual.

## Connected Device Tool

Configure a connected device.

The connected device tool is used for devices which require setup to be useable. For example, a device plugin which require a SeqZap Stream to be defined (e.g. a serial port).

The connected device tool looks like a capital “C” on cyan/turquoise background in the device browser:

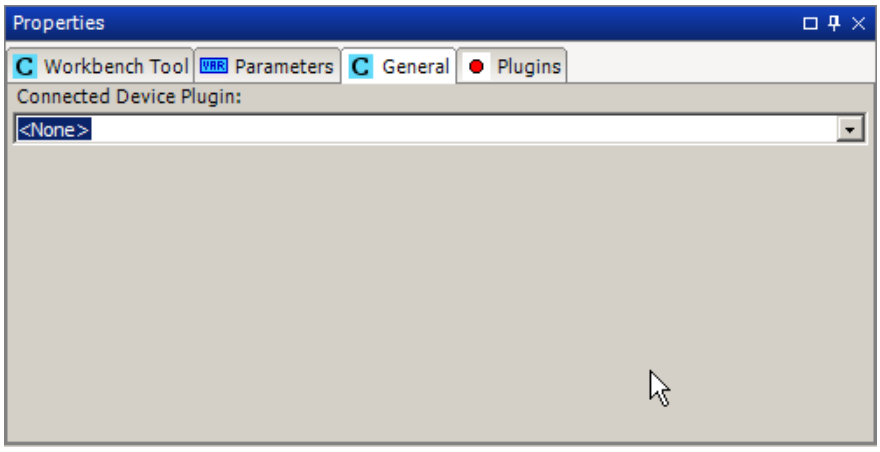



## Methods

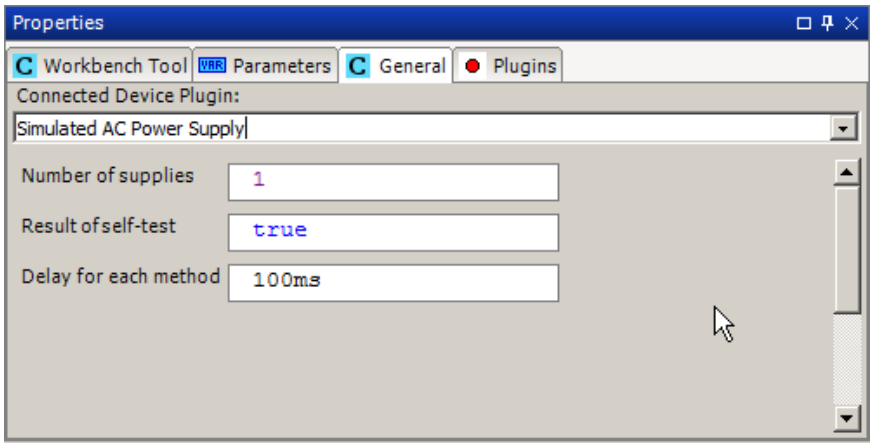
### *Setup*

Setup connected device.

The only setting the connected device tool requires to be setup is the name of the connected device plugin to use.




The plugin may add more parameters which need to be defined for the device to be setup.




For a more elaborate example on a connected device, please read the Power Supply section of this manual.

## Properties

### *Plugin*

The Title of the used connected device plugin.

# Digital IO ToolBox

Digial IO Devices

The Digital IO tool is used for simple digital input and output using digital data acquisition devices.

The Digital IO tool defines two different device entities:

- Digital Port (up to 64 bits wide)
- Digital Channel (1 bit wide)

Both entity types can be either:

- Input,
- Output or
- Bidirectional.

The two entity types are also available on virtual devices.

# Supported Devices

The Digital IO tool supports the same IO devices as the Analog IO tool.

# Digital IO Tool

Provides access to ports and channels on general purpose digital IO devices.

## Entities

### *Digital Channel*

### *Digital Port*

## Methods

### *GetChannel*

Get the channel (pin) on a digital IO device as a boolean.

### *SetChannel*

Set the channel (pin) on a digital IO device to true/false.

### *SetChannelDirection*

Set the direction of a channel (pin) on a digital IO device.

### *GetPort*

Get the value of a port on a digital IO device.

### *SetPort*
Set the value of a port on a digital IO device.

### *SetPortDirection*
Set the direction of a port (pin) on a digital IO device.

# Event Queue ToolBox

Tool handling and inspection on a queue of events.

Handling real-time events from the system under test, instruments, devices and parallel tasks.

## EventQueue
<tool description here>

### Methods

### *Clear Queue*
Clears the queue, removing all current events.

### *Add Event*
Adds an event to the event queue.

### *Get Event*
Expects an event with the specified properties.

### *Expect Event*
Expects an event with the specified properties.

## Properties

### *EventCount*
Gets the current count of events in the queue.

### *NextEvent*
Reference to the next

# EventElement
<tool description here>

## Properties

### *HasEvent*
Indicates whether the internal event reference is set.

### *IsEmpty*
Indicates whether the internal event reference is empty.

### *HostTime*
Time on the local PC where SeqZap is running.

### *SourceID*
Name or ID of the source of the event.

### *SourceTickTime*
Tick-time (millisecond counter) on the computer that generated the event.

### *SourceTickCount*
Tick-count (any unit) on the computer that generated the event

### *Category*
Event category

### *EventName*
Event name or ID

# FileTool

Manipulates the file system (list files, remove file, etc.)

Standard operating system methods to create/list/remove directories and create/move/copy/delete files.

## FileTool
Manipulates the file system (list files, remove file, etc.)

## Methods

### *List files*
List files and directories matching a pattern

### *Create Directory*
Create a new directory

### *Copy files*
Copy a file/directory on disk to a new position

### *Delete files and/or directories*
Delete files and/or directories based on a file pattern.

### *Read Text File*
Read a UTF-8 encoded text file (or specify another encoding)

### *Write Text File*
Write a UTF-8 encoded text file using the default newlines defined by your operating system

### *Get File Info*
Get atributes, number of files and directories and used disk space on a file or directory

# FileTransfer

Transfers (send or receive) a file through a stream (RS232, TCP etc.)

Sending and receiving files via any stream using different protocols, e.g. x-modem. Any protocol can be added as a separate plug-in.

## FileTransfer
Transfers (send or receive) a file through a stream (RS232, TCP etc.)

## Methods

### *Transmit File*
Transmit a file through a stream via the chosen protocol.

### *Receive File*
Receives a file through a stream via thosen protocol.

# GraphicalTool

Basic graphical display/bitmap tools.

Working with graphical bitmaps to e.g. inspect display dump from a device. Includes VNC client.

# GraphicalImage

A base graphical (dot-matrix) image tool

## Methods

### *Snapshot*

Create a clone (snapshot) of the display with it current content.

### *CheckUpdate*

Check the update state of ImageTool.

### *SetChanged*

Raises the event that the image has changed.

### *CreatePartialView*

Create a partial view of the image (a region).

## Properties

### *Width*

### *Height*

## Panels

### *Graphical Display*

Graphical Display for inspection of images.

# BitmapTool

A tool to operate on a bitmap

## Methods

### *Snapshot*

Create a clone (snapshot) of the display with it current content.

### *CheckUpdate*

Check the update state of ImageTool.

### *SetChanged*

Raises the event that the image has changed.

### *CreatePartialView*

Create a partial view of the image (a region).

### *SetupFromFile*

Setup BitmapTool to load bitmap file.

### *SetupFromUrl*

Setup BitmapTool to load bitmap from a url.

## Panels

### *Graphical Display*

Graphical Display for inspection of images.

## Properties

### *Width*

### *Height*

# GraphicalDisplay

A virtual graphical (dot-matrix) display

## Methods

### *Snapshot*

Create a clone (snapshot) of the display with it current content.

### *CheckUpdate*

Check the update state of ImageTool.

### *SetChanged*

Raises the event that the image has changed.

### *CreatePartialView*

Create a partial view of the image (a region).

### *SetupFromSource*

Setup GraphicalDisplay from an external image source.

### *Update*

Updates the display from its source.

## Panels

### *Graphical Display*
Graphical Display for inspection of images.

## Properties

### *Width*

### *Height*

# ScreenCapture
Captures an image of the display of a computer

## Methods

### *Snapshot*
Create a clone (snapshot) of the display with it current content.

### *CheckUpdate*
Check the update state of ImageTool.

### *SetChanged*
Raises the event that the image has changed.

### *CreatePartialView*
Create a partial view of the image (a region).

### *SetupFromSource*
Setup GraphicalDisplay from an external image source.

### *Update*
Updates the display from its source.

### *Setup*
Setup the ScreenCaptureTool.

## Panels

### *Graphical Display*
Graphical Display for inspection of images.

## Properties

### *Width*

### *Height*

# GSM

Access to simple GSM terminal hardware

The GSM tool provide support for receiving and sending short text messages (SMS) using a GSM modem connected to the PC running SeqZap.

The tool also provide support for receiving phone calls, although it can only answer the call and get the caller-id, there is only support for sending DTMF data - no support for transferring voice or other data to or from the GSM modem.

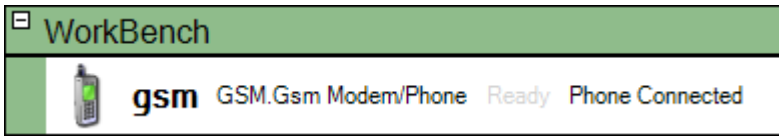
## Supported modems
Supported modems are:

- Huawei E173
- Tellit GT-HE910-EUD

If you try other modems using SeqZap, successfully or unsuccessfully, please notify us at support@seqzap.com so the list of supported (and eventually unsupported) modems can be updated, thank you!

# Gsm Modem/Phone

Provides access to GSM modems and phones via a serial port.



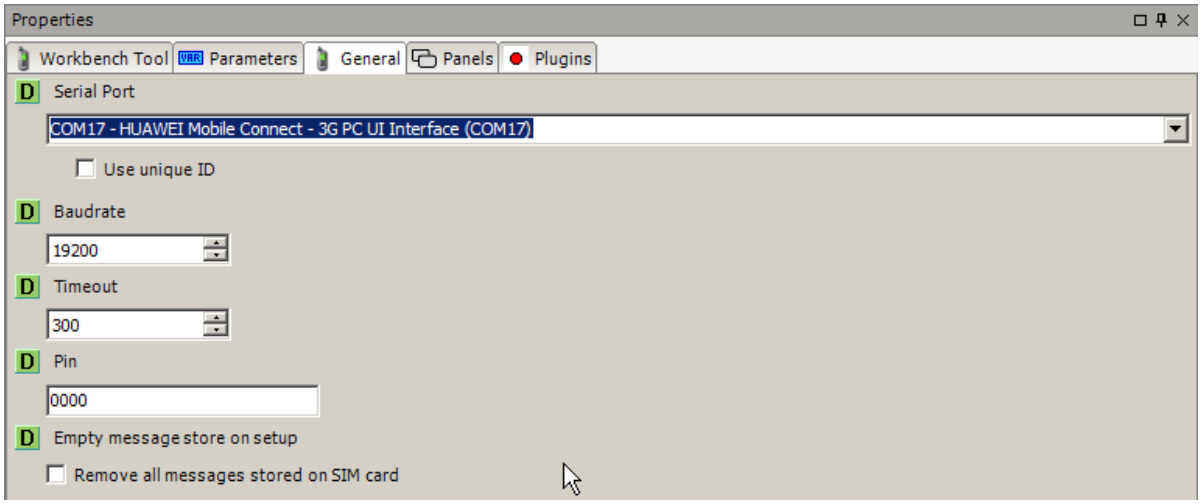

SeqZap comes with an example script for sending and receiving messages located in the `Examples\Tools\Gsm` directory where SeqZap is installed.

## Methods

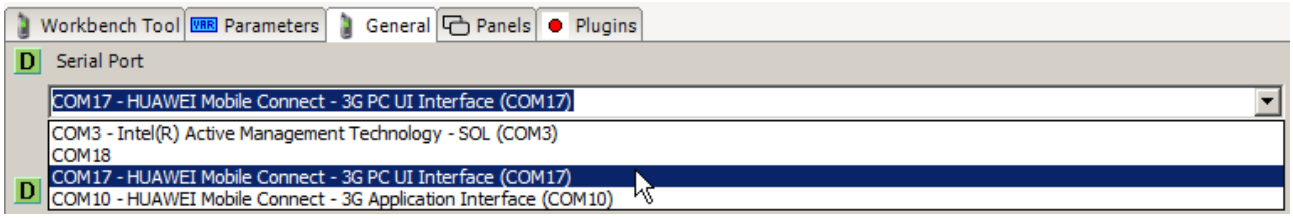
### *Setup*

Connect to GSM modem/phone on a particular port with a particular buad-rate.

During setup the GSM tool will enter the pin code for the SIM card (if needed) and enable caller-id identification when a call is received.



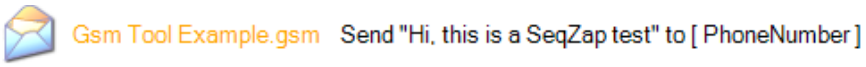

Some modems register more than one COM port on the PC where it is connected, for instance, a Huawei E173 modem will register two COM ports:




The easiest way to find the correct port is just by trial and error, by trying setting up the tool, for the Huawei E173 modem the correct COM port is the “PC UI Interface” one.

### *Send SMS*

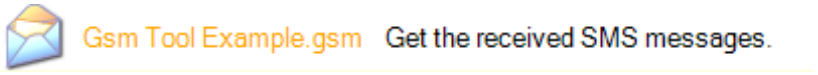
Send a message to a recipient.




Send an SMS with the given text to the given number.

### *Receive SMS*

Get all the SMS messages that has been received since the last time Receive SMS was called.




Receive all the incoming SMS messages from the modem.

### *Wait for call*

Wait for someone to call the phone/modem (does not answer the call).

Wait for a call to be made to the modem, when the call is received the caller-id is also returned.

### *Answer call*

Answer an incoming call

Answer a waiting call.

### *Hang up*

Hang up phone/modem

Hang up an existing call.

### *Make a call*

### *Send DTMF*

### *Change length of DTMF tones*

## Properties

### *Manufacturer*
The manufacturer of the modem.

### *Model*
The model of the modem.

### *Revision*
The revision of the modem.

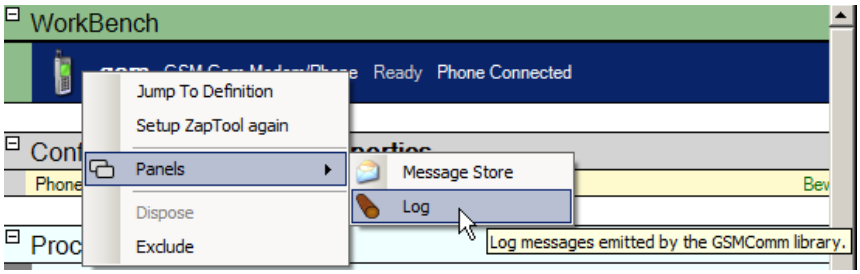
### *SerialNumber*
The serial number of the modem.

### *PinStatus*
Whether the modem is waiting for the pin to be entered.

### *SupportedCharacterSets*
The list of character sets supported by the modem.

### *CurrentCharacterSets*
The current character set used by the modem.

## Panels



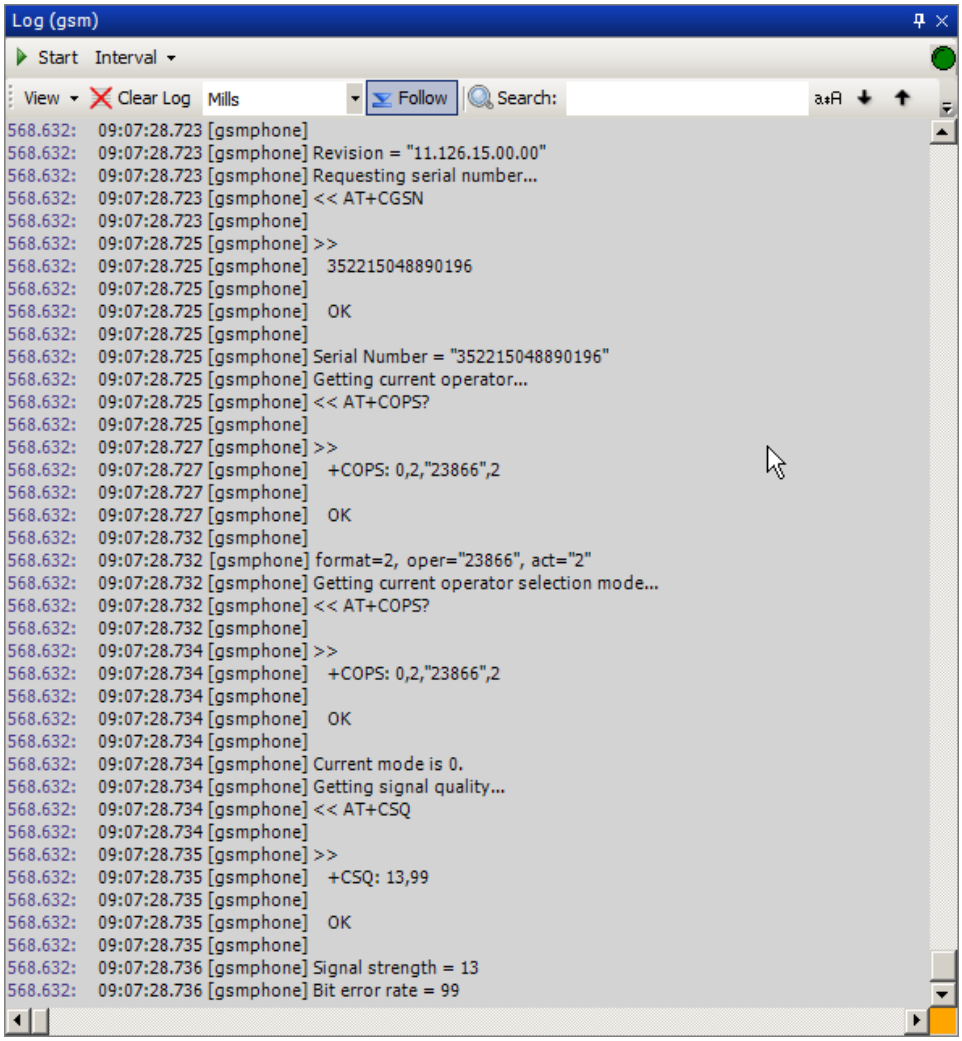

### *Message Store*
List the messages saved on the phone/modem/SIM-card

The message store allows browsing of the messages stored on the SIM card and modem.

### *Log*

Log messages emitted by the GSMComm library.

The log panel is useful when trying a new modem model, it will show the exact AT commands sent and received from the mode.




# HTTP toolbox

Methods for making various HTTP request.

## HTTP toolbox

Methods for making various HTTP request.

### Methods

***Request***
Perform a HTTP request

# JSON toolbox

Methods for parsing JSON strings and JSON HTTP responses.

## JSON toolbox

Methods for parsing JSON strings and JSON HTTP responses.

### Methods

***Request***
Perform a HTTP request and return parse JSON data

# LabVIEWTools

Tools for controlling LabVIEW applications and calling LabVIEW VIs.

LabVIEW is not a part of this toolbox, and needs to be installed when using these tools.

Supported LabVIEW versions are version 9.0 and later.

Automating National Instruments LabVIEW ® and LabVIEW Real-Time ® applications and calling LabVIEW ® VIs.

## VIServerTool

Tool for calling and acccessing LabVIEW VI's.

This tool can call LabVIEW VIs directly, the input parameters can be supplied and the output parameters is shown as output parameters.

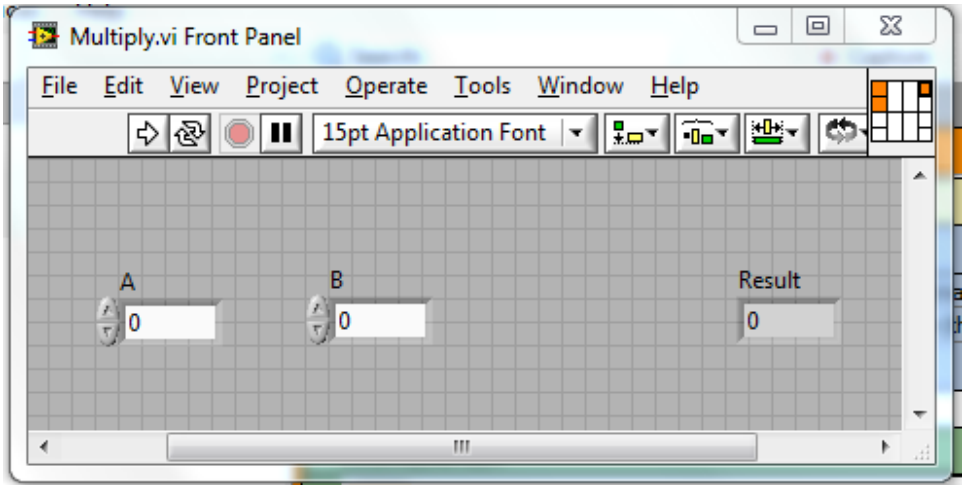
The tool requires a full version of LabVIEW installed on the PC where the test is written and executed

## Making a VI ready for SeqZap

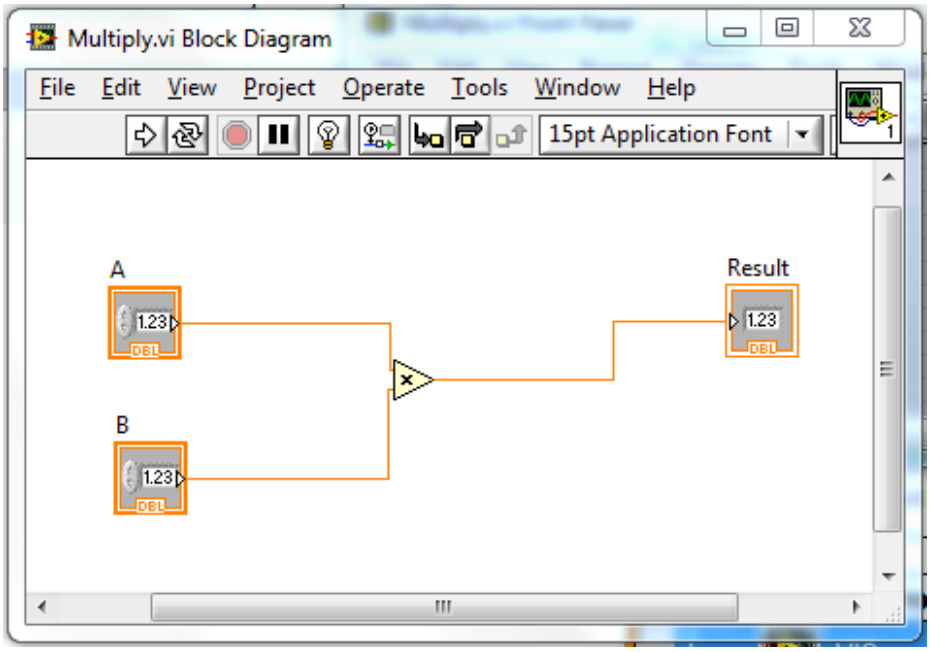
Most VIs should work out of the box.

The SeqZap installer includes a LabVIEW example in the ..\..\Test\SeqZapTest\Tools\LabVIEW\VIServerSystemTest folder in SeqZaps installation directory.

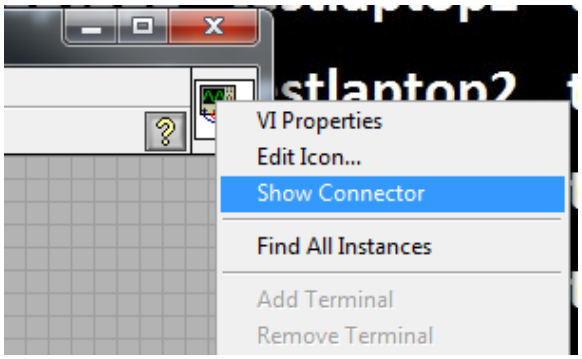
This test script calls a simple VI which simply multiplies the two input values “A” and “B” and returns the value in the “Result” output variable.




The VI is located here and has the following simple implementation:



Most LabVIEW value types are supported by SeqZap as input/output parameters. Before a parameter can be used it must be “Connected” by using the “Show Connector” panel in LabVIEW by right-clicking the icon and selected ->Show Connector.




## Methods

### *Setup*

Setup LabVIEW VIServer connection.

### *Call VI*

Calls a VI.

# LabVIEWAutomation

Tool for automating applications implemented in LabVIEW.

The application (or top-level VI) to be automated must include a parallel call to the "SQ Automation Server.vi" found in the SequantoLabVIEWAutomation.llb support library. See an the example of how to do it in "ApplicationDemo.vi" found in the same library.

The LabVIEW Automation tool is used to control and monitor a LabVIEW® application.
Automating LabVIEW is done either when the LabVIEW application is the system to test or when the LabVIEW application is used as part of the test system.

The tool has several different ways to control, monitor and exchange information with the connected application. The most important are:

- Get and set values on almost any control or indicator on any VI panel.
- Call VIs.
- Receive events sent  from LabVIEW.
- Send log-messages from LabVIEW to SeqZap to trace the execution flow of the application.

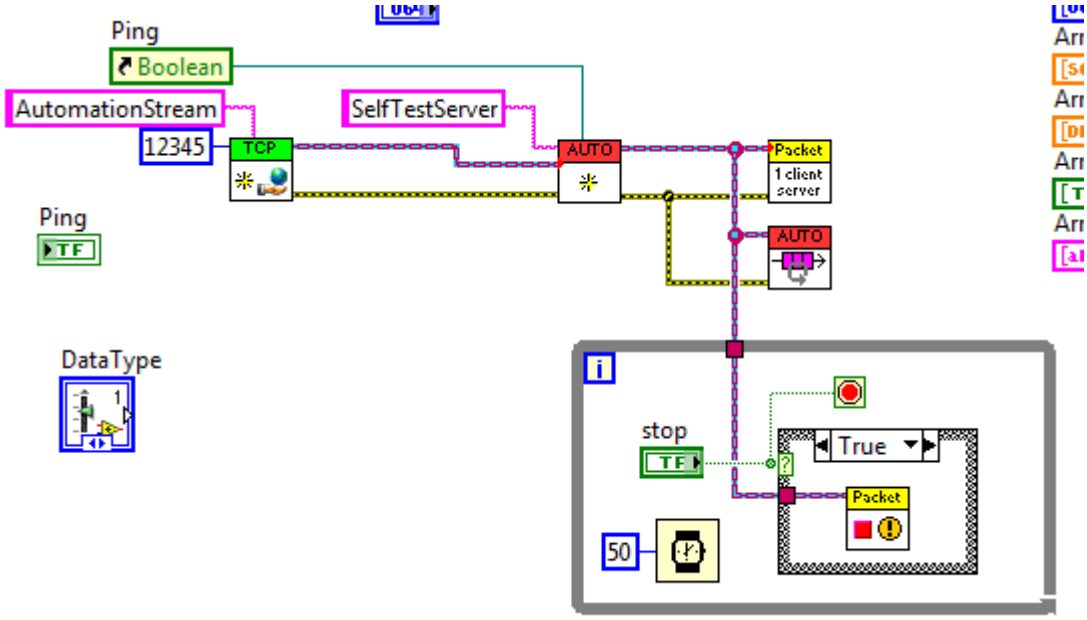
## Testing LabVIEW applications

Like any other system, applications developed in LabVIEW also needs to be tested during development.

The LabVIEW Automation tool makes it very easy to test the functionality of the application.

The SeqZap installer includes the VI Package needed to get the LabVIEW Automation up and running, it should be installed using the VI Package Manager by double-clicking the .vip file in the LabVIEW folder.

The LabVIEW code required to get the LabVIEW Automation Connection running is shown below.




The code can also be inspected in the SQ Self Test Server.vi file which ships with SeqZap.

## Registered controls

LabVIEW controls can be registered with the LabVIEW Automation system, which makes them available in SeqZap as a single name. The list of registered controls can also be cached so the test can be written without requiring the LabVIEW application to run.

When running on LabVIEW Real-Time and similar environments, the VIs can not be interactively browser, for these places it is necessary to register the controls which SeqZap should be able to communicate with by registering them.

## Using LabVIEW as an extension to the test system

When having real-time requirements in the test setup, LabVIEW Real-Time® and maybe even LabVIEW FPGA® can be used. The LabVIEW Automation tool can be used to control the LabVIEW application and to get the test measurements into SeqZap.

## About LabVIEW

We have almost 15 years of LabVIEW experience and can help customers developing and testing LabVIEW

applications.

The LabVIEW® development system can be bought from National Instruments and is NOT supported by Sequanto or included with SeqZap.

## Methods

### *Setup*

Setup LabVIEW application automation.

### *Open*

Open the automation connection.

### *Close*

Close the automation connection.

### *Ping*

Sends a Ping request and waits for a resonse.

### *Refresh Registered Controls List*

Sends a request for the list of registered controls.

### *Get Control Value*

Gets the value of VI panel control.

### *Set Control Value*

Sets the value of VI panel control.

## Properties

### *InOfflineMode*

Indicates whether the tool is currently in Offline mode.

### *IsOpen*

Indicates whether the TCP port is open (connected).

## Panels

### *Controls Browser*

Interactively list, monitor and set the value of the registered controls or the controls of a VI.

# NI-XNET

National Instruments CAN/LIN/FlexRay bus support using the NI-XNET driver.

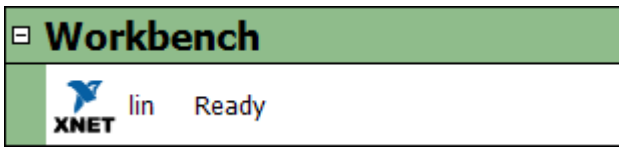
The NI-XNET driver supports access to high-speed serial buses such as CAN/LIN/FlexRay by putting the actual bus logic and device reading/writing in dedicated hardware outside the PC. This allows SeqZap to support the real-time timing of these serial buses.

The NI-XNET driver must be installed for the tool to work, the runtime variant is sufficient and version 16.0 is recommended, it can be downloaded here:

http://www.ni.com/download/ni-xnet-16.0/6131/en/

## NI-XNET

Access the NI-XNET using a database definition file such as a CAN DB (.candb) or a LIN Description Format (.ldf).




The database to use is specified as part of the setup of the tool, please see the Setup method for more.

Please see the parent NI-XNET toolbox description for information on driver installation and so on.

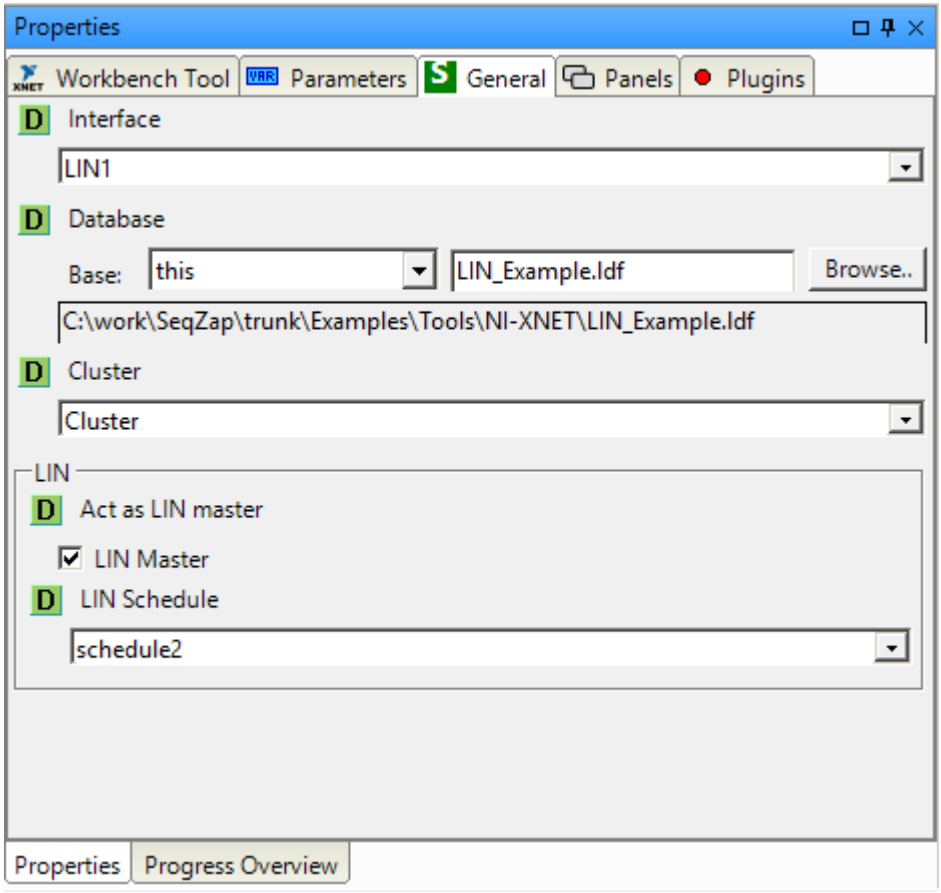
An example script using the NI-XNET device is available in the Examples menu under File -> Examples -> Tools -> NI-XNET.

## Methods

### *Setup*

Connect to an NI-XNET device and use a database.

The setup methods is where the database to use is defined, for example, the CANdb database file to use, the Cluster in the database to use must also be specified. For database formats (like LIN Description Files) where a Cluster is not used, a default Cluster of “Cluster” will be automatically created by the NI-XNET driver.




The Setup method also provides settings for specific interfaces, where specific configuration is needed to behave properly on the bus.

#### LIN

SeqZap can be configured to act as a master on the LIN bus using a particular schedule defined in the LIN description file.

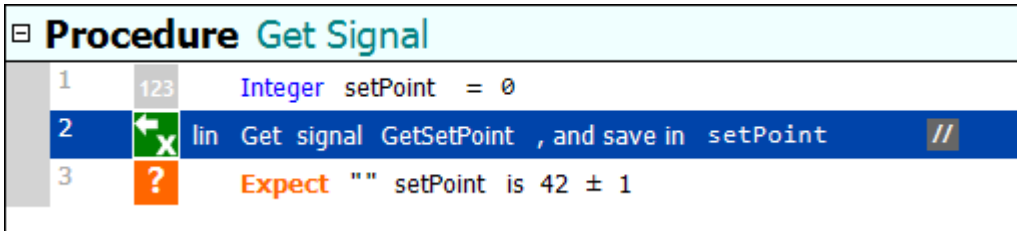
LIN busses must have a single master which is responsible for polling the various slave nodes at a given interval.

When setting LIN as master, the interface will also send wake-up frames on the LIN network to wake up any

sleeping slaves.

### *Get Signal*

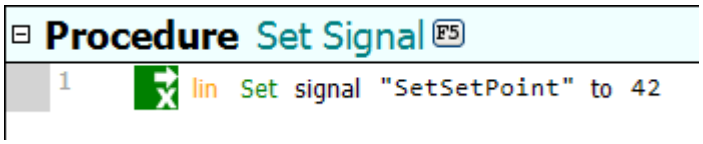
Get the value of a signal.




The data type of the returned value will be an integer or an decimal value, depending on the signal.

### *Set Signal*

Set the value of a signal.




## Properties

### *LinMaster*

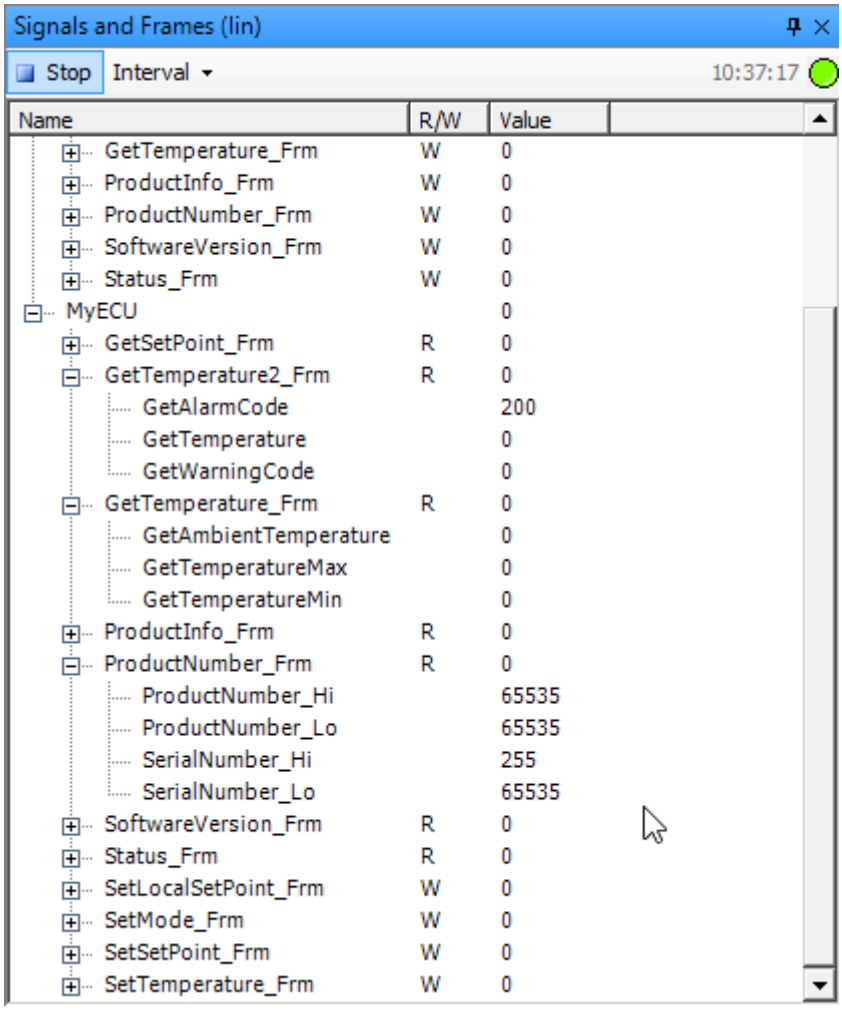
If true, SeqZap will act as a master on the LIN bus.

## Panels

### *Signals and Frames*

The signals and frames panel shows a read-only view of all the signals available grouped by the frame which contain the signal.

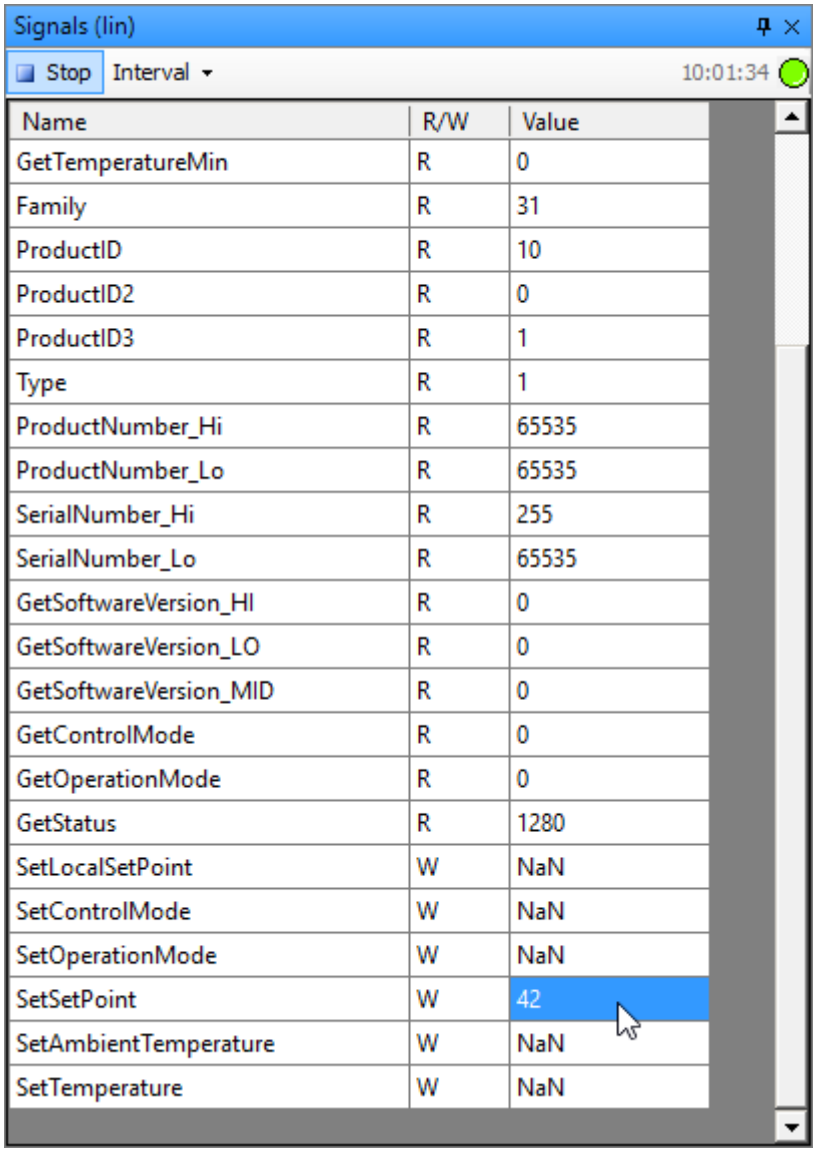
Generally it is easier to ignore the frames and just use signals when writing and debugging tests, which is why the Signal panel is the recommended panel – it also allows writing signals instead of only reading them.




## *Signals*

The signals panel will read signal values from the slaves and present them to provide an easy view of the current slaves when debugging a test or just experimenting with the slaves.

Writable signals can also be changed in the panel by selecting the value cell, typing and hitting the “Enter” key when done.



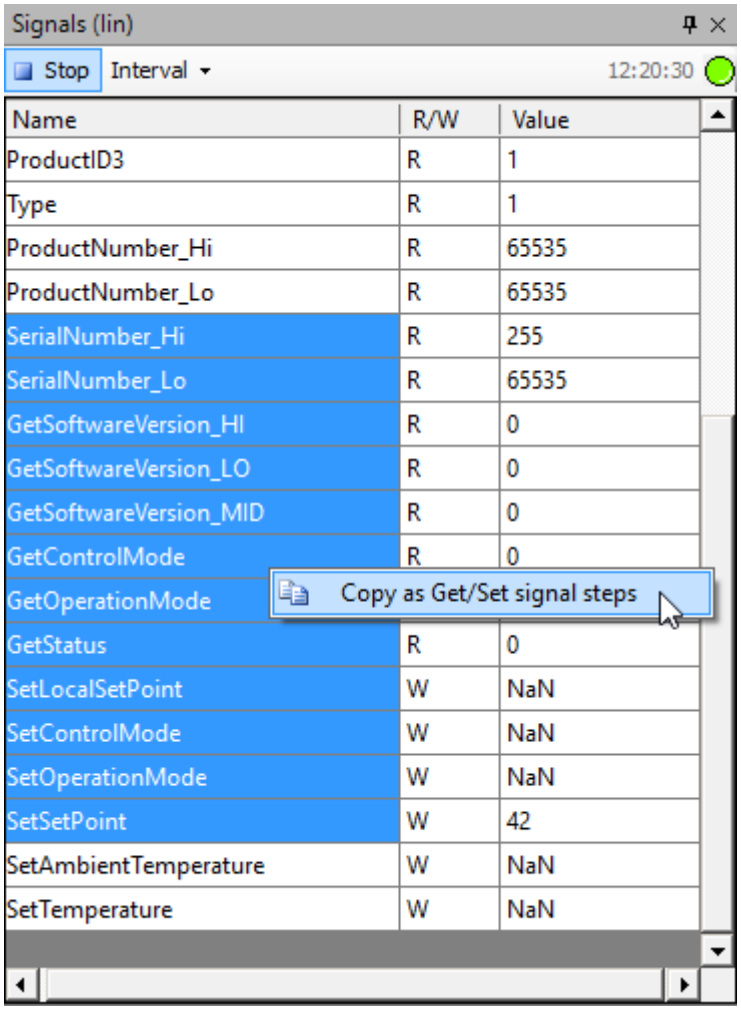

| Name | R/W | Value |
|---|---|---|
| GetTemperatureMin | R | 0 |
| Family | R | 31 |
| ProductID | R | 10 |
| ProductID2 | R | 0 |
| ProductID3 | R | 1 |
| Type | R | 1 |
| ProductNumber_Hi | R | 65535 |
| ProductNumber_Lo | R | 65535 |
| SerialNumber_Hi | R | 255 |
| SerialNumber_Lo | R | 65535 |
| GetSoftwareVersion_HI | R | 0 |
| GetSoftwareVersion_LO | R | 0 |
| GetSoftwareVersion_MID | R | 0 |
| GetControlMode | R | 0 |
| GetOperationMode | R | 0 |
| GetStatus | R | 1280 |
| SetLocalSetPoint | W | NaN |
| SetControlMode | W | NaN |
| SetOperationMode | W | NaN |
| SetSetPoint | W | 42 |
| SetAmbientTemperature | W | NaN |
| SetTemperature | W | NaN |

Writable signals have the value NaN until the signal is written to, either from a panel or from a script.

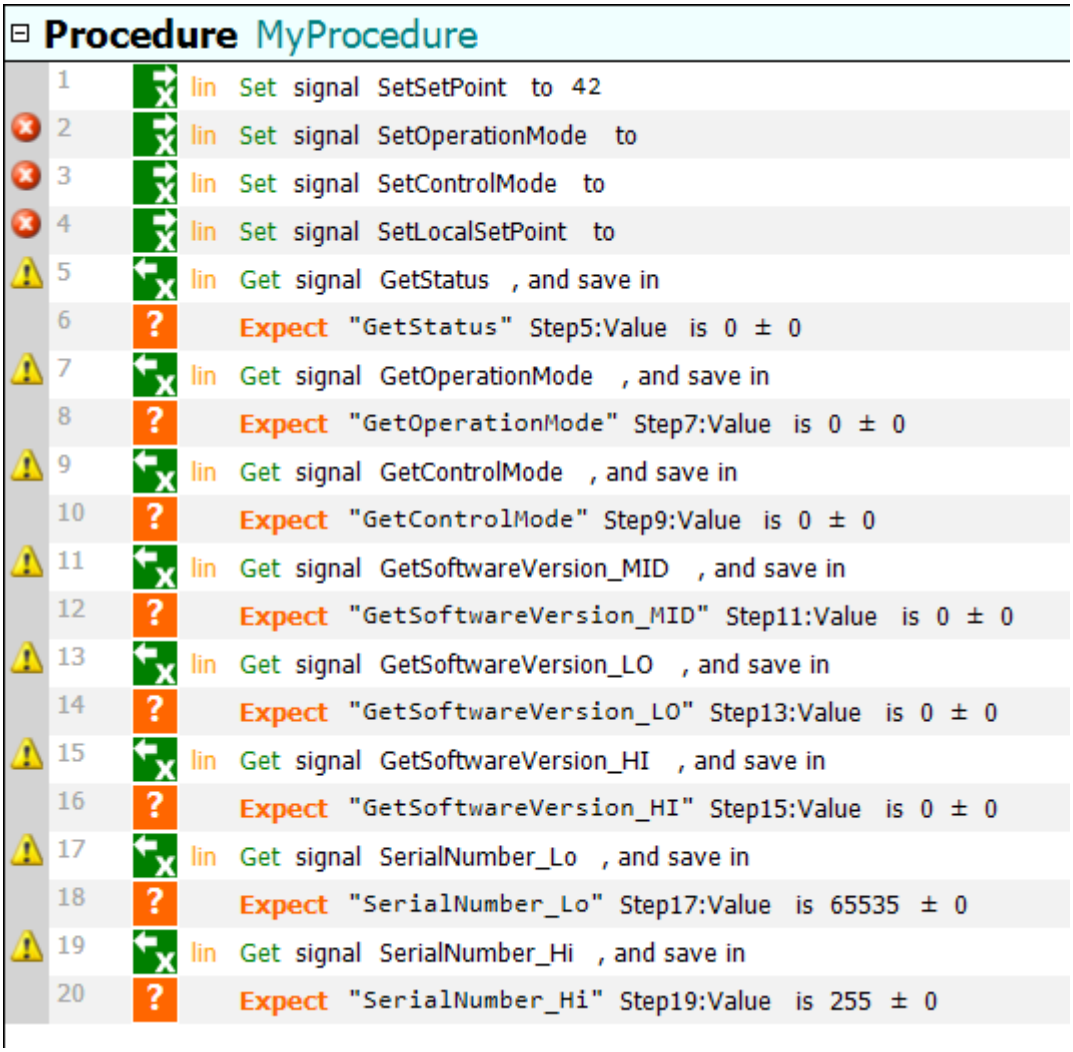
### Copy/Paste

The Signals panel supports Copy/Paste from the panel and to the script file, this feature makes it very quick to write scripts based on the actual values in the slave.

Start by selecting a number of signals to copy and then right-click the selection and select “Copy as Get/Set signal steps)”




Then select a procedure in a script file and press Ctrl+V (or right-click and select Paste from the context menu).




This will insert “Set Signal” steps for the writable signals, notice that the signals which have not yet been set are copied without a value and therefore the parser reports an error.

Readable signals are copied with an associated numeric expect step which expects the signal to have the current value when the script is executed, this step can just be deleted to just get the signal without expecting on the value.

# MachineAutomationToolBox

Generic interface for automating machines using the sequanto-automation protocol (implemented by the Automation Tool).

The Machine Automation tool is normally combined with the Windows Automation Tool to make it possible

to automate remote graphical user interfaces (GUIs).

The sequanto-automation project ships with remote GUI support for Linux and Windows, using the accessibility interface of these operating systems, and with support for platform independent QT applications where the sequanto-automation code is embedded directly in the application under test.

## Examples

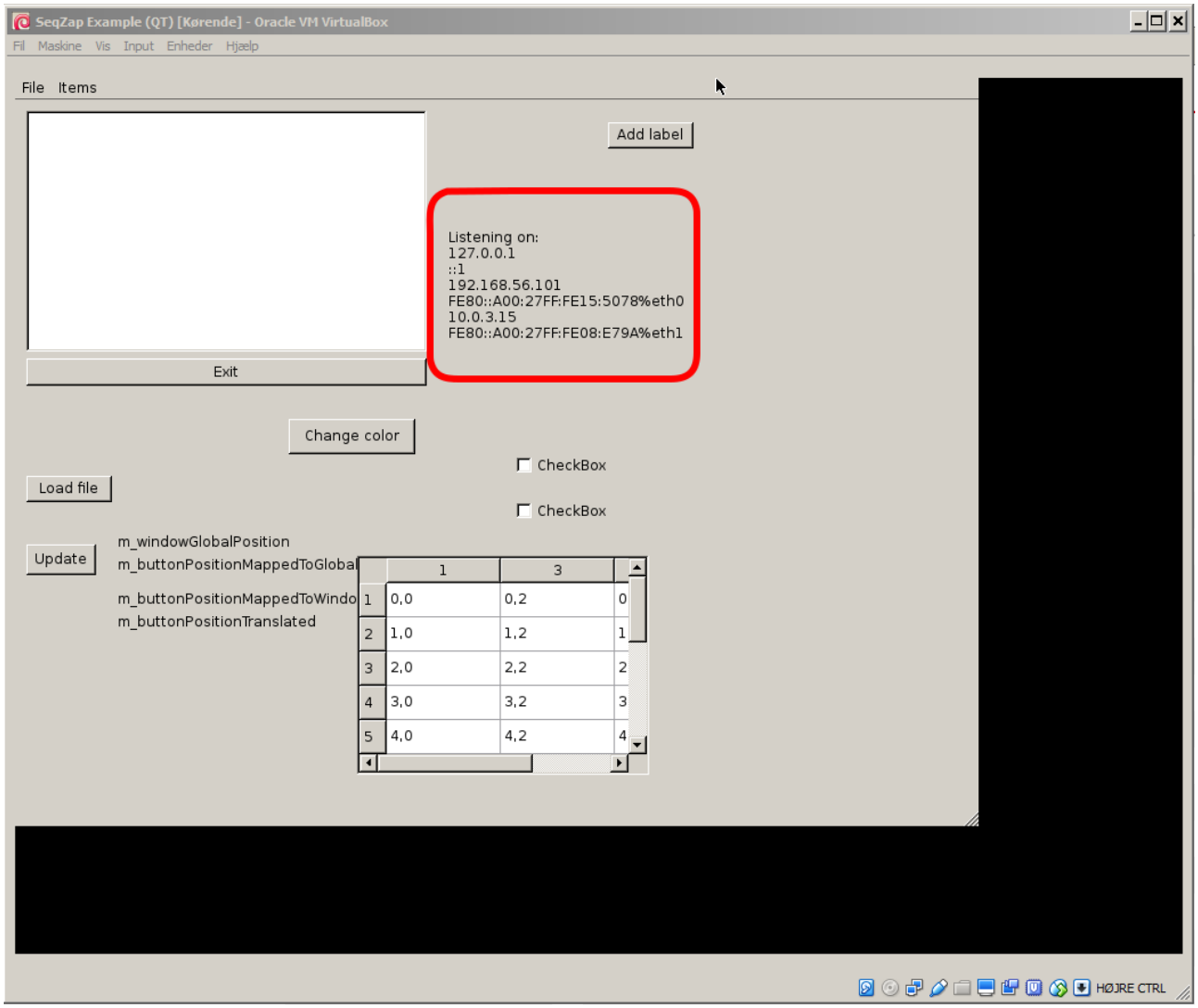
SeqZap comes with an example implementation of machine automation on a Linux based QT GUI, it can be found in Examples -> Tools -> Machine Automation -> MachineAutomationQTExample.szs the example requires that a virtual machine with the application under test is downloaded and run using either Oracle Virtual Box, VMWare Workstation Player, or another virtual machine system capable of loading .OVA files.

The virtual machine can be downloaded here:

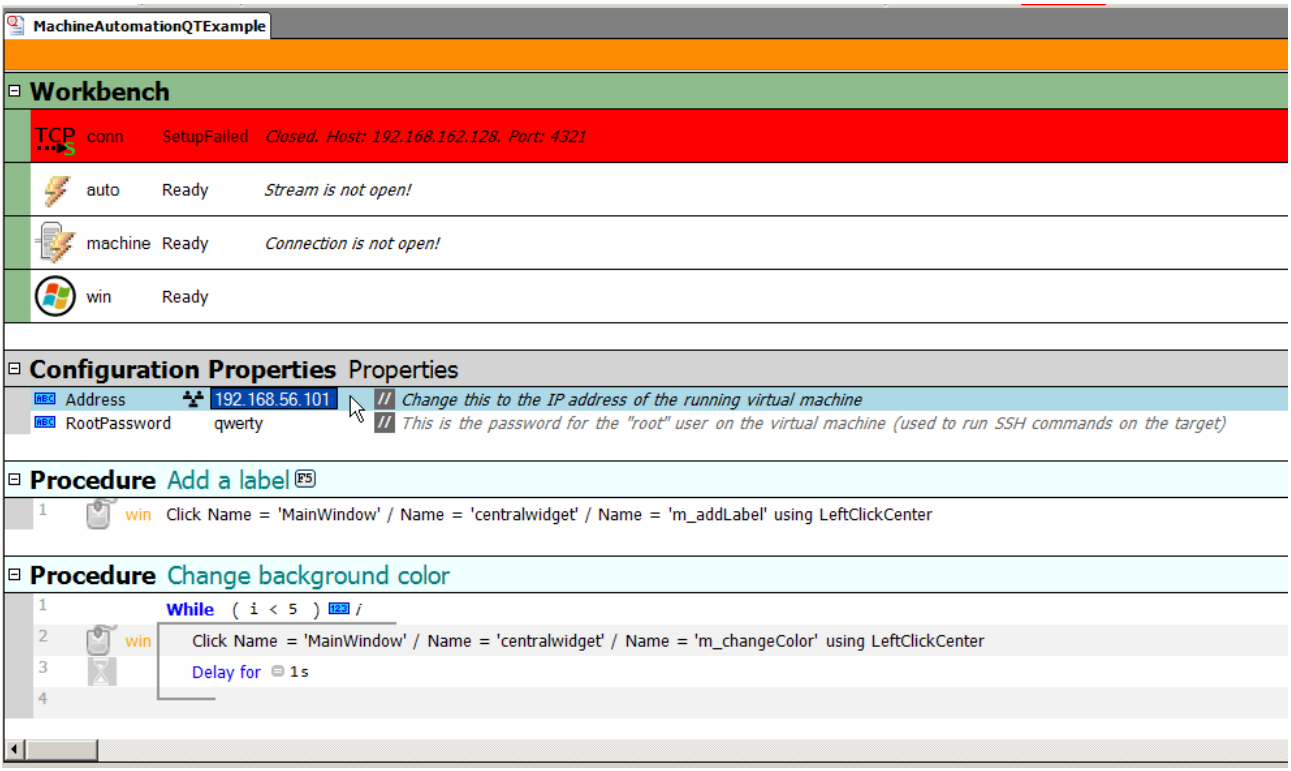
http://www.seqzap.com/downloads/examples/tools/machine_automation/seqzap_machine_automation_qt.ova

When the example has loaded and the virtual machine has started, the example file can be opened.

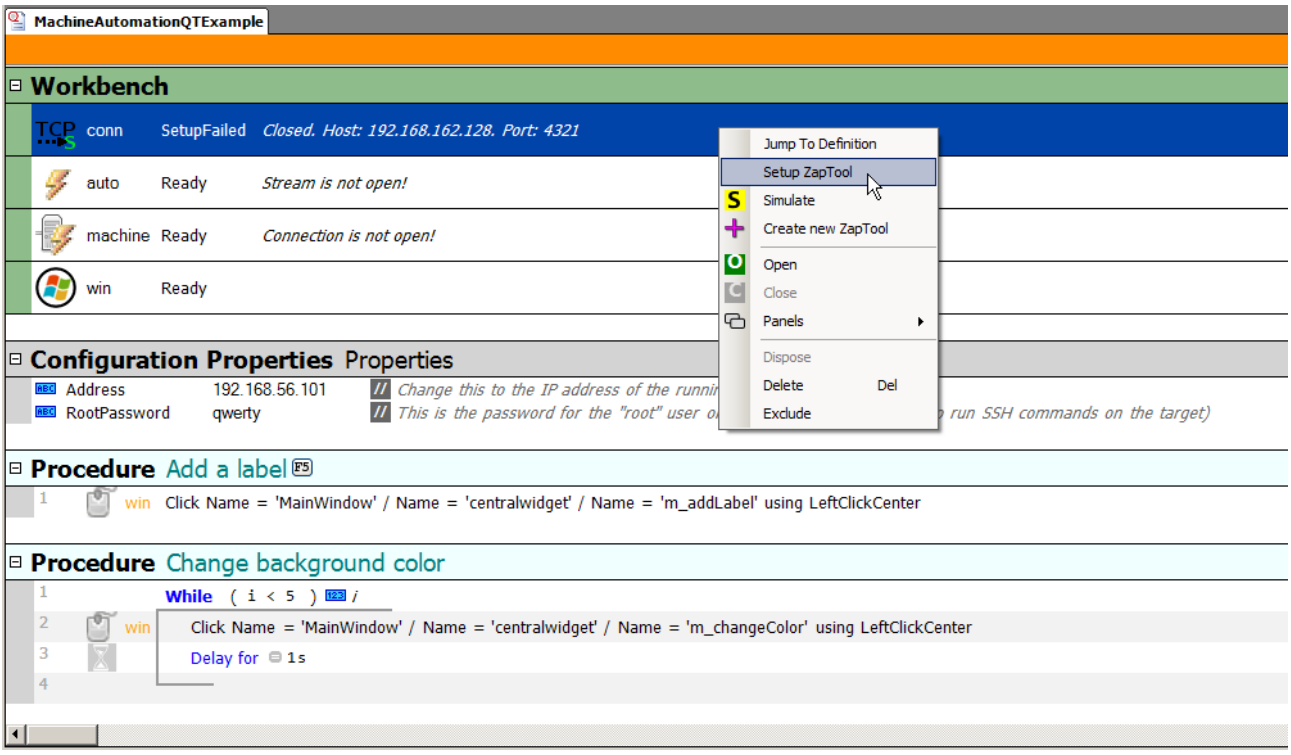
The screen of the virtual machine should show the names of the IP addresses of the virtual machine:




One of these IP addresses, usually the first non-localhost IPv4 address will do (in this case 192.168.56.101), should be written in the Address field of the Configuration Properties in the file:

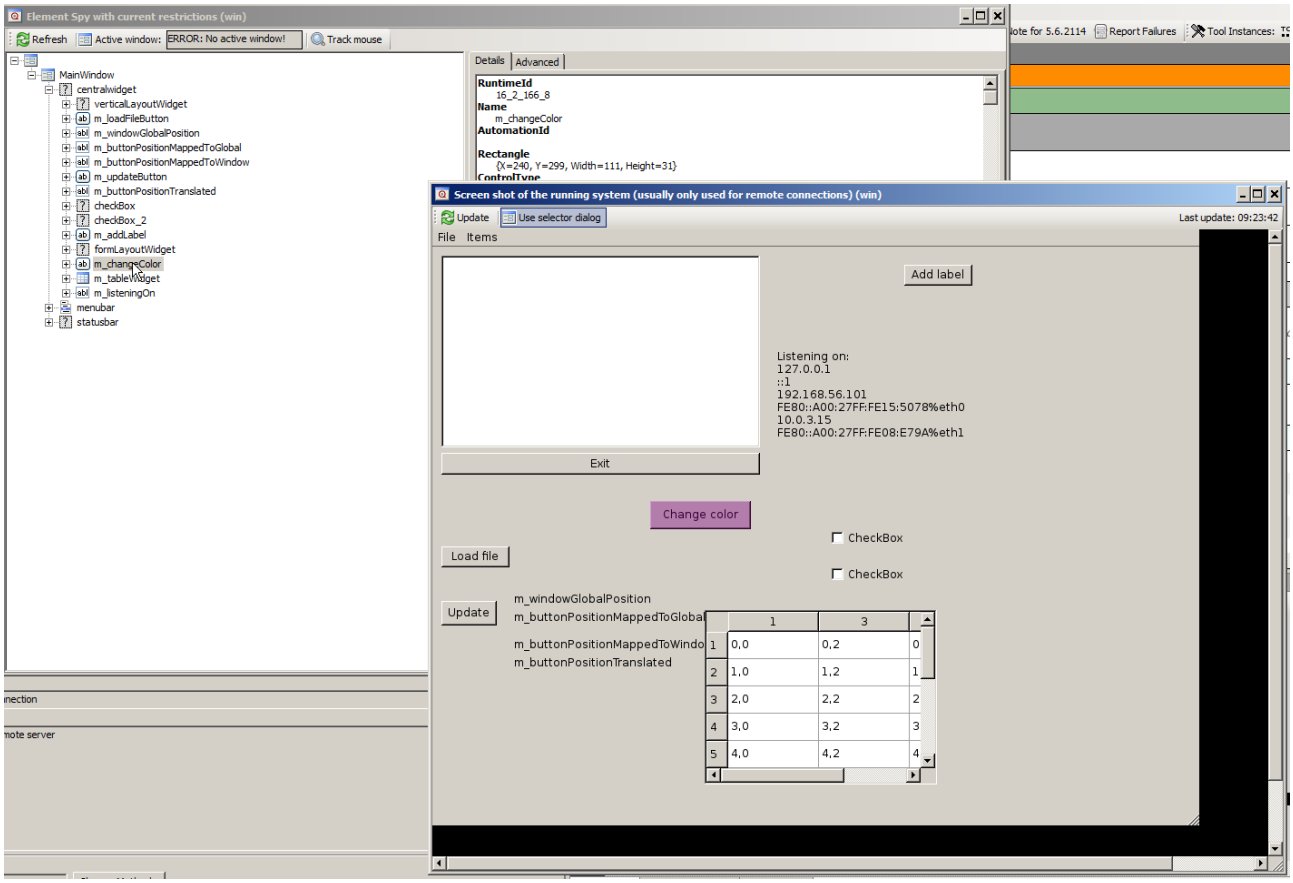



After this, the TCP connection to the virtual machine can be established by calling setup on the TCP connection:




After this, the Windows Automation Tool (win) should be able to see and interact with the remote GUI,

f.eks. using the “Element Spy” and “Remote Screen” panels:




The already written procedures should also be able to run, for example, the “Change background color” procedure which changes the GUI background 5 times.

# MachineAutomation

Machine Automation connection.

## Methods

### *Setup*

Create new machine automation instance

## Properties

### *Screen*

### *Connection*

### *PathToRoot*

### *ServerVendor*

### *ServerVersion*

### *ServerRevision*

### *ServerProcessId*

## Panels

### *Processes*

### *Files*

### *Windows*

# Mail

Send e-mails from your scripts.

## Mail

Send e-mails from your scripts.

## Methods

### *Send*
Sends an e-mail

## Mail Server Connection
Connect to a POP3/IMAP mail server to retrieve mails.

## Methods

### *Connect to a server.*
Set the server name/ip and username, password, etc.

### *Clear messages*
Delete and expunge all messages in a named mailbox.

### *Get messages*
Get all messages from a named mailbox.

## Properties

### *HostName*

### *Port*

### *UseSsl*

### *IgnoreCertificateErrors*

### *Username*

### *Password*

## Panels

### *Mail Reader*

# MIDI

MIDI Tools.

Send and receive MIDI-messages and streaming via plugins in SysEx-messages.

## Device

A base tool for MidiInputDevice and MidiOutputDevice

## Methods

### *SetupDevice*

Basic setup of a MIDI device

### *Open*

Open the device

### *Close*

Close the device

## InputDevice

Tool for receiving MIDI messages.

## Methods

### *SetupDevice*
Basic setup of a MIDI device

### *Open*
Open the device

### *Close*
Close the device

### *Start listening*
Start receiving MIDI messages.

### *Stop listening*
Stop receiving MIDI messages.

### *AwaitActivity*
Waits until the input device starts receiving messages.

### *AwaitSilence*
Waits until the input device does not receive any more messages.

## Properties

### *IsListening*

### *LastReceivedMessageTime*

### *LastReceivedRealtimeMessageTime*

## Panels

### *MIDI Piano Panel*
Piano Panel for playing notes through a MIDI Output

# OutputDevice
Tool for sending MIDI messages.

## Methods

### *SetupDevice*
Basic setup of a MIDI device

### *Open*
Open the device

### *Close*
Close the device

### *SendSysExMessage*
Send SysEx Message.

## Panels

### *MIDI Piano Panel*
Piano Panel for playing notes through a MIDI Output

# MidiStream

Stream that uses MIDI as lowlevel protocol.

## Methods

### *Open*

Open the stream

### *Close*

Close the stream

### *Read String*

Read a string from a stream

### *Read Line*

Read a line from a steam.

### *Read Byte*

Read a single byte from a steam.

### *Read Until*

Read from a stream until a given string is read.

### *Read Until Silent*

Read from a steam until no data has been received for a given time.

### *Write String*

Write a string to the stream

### *Write Binary Data from string*

Write binary data to the stream. The data is taken from a string listing the binary values. To decode the data string a decoder for the specific format must be selected.

### *Write Text*

Write multiple lines of text to the stream

### *Flush*

Flush read/write buffers of the stream

### *SetupStream*

Basic setup of a MIDI stream (through SysExMessages)

### *Request and wait for response*

### *Read Bytes*

### *Write Bytes*

### *Read XML*

## Panels

### *Data Counter*

Provides a byte counter to observe how many bytes are read/written

### *Data Sniffer*

Sniff the read/write data of a stream.

### *MIDI Stream Test Panel*

A UI for testing a MIDI Stream

### *Data Commander*

## Properties

### *WriteTimeout*

### *ReadTimeout*

### *IsOpen*

### *DataAvailable*

### *SupportsDataReceived*

# Sequence

Tool for a sequence of MIDI messages.

## Methods

### *Open MIDI file (*.mid or *.syx)*

Open a MIDI file (*.mid or *.syx).

### *OpenFile*

Open a MIDI file (*.mid or *.syx).

### *Save to MIDI file (*.mid or *.syx)*

Save sequence to a MIDI file (*.mid or *.syx).

### *SaveFile*

Save the sequence in a MIDI file (*.mid or *.sys).

### *Play*

Plays the sequence using the specified output device.

### *Record*
Records from the specified input device to the sequence.

### *Stop*
Stops playback or recording.

### *Continue*
Continue playing or recording

### *Clear*
Clear sequence

### *RemoveTiming*
Remove timing in all tracks

## Properties

### *WorkState*

## Panels

### *MIDI Sequence Viewer*
Lists all messages in the tracks in a MIDI sequence.

# Modbus

Provides access to the Modbus.

Communication using the Modbus protocol. Both the master role and simulation of slave devices are supported.

Modbus is an industry standard protocol for communication between a master unit and one or more slave devices.

The Modbus Tool has the following features:

- RTU, ASCII and TCP mode supported.
- Both master- and slave- mode supported.
- Simple slave device can be simulated directly from script.
- Advanced slave devices can be supported by writing a simple plug-in. Examples are supported.

# Modbus

Talk to devices on a Modbus.

## Methods

### *Setup*

Setup the Modbus.

### *Read Coil*

Read a coil from slave device.

### *Read Discrete Input*

Read a discrete input from slave device.

### *Read Multiple Coils*

Read multiple coils of a slave device.

### *Read Multiple Discrete Inputs*

Read multiple discrete inputs of a slave device.

### *Read Register*
Read a single unsigned 16-bit register of a slave device.

### *Read Multiple Registers*
Read multiple unsigned 16-bit registers of a slave device.

### *Write Single Coil*
Write a single coil to a slave device.

### *Write Multiple Coils*
Write a coils of a slave device.

### *Write Register*
Write a single unsigned 16-bit value to a register of a slave device.

### *Write Multiple Registers*
Write a multiple unsigned 16-bit values to a slave device.

## Properties

### *Stream*

## Panels

### *Registers*
Read a list of registers

### *Read Modbus Register*

### *Write Modbus Register*

### *Coils (function code 0x01)*
Read a list of coils

### *Discrete Inputs (function code 0x02)*
Read a list of discrete inputs

### *Analyze message*
Analyze a message by trying to decode it.

## ModbusSlave
Slave connection on a Modbus.

Slave tools have a register database used to contain the register values both written by the master and to be returned when read by the master. That makes the communication with the master independent of the test script execution.

The slave tool has methods to get and set the values in the register database.

## Methods

### *SetupSlave*
Setup the Modbus slave.

## Properties

### *Stream*

## Panels

### *Received messages*
Live updating view of the messages received on the modbus.

## ModbusSlaveDevice

Slave device simulation on a Modbus.

### Methods

#### *SetupSlaveDevice*

Setup the Modbus slave.

#### *ReadDeviceRegister*

Read Device Register

#### *WriteDeviceRegister*

Write Device Register

### Panels

#### *Device Registers*

View the list of registers on a simulated device.

#### *Received messages*

Live updating view of the messages received on the modbus.

# OPC

Tools for communicating with OPC servers.

The OPC toolbox contains tools related to the OPC (OLE for Process Control) protocol.

The toolbox is based on the Quick OPC component from OPC Labs and SeqZap includes a license for

QuickOPC allowing its use in SeqZap.

Disclaimer: CIM Software Testing are NOT OPC experts. Making it possible to connect to an OPC DA server on a remote machine requires OPC, DCOM and Windows administration skills. Please contact an OPC expert or your IT support for help setting up your PC for access to remote OPC servers.

# Troubleshooting OPC problems

## Connecting

Since OPC is based on COM and DCOM (Distributed COM), the error codes reported by OPC are usually hard-to-understand opaque COM error codes 0x8000????.

A common situation is that the OPC server is running locally on the machine, but SeqZap can still not connect or find the server (called browse the serer in OPC terminology).

A common way to fix this is to by-pass much of the DCOM permission system and connect directly to the local OPC server by setting MachineName to the empty string, instead of using localhost.

## Authentication and Permissions

A common situation is that SeqZap is running automated tests on the command line by being invoked by a build system slave (for example Jenkins) running as another user than the primary user account on a machine.

COM and DCOM also brings an authentication and permission system which is different from normal permission systems, at least, when it comes to error messages.

To help debug these issues the OPCToolTester.exe file shipped with SeqZap in the ZapTools\OCP_DOTNET451 folder. This program will connect to the local OPC server and list all servers and fields found using the local OPC server and writes them on the console (standard output), this makes it suitable for running as the SERVICE user where SeqZap Studio cannot run due to user interface limitations.

The following section documents the arguments that the OPCToolTester.exe can take.

## OPCToolTester.exe

The OPCToolTester.exe is located in the ZapTools\OPC_DOTNET451 folder, in the installation folder of SeqZap (usually C:\Program Files (x86)\SeqZap).

The OPCToolTester.exe will list all servers discovered by the local OPC server, and list the fields (leaves) found on those servers.

The OPCToolTester.exe connects to the OPC server on localhost through DCOM by default, but this can be changed by using the –h <hostname> argument – to connect to the local OPC server using normal COM, the empty hostname can be specified by using –h “”.

By default the OPC values are only listed, but not read, to read the values the –r argument can be added.

# OPC DA Client

OPC DA Client Tool.

The OPC Client tool is a tool for getting and setting item values from a connected OPC DA server.

The tool includes an abstraction layer to be able to assign the OPC items descriptive names to improve script readability and maintainability. By doing that, it is also possible to re-map items to another “physical” OPC item without having to change existing scripts.

The OPC client creates an OPC device with the same name as the tool instance, to expose the configured OPC items as device entities, making it possible to map virtual device entities to OPC items.

The OPC Client tool can only be used as a workbench instance (it is not possible to create a new instance in a procedure step). That is necessary because the list of OPC items needs to be configured and setup before the tool methods can be used.

The tool supports ‘Simulate’ mode. By right clicking a workbench tool and selecting ‘Simulate’ in the menu the tool will simulate all OPC items. When using this mode it is possible to execute scripts without having access to the used OPC servers. The execution log will show that the used OPC items are in simulate mode and Get methods will just return the default value of the item.

This manual also contains a section on troubleshooting OPC problems.

## Methods

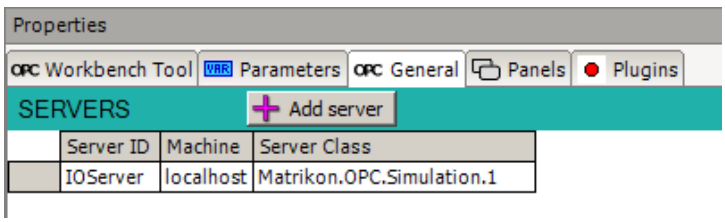
### *Setup*

Setup OPC Server connections and items.

The Setup method is used to setup the connection to the needed OPC Servers and the needed OPC Items. It is possible to setup a connection to any number of local and remote OPC Servers and any number of OPC Items.

The list of OPC Items will be presented to the script as a flat list where only the given name of each item is used, no matter which and how many different servers are used.

The list of servers is configured under the SERVERS section in the General tab of the properties.



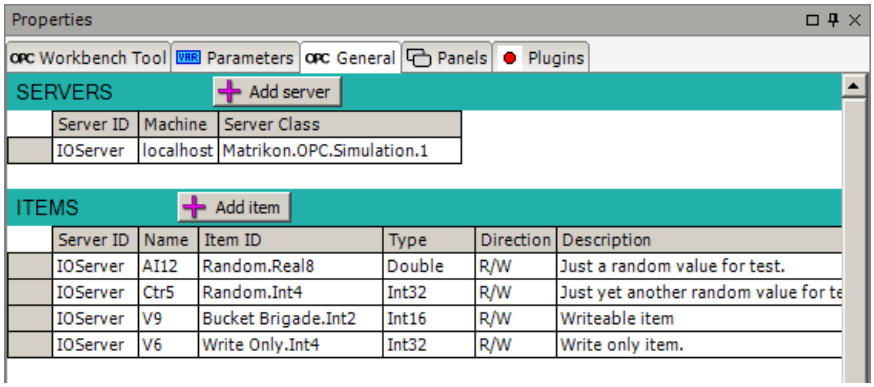

A new server can be added by pressing the ‘Add server’ button of the SERVERS heading line.

An existing server connection can be removed by pressing the Delete key when the server line is selected. A server connection can be moved up and down in the list by pressing Alt + Up or Alt + Down when the server line is selected.

There are three fields to setup for each connected OPC server:

- ServerID
  This is a text field where the user must set a descriptive short name for the server. This name is used in the item configurations to identify the parent server of each item.
- MachineName
  This is a text field for the name of the OPC server machine. It can be the machine name, the machine IP address or empty when connecting to a local OPC server.
  Please note that this means that there is a difference between connecting to localhost (which involves DCOM) and connecting to the local OPC server by setting the MachineName to the empty string. Please see the section named Troubleshooting OPC problems for more.
- ServerClass
  This is a text field for the class name of the OPC server on the specified machine. Click the browse-symbol (…) or press the space button to open a dialog for browsing available server classes on the selected machine.

The list of used OPC items is configured under the ITEMS section in the General tab of the properties.




A new item can be added by pressing the 'Add item' button of the ITEMS heading line or by pressing the Enter key on the line where you wish to insert a new item.
An existing item can be removed by pressing the Delete key when the item line is selected.
An item line can be moved up and down in the list by pressing Alt + Up or Alt + Down when the item line is selected.

The different fields for each item are:

- ServerID
  This is a text field where the parent server of the item is selected. The field must be set to the server ID of one of the servers configured in the servers list above.
- Name
  This is a text field where the chosen name of the item is set. By default the name will be set to the

name of the selected OPC item, but it can be set to a more descriptive name, making the scripts more readable and easy to maintain.

- ItemID
  This field is used to select the OPC item to use. Click the browse-symbol (…) or press the space button to open a dialog for browsing the server for available items.
- Type
  This field is for selecting the resulting data type of the item in SeqZap. The field will be set automatically when selecting the item via the item browser dialog.
- Direction
  This field shows the data access direction for the item; whether it is read-only, write-only or read-write.
- Description
  This is a text field where the item can be given a short description.

### Error Handling in Setup

Many different errors can occur in the setup process. The different error types are listed below along with a description of how each error type is handled during setup.

Errors on server entries:

| Error description | In parser | Breaks setup |
|---|---|---|
| Missing 'Server ID'<br>The 'Server ID' field is empty. | Error | Yes |
| Missing 'Server Class'<br>The 'Server Class' field is empty. | Error | Yes |
| Duplicate 'Server ID' on server entry<br>The ID has the same name as a pervious entry in the list. | Error | Yes |
| The specified 'Server Class' was not found<br>The specified server class was not found on the specified machine. | No | No |

Errors on OPC items:

| Error description | In parser | Breaks setup | Step error | Simulates |
|---|---|---|---|---|
| Missing 'Server ID'<br>The 'Server ID' field is empty. | Error | Yes | Yes | No |
| Unknown server ID<br>No server entry has the specified server ID. | Error | Yes | Yes | No |
| Missing 'Name'<br>The 'Name' field is empty. | Error | Yes | - | No |
| Duplicate 'Name'<br>The entry has the same name as a previous entry in the list. | Error | Yes | No | No |
| Missing 'Item ID'<br>The 'Item ID' field is empty. | Error | Yes | Yes | No |

| | | | | |
|---|---|---|---|---|
| Unknown item ID<br>The OPC server has no item with the specified ID. | Warning | No | Yes | No |
| Selected 'Type' is different from the data type of the item on the OPC server. | - | No | No | Yes |
| Selected 'Direction' is incompatible with the direction of the item on the OPC server. | - | No | No | Yes |
| Syntax error in specified 'Update Rate'<br>The specified update rate does not follow the supported format of a time interval value. | Error | Yes | No | No |
| Quality is bad and not one of these values:<br>LastKnown, WaitingForInitialData | - | No | No | Yes |

The column 'In Parser' indicates whether the error is listed in the Errors and Warnings view, and whether it is reported as an error or as a warning.
The column 'Breaks setup' indicates whether the error will prevent the setup of the tool from completing. If the error breaks the setup, the error has to be fixed before the tool can be used.
The column 'Step error' indicates whether steps using the item will report an error in the Errors and Warnings view.
The 'Simulates' column indicates whether the error will force the tool into 'Simulate' mode.

### *Get Item Value*

Gets the value for the specified OPC item.

This method gets the value of an OPC item.

The setup shows the list of available items for the selected OPC Client instance. The user can select one of the items on the list and the output data type of the procedure step will be set to the data type of the selected item.

### *Set Item Value*

Sets the value for the specified OPC item.

This method sets the value of an OPC item.

The setup shows the list of available items for the selected OPC Client instance. The user can select one of the items on the list and the input data type of the procedure step will be set to the data type of the selected item.

## Panels

### *Items*

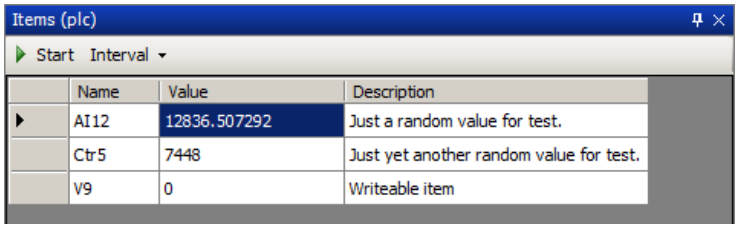
Configured Items

The Items panel shows a table with the list of OPC items and their current values.

The values are automatically updated whenever the items are read, either in a test script or when items are

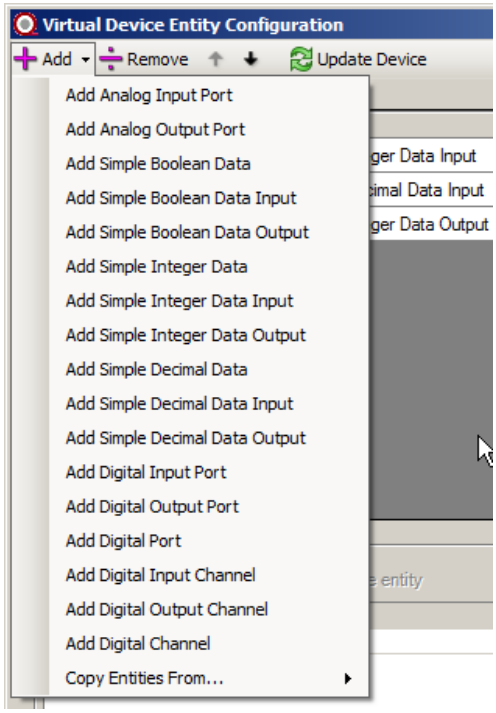
periodically polled.

Polling can be started by pressing the Start button in the panel and the poll interval can be changed by clicking the Interval button and thereafter selecting an interval time in the drop-down menu that appears.




## Using OPC items in a virtual device

The configured OPC items of an OPC Client tool can be used as sources by device entities of virtual devices. The virtual device entity types to use for OPC entities are the *Simple Boolean*, *Simple Integer* and *Simple Decimal* types.




Please refer to the Virtual Device Tool for more info on creating and using virtual devices.

# Power Supply Toolbox

Power Supply Toolbox

The Power Supply (PSU) toolbox defined an abstract interface to power supplies.

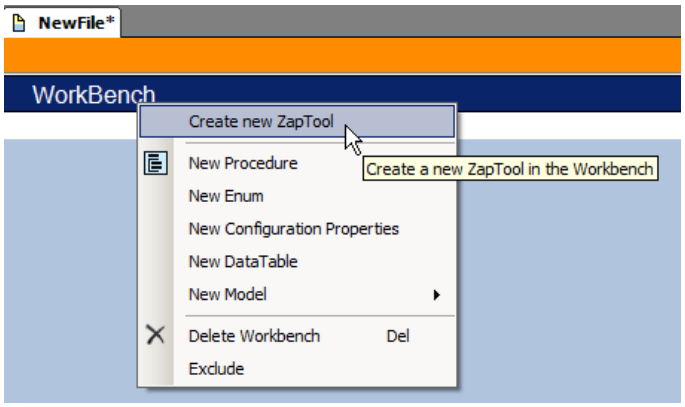
Power supplies are exposed as device entities in SeqZap, this means that they can be used in a virtual device.

The Power Supply toolbox does not provide any drivers to access power supplies, it only defines the PSU device entity and the methods to use a PSU in SeqZap scripts.

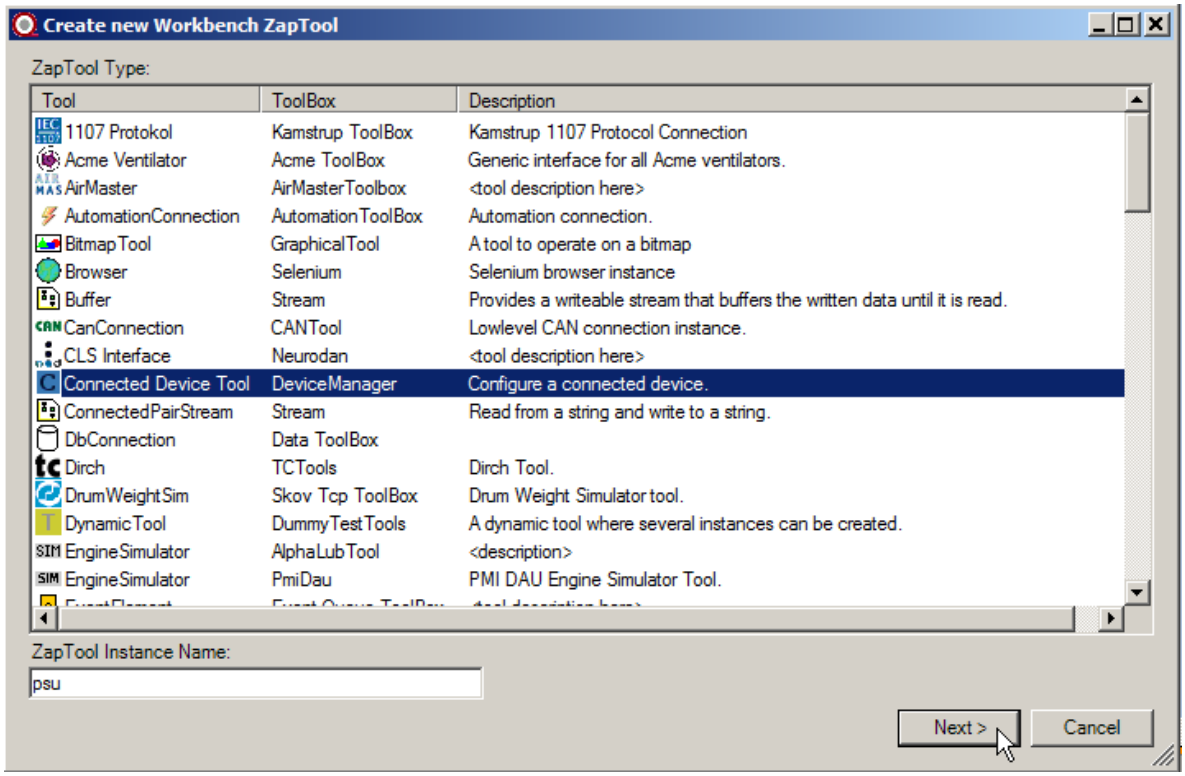
## Setting up a power supply device

The power supply is represented as a device entity, but because the most power supplies needs some level of setup before they can be used, for example to configure the COM port to communicate over, the power supply is represented as a connected device plugin.

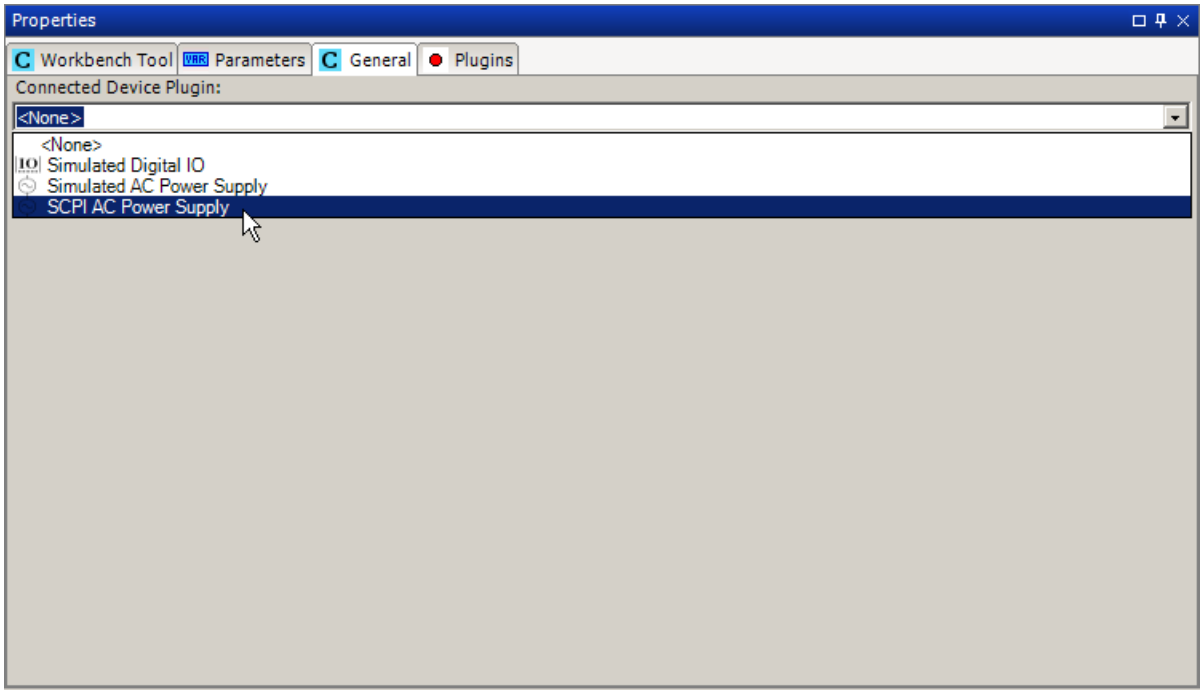
To use a connected device, a connected device tool must be added to the workbench:



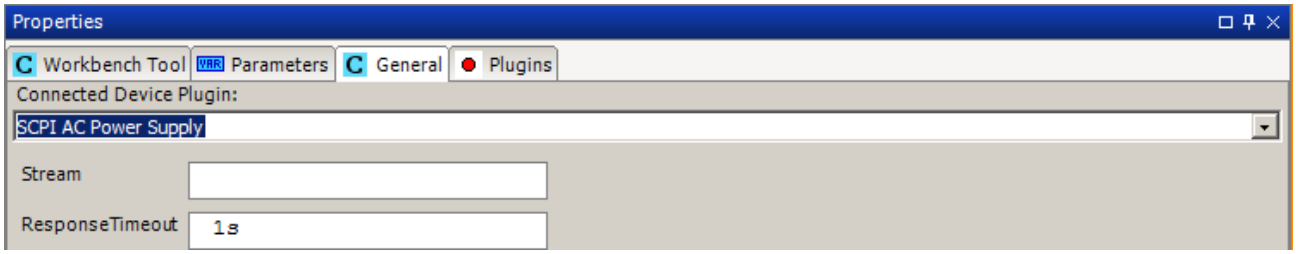

The name of the connected device tool will also be the name of the device entity created.



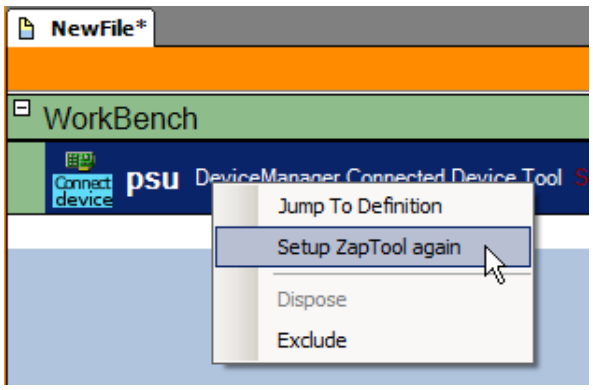

In the General tab of the properties view, the specific connected device plugin to use can now be selected.




Some plugins require additional parameters to be set, the SCPI AC Power Supply plugin, for example, requires two parameters to be set. These parameters can both be set directly on the General tab or on the Parameters tab of the properties view.




After the settings have been changed, the Power Supply must be setup again in the workbench.




Please remember that workbenches are parsed from top to bottom, so if the Power Supply requires another tool, for instance a serial port or VISA resource, that tool must be placed *above* the Power Supply tool in the workbench.

Items in a SeqZap script file are re-arranged by selecting the item and pressing Alt+Up/Down to move the item.

## Included Examples

SeqZap includes an example script which use the Power Supply tool in the Examples\Tools\GPIB Power Supply directory where SeqZap is installed.

Additionally SeqZap also comes with the test projects which CIM Software Testing use to verify the Power Supply tool internally, the projects are located in the Test\SeqZapTest\Tools\PowerSupply direcotory.

In this directory the following tests are located:

- **PSU_Verification:** A sunshine test to verify the operation of a PSU, it is supposed to work with a physical PSU which supply a light-bulb.
- **ScpiProtocolTest:** Is a protocol test which use the Test Stream from the Stream tool to verify that SCPI commands sent by the AC SCPI Power Supply plugin.
- **SystemTest:** Automates SeqZap Studio to verify that the Power Supply tool can be added to a workbench and used from SeqZap scripts.

## AC Power Supply

Access to AC power supplies.

The AC Power Supply defines a common set of methods that AC Power Supplies can be expected to support.

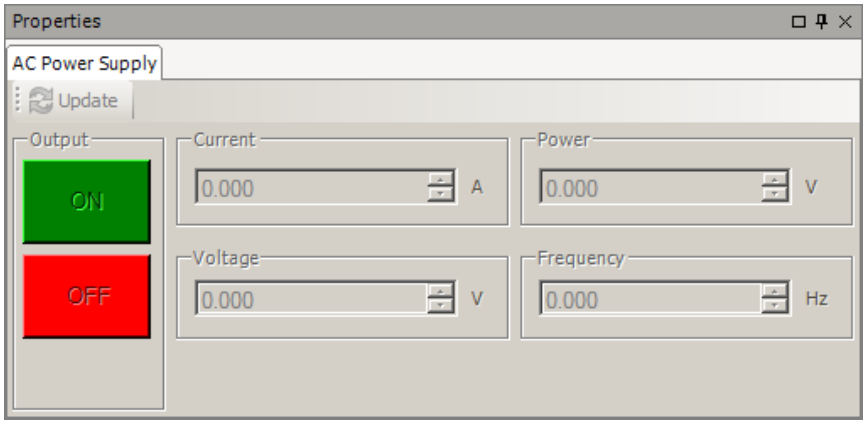
Many of the methods are only optional, and the method will report a parse error if the selected AC Power Supply device does not support the method.

All the methods can report InvalidOperationError if an AC Power Supply method is called in an invalid situation, for example if setting the voltage while the output is enabled is not allowed.

## AC Power Supply Device Entity Panel

As most other device entities in SeqZap, the AC Power Supply entity also has a device entity panel.

The panel is shown by selecting a PSU entity in the device browser panel.




When the panel is initially shown it will refresh the state of the PSU, this is equivalent to pressing the Update button.

While the panel is updating the user-interface is disabled and cannot be used.

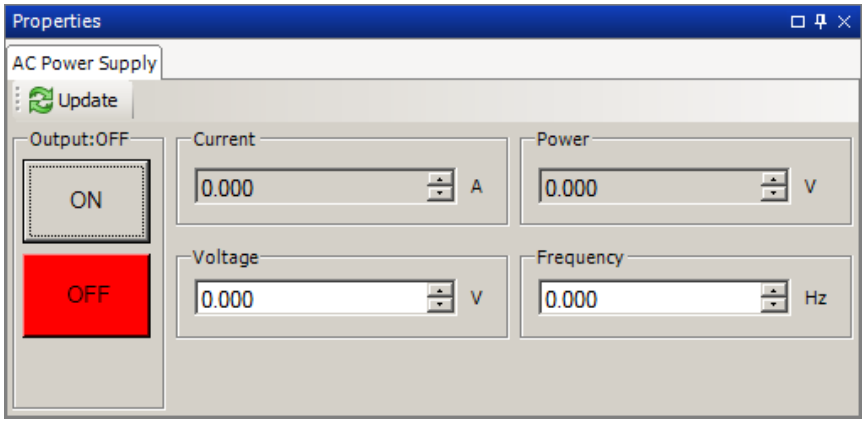
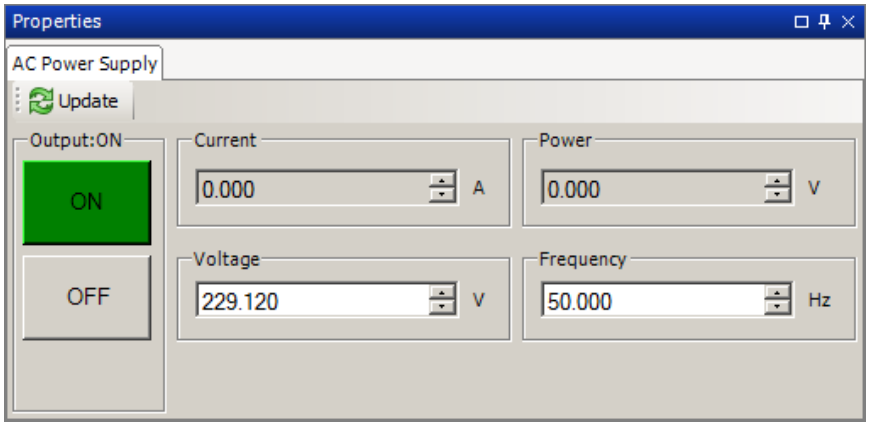



**Figure 2 AC Power Supply entity in with output disabled**

When the PSU is OFF (output is disabled) the Voltage value shows the configured voltage level – after the PSU is turned ON (output is enabled) the Voltage value shows the voltage level measured by the PSU.




Please note that the values shown in the panel is not updated automatically or refreshed periodically, to retrieve the current state of the power supply, the Update button must be pressed.

## Entities

### *AC Power Supply*

All the AC Power Supply methods take an AC Power Supply entity as the first argument, the power supply can both be a physical one or a virtual one mapped using the Virtual Device tool.

The AC Power Supply is described in detail earlier in this manual.

### *OutputEnabled*

The OutputEnabled entity is a Simple Boolean Read/Write data entity, and can be used to enable the output on the power supply using generic Simple Boolean device methods.

## Methods

### *Get Voltage*

Get the currently set AC RMS voltage in volts.

Get the output voltage (RMS) in volts.

This method is supported by all AC power supplies.

### *Set Voltage*

Set the output voltage (RMS) in volts.

This method is supported by all AC power supplies.

### *Get Current*

Get current as a decimal value measured in amperes (RMS).

This method is supported by all AC power supplies.

### *Enable Output*

Enable the output of the power supply.

This method is supported by all AC power supplies.

### *Disable Output*

Disable the output of the power supply.

This method is supported by all AC power supplies.

### *Is Output Enabled*

Determine whether the output of the power supply is enabled.

This method is supported by all AC power supplies.

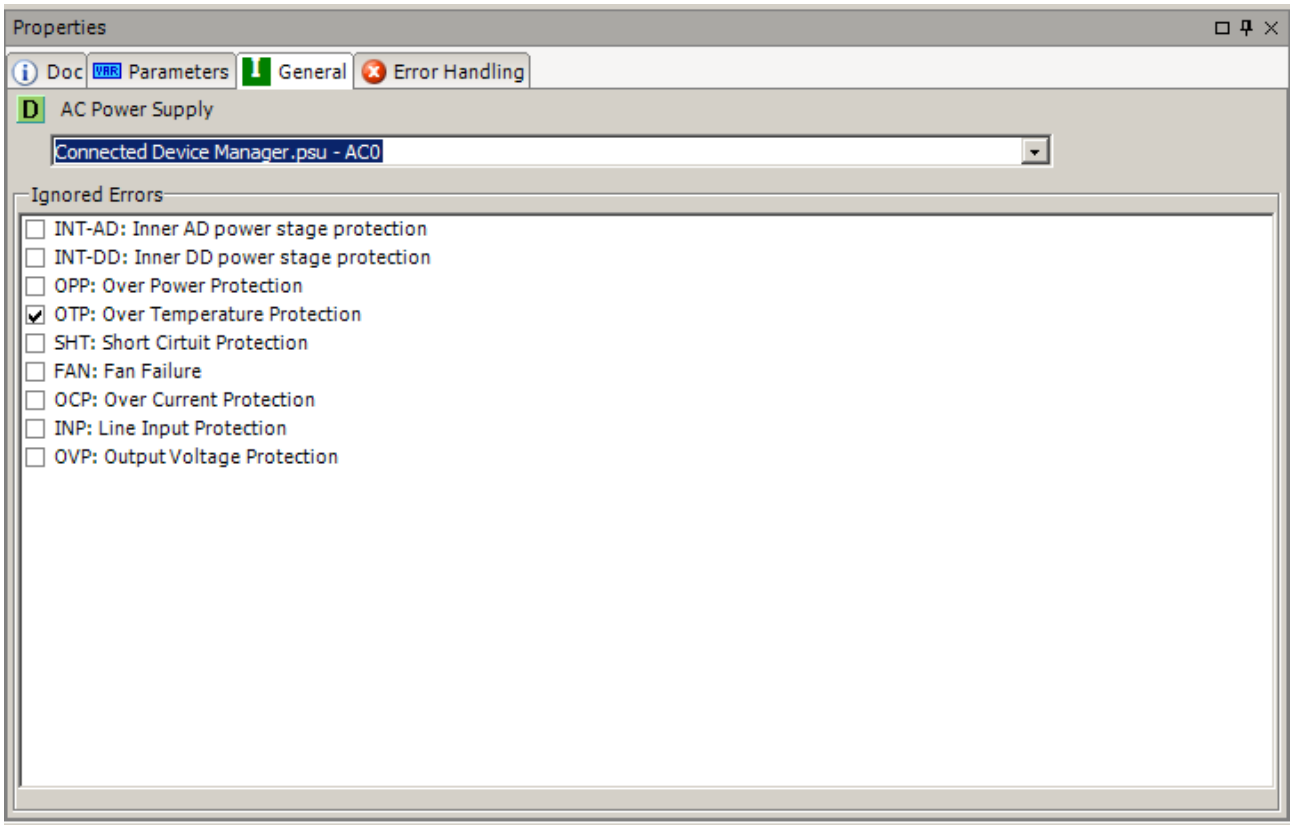
### *Identify*

Get a string which identifies the model and revision of the connected power supply.

This method is supported by all AC power supplies.

### *Ignore Errors*

Ignore one or more errors that the AC Power Supply can report, this can be used to ignore errors which would otherwise result in a failed step.




This can, for example, be used to ignore a temporary “Over current protection” error which would otherwise cause the test to stop.

The ignored error will be ignored until the next call of the “Ignore Errors” method, un-ignoring all errors can be done by calling “Ignore Errors” without specifying any errors.

This method is supported by all AC power supplies.

### *Set Voltage Range*

Set the voltage range of the power supply.

If the range is not supplied, the power supply should automatically set the range.

Power supplies usually support a predefined set of ranges, e.g. 0-150 or 0-300, if the script tries to set an unsupported range InputOutOfRange is reported.

InputOutOfRange is also reported if the power supply does not support auto-range.

If the power supply does not support setting the voltage range a parsing error will be reported for the step.

### *Get Frequency*

Get the currently set frequency in Hz.

If the power supply does not support setting the voltage range a parsing error will be reported for the step.

### *Set Frequency*

Set the frequency in Hz.

If the power supply does not support the specified frequency, InputOutOfRange will be reported.

If the power supply does not support setting the voltage range a parsing error will be reported for the step.

### *Set Current Limit*

Set the peak current limit on the power supply in amperes.

If the power supply does not support the specified current limit, InputOutOfRange will be reported.

If the power supply does not support setting the voltage range a parsing error will be reported for the step.

### *Get Power*

Get the power as a decimal value in watts.

If the power supply does not support setting the voltage range a parsing error will be reported for the step.

### *Get Power Factor*

Get the power factor of the power supply.

If the power supply does not support setting the voltage range a parsing error will be reported for the step.

### *Get Crest Factor*

Get the crest factor of the power supply.

Get crest factor as a decimal value.

If the power supply does not support setting the voltage range a parsing error will be reported for the step.

### *Clear protection*

Clear the latch protection of the power supply.

If the power supply does not support setting the voltage range a parsing error will be reported for the step.

### *Set Protection Level*

Set the software overvoltage protection level of the ac source.

If the power supply does not support the given protection level, InputOutOfRange will be reported.

If the power supply does not support setting the voltage range a parsing error will be reported for the step.

### *Reset*

Reset the power supply.

If the power supply does not support setting the voltage range a parsing error will be reported for the step.

### *Self-Test*

Perform a self-test of the power supply.

If the self-test was not successful, SelfTestFailed is reported.

If the power supply does not support setting the voltage range a parsing error will be reported for the step.

### *Get Ignored Errors*

Get a the list of errors which have been previously ignored.

A list of the errors which *can* be ignored is also returned as an array of strings.

# ProcessControl

Execute/terminate programs and retrieve their output

This is a simple tool used to execute system commands and applications on the local test machine.

The tool can also be used to get a list of the currently running applications.

## Included Examples

SeqZap includes an example use of the Run Command.

## ProcessControl

Execute/terminate programs and retrieve their output

### Methods

#### *Run*

Execute a commandline program/script

This method is obsolete, please use the “Run Command” method instead.

#### *Start Application*

Start a local windows application, optionally waiting for it to open a new window.

#### *Stop Application*

Stop application and wait for it to finish.

#### *Query process*

Retrieve information about a process running on the local machine.

#### *Run Command*

Execute a commandline program/script

The run Command is used to execute a windows batch command and optionally retrieve the exit code, standard output and standard error of the command.

The command can also optionally be supplied with a string to use as standard input for the command.

SeqZap includes an example use of Run Command.

# Programmer Toolbox

Tools for related to programming of memory devices.

This toolbox contains tools related to the programming of memory devices.

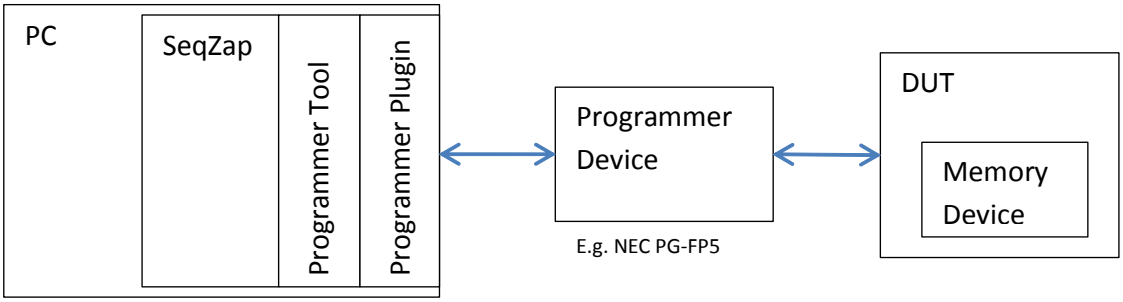
# ProgrammerTool

Tool for programming memory devices.

This a general tool for erasing, programming and verification of general memory devices through a connected programmer device. Typical memory device types are flash-memory and EPROMs.

The Programmer Tool is a dynamic tool and the Setup method must be used on a new tool instance to select the kind of programmer device to use.

The ProgrammerTool uses a *programmer plugin* to interface a specific type of programmer device.
The relationship between SeqZap, the tool, the plugin and the programming device is illustrated below.



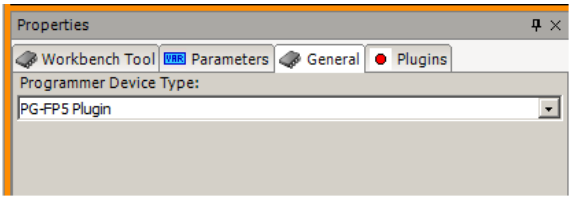

## Methods

### *Setup*

Setup the programmer tool.

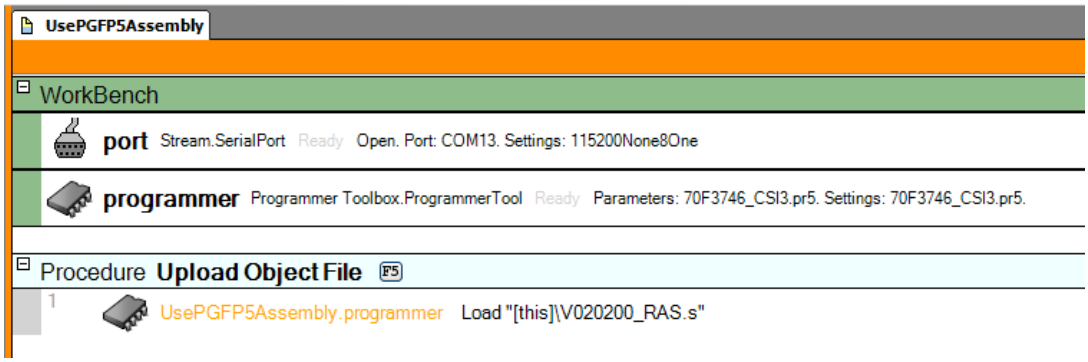
This method initializes the programmer tool using the specified data.

The main parameter of this method is the programmer plugin selection, where the type of programmer is selected.




Depending on the selected programmer type (plugin), the Setup method will expand with any number of additional input parameters specified by the selected programmer plugin.

The example below shows a programmer tool instance created in a workbench.




### *Load*

Load the programmer memory.

This method loads a memory-data file into the programmer device, to prepare for Program and Verify actions.

The only parameter for this method is the file path to the HEX-file to load.

### *Erase*

Erase the device memory.

This method erases the memory device to prepare it for a new programming.
The method has no parameters.

### *BlankCheck*

Blank Check the device memory.

This method reads the complete memory device to check whether it is totally ‘blank’ (all memory is in its initial cleared state).
The method has no parameters.

### *Program*

Program the device memory.

This method programs the memory device using the file loaded with the Load method.
The method has no parameters.

### *Verify*

Verify the programmed device memory.

This method reads the complete memory device and checks whether all memory addresses have the same value as specified in the loaded file.
The method has no parameters.

### *Erase and Program*

Erase, BlankCheck, Program and Verify the device memory.

This is a convenience method that sequentially performs the commands:

1. Erase,
2. Blank Check,
3. Program and
4. Verify.

If any of the commands fails, the subsequent commands are not performed.
The method has no parameters.

## Properties

### *ProgrammerDeviceState*

Gets the latest updated state of the programmer device (plugin).

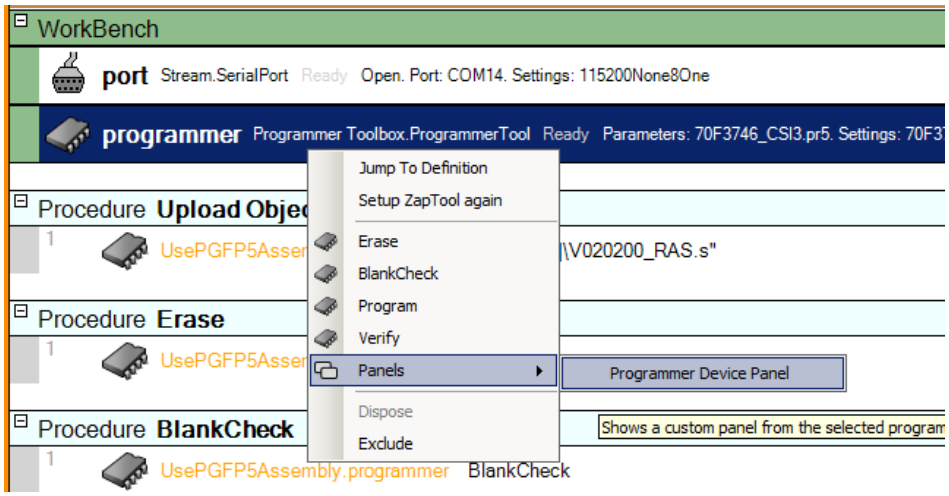
This is a read-only text property that returns a string with the current state of the selected device plugin. The string has no specific format. The developer of the programmer plugin chooses the information it contains.

## Panels

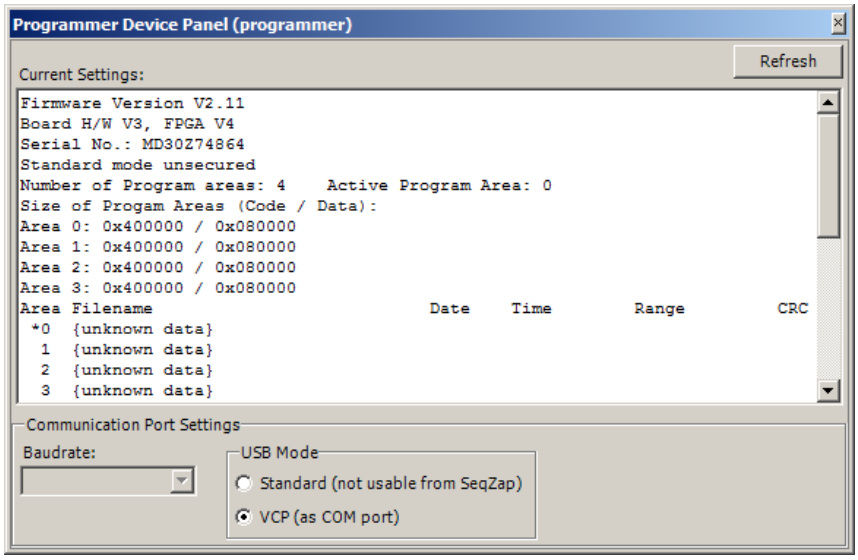
### *Programmer Device Panel*

Shows a custom panel from the selected programmer plugin.

The panel is opened by right-clicking the workbench tool and selecting Panels → Programmer Device Panel.




The panel will contain a device specific panel from the selected Programmed Device Plugin.
The example shown below is the panel for the PG-FP5 programmer plugin.




# Programmer Plugin API

The programmer device API defines the interfaces to use when implementing programmer device plugins. The API is only relevant for software developers implementing a plugin for a specific programmer device type.

This section will not describe all the details of the API, but will describe the purpose and usage of the defined interfaces, methods, properties and events. Please refer to the Programmer Tool assembly for the latest build-in documentation.

## *IProgrammerPlugin interface*

This defines the interface of a programmer plugin. The interface has only a few methods.

### Methods

#### *ListSetupParameters*

This must return the list of additional plugin specific parameters for the Setup method of the programmer tool. The parameters specified by this method will be passed to the Setup method of the programmer device object.

#### *CreateDeviceInstance*

This method is used to create a programmer device object (implements the `IProgramerDevice` interface) to be used by the programmer tool instance to perform all programming actions.

## *IProgrammerDevice Interface*

Programmer device objects must implement the `IProgrammerDevice` interface defined by the Programmer Tool assembly. The interface defines the methods, properties and events the Programmer Tool will use to perform the programming actions.

### Methods

*Setup*
This method is called by the Setup method of the Programmer Tool instance to initialize and setup the programmer device. After this method has been called, the device should at least be ready for the Erase and Blank Check operations.

The Programmer tool instance will pass the arguments (values) of the parameters that were specified by the `IProgrammerPlugin.ListSetupParameters` method.

*LoadFile*
This method is used to transfer the memory image file to the programmer device or the programmer device object.

After this method has been called, the programmer device should be ready for Program and Verify commands.

*Erase*
This method is used to perform an Erase operation with the programmer device.

*BlankCheck*
This method is used to perform a Blank Check operation with the programmer device.

*Program*
This method is used to perform a Program operation with the programmer device.

*Verify*
This method is used to perform a Verify operation with the programmer device.

*CreateDevicePanelControl*
This method creates a UI control for user interaction with the programmer device. The functionality and look of the control is specific for each programmer plugin.

### Properties

*CommunicationSync*
This read-only property returns an object to be used for locking (reserving) the programmer device object while performing one or more operations.

*State*
This is a read-only property returning a textual single line description of the state of the programmer device.

### Events

*StateChanged*
This event notifies when the State property text has changed.

# SampleArray

Tools for sampled data.

Used by other tools to view, measure, generate and analyze multi-channel sample-data

The Sample Array tool is a data tool and is used for holding multi-channel constant samplerate or timestamped samples.

An instance of a Sample Array

## SampleArray

Array for sampled data

### Methods

#### *Create SampleArray Data*

Creates some sample array data. The data can either be the same value or generated by a signal generator.

#### *Create SampleArray*

Creates a sample array. The data can either be 0s (zeroes) or generated by a signal generator.

#### *Create SampleArray with iregular sample timing.*

Creates a sample array with the specified channels and with no samples.

#### *Get Length*

Get the length of the sample array (number of samples on each channel).

#### *Get Sample Count*

Get the number of samples on the specified channel.

### *Add sample to specified channel.*

Adds a single sample to the specified channel.

### *Set Sample Value*

Set the value of a single sample on the specified channel at the specified index. SampleArray must not be read-only.

### *Get Sample Value and Time*

Get the value of a single sample on the specified channel at the specified index.

### *Clone SampleArray*

Makes a clone of the SampleArray.

### *Add Value*

Adds the specified value to every sample in the SampleAray.

### *Multiply*

Multiplies every sample in the SampleAray with the specified value.

### *Rotate SampleArray*

Rotate the samples in the SampleArray in the specified direction.

### *Get Statistics*

Get statistic information about the samples.

### *Diff*

Calculate the difference between two sample arrays and return it as a new sample array

### *CompareChannelWithReference*

Compare a channel and the specified reference curve by finding the maximum deviation.

The TimeDeviation field is used to set the timing tolerance of the comparison. If the TimingTolerance is set to zero, all samples are compared one-to-one with the reference. If TimingTolerance is set to 2, every sample is compared to 5 samples (2 before and 2 after) in the reference (e.g. sample 6 is compared to reference samples 4,5,6,7 and 8). The smallest deviation of the 5 is used.

The WrapEnds field can be used for cyclic data. When TimeDeviation is set to 1, sample 0 of the array will also be compared to the last sample of the reference SampleArray.

### *Set Current Inspection Mark*

Sets current point for inspection of the data.

### *Set Logic Levels*

Sets the HI and LO levels for converting to logic level.

### *Convert To Logic Changes*

Gets the sample number and time for the next change in logic level.

### *Get Next Logic Level Change*

Gets the sample number and time for the next change in logic level.

### *Get Channel Trig Point*

Get the time where the samples of a channel crosses the specified value.

### *Save CSV file*

Save sample array as a CSV file.

### *Save CSV file interactively*

Save a CSV file.

### *Load CSV File*
Load sample array from a CSV file.

## Properties

### *ReadOnly*

### *Channels*

### *Samples*

### *MaxLength*

## Panels

### *Sample Arrays*
Investigate the created sample arrays

# Selenium

The Selenium tool has been permanently discontinued.

All new test scripts should use the new WebDriver (Selenium 2.0) tool.

It is also recommended to migrate all Selenium scripts to the new WebDriver tool.

# SeqZap Automation

# SeqZap Automation

## Methods

### *Setup*

Start a new SeqZap instance with automation enabled.

### *Start*

Start SeqZap.

### *Wait for parser*

Wait for the parser to finish and optionally expect.

### *Open File*

Open a script file

### *Close All Files*

Close all files

### *Restrict to view*

Add a restriction to a windows automation tool instance for a view in SeqZap

### *Stop*

Stop SeqZap (Quit it).

### *Expect no Failure Reports*

Expect that no failure reports has been reported.

### *Update Tool Documentation*

Extract documentation from a loaded tool and update a Word file.

## Properties

### *CoreFilesLoaded*

### *ParserState*

### *ParserResult*

### *ParserErrors*

### *ParserWarnings*

### *ParserInfos*

### *ExecutionRunning*

### *ProductName*

### *ProductSuite*

### *ProductCompany*

### *Started*

### *Stopped*

### *SeqZapId*

#### *ExecutablePath*

#### *ProcessId*

#### *Connection*

#### *Connected*

### Panels

#### *Currently running SeqZap instances.*

#### *State overview*
Provides an overview of the state of the automated SeqZap instance.

# Soap

SOAP related tools.

Provides a way to interface with web services which expose a SOAP interface.

## SoapTool

### Methods

#### *Setup*
Parse a web service description file.

#### *Call*
Call a web service method.

# SSH

SSH + SCP protocol support.

## SSH

SSH + SCP protocol support.

### Methods

#### *Run*

Run a remote command on a target using SSH.

# State Machine ToolBox

Toolbox for state machine related tools.

## State Machine Engine

<tool description here>

### Methods

#### *Setup (create state machines)*

Setup state machine types and create state machines.

#### *Get Script State Machine Reference*

Setup state machine types and create state machines.

### *Reset All Script State Machines*
Reset all state machines to initial state.

### *Start All Script State Machines*
Starts all enabled script state machines.

### *Stop All Script State Machines*
Stops all running script state machines.

### *Await Action*
Setup state machine types and create state machines.

## Panels

### *State Machines View*
Shows the list of state machines ant their state and properties.

## Properties

### *PreciousActionTime*

# ScriptStateMachineTool
<no description yet>

## Methods

### *Private Log*
Add a log entry in the private log.

### *Change State*
Setup state machine types and create state machines.

### *Start State Machine*
Set state machine in 'Running' mode.

### *Stop State Machine*
Set state machine in 'Not Running' mode.

### *Create 'Change State' Trigger*
Creates a trigger that can be used to signal a state change request.

### *Set Async Action*

## Properties

### *CurrentState*
The current state of the state machine.

### *InStoppableState*
Wheter the current state is a valid state for stopping the state machine.

### *CurrentStateExtraInfo*
Additional state information text. Is shown in state machine tool instance state.

### *StartTime*
The time where the state machine was started.

### *CurrentStateChangeTime*
The time for the last state change.

### *CurrentStateEntryTime*
The time when the entry handler for the current state was called.

### *LastIntervalTimerCalled*
The time when the entry handler for the current state was called.

### *IsEnabled*
Whether the state machine is currently enabled.

### *IsRunning*
Whether the state machine is currently running (started and not stopped yet).

### *LastState*
The last state before the current state of the state machine.

# Stream

General stream handling toolbox.

The stream toolbox provides access to a lot of stream oriented devices, such as serial ports, files and network connections.

Many SeqZap tools utilize the stream toolbox to define a protocol which can work any underlying stream, the same protocol will work for both serial ports and network connections, for instance.

## Included Examples
SeqZap includes an example use of the serial port.

## Stream
Data stream

This is the base on which all other streams are based, so everything defined on the stream is also defined on the other streams.

## Methods

### *Open*

Open the stream

Open the stream.

### *Close*

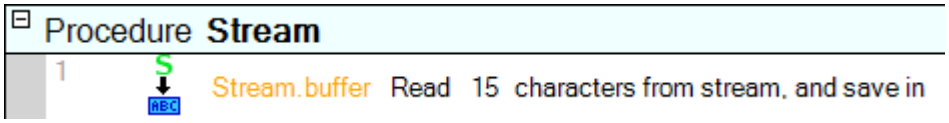
Close the stream

Close the stream.

### *Read String*

Read a string from a stream

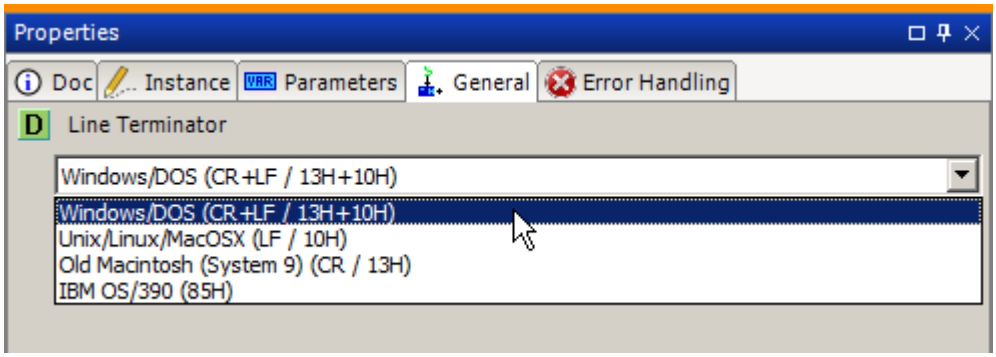
Read a number of characters from the stream.




### *Read Line*

Read a line from a steam.

Read a line of data from a stream as a string.

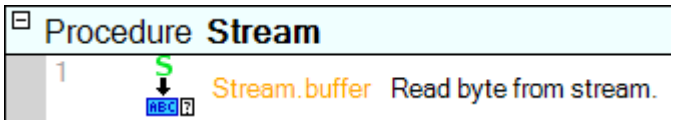



The line terminator can be changed on the setup page.

### *Read Byte*

Read a single byte from a steam.

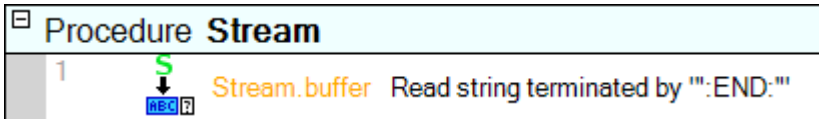
Read a single byte from a stream.




The byte is returned both as the actual value, and as a single character as defined by stream's encoding.

### *Read Until*

Read from a stream until a given string is read.




Read from the stream until the given terminator is read.

### *Read Until Silent*

Read from a steam until no data has been received for a given time.

Read from a stream until it has been silent for a defined time.

### *Write String*

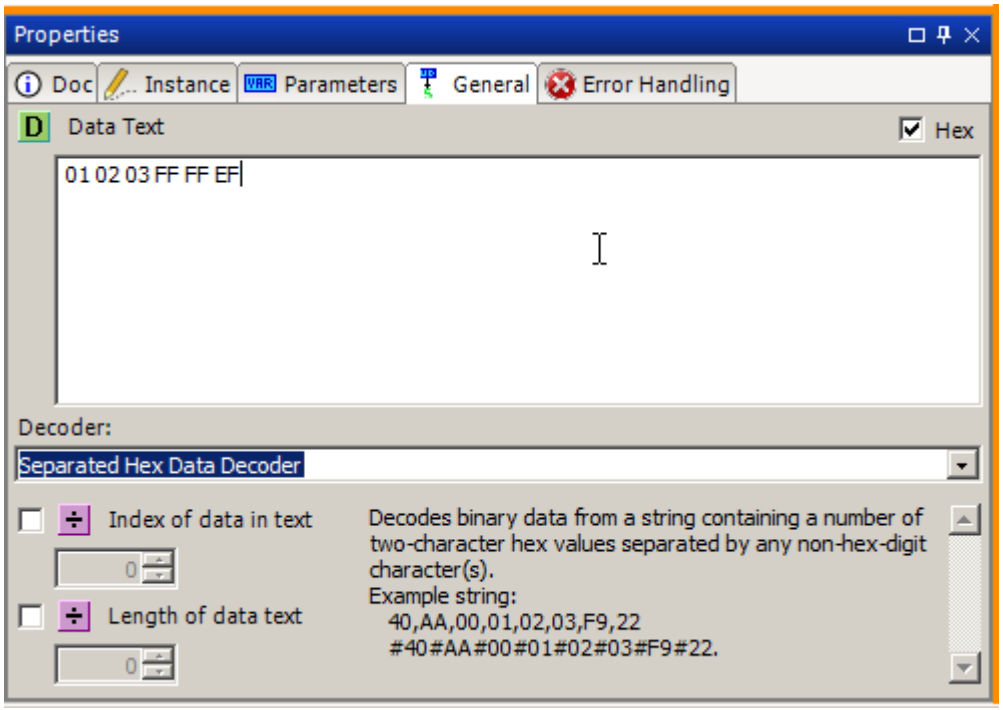
Write a string to the stream

Write a string to the stream using the encoding defined on the stream.

### *Write Binary Data from string*

Write binary data to the stream. The data is taken from a string listing the binary values. To decode the data string a decoder for the specific format must be selected.

Write binary data to the stream.




The binary data is given as a hexadecimal encoded string.

### *Write Text*

Write multiple lines of text to the stream

This method has been deprecated.

### *Flush*

Flush read/write buffers of the stream

Flush the buffers of the stream.

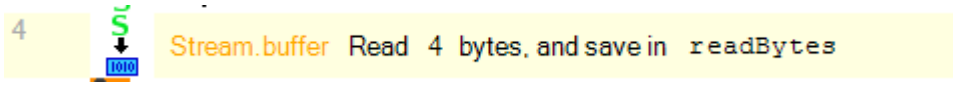
### *Read XML*

Read an XML element from the stream.

### *Read Bytes*

Read a number of bytes from the stream

Read a given number of bytes from the stream.



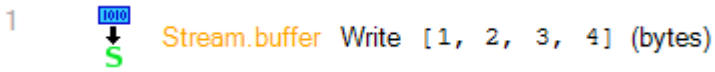
If the stream reports an error while reading (timeout or end-of-stream), the script can ignore this error using the Error Handling tab and the bytes which was read will still be returned.

```
  105:  {Step} #4 : ZapToolAction
  109:  Invoking ZapTool instance named "buffer" method Read Bytes ( Data = <readBytes> )
1.618:  [Stream.Buffer.Read Bytes] Read 'FF FF' (2 bytes) from buffer
1.619:  {RUNTIME-ERROR} EndOfStreamExecutionError: End of stream
1.624:  Exited ZapTool method ( Data = [ 255, 255 ] )
```

### *Write Bytes*

Write an array of bytes to the stream

Write an array of bytes to a stream.

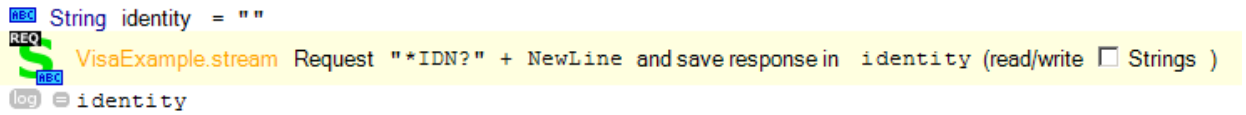



The bytes are given as an array of integers, if the integers given is outside the range of byte the ValueOutOfRangeError will be reported.

### *Request and wait for response*

Write a string or byte-array to a stream and read the response.

Write a string or an array of bytes and wait for, and read the response.




This method is useful because other users of the stream are prevented from using the stream while the Request and wait for response step is executing, for example to prevent panels from reading and writing from the stream while waiting for a response.

The input and output data are always the same type, so the step should be marked as either using strings or a byte array.

## Properties

### *WriteTimeout*

### *ReadTimeout*

### *IsOpen*

### *DataAvailable*

The number of bytes available for reading on the stream.

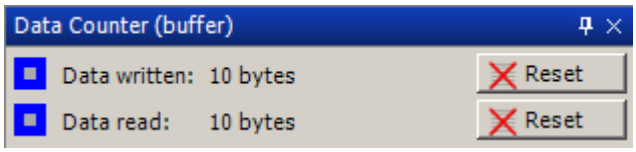
### *SupportsDataReceived*

## Panels

### *Data Counter*

Provides a byte counter to observe how many bytes are read/written

The data counter provides an easy way to monitor whether data is being read and/or written from/to a stream.

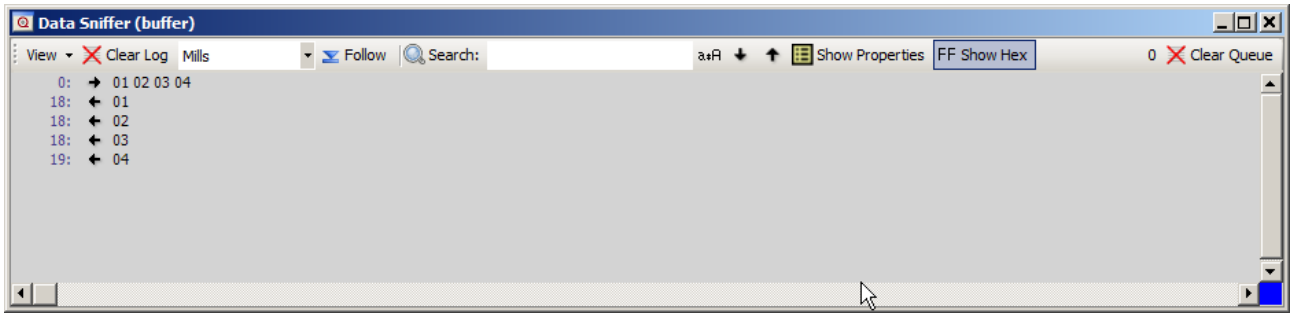



The reset button will reset that counter to 0.

### *Data Sniffer*

Sniff the read/write data of a stream.

The data sniffer panel is used to monitor the bytes passing through the stream.




It uses the same functionality for clearing/following and searching as the execution log in SeqZap.

The data sniffer can also show the transferred bytes as hexadecimal values by toggling the “Show Hex” button.

### *Data Commander*

Write directly to a stream.

The Data Commander panel is used to write to a stream, or tell the stream to read.

The panel does not show the data written or read, so it is normally paired with the Data Sniffer panel.

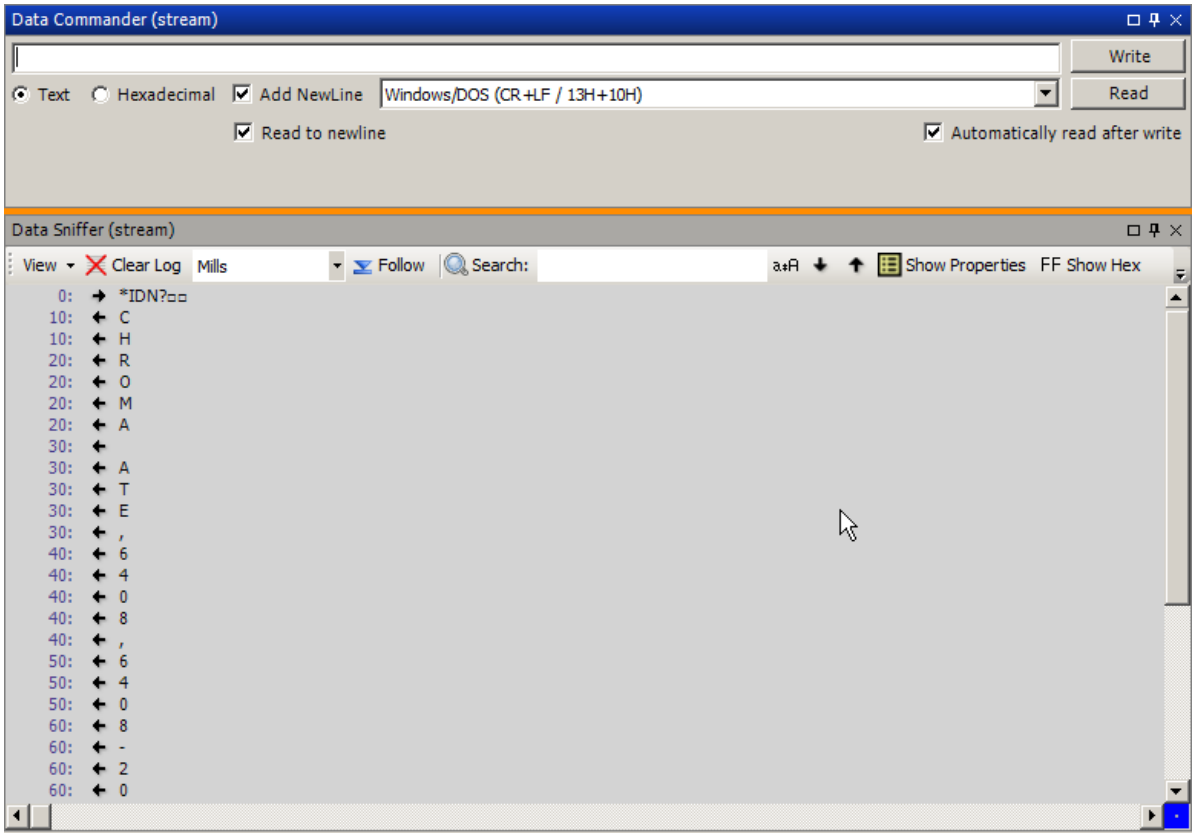



**Figure 3 Data Commander docked above Data Sniffer**

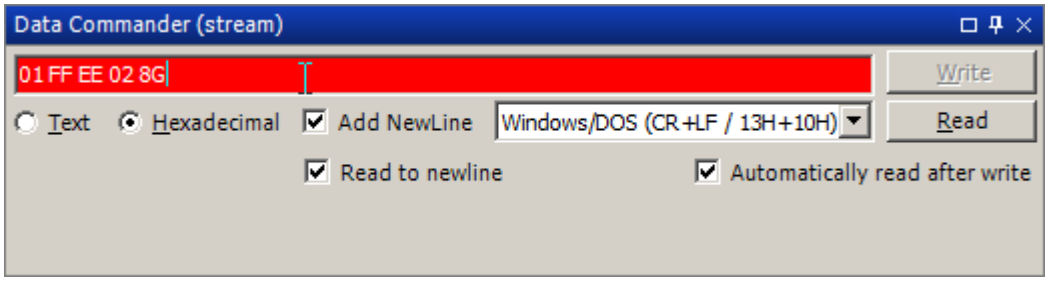
The Data Commander can both transmit textual data (encoded using the streams text encoding, UTF-8 by default), or hexadecimal byte data by selecting the relevant option button.

When enter/return is pressed in the input field or the “Write” button is pressed, the data is written to the stream, optionally followed by a newline character if the “Add NewLine” box is checked.

If the “Automatically read after write” box is checked, the Data Commander will read the available data from the stream, or up until a newline character if the “Read to newline” box is checked.

The same read operation is performed if the “Read” button is pressed.

When sending hexadecimal data, the input field will turn red if the input is not valid hexadecimal data:




In addition, the “Write” button is disabled.

## Errors

All read/write tool methods in the stream tool can report the following errors back.

### *TimeoutExecutionError*

The operation timed out.

### *StreamNotOpenExecutionError*

Reported when trying to read/write to a stream that is not yet open.

### *OperationNotSupportedError*

If you try to write to a stream that does not support writing (e.g. a file opened in read mode) - or reading from a stream that does not support reading.

# SerialPort

Physical port

Please see Stream tool for information about the methods, properties and panels on the Serial Port.

SeqZap includes an example use of the serial port.

## Methods

### *Open*

Open the stream

### *Close*

Close the stream

### *Read String*

Read a string from a stream

### *Read Line*

Read a line from a steam.

### *Read Byte*
Read a single byte from a steam.

### *Read Until*
Read from a stream until a given string is read.

### *Read Until Silent*
Read from a steam until no data has been received for a given time.

### *Write String*
Write a string to the stream

### *Write Binary Data from string*
Write binary data to the stream. The data is taken from a string listing the binary values. To decode the data string a decoder for the specific format must be selected.

### *Write Text*
Write multiple lines of text to the stream

### *Flush*
Flush read/write buffers of the stream

### *Setup SerialPort*
Setup a serial port and set baud rate, parity, etc.

### *Open SerialPort*
Open a serial port and setup baud rate, parity, etc.

### *Read XML*
Read an XML element from the stream.

### *Read Bytes*

### *Write Bytes*

### *Request and wait for response*

## Properties

### *ReceiveError*
Indicates whether a receive error has been detected.

### *LastReceiveError*
Gets the value of the last receive error.

### *Parity*
Get the parity of the open serial port.

### *Handshake*
Get the handshake of the open serial port.

### *BaudRate*
Get the baud-rate of the open serial port.

### *DataBits*
Get the number of data-bits of the open serial port.

### *StopBits*
Get the number of stop-bits of the open serial port.

### *DataAvailable*

### *CtsHolding*

Gets the state of the Clear-to-Send line.

### *DsrHolding*

Gets the state of the Data Set Ready signal.

### *DtrEnable*

Gets or sets a value that enables the Data Terminal Ready (DTR) signal during serial communication.

### *RtsEnable*

Gets or sets a value indicating whether the Request to Send (RTS) signal is enabled during serial communication.

### *CDHolding*

Gets the state of the Carrier Detect line for the port.

### *WriteTimeout*

### *ReadTimeout*

### *IsOpen*

### *SupportsDataReceived*

## Panels

### *Data Counter*

Provides a byte counter to observe how many bytes are read/written

### *Data Sniffer*
Sniff the read/write data of a stream.

### *Data Commander*

## FileStream
Read/Write from a file on a filesystem.

## Methods

### *Open*
Open the stream

### *Close*
Close the stream

### *Read String*
Read a string from a stream

### *Read Line*
Read a line from a steam.

### *Read Byte*
Read a single byte from a steam.

### *Read Until*
Read from a stream until a given string is read.

### *Read Until Silent*
Read from a steam until no data has been received for a given time.

### *Write String*
Write a string to the stream

### *Write Binary Data from string*
Write binary data to the stream. The data is taken from a string listing the binary values. To decode the data string a decoder for the specific format must be selected.

### *Write Text*
Write multiple lines of text to the stream

### *Flush*
Flush read/write buffers of the stream

### *Open File*
Open a file for reading or writing.

### *Read XML*
Read an XML element from the stream.

### *Read Bytes*

### *Write Bytes*

### *Request and wait for response*

## Panels

### *Data Counter*
Provides a byte counter to observe how many bytes are read/written

### *Data Sniffer*
Sniff the read/write data of a stream.

### *Data Commander*

## Properties

### *WriteTimeout*

### *ReadTimeout*

### *IsOpen*

### *DataAvailable*

### *SupportsDataReceived*

# StringStream
Read from a string and write to a string.

## Methods

### *Open*
Open the stream

### *Close*
Close the stream

### *Read String*
Read a string from a stream

### *Read Line*
Read a line from a steam.

### *Read Byte*
Read a single byte from a steam.

### *Read Until*
Read from a stream until a given string is read.

### *Read Until Silent*
Read from a steam until no data has been received for a given time.

### *Write String*
Write a string to the stream

### *Write Binary Data from string*
Write binary data to the stream. The data is taken from a string listing the binary values. To decode the data string a decoder for the specific format must be selected.

### *Write Text*
Write multiple lines of text to the stream

### *Flush*
Flush read/write buffers of the stream

### *Open String*

### *Read XML*
Read an XML element from the stream.

### *Read Bytes*

### *Write Bytes*

### *Request and wait for response*

## Panels

### *Data Counter*
Provides a byte counter to observe how many bytes are read/written

### *Data Sniffer*
Sniff the read/write data of a stream.

### *Data Commander*

## Properties

### *WriteTimeout*

### *ReadTimeout*

### *IsOpen*

### *DataAvailable*

### *SupportsDataReceived*

# Buffer
Provides a writeable stream that buffers the written data until it is read.

## Methods

### *Open*
Open the stream

### *Close*
Close the stream

### *Read String*
Read a string from a stream

### *Read Line*
Read a line from a steam.

### *Read Byte*
Read a single byte from a steam.

### *Read Until*
Read from a stream until a given string is read.

### *Read Until Silent*
Read from a steam until no data has been received for a given time.

### *Write String*
Write a string to the stream

### *Write Binary Data from string*
Write binary data to the stream. The data is taken from a string listing the binary values. To decode the data string a decoder for the specific format must be selected.

### *Write Text*
Write multiple lines of text to the stream

### *Flush*
Flush read/write buffers of the stream

### *Read XML*
Read an XML element from the stream.

### *Read Bytes*

### *Write Bytes*

### *Request and wait for response*

## Panels

### *Data Counter*
Provides a byte counter to observe how many bytes are read/written

### *Data Sniffer*
Sniff the read/write data of a stream.

### *Data Commander*

## Properties

### *WriteTimeout*

### *ReadTimeout*

### *IsOpen*

### *DataAvailable*

### *SupportsDataReceived*

# TCP Connection
TCP Connection to a remote server

## Methods

### *Open*
Open the stream

### *Close*
Close the stream

### *Read String*
Read a string from a stream

### *Read Line*
Read a line from a steam.

### *Read Byte*
Read a single byte from a steam.

### *Read Until*
Read from a stream until a given string is read.

### *Read Until Silent*
Read from a steam until no data has been received for a given time.

### *Write String*
Write a string to the stream

### *Write Binary Data from string*
Write binary data to the stream. The data is taken from a string listing the binary values. To decode the data string a decoder for the specific format must be selected.

### *Write Text*
Write multiple lines of text to the stream

### *Flush*
Flush read/write buffers of the stream

### *Open TCP Stream*
Open a TCP connection to a remote server.

### *Read XML*
Read an XML element from the stream.

### *Read Bytes*

### *Write Bytes*

### *Request and wait for response*

## Properties

### *NoDelay*

### *WriteTimeout*

### *ReadTimeout*

### *IsOpen*

### *DataAvailable*

### *SupportsDataReceived*

## Panels

### *Data Counter*
Provides a byte counter to observe how many bytes are read/written

### *Data Sniffer*
Sniff the read/write data of a stream.

### *Data Commander*

## UDP Connection
One-to-one UDP connection (listens on a UDP port).

## Methods

### *Open*
Open the stream

### *Close*
Close the stream

### *Read String*
Read a string from a stream

### *Read Line*
Read a line from a steam.

### *Read Byte*
Read a single byte from a steam.

### *Read Until*
Read from a stream until a given string is read.

### *Read Until Silent*

Read from a steam until no data has been received for a given time.

### *Write String*

Write a string to the stream

### *Write Binary Data from string*

Write binary data to the stream. The data is taken from a string listing the binary values. To decode the data string a decoder for the specific format must be selected.

### *Write Text*

Write multiple lines of text to the stream

### *Flush*

Flush read/write buffers of the stream

### *Open TCP Stream*

Start listening on a UDP port, and set the destination for data written to this stream.

### *Write string to UDP receiver*

Write a string to a receiver the stream

### *Read XML*

Read an XML element from the stream.

### *Read Bytes*

### *Write Bytes*

### *Request and wait for response*

## Properties

### *ListenPort*

### *WriteTimeout*

### *ReadTimeout*

### *IsOpen*

### *DataAvailable*

### *SupportsDataReceived*

## Panels

### *Data Counter*

Provides a byte counter to observe how many bytes are read/written

### *Data Sniffer*

Sniff the read/write data of a stream.

### *Data Commander*

# Telnet Connection

Telnet Connection to a remote host

## Methods

### *Open*
Open the stream

### *Close*
Close the stream

### *Read String*
Read a string from a stream

### *Read Line*
Read a line from a steam.

### *Read Byte*
Read a single byte from a steam.

### *Read Until*
Read from a stream until a given string is read.

### *Read Until Silent*
Read from a steam until no data has been received for a given time.

### *Write String*
Write a string to the stream

### *Write Binary Data from string*
Write binary data to the stream. The data is taken from a string listing the binary values. To decode the data string a decoder for the specific format must be selected.

### *Write Text*
Write multiple lines of text to the stream

### *Flush*
Flush read/write buffers of the stream

### *Open Telnet Stream*
Open a telnet connection to a remote host.

### *Read XML*
Read an XML element from the stream.

### *Read Bytes*

### *Write Bytes*

### *Request and wait for response*

## Panels

### *Data Counter*
Provides a byte counter to observe how many bytes are read/written

### *Data Sniffer*
Sniff the read/write data of a stream.

### *Telnet Options*
Lists the negotiated options for a telnet connection.

### *Telnet Values*
Lists values used and negotiated for the telnet connection.

### *Data Commander*

## Properties

### *WriteTimeout*

### *ReadTimeout*

### *IsOpen*

### *DataAvailable*

### *SupportsDataReceived*

# Null

A write-only stream that discards all data written to it.

## Methods

### *Open*

Open the stream

### *Close*

Close the stream

### *Read String*

Read a string from a stream

### *Read Line*

Read a line from a steam.

### *Read Byte*

Read a single byte from a steam.

### *Read Until*

Read from a stream until a given string is read.

### *Read Until Silent*

Read from a steam until no data has been received for a given time.

### *Write String*

Write a string to the stream

### *Write Binary Data from string*

Write binary data to the stream. The data is taken from a string listing the binary values. To decode the data string a decoder for the specific format must be selected.

### *Write Text*

Write multiple lines of text to the stream

### *Flush*

Flush read/write buffers of the stream

### *Read XML*

Read an XML element from the stream.

### *Read Bytes*

### *Write Bytes*

### *Request and wait for response*

## Panels

### *Data Counter*
Provides a byte counter to observe how many bytes are read/written

### *Data Sniffer*
Sniff the read/write data of a stream.

### *Data Commander*

## Properties

### *WriteTimeout*

### *ReadTimeout*

### *IsOpen*

### *DataAvailable*

### *SupportsDataReceived*

# TCP Server
Listen for TCP incoming connections

## Methods

### *Open TCP Server*
Start listenining for TCP connections from clients.

### *Accept*
Accept a client connection

### *Close*
Stop listening

## Properties

### *Pending*
True if there are any connections waiting to be handled.

### *AcceptedClients*
The number of clients that have been served using Accept()

### *IsListening*
True if the server is currently listening on the socket

### *Port*
The port on which the server is listening

# DotNetStream
Read/Write from standard dot net stream.

## Methods

### *Open*
Open the stream

### *Close*
Close the stream

### *Read String*
Read a string from a stream

### *Read Line*
Read a line from a steam.

### *Read Byte*
Read a single byte from a steam.

### *Read Until*
Read from a stream until a given string is read.

### *Read Until Silent*
Read from a steam until no data has been received for a given time.

### *Write String*
Write a string to the stream

### *Write Binary Data from string*
Write binary data to the stream. The data is taken from a string listing the binary values. To decode the data string a decoder for the specific format must be selected.

### *Write Text*
Write multiple lines of text to the stream

### *Flush*
Flush read/write buffers of the stream

### *Read XML*
Read an XML element from the stream.

### *Read Bytes*

### *Write Bytes*

### *Request and wait for response*

## Panels

### *Data Counter*
Provides a byte counter to observe how many bytes are read/written

### *Data Sniffer*
Sniff the read/write data of a stream.

### *Data Commander*

## Properties

### *WriteTimeout*

### *ReadTimeout*

### *IsOpen*

### *DataAvailable*

### *SupportsDataReceived*

# TestStream
Stream for testing protocol ZapTools.

## Methods

### *Open*
Open the stream

### *Close*
Close the stream

### *Read String*
Read a string from a stream

### *Read Line*
Read a line from a steam.

### *Read Byte*
Read a single byte from a steam.

### *Read Until*
Read from a stream until a given string is read.

### *Read Until Silent*
Read from a steam until no data has been received for a given time.

### *Write String*
Write a string to the stream

### *Write Binary Data from string*
Write binary data to the stream. The data is taken from a string listing the binary values. To decode the data string a decoder for the specific format must be selected.

### *Write Text*
Write multiple lines of text to the stream

### *Flush*

Flush read/write buffers of the stream

### *Setup TestStream*

### *Set Auto Response*

. To decode the data string a decoder for the specific format must be selected.

### *Read XML*

Read an XML element from the stream.

### *Read Bytes*

### *Write Bytes*

### *Clear Auto Response*

### *Request and wait for response*

## Properties

### *SourceStream*

The source stream to use in PassThrough mode, and to use if test data should be verified against the real target.

### *Mode*

The mode of the stream.

### *PassThrough*

The mode of the stream. If set to true, the stream will pass dta in both directions to the source stream.

### *WriteTimeout*

### *ReadTimeout*

### *IsOpen*

### *DataAvailable*

### *SupportsDataReceived*

## Panels

### *Data Counter*
Provides a byte counter to observe how many bytes are read/written

### *Data Sniffer*
Sniff the read/write data of a stream.

### *Data Commander*

# ConnectedPairStream
Read from a string and write to a string.

## Methods

### *Open*
Open the stream

### *Close*
Close the stream

### *Read String*
Read a string from a stream

### *Read Line*
Read a line from a steam.

### *Read Byte*
Read a single byte from a steam.

### *Read Until*
Read from a stream until a given string is read.

### *Read Until Silent*
Read from a steam until no data has been received for a given time.

### *Write String*
Write a string to the stream

### *Write Binary Data from string*
Write binary data to the stream. The data is taken from a string listing the binary values. To decode the data string a decoder for the specific format must be selected.

### *Write Text*
Write multiple lines of text to the stream

### *Flush*
Flush read/write buffers of the stream

### *Setup ConnectedPair stream*

### *Read XML*
Read an XML element from the stream.

### *Read Bytes*

### *Write Bytes*

### *Request and wait for response*

## Panels

### *Data Counter*

Provides a byte counter to observe how many bytes are read/written

### *Data Sniffer*

Sniff the read/write data of a stream.

### *Data Commander*

## Properties

### *WriteTimeout*

### *ReadTimeout*

### *IsOpen*

### *DataAvailable*

### *SupportsDataReceived*

# Switch Matrix

Provides access to switch matrix equipment

NI DAQmx Switch Matrix support.

## Switch Matrix

Provides access to switch matrix equipment

### Methods

#### *Setup*

#### *Connect*

Connect two channels (possible via a third channel)

#### *Disonnect*

Disconnect a channel pair

#### *DisonnectAll*

Disconnect all channels

### Panels

#### *Live View of the Matrix*

#### *Device Routes*

#### *Device Channels*

# Task ToolBox

Tool for creation and interaction with tasks.

Abstract SeqZap interface to background tasks, used by other tools and custom tools to provide a way to

control and wait for the completion of tasks.

# Async Task Tool

<tool description here>

## Methods

### *Await Task Finalization*

Waits until the task ends, either because it finishes or is aborted.

## Properties

### *TaskDescription*

Short description of the task.

### *TaskResultDescription*

Description of the result for the finished task.

### *TaskFinished*

Indicates whether the task has finished.

### *TaskRunning*

Indicates whether the task is currently running.

### *TaskAborted*

Indicates whether the task has been aborted.

### *TaskFailed*

Indicates whether a failure caused the task to end.

### *StartTime*
Execution time for the task.

### *ExecutionTime*
Execution time for the task.

# TimerCounter

<toolbox description>

Using hardware timer/counters for event counting, time/frequency measurements and frequency-/pulse-generation.

## TimerCounter
<tool description here>

### Methods

### *Create TimerCounter*
Create TimerCounter from a device.

### *Set Mode*
Set the TimerCounter mode.

### *Reset TimerCounter*
Reset the TimerCounter to its initial value.

### *Start*
Start the TimerCounter.

### *Stop*
Stop the TimerCounter.

### *Read Counter*
Read the current value of the TimerCounter.

## Properties

### *CounterValue*

# Trigger

Tools for action triggering.

## Starter
Tool for triggering (starting) a list of actions simultaneously.

## Methods

### *Fire*
Fire the trigger

### *Setup DataSource Trigger*
Setup trigger to fire when the specified DataSource changes.

## Properties

### *IsAbandoned*
Indicates wheter the trigger has been abandoned (not active anymore).

### *IsTrigged*
Indicates wheter the trigger has been fired.

### *TrigCount*
Indicates how many times the trigger has been fired since it was created or reset.

### *LastTriggerTime*
Indicates the time when the trigger was last fired.

### *LastTriggerSource*
Indicates the source of the last trigger fired.

### *AbandonWhenTrigged*
Indicates wheter the trigger should be abandoned (not used anymore) when it has been fired.

# Tron ToolBox

## Tron

## Methods

### *Setup*

### *Start test*

### *Get Input*

Get a message from the input stack (if any)

### *Send Output*

Send an output message to Tron.

## Properties

### *TronExecutable*

### *IsTestRunning*

# VISA

Provides SeqZap Stream access to VISA I/O connections.

The VISA toolbox allows SeqZap to use VISA I/O like normal SeqZap streams.

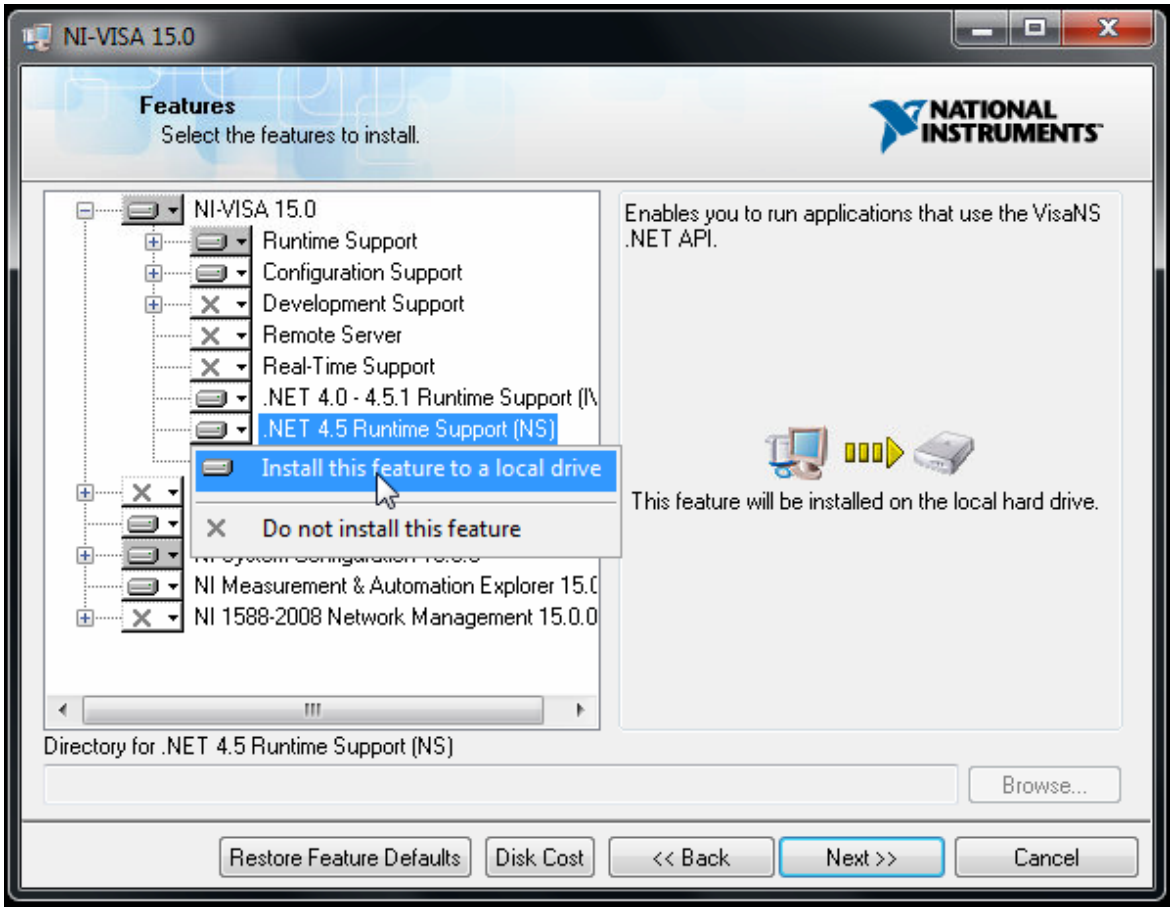
If the VISA tool is not available in SeqZap, the computer probably needs NI-VISA to be installed, please see the following section.

## Included Examples

SeqZap includes an example script file located in Examples\Tools\VISA in the directory where SeqZap is installed.

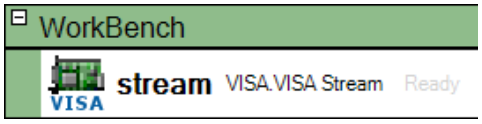
## Installing NI-VISA

When installing NI-VISA it is important to install the .NET 4.5 Runtime Support (NS) feature.




# VISA Stream

Provides SeqZap Stream access to VISA I/O connections.



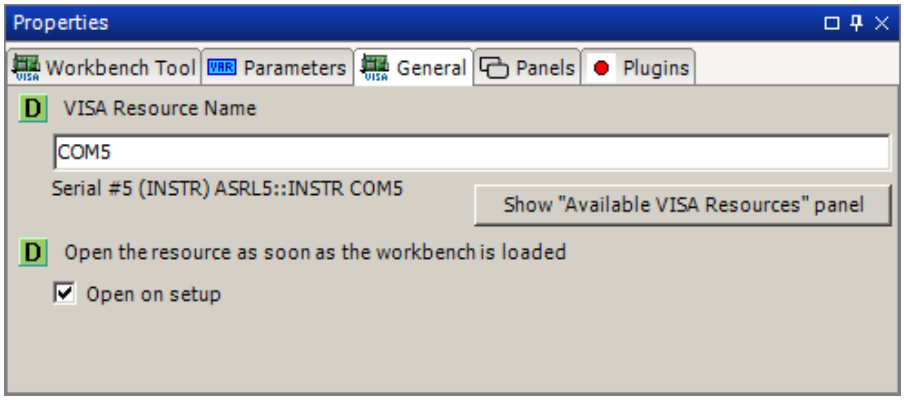

## Methods

In addition to the Setup method below, the VISA stream also support all the standard methods of the standard Stream tools.

### *Setup*

Set the VISA resource to use and optionally open it.

The setup page of a VISA Stream allows the user to select the VISA device to use.




The “Available VISA Resources” panel can be easily opened from the setup page to make it easier to find out which VISA resources are available on the PC.

### *Open*

### *Close*

### *Read String*

### *Read Line*

### *Read Byte*

### *Read Until*

### *Read Until Silent*

### *Request and wait for response*

### *Read Bytes*

### *Write Bytes*

### *Write String*

### *Write Binary Data from string*

### *Write Text*

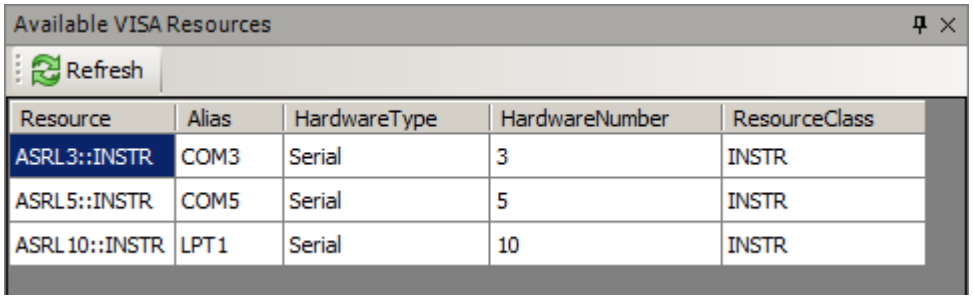
### *Flush*

### *Read XML*

## Panels

In addition to the panel below, the VISA stream also support the standard Stream panels.

### *Available VISA Resources*




The Refresh button must be pressed when the panel is initially opened to populate the list of available VISA resources.

### *Data Counter*

### *Data Sniffer*

### *Data Commander*

## Properties

### *ResourceName*

Name of the VISA resource to use. The resource can only be changed when the stream is closed.

### *WriteTimeout*

### *ReadTimeout*

### *IsOpen*

### *DataAvailable*

### *SupportsDataReceived*

# VncToolbox

VNC Client Tool based on VncSharp.

VNC is a simple bitmap based protocol for providing access to the graphical display of a remote system.

The VNC tool is used to capture the graphical display of a remote system.

This tool is based on the Graphical tool and therefore inherits all its methods, properties and panels.

A panel shows the live image of the remote system, and the Snapshot method can be used in a script to get the current content of the display.

# VncConnection

A VNC Connection

## Methods

### *ConnectionSetup*

Setup VNC Connection.

### *Connect*

Connect to the remote desktop.

### *Disconnect*

Disconnect from the remote desktop.

## Panels

### *Vnc Sniffer*

Show received and sent messages.

# VncDisplay

The display of a VNC connection

## Methods

### *Snapshot*
Create a clone (snapshot) of the display with it current content.

### *CheckUpdate*
Check the update state of ImageTool.

### *SetChanged*
Raises the event that the image has changed.

### *CreatePartialView*
Create a partial view of the image (a region).

### *SetupFromSource*
Setup GraphicalDisplay from an external image source.

### *Update*
Updates the display from its source.

### *DisplaySetup*
Setup VNC Display.

## Panels

### *Graphical Display*
Graphical Display for inspection of images.

## Properties

### *Width*

### *Height*

# WebDriver Toolbox

Allows automation of WebDriver targets (web-browsers and mobile phones) using the WebDriver/Selenium driver.

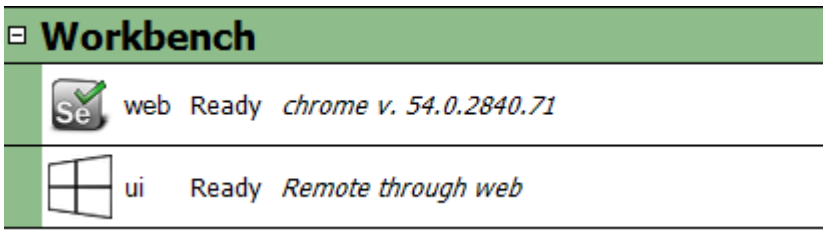
The WebDriver Toolbox acts as a link between SeqZap's general user interface testing tool, the Windows Automation Tool, and the WebDriver supported by all the major browser vendors such as Google Chrome, Mozilla Firefox and Microsoft Edge.

## WebDriver

The WebDriver tool instance will setup the specific WebDriver target to test against: a web browser or a mobile phone.

It also provides non user interface methods for things specific to WebDriver which are not supported by the Windows Automation Tool, such as navigating to an URL or reloading the page.

Because the WebDriver tool is also a Remote Windows Automation Tool, it is always used with an instance of the Windows Automation Tool which then references the WebDriver Tool.




## Supported Browsers

The WebDriver tool can run tests on any of the supported browsers, which currently are:

- Google Chrome
- Mozilla Firefox
- Microsoft Edge
- Microsoft Internet Explorer

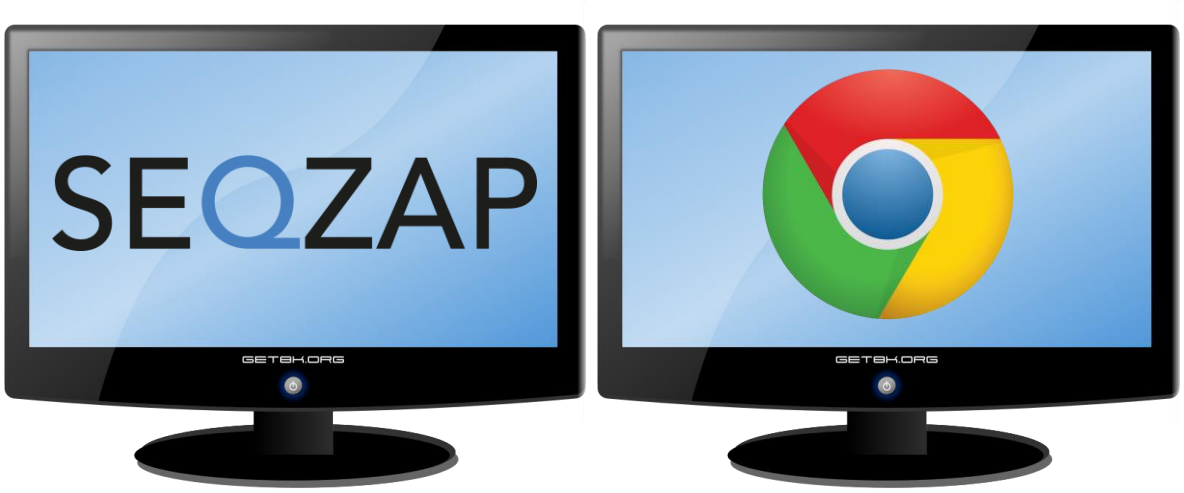
When writing scripts, however, Google Chrome is the only supported browser since we provide special handling for that browser to make it possible to select the element to interact with using the mouse and the browser.

## Writing test scripts

It is a good idea to first understand how the Windows Automation Tool works by reading the introduction for that tool.

Writing WebDriver tests uses the same way of writing tests, that is, by selecting the element to click by dragging the mouse over the element and using the element selection dialog to define a good selector for that element.

We really recommend using two screens when writing WebDriver tests so that one screen can show SeqZap, and the other can show the browser.




IFrames require special handling when writing and running a test, instructions for how to do this is described in the section of the manual for the IFrames panel.

## Methods

### *Setup*

Create new WebDriver instance.

This allows selecting the browser to use.

It also contains the list of HTML attributes to show for each element, this list is given as an input parameter to the Setup method.

If the web application under test requires special attributes to be available during test, they can be added to the list at Setup, for instance, to support one of the application specific data-* attributes.

By default the following list of attributes are:

- id
- class
- name
- placeholder
- href
- data-id

### *Goto*
Navigate to a webpage identified by an url.

### *Back*
Navigate backwards in the browser.

### *Forward*
Navigate forward in the browser.

### *Refresh*
Refresh the currently loaded webpage.

### *Execute Script*
Execute a script (JavaScript) command on the running driver (browser).

### *Enter IFrame*
Future WebDriver calls are directed to the selected IFrame.

### *Exit IFrame*
Exit the IFrame most recently entered using the Enter IFrame method.

## Properties

### *Title*
The title of the current page.

### *Url*
The url of the current page.

### *PageSource*
The source of the current page.

### *BrowserName*
The name of the browser.

### *BrowserVersion*
The version of the browser.

### *IgnoreCaseOfValueWhenSelecting*
If true (the default), selectors which use the "Value" property ignore the character casing of the Value to compare.

## Panels

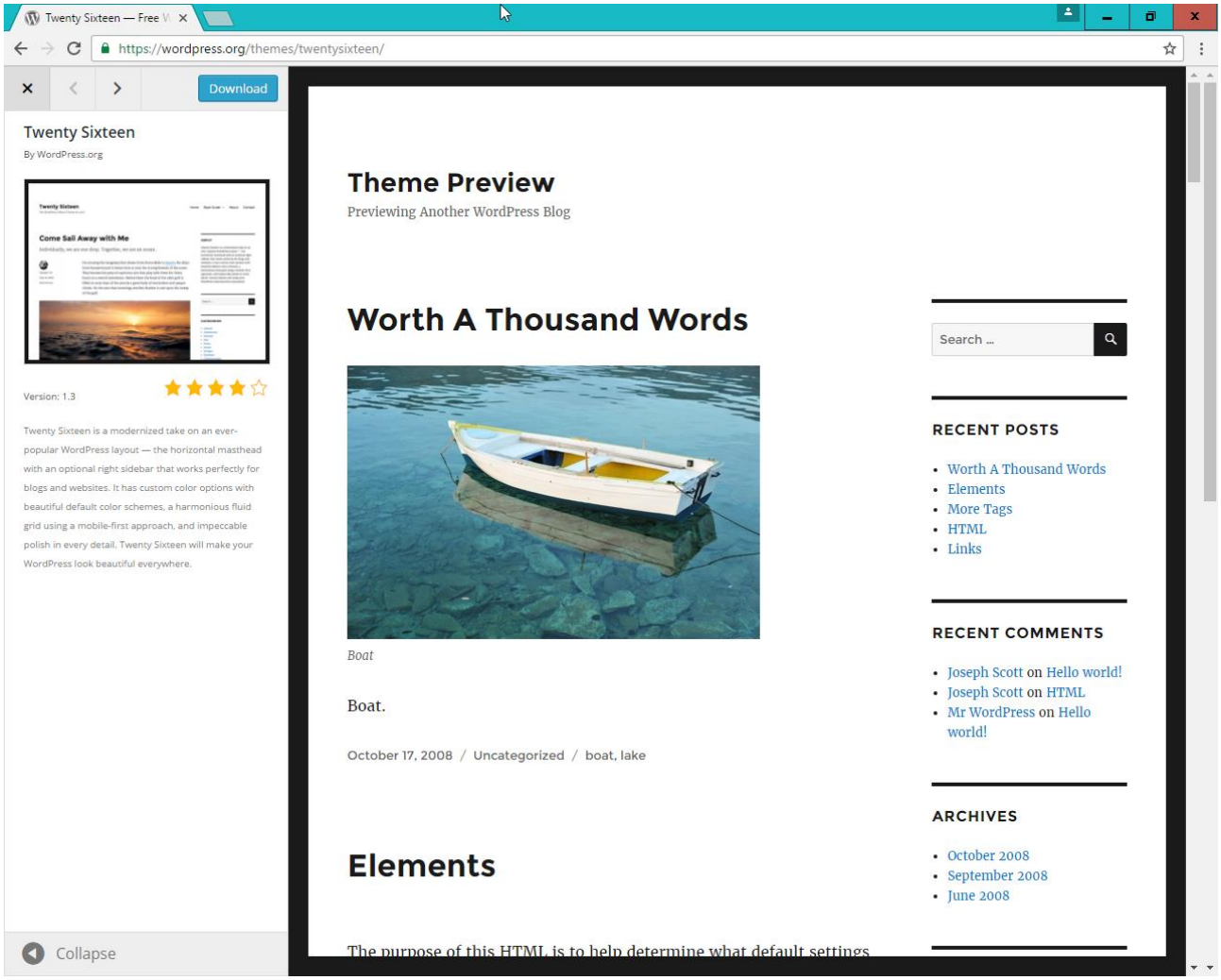
### *IFrames*
The IFrames panel is used to navigate and test web applications which use IFrames.

The IFrames panel lists all the IFrames on the current page, refreshed every second.

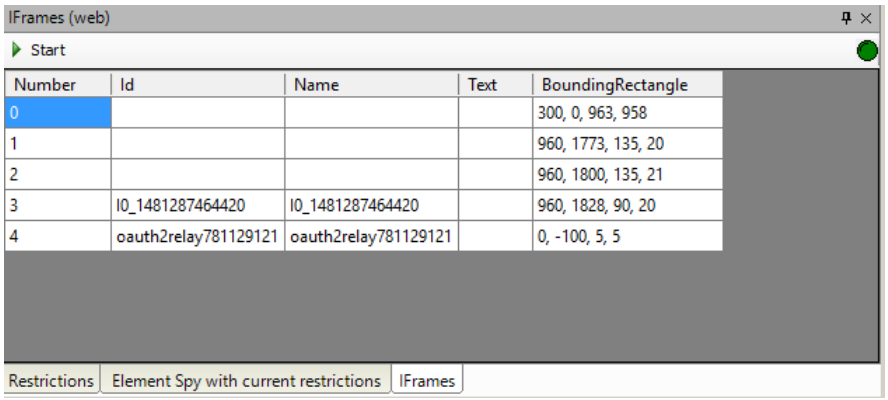
When the mouse cursor is above an IFrame in the list, the rectangle of that IFrame will be highlighted in the

browser if available.

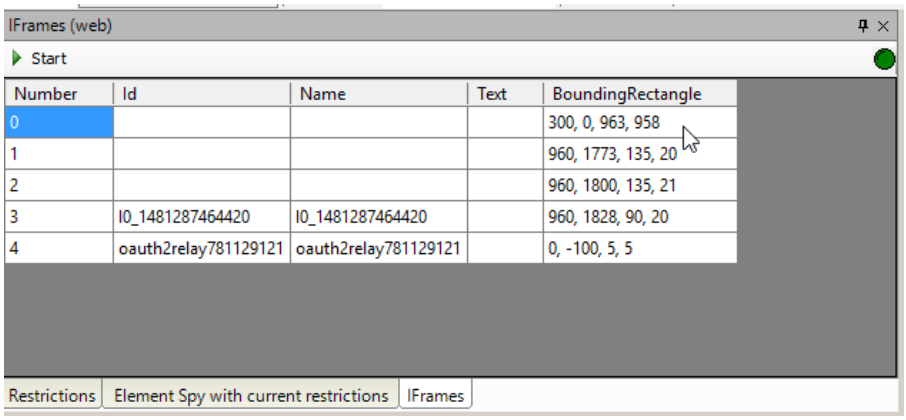
This can be illustrated by navigating to a page with IFrames, for example, the Theme Preview page on wordpress.org.



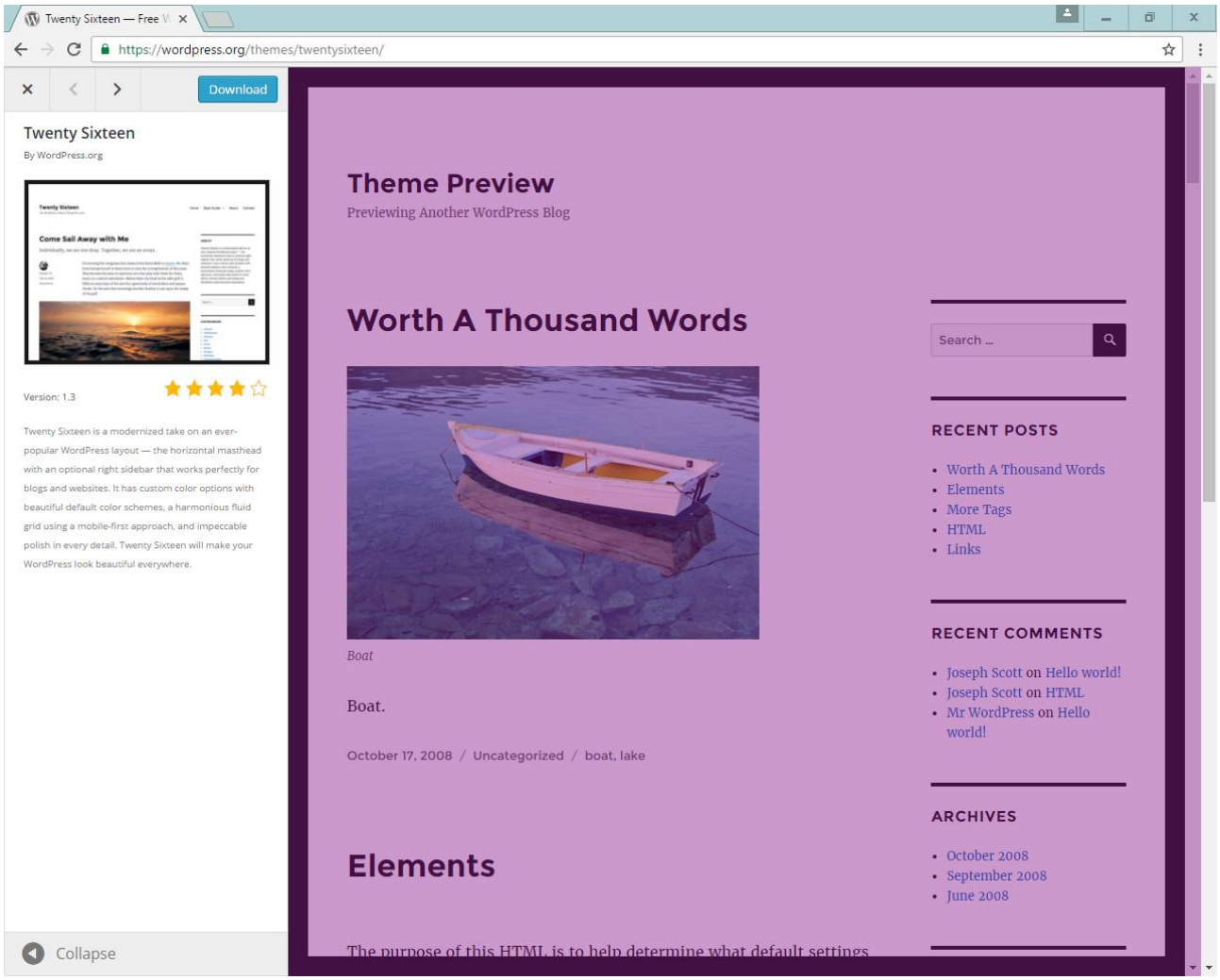

The list of IFrames is shown in the IFrames panels.



If the mouse hovers the first IFrame, which is the preview of the selected theme:




Then that IFrame will be highlighted in the browser:




This can be used to inspect the IFrames of a page.

The panel can also be used when writing the test, by right clicking an IFrame, it is possible to either Enter

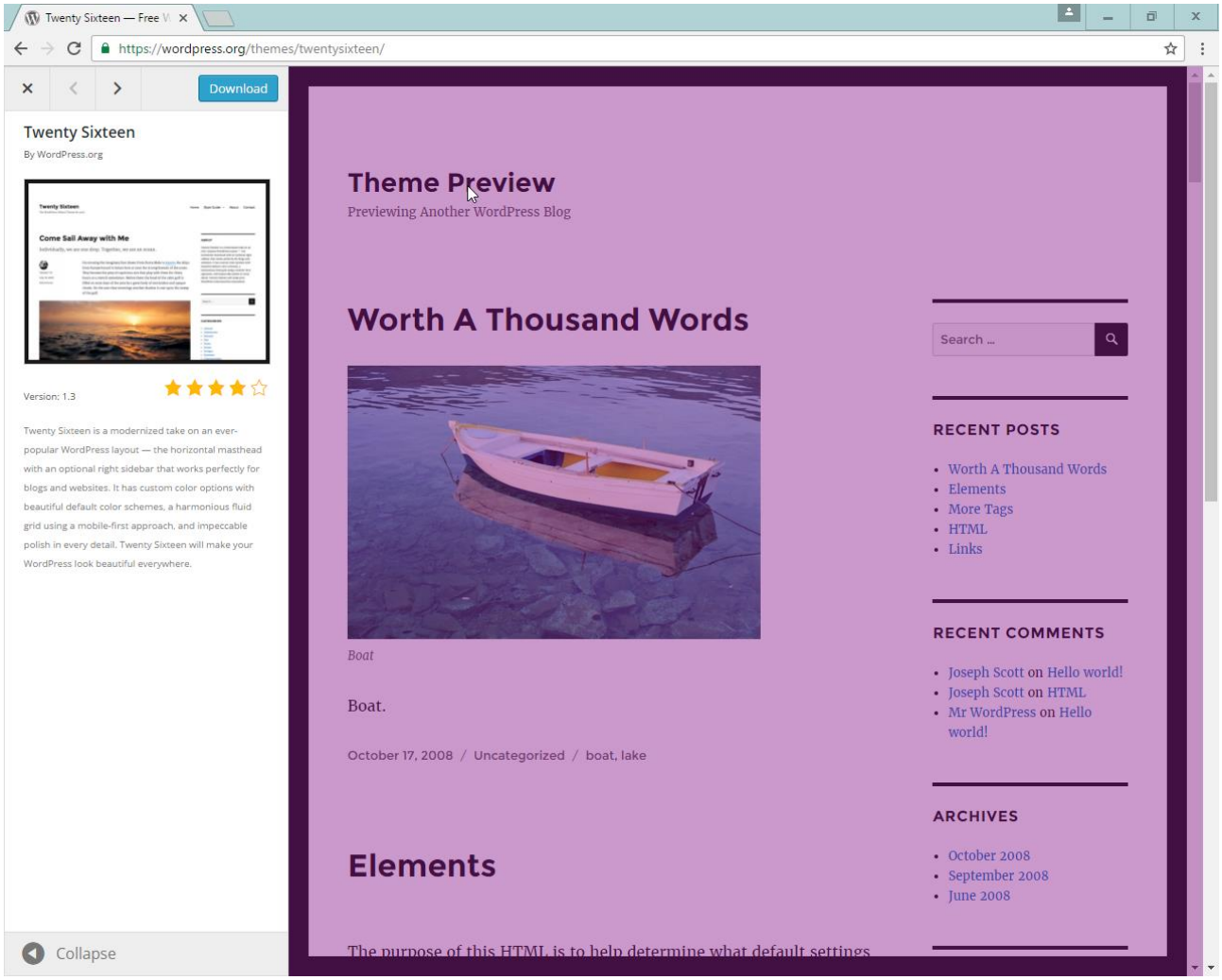
the IFrame right now – as part of writing a test script or just for debugging, or to Copy a step to enter the IFrame to the clipboard, which can than later be pasted in a test script.

It is a useful exercise when writing a test script, to use the “Enter IFrame” menu item, and watch the Element Spy panel change when an IFrame is entered.

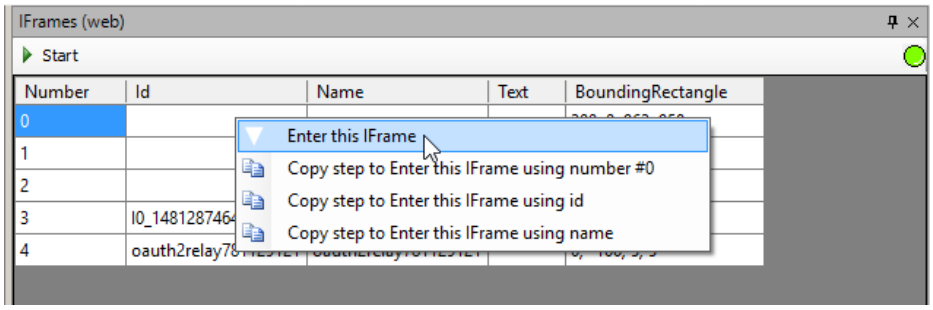
IFrames are handled differently when testing a web-application, because each IFrame is a separate HTML document / tree. This means that the element tree follows the current IFrame (or the top page) and changes when an IFrame is “entered” in a test script.

This can be observed when a test script for the previously shown “Wordpress Theme Preview” page is under test.

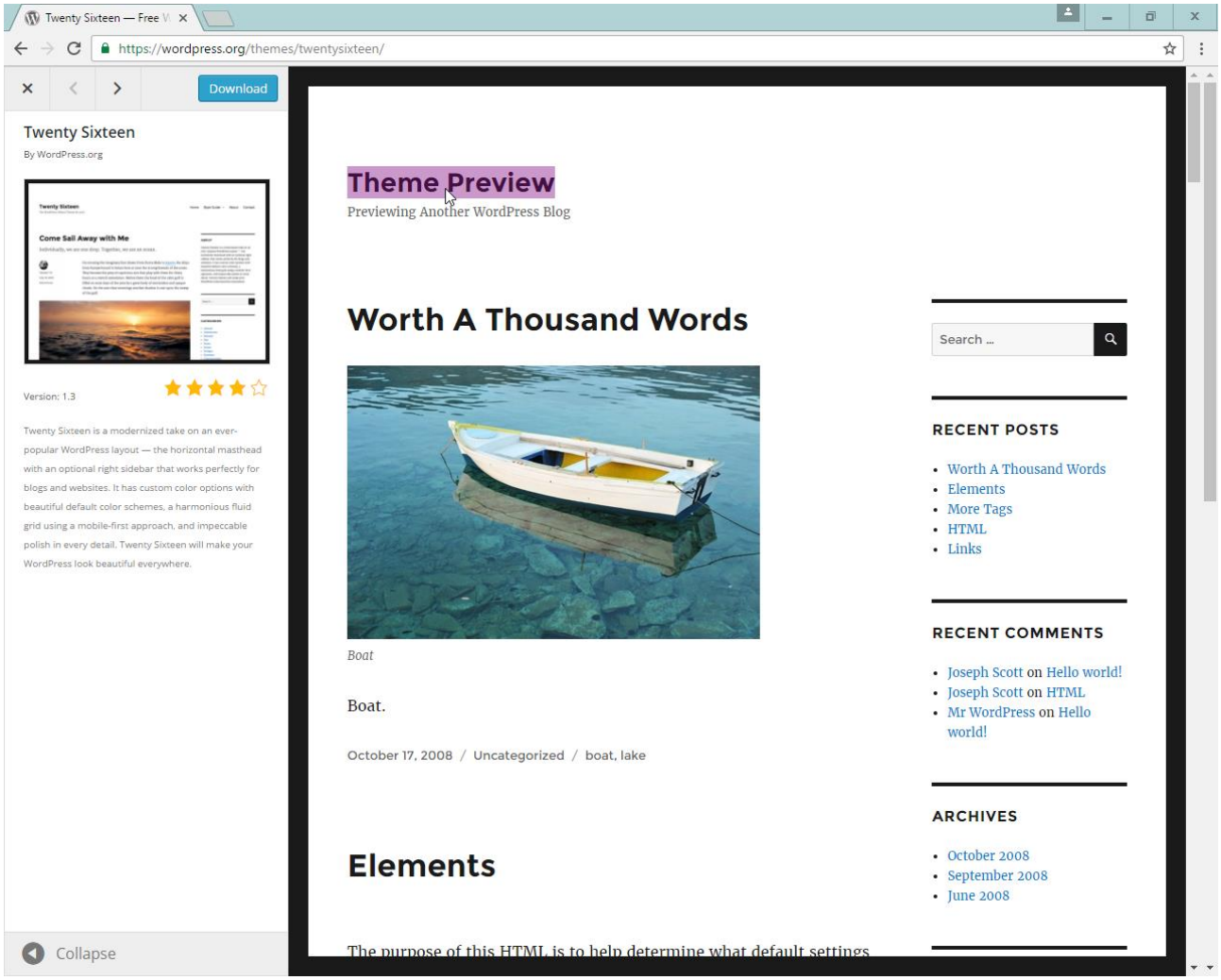
If we try to select the “Theme Preview” headline of the preview, only the IFrame can be selected.



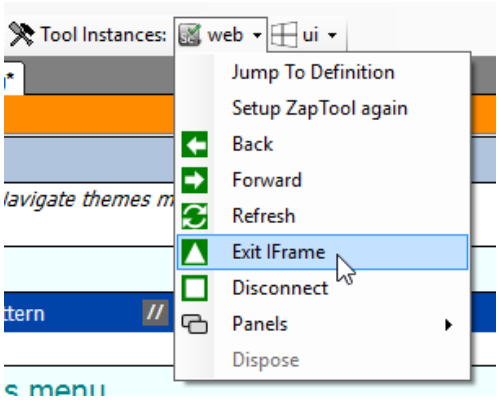

But if the preview IFrame is entered:




Then it becomes possible to select the Theme Preview headline:




To exit the IFrame again, the “Exit IFrame” method should be used, either in the test script or, while writing the test script, by calling the method from the workbench:




### *XPath Tester*

# Windows Automation ToolBox

The Windows Automation toolbox is SeqZap's standard way of automating any user interface element.

The Windows Automation toolbox provides a standardized view of any user interface, both locally running windows applications as well as remotely running user interfaces running on an embedded target or another PC.

The Windows Automation toolbox allows any user interface to be automated, is just requires a remote connection to be implemented for that particular user interface (UI) technology.

Using this approach, browsers and mobile phones can be automated just as easily as a locally running windows application such as Word.

## Windows Automation ToolBox

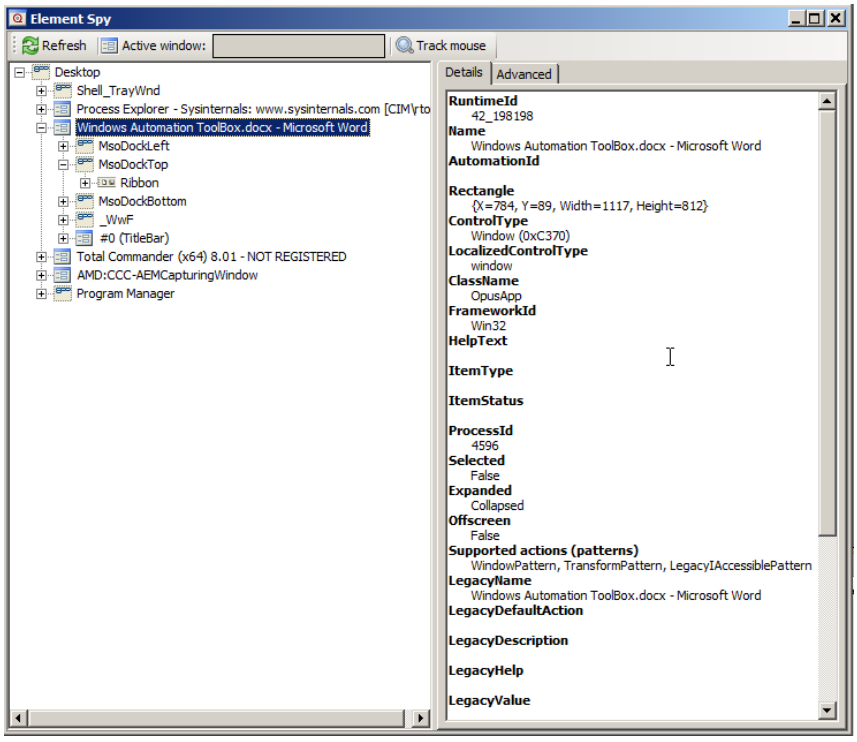
Methods used to automate Windows (Win32, Windows.Forms, WPF, etc.) applications.

## Panels

### *Element Spy*

The element spy shows the local elements on the machine where SeqZap is running.

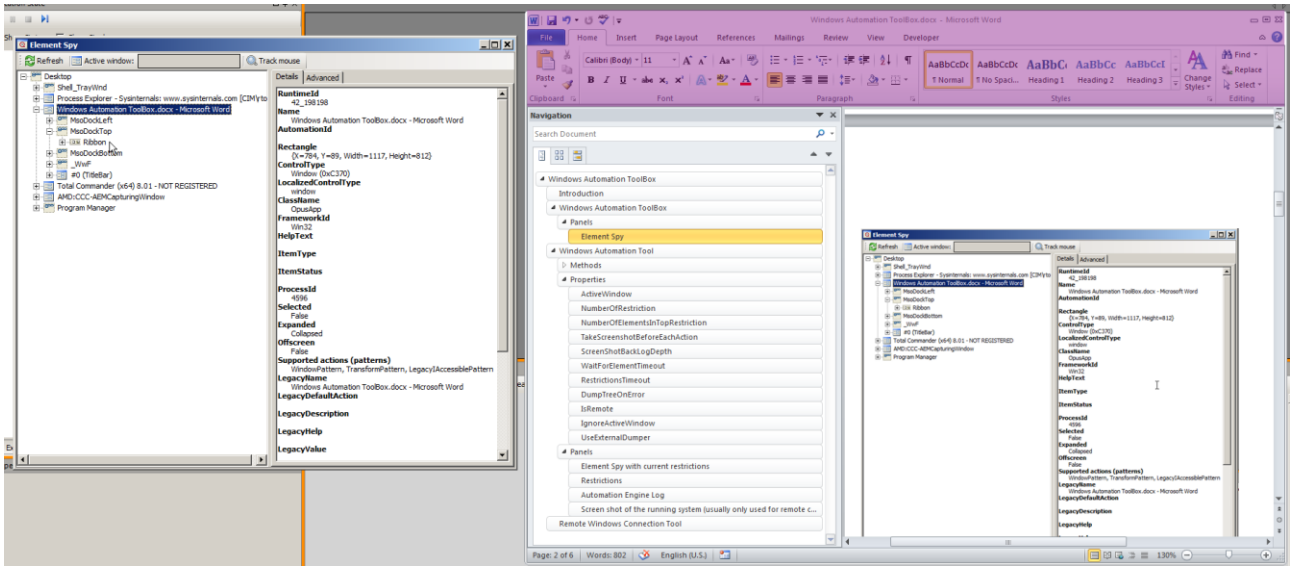
It can be used to determine whether a particular element on the screen can be seen by SeqZap, and what values and actions are available for that element.




When an element in the tree is selected it will detailed information about that element.

Please note that while one SeqZap process is never visible to itself it is, however, possible to see one SeqZap process from another SeqZap process.

If the mouse cursor hovers over an element and that element is currently shown on the screen, then that element is marked with a magenta overlay.



In the screenshot above the mouse cursor is pointing at the “Ribbon” part of the running Word application.

This panel is static and therefore available directly from the Panels->ZapTool Panels menu inside SeqZap,

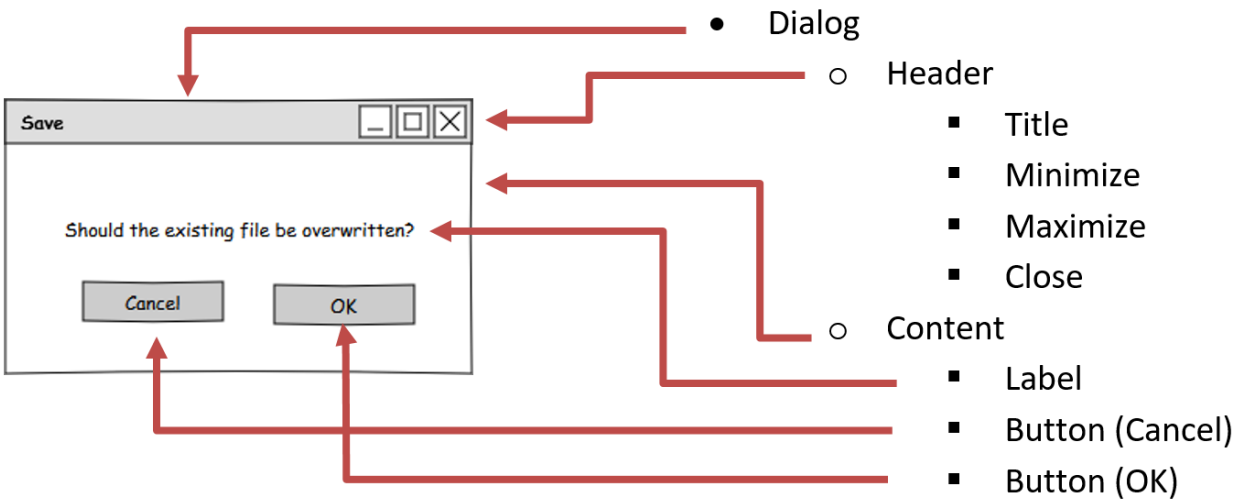
but the panel also comes in an instance bound variant.

# Windows Automation Tool

Makes it easier to write windows automation scripts

## Introduction

Most user interface (UI) technologies arrange their UI elements, such as buttons, textboxes and dialogs in a tree. By navigating this tree, the user interface of an application can be reduced to a logical view rather than just the raw bitmap/pixal data which makes up a screenshot.




### *Identifiers*

In the example above, an example “save dialog” is deconstructed into the separate entities that make up the entire dialog. Each element in the user interface can have much information associated with it, such as:

- AutomationId, for instance, the OK button may have the AutomationId “overwriteOkButton”.
- Value, for instance, “OK” for the OK button.
- ControlType, the buttons are marked as buttons, the text label is marked as a label, and so on.

All these bits of information are referred to as identifiers in the Windows Automation tool, because they are used to identify elements in the user interface, for instance, to identify the button to click.

For instance, in the example above we could use Value = ‘OK’ to identify the OK button.

### *Selectors*

When writing a user interface test using the Windows Automation Tool, the element to interact with – for instance the element to click – must be identified in the script.

To identify user interface elements, selectors are used to describe the path that the Windows Automation

tool must take to navigate the user interface tree to the element to interact with.

Selectors are lists of identifiers along with an expected value, for instance: Value = 'OK' is an identifier (Value) with an expected value (OK).

In the "Save dialog" example above, the selector to identify the OK button would have to have three selector parts:

- One identifying the dialog
- One identifying the content part of the dialog
- And one identifying the OK button.

In reality, selectors are usually deeper, depending on the complexity of the user interface under test, but for this simple example a selector for the OK button could be:

- AutomationId = 'OverwriteDialog'
- AutomationId = 'Content'
- Value = 'OK'

### *Wildcards*

Sometimes parts of the path to an element cannot be described in a way which makes the test robust enough, for instance a selector containing AutomationId = 312131 looks like something which is generated dynamically by the application, and something which will change the next time the application is run.

In this case it is possible to simply just put a wildcard ***** (star) on that position of the selector. In the example above, we could ignore the content element, by using this selector instead:

- AutomationId = 'OverwriteDialog'
- *
- Value = 'OK'

This will make the Windows Automation tool try to search all elements at that level in the tree for a child where the Value = 'OK' identifier matches.

Furthermore, it is possible to ignore several levels of elements in the user interface tree by using the ****** (double star) wildcard – this wildcard is referred to as the "all descendants" wildcard. For instance:

- **
- Value = 'OK'

This will make the Windows Automation tool search for any element where the Value = 'OK' identifier matches, no matter where it is in the tree.

Wildcards can be combined and used multiple times to create short paths for very complex user interface trees, for instance:

- **

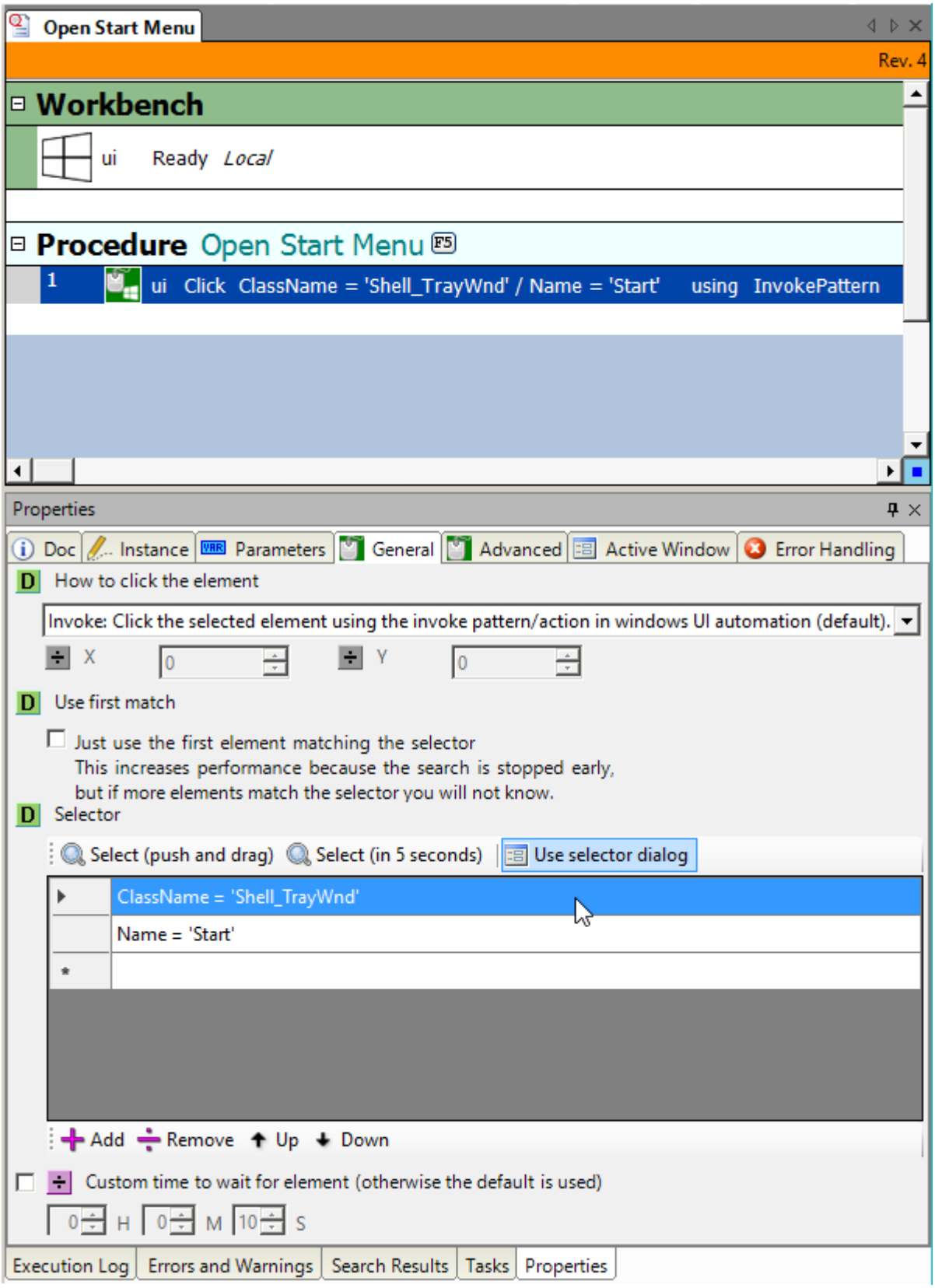
- AutomationId = ‘ScriptEditor’
- **
- Value = ‘Edit’

This selector will first find any elements matching AutomationId = ‘ScriptEditor’ in the user interface tree, and then from each of those elements, look for any element which matches the Value = ‘Edit’ identifier.

By default, the Windows Automation tool will search the entire tree to make sure that only one element matches the entire selector, this is done to make sure that the Windows Automation tool will not accidentally interact with an unwanted element.

### *Writing Windows Automation tests*

All Windows Automation tool steps/methods which interacts with an element needs to have the selector for that element defined.




In the example above, a “Click” step for clicking the Windows start button has been inserted.

It is, of course, possible to change the selector manually using the “Add/Remove/Up/Down” buttons and the keyboard, but it is much easier to use the “Select (push and drag)” and “Select (in 5 seconds)” buttons shown above the selector.

Both buttons will change the selector to reflect the element under the mouse button, but work in two different ways:

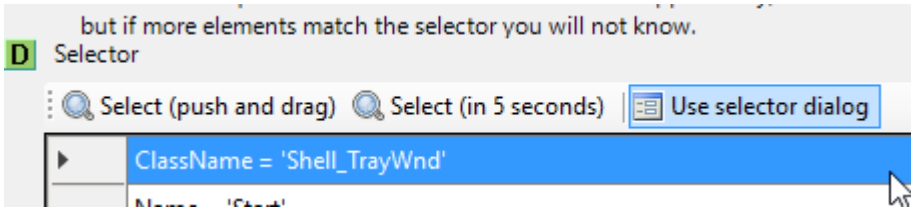
- Select (push and drag) – here the element is selected by pressing and holding the left mouse button down on the button, and then dragging the mouse to the element which the selector should refer to and then releasing the left mouse button.
- Select (in 5 seconds) – can be used to click elements which hide themselves when another application is clicked – for instance to click a sub menu-item. So the element is selected by clicking the button, and then, within 5 seconds, moving the mouse to element which the selector should refer to. 5 seconds should be enough to open any menu items to point to a sub menu-item.

It is easier to try this than to read about it, so experimenting is usually a good way to get acquainted with the Windows Automation Tool’s selector.

In both cases the element under the mouse is highlighted using a transparent magenta rectangle.

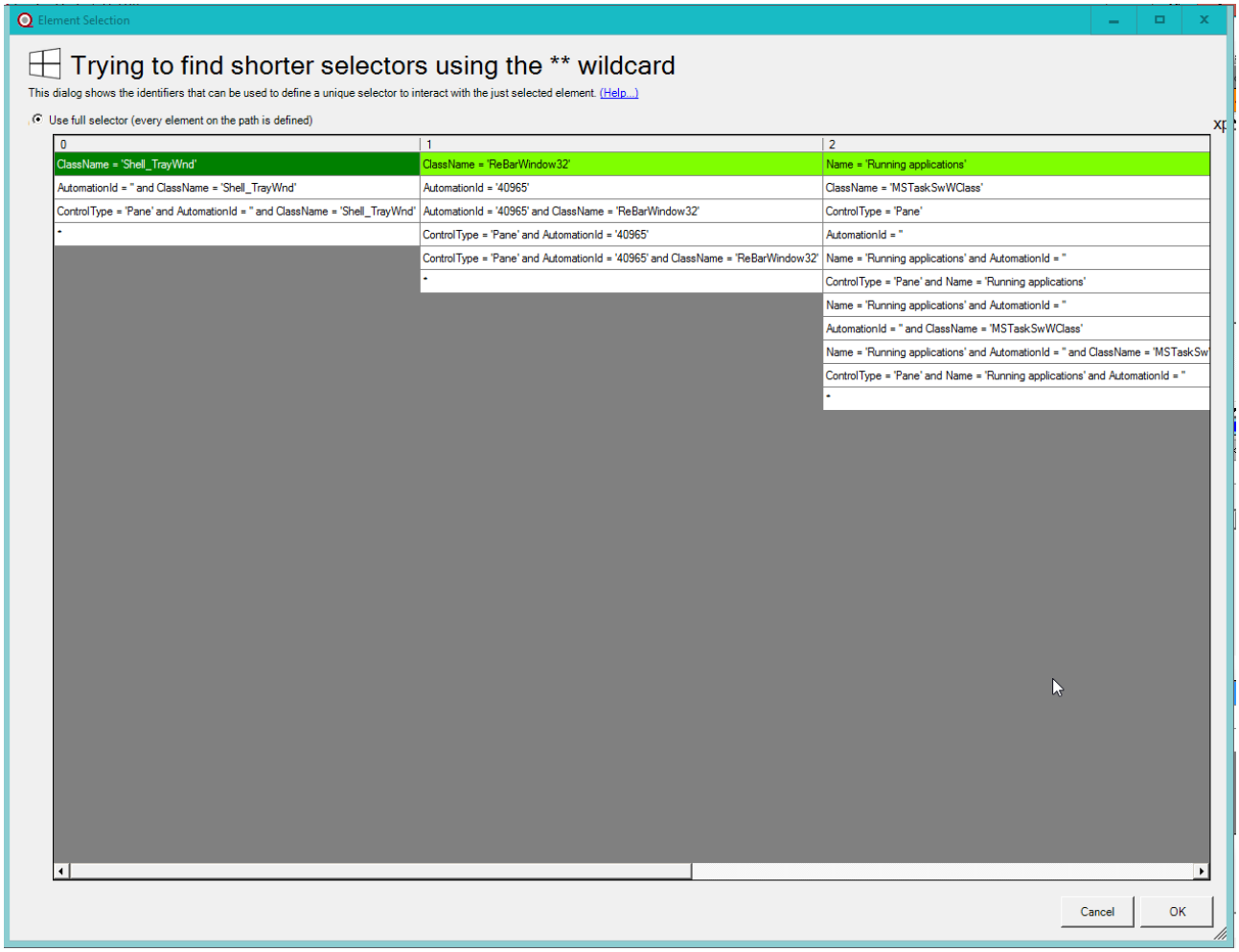
### *Element Selection Dialog*

When the “Use selector dialog” button is active/highlighted (by default it is), then the Element Selection Dialog is shown after an element is selected.




Using this dialog, the script writer can improve on the selector which the Windows Automation Tool can find to the highlighted element.

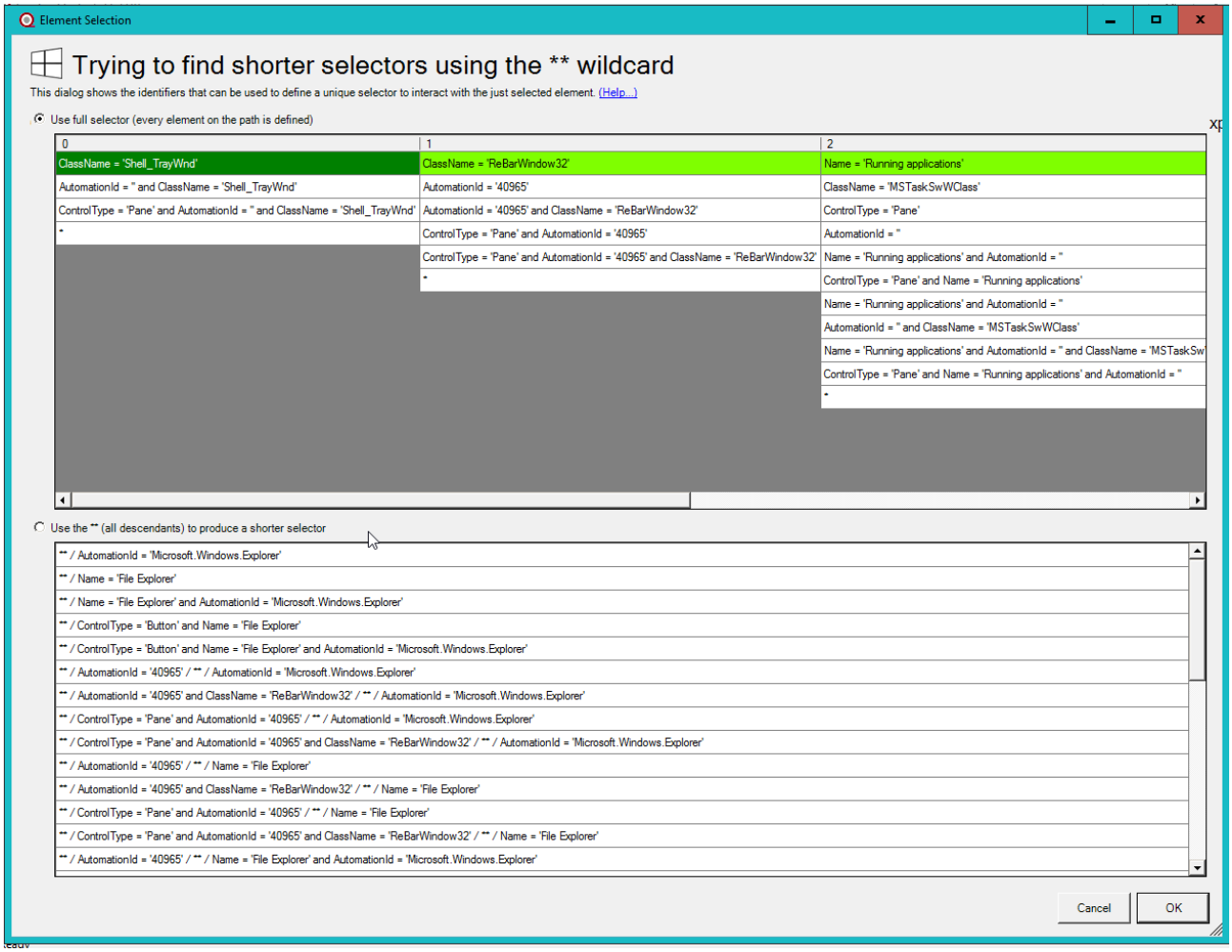
The Element Selection Dialog will examine the user interface tree to find the identifiers of the elements, and list the identifiers which results in a unique selector.



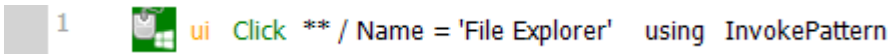

In the screenshot above, the Element Selection Dialog is showing the possible selectors which point to the “File Explorer” icon on the Windows start menu.

The script writer can then look at the individual elements in the selector and select the relevant identifier to use, the script writer can also choose to use the * wildcard to ignore parts of the selector.

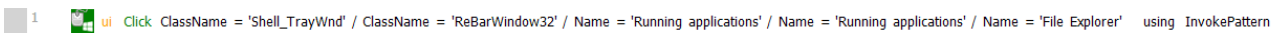
After the Element Selection Dialog has found the possible identifiers for each of the element selector elements, it will try to find even shorter selectors using the ** (all descendants) wildcard. If any wildcard selectors are found, they will be shown in a new list in the dialog.




In the screenshot above, the Element Selection Dialog has found a very short selector which uniquely identifies the element, the script can use this step:




Instead of this step:




Using the shorter selector has the potential of making the test more robust against changes to the user interface, for instance, if a button is moved in the user interface tree. But the Element Selection Dialog can only help to suggest unique identifiers to an element, only the script writer can tell whether a selector is good or bad using knowledge about the application under test.

## Automation Strategies

This section of the manual explains various strategies for testing various user interface elements.

### *Tables*

A table does not normally have individual identifiers on each cell of the table to be used when automating the table.

This means that it might be hard to find a way to identify the particular cell to use in a test.

Consider the following table:

| Name | Value |
|---|---|
| **Parameter A** | 312.32 |
| **Parameter B** | 12.3 |
| **Parameter C** | -123 |

For a human, it is easy to see that by using the parameter name, it is easy to find the value of that particular parameter by looking in the same row in the table.

We can use this when identifying the value cell of a particular row in the table.

Instead of trying to identify the value cell using the Element Selection Dialog a good strategy is to use the Element Selection Dialog to identify the name cell for that particular cell. For instance:

```
** / InnerText = “Parameter A”
```

We can then use the **..** selector to navigate to the parent of the name cell, the row, and then navigate to cell two, which is identified as child 1 of the row (the first child has index 0).

```
** / InnerText = “Parameter A” / .. / 1
```

In this way we can use the identifier we know a permanent, the name of the parameter, to navigate to the cell we actually want to access – the value.

## Local mode

When running in local mode, the Windows Automation Tool provides a way to automate application running on the same system as SeqZap, it uses the accessibility interface for windows to be able to look at the windows on the screen as logical rectangular elements rather than just a collection of colored pixels.

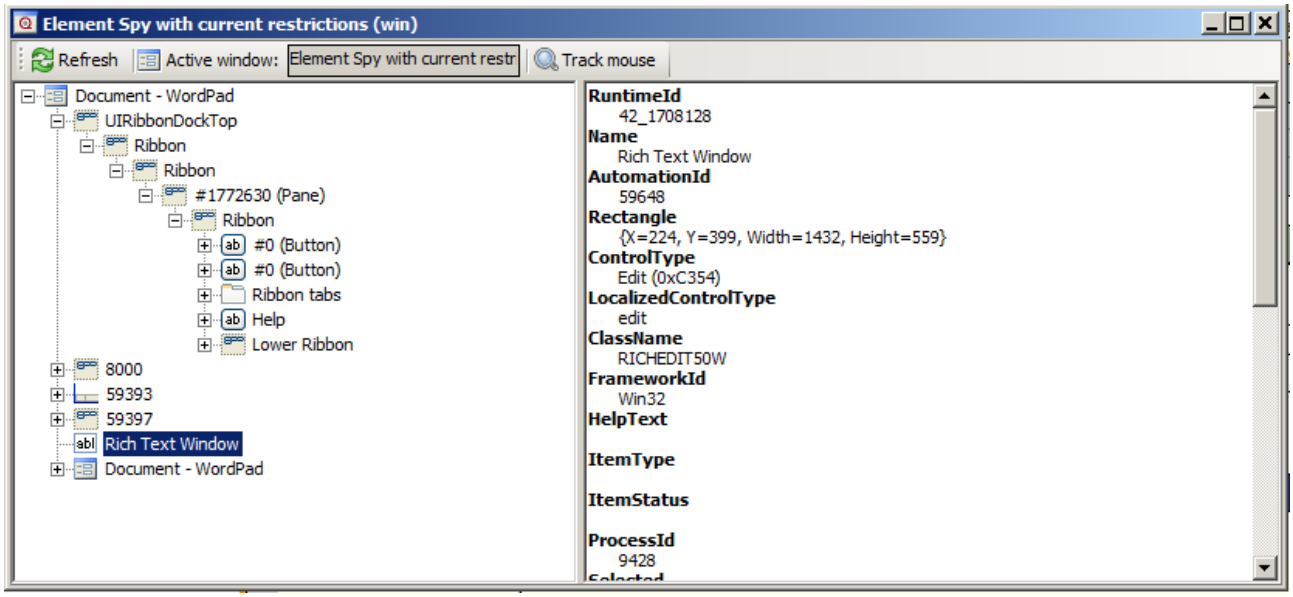


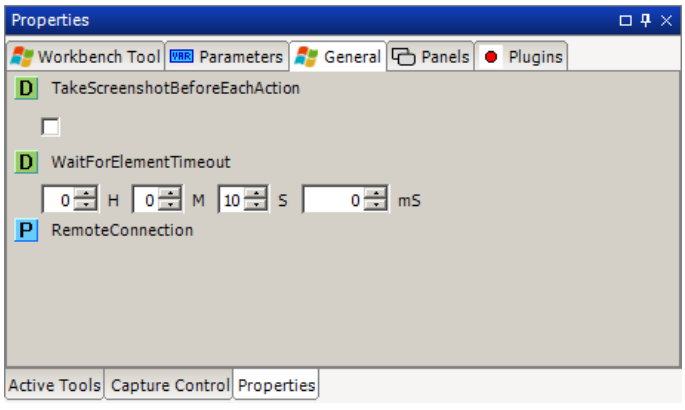

**Figure 4 A look at WordPad from the point of view of the Windows Automation Tool**

The tool utilitises the same mechanism for browsing and automating as Windows uses generally when providing accessiblity functionality for people with disabilities. This means that almost everything on the windows desktop can be automated.

# Methods

## *Setup*

Setup a windows automation tool instance.




If “TakeScreenshotBeforeEachAction” is true, the Windows Automation Tool will put a screenshot in the report before each step. This property can also be changed on runtime using the TakeScreenhotBeforeEachAction boolean property.

The Windows Automation instance can use a remote source of elements instead of the local source on the machine where SeqZap is running.

This is done by setting the parameter called RemoteConnection to something other than null.

### *Get information*

Get the attributes of the selected element.

Please read the Introduction to the Windows Automation Tool.

### *Focus*

Focus a particular element.

Please read the Introduction to the Windows Automation Tool.

### *Click*

Click a user interface element

Please read the Introduction to the Windows Automation Tool.

### *Get text*

Get the text of an element.

Please read the Introduction to the Windows Automation Tool.

### *Get/Set value*

Get or set the value of an element (can be used to simulate keyboard input).

Please read the Introduction to the Windows Automation Tool.

### *Toggle element*

Toggle the state an element (e.g. checkbox).

Please read the Introduction to the Windows Automation Tool.

### *Select item*

Select an item in the user interface (item in a list, etc.).

Please read the Introduction to the Windows Automation Tool.

### *Expand/Collapse element*

Expand or collapse an element (e.g. a menu or a tree item).

Please read the Introduction to the Windows Automation Tool.

### *Select value from a ComboBox*

Select a value from a ComboBox by pressing up/down in the combo-box until the value of the ComboBox is as desired.

Please read the Introduction to the Windows Automation Tool.

### *Contains Bitmap*

Check whether an element contains a particular bitmap.

Please read the Introduction to the Windows Automation Tool.

### *Press Key*

Press one or more keys on the keyboard

Please read the Introduction to the Windows Automation Tool.

### *Hold Key*

Hold or release a key on the keyboard

Please read the Introduction to the Windows Automation Tool.

### *Restrict to process*

Restrict further actions to process

Please read the Introduction to the Windows Automation Tool.

### *Restrict to element*

Restrict further actions to children of an element

Please read the Introduction to the Windows Automation Tool.

### *Pop the top restriction*

Remove the restriction which was most recently added

Please read the Introduction to the Windows Automation Tool.

### *Clear restrictions*

Clear all restrictions placed on future actions

Please read the Introduction to the Windows Automation Tool.

## Properties

### *ActiveWindow*

Return the window containing the currently focused element on the windows desktop.

### *NumberOfRestriction*

Number of restrictions applied to the Windows Automation instance.

### *NumberOfElementsInTopRestriction*

The number of elements in the top restriction.

### *TakeScreenshotBeforeEachAction*

Put a screenshot in the report at the start of each Windows Automation step.

### *ScreenShotBackLogDepth*

Keep the last <ScreenShotBackLogDepth> number of screenshots and show them in the report when an

error is reported, set this to zero to avoid any screenshots being taken.

### *WaitForElementTimeout*

Default time to wait for an element to appear in a Windows Automation method.

### *RestrictionsTimeout*

Time to wait before deciding that a restriction is permanently invalid.

### *DumpTreeOnError*

Dump the entire tree of elements when reporting an error (this might take a long time)

### *IsRemote*

True if this Windows Automation instance use a remote connection.

### *IgnoreActiveWindow*

### *UseExternalDumper*

## Panels

### *Element Spy with current restrictions*

This panel is a variant of the static Element Spy panel, and has the same feature set.

But this panel will only show the element found inside the topmost restriction of the Windows Automation instance.

The following figure shows the Element Spy panel before and after restricting the Windows Automation instance to the Word process.

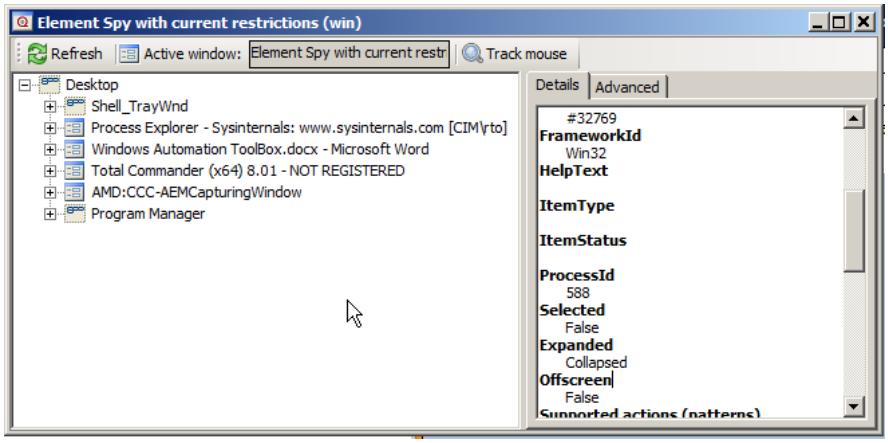



**Figure 5 Before restricting to Word**

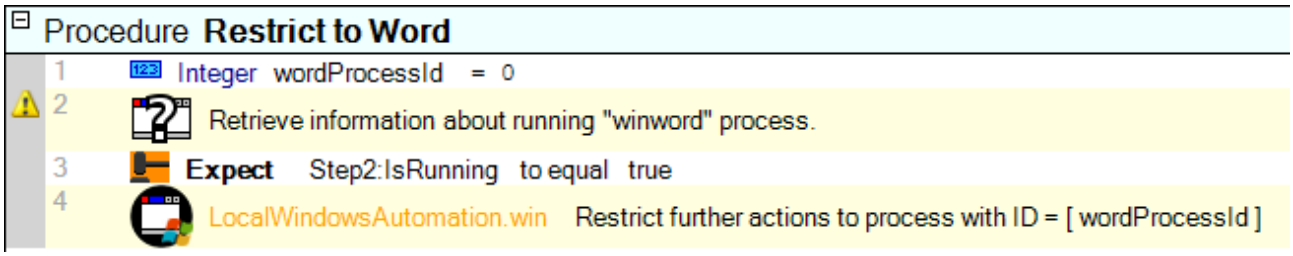



**Figure 6 Procedure to restrict to Word process**

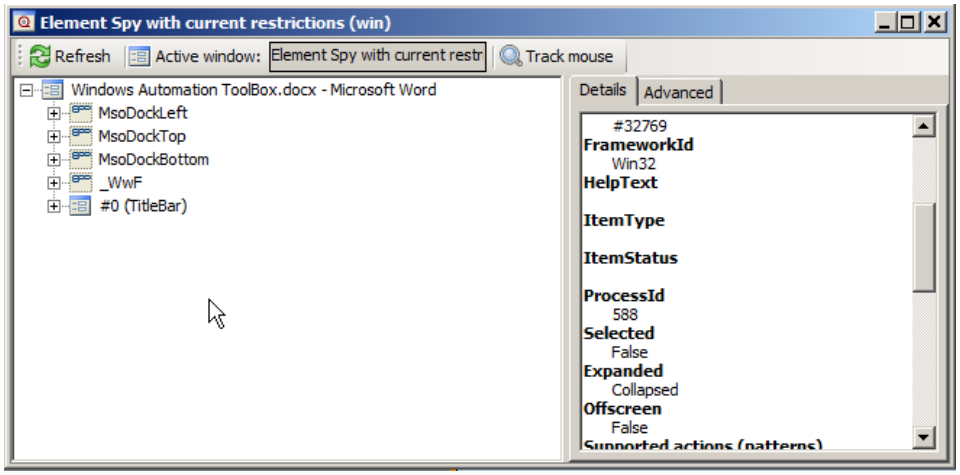



**Figure 7 After restricting to Word**

The Element Spy can also be used to write scripts, when an element is right-clicked it is possible to copy steps to perform various actions on the element. The copied step can then be pasted in the script.

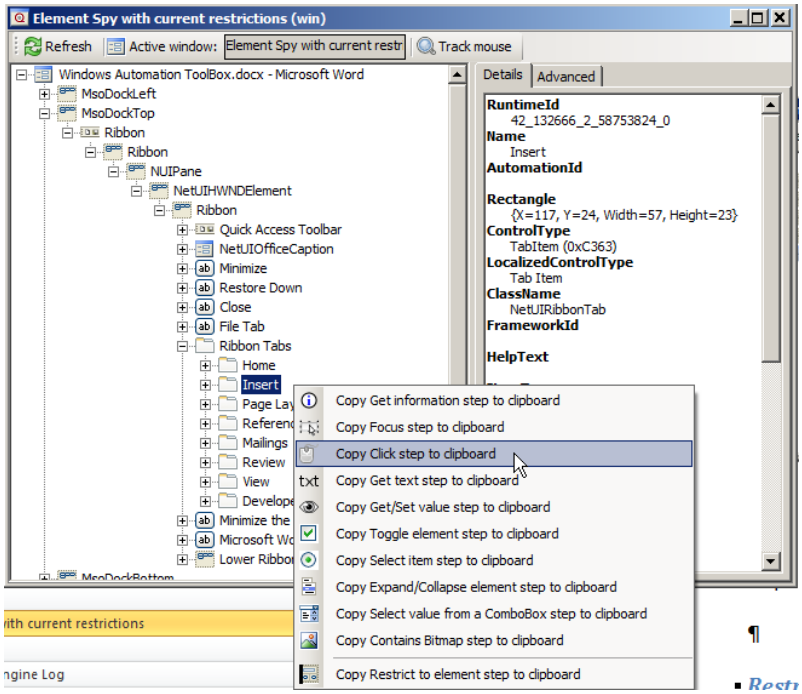



**Figure 8 Copying step to click the "Insert" ribbon menu in Word**

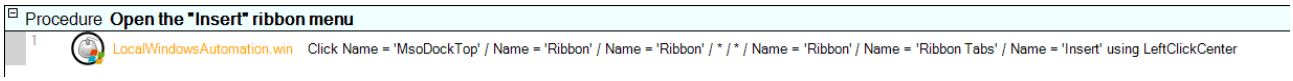



**Figure 9 After the copied step is inserted**

### *Restrictions*

Current restrictions

### *Automation Engine Log*

Provides a log of the actions that the automation tool instance has performed on the underlying target (usually the accessibility layer in windows).

### *Screen shot of the running system (usually only used for remote connections)*

## Remote Windows Connection Tool

Uses a remote source of elements instead of the local elements on the machine where SeqZap is run.

This tool provides an abstract interface that other tools can use to provide access to their source of elements. Almost any source of elements can be used as long as they are a tree of elements representing rectangles (X, Y, Width, Height) with various values used to identify the particular elements (names, types,

text).

Any tool can be implemented, but SeqZap currently includes two tools which provide remote windows connection elements:

- The WebDriver tool which makes it possible to use automate webbrowsers using the Windows Automation tool.
- The Machine Automation tool which makes it possible to control applications running remotely on another machine/system over the Machine Automation protocol which is based on Sequanto Automation protocol.

# Xml ToolBox

A tool for reading, writing and validating XML

The XML tool makes it possible to read simple XML fragments using SeqZap.

It extends the Stream tool with a tool method to read an xml element from a stream.

For slightly advanced XML fragments we recommend writing a custom ZapTool instead.

## XmlElement

### Methods

#### *Get Attribute*
Get value of an attribute

#### *Find First Element*
Get the first element with a given name

#### *Get element text*
Get the text of an element specified by a path

### *Open Xml File*
Open an xml file as an xml instance.

## Properties

### *Name*

### *Value*

### *AllText*
Retrieve all text for this element and all its descendants.

### *AttributeNames*

### *Children*

# XYDisplay

Basic X-Y Display Tools.

For text-based displays and terminals.

## XYDisplay
A virtual character display

## Methods

### *Get Text Line*
Gets a text line from the display.

### *Find Text Line*
Searches a display section for the specified string.

### *Get Position Data*
Gets the data for the specified character position.

### *Count Appearances*
Counts the appearances of the specified string in the display.

### *Snapshot*
Create a clone (snapshot) of the display with it current content.

## Properties

### *Width*

### *Height*

### *Title*

## Panels

### *XY Display*
XY Display for automating displays.

# XYTerminal

Tools for terminals with X-Y display.

# XYTerminal

A terminal with X-Y display.

## Methods

### *Get Text Line*

Gets a text line from the display.

### *Find Text Line*

Searches a display section for the specified string.

### *Get Position Data*

Gets the data for the specified character position.

### *Count Appearances*

Counts the appearances of the specified string in the display.

### *Snapshot*

Create a clone (snapshot) of the display with it current content.

### *Setup*

Set the type and size of the XY Terminal.

### *Send Key*

Send a key to the device

### *Reset*

Send a reset command to the connected terminal

### *Pause*
Pause the terminals use of its stream.

### *Resume*
Resume the terminals use of its stream.

## Properties

### *Stream*

### *IsOpen*

### *Width*

### *Height*

### *Title*

## Panels

### *XY Display*
XY Display for automating displays.

### *XY Terminal Controller*
Simple up/down/left/right/escape/enter controller for XY terminals.

# Plugins

## PG-FP5 Plugin
This plugin is a Programmer Plugin for the Programmer Tool and interfaces an NEC PG-FP5 flash programmer device through a COM-port or a USB port.

Please refer to the Programmer Tool manual for a description of how to use this plugin from SeqZap and how the plugin is used by the Programmer Tool.

The physical connection to the FP5 can either be a standard RS232 COM port or the USB connector via a VCP-driver (Virtual Com Port). When the VCP-driver is used, the communication speed to the device is increased very much compared to the RS232 port speed. Please refer to the section about installation of the VCP-driver. The Status Panel of this plugin can be used to change the USB mode of the connected programmer from “Standard” to “VCP” mode.

## The Programmer Device Object

### *Methods*

The methods described below are the API methods of the plugin defined by the Programmer Tool and are used by the different Programmer Tool methods.

#### Setup

The Setup method has three parameters:

- Port
  Which COM-port the PG-FP5 programmer device is connected to.
- ParametersFile
  A parameters file (*.pr5) to load into the PG-FP5 programmer device.
- SettingsFile
  A settings file (*.esf) to load into the PG-FP5 programmer device.

Four actions are performed in sequence:

- If setup has already been done, the
- Initialize
- Load parameters file
- Load settings file

#### Load

This method transfers a HEX-file with the memory image to the programmer device.

#### Erase

This method activates the Erase command on the device.

#### BlankCheck

This method activates the BlankCheck command on the device.

#### Program

This method activates the Programming command on the device. The PG-FP5 device can perform more than one action. Each action will report its progress, making it possible to see the progress of the command in the SeqZap UI.

### Verify

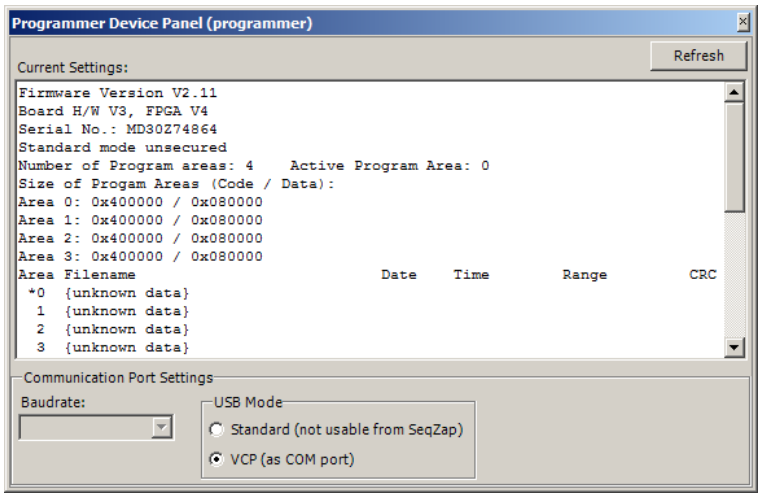
This method activates the Verify command on the device. The PG-FP5 device can perform more than one action. Each action will report its progress, making it possible to see the progress of the command in the SeqZap UI.

### CreateDevicePanelControl

The device panel of the PG-FP5 plugin displays setup information and can also be used for changing baudrate and USB connection functionality of the programmer device.

The Current Settings view is the output of the “conf” command. The output could be different in different versions of the programmer firmware.

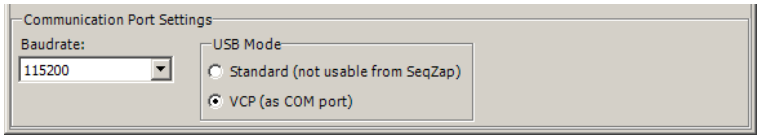
The USB Mode selection controls whether the device USB port should connect to the PC as a standard driver or a VCP (Virtual Com Port) driver. SeqZap does not currently support the Standard mode.




When the USB VCP connection is used the Baudrate selection is disabled.

When using the RS232 port on the device the Baudrate selector will show the current baudrate. Selecting another baudrate will send a baudrate change request (“brt” command) to the device. If the device responds successfully, the baudrate on the PC will be changed to the same baudrate and a new “brt” command is sent to the device to check whether the device is still responding.

Remember that this will not change the setup of the serial port tool. If the new baudrate should be used when the current script is loaded again, the baudrate also needs to be changed in the workbench.



## Troubleshooting

### *Setup method reports "No response from programmer device"*

When using the RS232 port on the device:

- Check that the cable is connected to both the PC and the programmer.
- Be sure to use a crossed cable (null-modem).
- Be sure to set the correct baud rate on the used serial port.

When using the USB connection via the VCP driver:

- The VCP driver from Renesas needs to be installed on the PC.
- A USB cable must be connected between the PC and the mini-USB connector on the programmer device.
- Check that a "Renesas FP5 Virtual COM Port" is listed in the Devices and Printers view on the PC.

General:

- Check that the programmer device is switched on.
- Check that there is no error-message in programmer device display and that neither the BUSY LED nor the ERROR LED is lit or blinking.
- Try switching the programmer device off and then back on again.

## Using the PG-FP5 USB VCP Driver

It is possible to speed up the communication between the PC and the programmer device by using USB and the special VCP driver for the FP5 programmer. By using the VCP driver the selected baud rate of the port will be ignored by the driver, and the communication will be done at USB-speed (measured to be more than 30 times faster than 115200 baud).

The VCP driver is not a part of the SeqZap installation.

Get more information and download the VCP driver from:
http://www.renesas.eu/

The latest firmware for the programmer device can be found at:
http://www2.renesas.eu/products/micro/download/index.html/?id=229

### *Changing to USB VCP mode*

To change between using the RS232 port and the USB port you can follow one of the two procedures in the following sections.

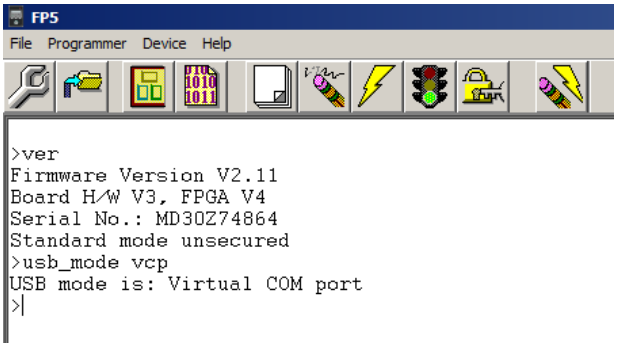
#### Using the FP5 application from Renesas to switch to VCP mode

If you have the FP5 application from Renesas installed, you can use that application to switch to VCP mode.

This procedure requires no RS232 connection, but only a USB cable.

Follow these steps:

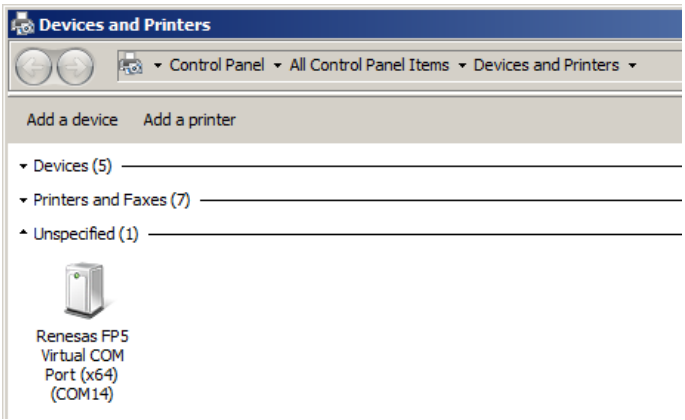
1. Install the Renasas FP5 VCP driver and restart PC if needed.
2. Connect the USB cable between the FP5 programmer device and the PC.
3. Open the Renesas FP5 application.
4. Type the command: usb_mode vcp




5. Press return
6. Exit the FP5 application
7. Switch off the programmer device and switch it back on again.

If the VCP mode has not been used before, the VCP driver will be installed for your programmer device.

The (virtual) COM port will be shown in your Windows device browser (Devices and Printers).



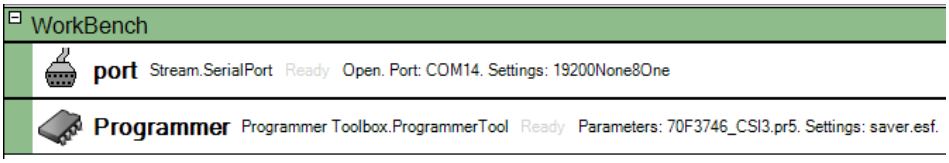

## Using SeqZap to switch to VCP mode

You can use SeqZap to switch to VCP mode if you have an RS232 cable connection between the programmer device and the PC.

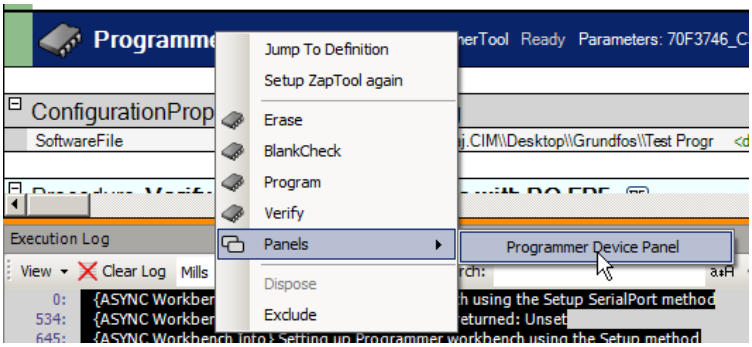
Follow these steps:

1. Open SeqZap
2. Open or create a script file with a workbench with a serial port tool and a programmer tool. The serial port must be set to the current serial port and have the same settings for the serial port as the programmer device (e.g. baudrate). The programmer tool must be set to use the PG-FP5 plugin

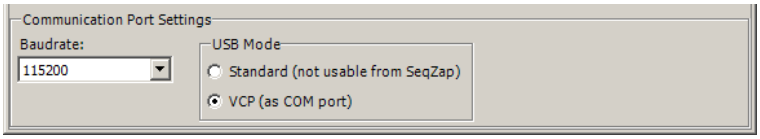
and the parameters must be setup.



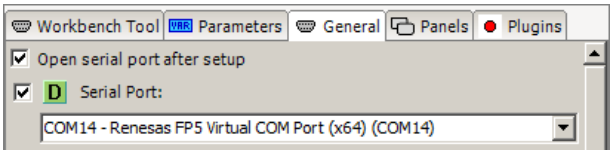

3. Right click the programmer tool in the workbench to open the PG-FP5 plugin panel.




4. Click the VCP radio button.




5. Close the panel.
6. Close SeqZap
7. Connect the programmer to the PC with a USB cable.
   The RS232 cable can be removed.
8. Switch off the programmer device and switch it back on again.
   If VCP mode has not been used on the PC before, the driver will be installed automatically for your device.
9. Wait until the new virtual COM port is shown in the Windows device browser (Devices and Printers).
10. Open SeqZap again and the script file.
11. Change the setup of the serial port tool in the workbench to use the new virtual COM port.




12. Right click the serial port tool in the workbench and select ‘Setup ZapTool’.
13. Right click the programmer tool in the workbench and select ‘Setup ZapTool’.

## SCPI Devices

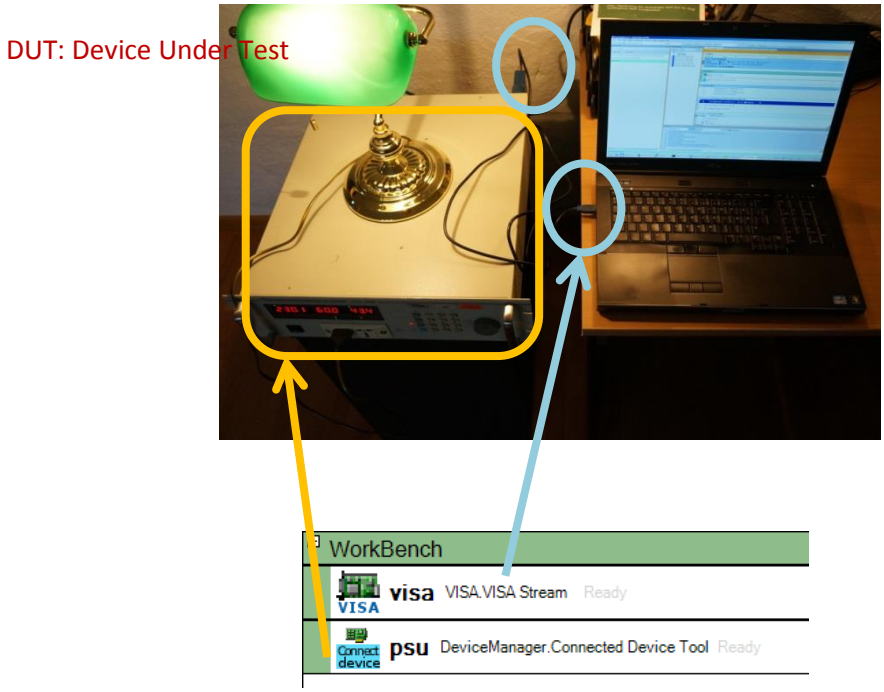
The SCPI Devices plugin provides support for various GPIB/SCPI devices.

All devices use a standard SeqZap Stream for communicating with the device.

The SCPI Devices plugin is Connected Device plugin, a Connected Device Tool must be added to the

workbench to setup the plugin and connected it to a GPIB device.

SCPI devices are usually connected to the PC by using a GPIB interface such as the National Instruments GPIB-to-USB interfaces supported by the NI VISA tool.




The figure above shows how a SCPI device workbench usually looks. The first workbench tool is a VISA resource using a National Instruments GPIB-to-USB device. The SCPI device is then setup as a Connected Device which use the VISA resource for transmitting GPIB commands. The lamp is the device under test (DUT).

## SCPI AC Power Supply

Expose SCPI AC Power Supplies as AC Power Supply devices in the SeqZap device tree.

For instructions on how to use the SCPI power supply, please read the Power Supply section of this manual.

### *Supported Devices*

Although most SCPI AC Power Supplies should work, SeqZap has been verified to work with the following list of power supplies:

- Chroma 6408
- Chroma 6430
- Chroma 61605
- Chroma 61704

If other power supplies are verified to work with SeqZap, please let CIM Software Testing know so the

manual can be updated accordingly.

### *Setup*

The only thing needed to setup a SCPI AC Power Supply is to set the stream to use in the Stream parameter.

Most GPIB interface devices are supported by the VISA Stream Tool.