BIFF User Guide

Bitchin Instrumentation Framework

Flexible, data agnostic instrumentation

Legal

Revisions

Date	Revision	Description
April 2016	16.04	Initial Release
June 2016	16.06	Added Peekaboo Options
July 2016	16.07	Fixed <Modifier> section. Added experimental SyncFile. Added ProcessThread.
August 2016	16.08	Added note on Multi-Source widgets Added <Plugin> for DynamicWidgets Added <Synchronized> for charts.
September 2016	16.09	Added –altSplash option for Marvin. Added new entry to trouble shooting. Added new feature to <Operator>Average. Added <Bound> option for collectors Added MinValue and MaxValue operators
	16.10	Added <Oscar> settings to Marvin <Network> for dynamic connections. Operator <Input> added DefaultValue. Added <Import> and <DefaultAlias> for Marvin Alias's

Contents

1 Introduction

This document serves as a guide to the various components of the Bitchin Instrumentation Framework project.

It is intended to provide an overview of the various components as well as provide technical details on the XML configuration files that are at the heart of its flexibility.

1.1 History and Design Goals

I set out to create a flexible framework that could be used for demonstrations. Years ago I wrote a fairly simple Java application to demonstrate the power of SR-IOV (you can see it in action here: https://www.youtube.com/watch?v=bOMB9RsQfo4&list=WL&feature=mh_lolz)

This little application helped the industry understand what SR-IOV is and what it can do for them. It helped take something fairly complex and put it into simple understandable dials. Years later and I still get requests for updates to this tool for in-house demos.

Now I am working on new things that are even more complicated, so I set out to create a way of demonstrating not just Ethernet traffic as my first application did, but anything that could be instrumented.

The first founding principle of this framework is that you can display any data you wish. If you can gather a piece of information somehow, this framework should be able to display it, whether it be CPU utilization, network bandwidth, temperature, voltage or the number of users on a system.

The second design goal is that the framework should know nothing about the data it is collecting and displaying. It is agnostic to the data, could be string, could be an integer could be a real number, Gigabits per/second, I/O operations per second, power usage etc. The framework does not know anything about this.

The last major design goal is that it be completely configurable via external files that describe how to gather data and how to display it. You should be able to put a Dial on the screen with a few lines in a text file and with a few more lines in another file describe how to go get the data to feed that dial.

So in summary the design goals are:

- If you can instrument it, the framework can display it
- Framework is agnostic to the data being collected and displayed
- Changes to data being collected and displayed can be achieved via external text files

1.2 Naming

You will likely note that all of the pieces of this project have names of cartoon or cartoonish characters.

There is no particular reason for this, other than the fact that I happen to like these cartoon characters and found the names easy to distinguish.

You may also wonder where the last 'F' in BIFF comes from. It's a silent 'F'. (That is in inside joke for my high school English teacher, whose dog was named 'Tuc7k' – with a silent 7) ☺

1.2.1 Legal use of Copyrighted Images

It is not my intention to illegally use the images of a Minion, Marvin the Martian or Oscar the Grouch. The images I used in this document are more for my entertainment purposes than anything else.

The use of these images will not affect the value of the original work or limit the copyright holder's rights or ability to distribute the original. In particular, copies of this image could not be used to make illegal copies of the original full-length cartoon or television program.

1.3 Coding

Minion and Oscar are written in Python while Marvin is written in Java. I could have written all in Java, however I had never done any Python it seemed like a good opportunity to learn it.

As it turns out, Python is a very good choice for Minion as it provides a great framework for the data collection and is available in all Linux distros.

This entire project has been and continues to be very organic. I had an idea of what I wanted and just started coding (and learning). As such, the code is much more erratic and spaghetti like than I would have preferred, but it does work even if it is a bit hard to follow.

A quick note on my coding style, especially for the Java purists – if you don't like it (especially my indentation style), then suck it up ☺ I'm a dinosaur and that's the coding style I learned nearly 30 years ago and it works for me. If you can't read it, use the pretty-printer in your editor to make it how you like☺. Note thought that if you push updates to my repository, I reserve the right to pretty-print it myself if I tweak it. ☺

Also note that this was my first attempt at coding in Python – not my most elegant work. ☺

1.4 Versioning

I have chosen to version all the components of BIFF, including this document much in the same way Ubuntu does its versioning, where the version number is the Year and Month of the release. Followed possibly by the day of the month and a build #.

2 High Level Overview

The Bitchin Instrumentation Framework project has three components:

1. Minion - the data collector
2. Oscar – The orchastrator
3. Marvin – The display GUI

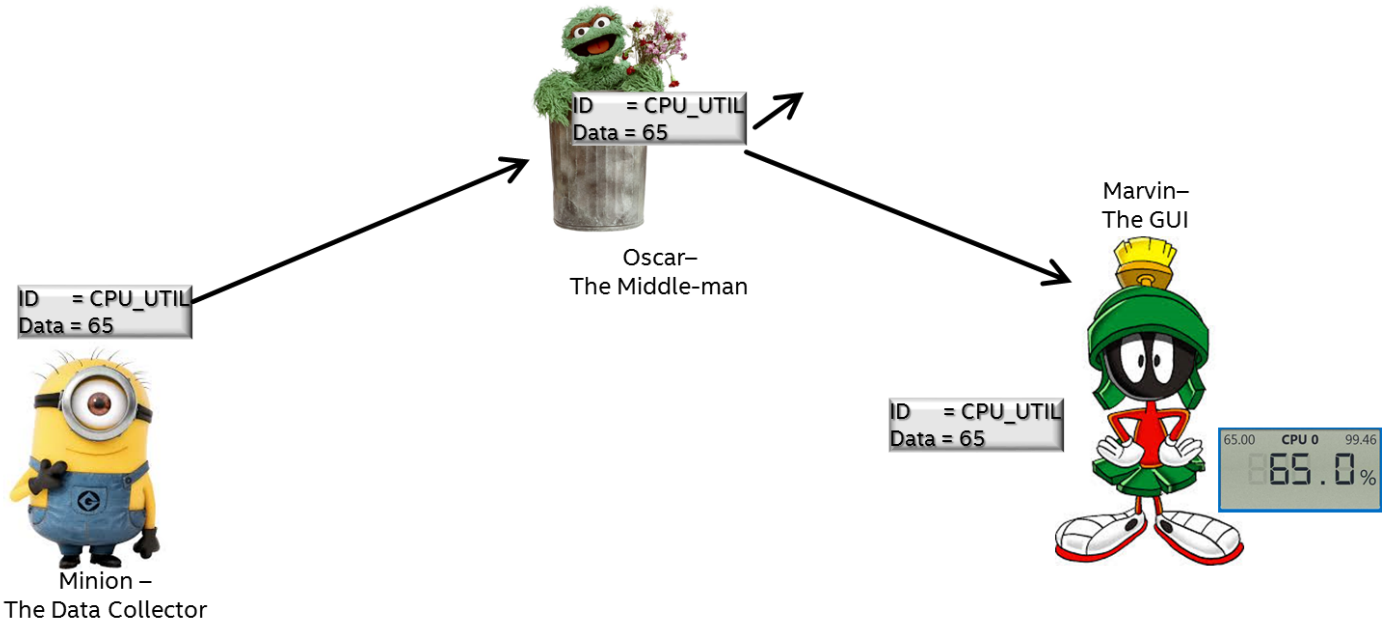


Figure 1 Components of Instrumentation Framework

The operation is fairly straight forward, the Minion framework collects data (as defined and described in an external XML file) associated an ID with it (also defined in the XML file) and passes it to Oscar over a UDP socket in XML format.

Oscar receives data from one or more Minions and simply passes it on to one or more Marvin GUI's. Additionally Oscar can save the incoming data to a file and play it back at a later time.

The GUI, named Marvin receives the data originally sent by a Minion and after validating it, pushes it to one or more 'Widgets' (dial, graph, text etc.) for displaying. The association of a data point ID with a widget, as well as the location, size, color and more for a widget is defined in an external XML file.

All of these components can exist on a single computer or on separate ones. It makes no difference to the framework.

2.1 M.O.M.

So the data flows from Minion to Oscar to Marvin for BIFF. Whose initials of course spell MOM.

Figure 2 the Three Amigos – MOM

Again, this is strictly for my amusement – was a bit challenging to come up with three names to spell MOM. ☺

3 System Requirements

Minion and Oscar are written in Python and require Python v3.3 or later. I chose Python 3.3 because my initial development was on a Microsoft Windows system, and I just grabbed the latest version, unaware that most Linux distros come with a 2.x release.

Marvin is written in Java 8 and needs it to run. Specifically Java 8 update 20 or later.

Note: I have successfully converted Minion to python 2 using the python 3to2 package, and even have some build-in support in Minion for 2.x

3.1 Installing Python

https://www.python.org/download/.

Note: Make sure you select Add Python to Path during install or manual add Python to your environment path if installing on a Windows platform.

3.2 Installing Java

https://java.com/en/download/index.jsp

4 Minion

Minion, the data collection portion of the Bitchin Instrumentation Framework project is written in Python. It is a command line application with no GUI components.

It is designed to be a light-weight framework that collects data at defined intervals, packages it up and sends it to an Oscar.

The basic operation of Minion is that it will call an external application (defined in an XML file) at a given interval (also defined in the XML file), take the output of that external application, assign an ID (again, defined in the XML file) then send it to an Oscar (whose IP and port are in the XML file).

Minion itself knows nothing about how to collect the data, it simply calls the external application (or script), takes the output, tags it with an ID and sends it on its way.

The Minion framework can call as many external applications (or scripts) as you define in the XML file.

Minion supports normalization of data (averaging it to a per second basis) if so configured in the XML file.

There are two 'bundles' for Minion. One that works with Python 2.x and the other that works with Python 3.x.

4.1 Invoking Minion

Running minion is the same as launching any other Python application, by running Python with the parameter of Minion.py.

Minion itself requires a parameter to specify the application definition file, which is an XML file. An example invocation is:

```
python Minion.py –i MinionConfig.xml
```

Minion can also be invoked with additional parameters.

Parameter	Description / Use
`-i <filename>`	Application XML definition file
`-h | -help`	Show the help information
`-v | –vv | –verbose`	Prints out debug information as it runs
`-r or -runonce`	Runs each of the collectors once and only once and then exit
`-a | -aliasfile`	

4.1.1 One-and-done

There is an additional Minion command line parameter –r or –runonce. This parameter will run each of the collectors once and only once and then exit.

The usage for this is that you could setup a Task to call a script that in turn launches a minion with a –r option in which the configuration file might send default/initial values for all dials as a kind of 'reset'.

4.1.2 Using Alias File

```
-a | -aliasfile
```

The Alias file is a simple AliasName=AliasValue. Where each Alias is on a different line. For example:

```
NumberOfCores=72
TimeZone=New Zealand
Author=Patrick Kutch
```

If these are in an alias file and used, then within the configuration file, the aliases of $(NumberOfCores), $(TimeZone) and $(Author) would be available.

4.2 Configuration File

The XML configuration file is where you will define what data you want to collect, how often to collect it, the ID to tag it with and where to send it.

The basic hierarchy for the XML file is as follows:

```
<Minion>
   <Namespace>
      <Name><Name>
      <TargetConnection></TargetConnection>
      <Collector>
      </Collector>
         ...
      <Collector>
      </Collector>
   </Namespace>
   <Namespace>
      <Name><Name>
      <TargetConnection></TargetConnection>
      <Collector>
      </Collector>
         ...
      <Collector>
      </Collector>
   </Namespace>
      .....
   <Namespace>
```

```
    </Namespace>
</Minion>
```

Where <Minion> is the root XML node and there are one or more <Namespace> nodes – though in most cases there is only one <Namespace>

Note: Since Linux is case-sensitive it is important to use the same case in the Minion xml and both Oscar and Marvin definition files.

4.2.1 <Minion>

The Minion Tag (the root) can take a single optional attribute which determines the threading model Minion uses. Each collector can be run in its own thread, or all collectors within a single <Namespace> can be run in a single thread.

This is an experimental setting for testing purposes.

The attribute is `SingleThreading` and can be either True or False, or not there at all, which is the same as False.

4.2.2 <Namespace>

A Namespace can be thought of as a container or an identifier. In most cases it is used to identify the computer from which the data is being gathered.

The Namespace and ID for a data point are used for a unique identifier for a Widget. In this way one could use the same minion configuration file on multiple different systems to gather the same data (such CPU Utilization) and the ID for the collectors would be the same (say CPU_UTIL) but the namespace would be different to reflect the different computers from where the data was collected.

4.2.2.1 <Name>

This is the name of the Namespace, it must be unique per instance of a minion. It can be repeated in other Minions, but not within the same XML configuration file.

4.2.2.1.1 Example

```
<Minion>
   <Namespace>
      <Name>Workload_Server</Name>
   </Namespace>
</Minion>
```

4.2.2.2 <TargetConnection>

The TargetConnection tag defines where the target Oscar can be found on the network.

4.2.2.2.1 Attributes

The <TargetConnection> tag supports the following attributes, which are case sensitive.

Attribute	M/O	Comments
`IP`	M	Target IP Address or FQDM or DNS Name

PORT	M	Target UDP Port Number

4.2.2.2.2 IP

IP address of the target Oscar. This can be a DNS name or an IP address.

Note: If the target Oscar does not have a static IP address and uses DHCP to set the IP Address it is recommended to use the Full Qualified Domain Name (FQDM). Additionally, if the target Oscar is not in a permanent location or the IP address changes it may take some time for the DNS name resolution to point to the new IP address.

4.2.2.2.3 Port

Port on which the target Oscar is listening

4.2.2.2.4 Example

```
<Minion>
   <Namespace>
      <TargetConnection IP="localhost" PORT="3232"/>
   </Namespace>
</Minion>
```

Note: Verify that the UDP Port is not already assigned and that it is not blocked by Firewalls or Routers such as firewalld or iptables in Linux.

4.2.2.3 <DefaultFrequency>

This is the default frequency, in milliseconds for which the Minion framework will call every Collector within this Namespace, unless the Collector specifies its own frequency.

Note: The faster the DefaultFrequency (Lower number) the more often the Collectors will run which may impact system performance and increase network traffic between Minion and Oscar. Using a slower DefaultFrequency (Higher number) will increase the amount of time between data collection for all Collectors. Setting the DefaultFrequency between 3000-5000 (3-5 seconds) and then specifying 1000 (1 second) Frequency on individual collectors is a good way to balance data collection and system performance.

4.2.2.3.1 Example

This example specifies a default frequency of 1.5 seconds (1500ms).

```
<Minion>
   <Namespace>
      <DefaultFrequency>1500</ DefaultFrequency >
   </Namespace>
</Minion>
```

4.2.2.4 <DefaultPrecision>

This is the default precision for numeric values collected within the namespace. The default in two decimal places. With this setting you can change the default for all collectors in the Namespace.

The default precision can be overridden in any individual collector using the <Precision> capability.

4.2.2.4.1 Example

This example specifies a default precision of 4. With this if a collector has a value of 1.25, the value sent will be 1.2500.

```
<Minion>
   <Namespace>
      <DefaultPrecision>4</ DefaultPrecision >
   </Namespace>
</Minion>
```

4.2.2.5 <IncomingConnection>

The IncomingConnection tag defines a socket where Minion will listen for incoming data packets. This connection point will be for performing Taks and other data exchanges.

This tag is optional, if you do not have it, the framework will listen on all interfaces and pick a random port.

4.2.2.5.1 Attributes

The <IncomingConnection> tag supports the following attributes, which are case sensitive.

Attribute	M/O	Comments
`IP`	O	Local IP Address
`PORT`	O	Local UDP Port

4.2.2.5.2 IP

IP address for Minion to listen on. If not specified, it will listen on all available interfaces

4.2.2.5.3 Port

UDP Port on which the minion will listen for incoming data. If not specified a random, unused UDP port number will be chosen. Example

```
<Minion>
   <Namespace>
      <IncomingConnection IP="192.168.1.10" PORT="6032"/>
   </Namespace>
</Minion>
```

4.3 <Collector>

Each namespace contains one or more collector. A collector can be thought of as a plugin that is responsible for going and gathering a desired piece of data. The Collector calls the specified executable program and takes the result, tags it with the given ID and sends it to Oscar.

4.3.1 Attributes

The <Collector> tag supports the following attributes, which are case sensitive.

Attribute	M/O	Comments
`ID`	M	The ID the resulting data is tagged with
`Frequency`	O	How often, in milliseconds, to collect data or OnDemand
`OnlySendOnChange`	O	Boolean (Default is False)
`SendOnlyOnChange`	O	Boolean (Default is False)
`DoNotSend`	O	Boolean (Default is False)
`Scale`	O	Multiplier for the collected value (Default is 1)
`OverrideID`	O	Different ID to use when sent to Marvin.
`ProcessThread`	O	Specify an ID of a separate worker thread group

4.3.1.1 ID

This is the ID the collected data will be tagged with, the Widget in the GUI uses the Namespace + ID as an identifier. The ID must be unique within the Namespace.

4.3.1.2 OverrideID

This was added to accommodate Compare <Operator>s. Every collector must have a unique ID within the namespace, however you may want different compare operators to send data to the same ID. In this case you can use the OverrideID. The Minion demonstration has an example in the AdditionalFile.xml file for LCD.Override.

4.3.1.3 Frequency

How often to call this collector, in milliseconds. If Frequency is not specified for a Collector, then the DefaultFrequency for the Namespace is used.

If you specify "OnDemand" for the frequency, then the collector will only collect when it receives a task from Marvin.

4.3.1.3.1 "OnDemand" Frequency

If you specify this value, then the Collector will act more like a task than a collector. The difference being that a task does not return data, an OnDemand collector will. In order to activate the OnDemand collector, Marvin sends a Task with the approprate TaskID, which is the ID of the Collector and the corresponding Namespace, along with any optional parameters you wish to add to the Collector. The collector can have its own list of parameters defined in the config file, and an OnDemand one can also have additional parameters sent from Marvin as part of the task.

4.3.1.4 OnlySendOnChange

This Attribute can have a value of "True" or "False". If True, then the data collected is only sent to Oscar if it has changed since the last time it was sent.

This can be useful for things such as a flag indicating if a test has finished or not. For example if you have a FileCollector reading a status every 200ms that updates an image in Marvin, it may not be desirable to send an update every 200ms when the data may not change for several minutes.

Note: In order to ensure that the GUI gets all data when it starts up, it sends a message to Oscar, which in turn sends a message to all Minion to an update from all collectors, even if it is marked as OnlySendOnChange.

4.3.1.5 SendOnlyOnChange

Is the same as OnlySendOnChange – added this because I kept typing it in instead of OnlySendOnChange ☺

4.3.1.6 DoNotSend

This Attribute can have a value of "True" or "False". If True, then the data collected but not sent. The default value is False, which is the same as not specifying DoNotSend, and the data will be sent.

This can be useful for Operators that can take data from other collectors and do something with them. Say for example you want to use the average operator that averages the data from several collectors – you may not need or want the data from the individual collectors to be sent, in such a case use the DoNotSend attribute.

4.3.1.7 Scale

If you specify the Scale="value" value then the resulting numeric value from the collection (or Normalization if you do that) will be multiplied by the value specified.

4.3.1.8 ProcessThread

The collection process is done sequentially in the order you specify within the configuration files. Some collectors may take a relatively long time to perform. You can create a new ProcessThread group using the 'ProcessThread' attribute for a collector, or the <ProcessThread> tag.

When you use the 'ProcessThread' attribute or Tag you specify an ID that you create. Each unique ID you specify will place the Collector in a process that only processes collectors with that ProcessThread ID. In this way you can place 'slow' collectors in their own process.

Specifying a ProcessThread is pretty flexible, and is case sensitive. So if you specify an ID of 'Foo' on one collector and create a <ProcessThread> tag for a group of collectors with an ID of 'foo' they will be in different processes; if you however specify 'Foo' for both, they will all run in the same process/worker thread.

Example:

```
<Collector ID="RX-1" ProcessThread="MyOtherWorker">
```

```
    <Executable>Collectors/Network2.py</Executable>
  </Collector>
```

4.3.2 <Executable>

This specifies the external program to be launched that will return the data to be sent to Oscar. The Minion framework will use the exact case that is provided in the XML file, as such if the OS and or program you are calling is case sensitive, take care.

When the external program is launched, it is done so in an external process, this is not very fast and does take resources. Please view section 4.10.2 for more information.

Note that I've done some interesting work that allows Python collectors to be dynamically loaded into the Minion process, rather than launching a separate process. Please refer to section 4.10.1 for more details.

4.3.3 <Bound>

Optional

This tag allows you to specify a range to bound the numeric data in and what to do if the data falls outside that range.

Example:

```
<Bound Max="20000" Min="15555" Action="set"/>
```

The <Bound> allows you to specify a minimum or maximum, or both and what to do if the collected value is outside those. The values must be numeric, they can be integer or float values.

Valid Actions are:

- Drop – drop the data, do not send it
- Set – change the collected value to the bound which it passed
- RepeatLast – re-send the last value sent that falls within the bounds.

Set is the default Action if you do not specify one. You must specify either Min or Max or both.

4.3.4 <Param>

The <Executable> specified may need parameters. You may put one or more <Param> nodes in a collector to provide the parameters.

4.3.4.1 Example

The following is an example of a collector that is written in Python, it will be called every 250ms. Note that the name of the executable is Python.exe and the parameters are the actual Python file to run (GetProgress.py).

```
<Collector ID="Progress" Frequency="250">
   <Executable>Python.exe</Executable>
   <Param>GetProgress.py </Param>
```

```
</Collector>
```

4.3.5 Using another Collector as a <Param>

You may wish to use the output of another collector or operator as a <Param> to a collector. To do this, you specify the ID of the collector wrapped in @() as the parameter:

```
<Collector ID="ProcessProgress" Frequency="250">
   <Executable>MyBashScript.sh </Executable>
   <Param>@(Progress)</Param>
</Collector>
```

In this collector, we call an external script called "MyBashScript.sh" and pass the value of the data collected from the 'Progress' Collector.

The two collectors must be in the same Namespace. If the 'ProcessProgress" collector is run before the 'Progress" collector has actually collected any data, then the 'ProcessProgress' collector will not collect anything.

4.3.6 <Normalize>

Sometimes the data being collected is desired to be in a per second or per time period basis. Network throughput for example is usually in a Megabits Per Second or Gigabits Per Second resolution.

A Collector may go out and read the current # of Bytes that have been send or received over a given network interface every second. However that is raw data not normalized (or averaged).

If you specify a Normalization factor the framework will do some calculations to determine the difference from the last time the data was collected and normalize it to a per second basis.

The <Normalize> number is a float value, it should be a positive non-zero number.

A value of 1, will simply normalize the data to a per second value.

However if you wish to do other calculations, you can specify a different value. For example the build-in Network Collectors return BytesPerSecond. This is not the way most customers in the networking world think, they are used to Megabits Per Second. To convert from Bytes to second to Bits per second, a Normilize value of 0.00000008. (1Byte per second = 0.00000008 Mbps)

4.3.6.1 SyncFile Attribute

Experimental

Normalization is a data rate over calculated based upon the time between collections that is factored into a rate per second value and then scaled with whatever number you provide. The time between collections is done within the Minion framework. You can use the timestamp of a file as the time between collections instead if you like:

```
<Collector ID="TX-1" Frequency="250">
   <Executable>Collectors/Network.py</Executable>
   <Param>GetNetTx</Param>
```

```
    <Param>Local Area Connection</Param>
    <Normalize SyncFile=”NetworkIo.txt”>0.00000008<Normalize>
</Collector>
```

Here you gather some data and instead of using the current system time and comparing it to the last time the collection was run as part of the normalization factoring, it uses the current timestamp on the NetworkIo.txt file and compares to the last time the collection was run and it checked the timestamp on the same file.

This type of calculation likely has limited value and maybe most suited for DynamicCollectors.

4.3.7 <Precision>

Many times the data collected, normalized and scaled is a float value. The <Precision> tag specifies how many digits to the right of the decimal you wish the data to have. The default is to leave the precision as none, meaning as many decimal places as was provided by the collector.

4.3.8 Example

The following example calls a built-in collector to read the network TX bytes from the ‘Local Area Connection’ LAN Port. Note the <Normalize> tag and value. The resulting value will have a single digit to the right of the decimal place via the <Precision> tag.

```
<Collector ID="TX-1" Frequency="250">
    <Executable>Collectors/Network.py</Executable>
    <Param>GetNetTx</Param>
    <Param>Local Area Connection</Param>
    <Normalize>0.00000008<Normalize>
        <Precision>1</Precision>
</Collector>
```

4.4 <Group>

The <Group> tag allows you to group a bunch of collectors together. The collectors <Collector> listed within a <Group> tag are all collected in sequential order and the results from all the collectors are packaged up into a single network packet and sent.

This could be useful if you are charting many individual pieces of data within one chart – it makes sure they all arrive at the same time.

Attribute	M/O	Comments
`Frequency`	O	Frequency to collect data – for ALL collectors within the group

4.4.1.1 Frequency

How often to call this group of collectors, in milliseconds. If Frequency is not specified for a group, then the DefaultFrequency for the Namespace is used. Any frequencies listed on an

individual Collector within the group will be ignored.

4.4.1.2 Example

```
       <Group Frequency="300">
           <Collector ID="TX" Frequency="250">
<Executable>Collectors\FileCollector.py</Executable>
<Param>ParseFile</Param>
<Param>BX_Simulator.txt</Param>
<Param>TX</Param>
<Param>=</Param>
<Param>1</Param>
           </Collector>
           <Collector ID="RX" Frequency="250">
<Executable>Collectors\FileCollector.py</Executable>
<Param>ParseFile</Param>
<Param>BX_Simulator.txt</Param>
<Param>RX</Param>
<Param>=</Param>
<Param>1</Param>
           </Collector>

           <Collector ID="BX" Frequency="250">
<Executable>Collectors\FileCollector.py</Executable>
<Param>ParseFile</Param>
<Param>BX_Simulator.txt</Param>
<Param>BX</Param>
<Param>=</Param>
<Param>1</Param>
           </Collector>
       </Group>
```

4.5 <DynamicCollector>

A DynamicCollector reads the contents of a text file containing one or more lines and ID and DATA pairing such as:

```
Temp=75

NumCPUs=4

NumCores=16
```

It will read this text file at the period defined by the Namespace Frequency, or one specified for the DynamicCollector itself.

When it reads the file, it will make a <Collector> for each ID found in the file and assign the value associated with it. If new IDs are added to the file, they will dynamically be added as well.

As the DynamicCollector runs, it will update the data associated with each <Collector> it adds to the framework, and the data for those collectors will be sent onwards.

The key point is that the DynamicCollector is the piece that creates other Collectors based upon it doing something – usually reading the contents of a file.

Note: There is no ID associated with the <DynamicCollector>

Note: If you have a large file as your source (many data points) you are likely to get an OS level error something like: Minion - WARNING - Error sending data :[WinError 10040] A message sent on a datagram socket was larger than the internal message buffer or some other network limit, or the buffer used to receive a datagram into was smaller than the datagram itself.

This is because the single packet it attempted to create as too huge for the network to handle. If can happen if you put the <DynamicCollector> in a group.

4.5.1 Attributes

The <Collector> tag supports the following attributes, which are case sensitive.

Attribute	M/O	Comments
`Frequency`	O	How often, in milliseconds, to collect data or OnDemand
`OnlySendOnChange`	O	Boolean (Default is False)
`DoNotSend`	O	Boolean (Default is False)
`Prefix`	O	Text to prepend to the ID
`Suffix`	O	Text to append to the ID

4.5.1.1 Frequency

How often to call this collector, in milliseconds. If Frequency is not specified for a Collector, then the DefaultFrequency for the Namespace is used.

If you specify "OnDemand" for the frequency, then the collector will only collect when it receives a task from Marvin.

Keep in mind that this collector goes and reads a file and creates <Collector>s based upon the data within the file which in turn sends data. It does not send data itself.

4.5.1.1.1 "OnDemand" Frequency

This has not been tested for the <DynamicCollector>, it will most likely work just fine, just be aware that it won't update the resulting <Collector>s data until you active this collector.

See the <Collector> OnDemand for an explanation on how it work.

4.5.1.2 OnlySendOnChange

This Attribute can have a value of "True" or "False". If True, then the data collected is only sent to Oscar if it has changed since the last time it was sent. In the case of the <DynamicCollector> it will pass this flag down to any <Collector>s it creates.

4.5.1.3 DoNotSend

This Attribute can have a value of "True" or "False". If True, then the data collected but not sent. The default value is False, which is the same as not specifying DoNotSend, and the data will be sent.

In the case of the <DynamicCollector> it will pass this flag down to any <Collector>s it creates.

4.5.1.4 Prefix

The DynamicCollector makes the ID for the resulting collector from the data within the specified file. If you specify a Prefix, it will prepend that to the ID string found in the file.

So if in the file you have:

```
Temp=75
```

And you specify Prefix="CPU." The resulting data ID will be "CPU.Temp"

4.5.1.5 Suffix

The DynamicCollector makes the ID for the resulting collector from the data within the specified file. If you specify a Suffix it will append that to the ID string found in the file.

4.5.2 <File>

This specifies the external text file that the <DynamicCollector> is to go read. This is required, unless you are making your own DynamicCollector and using the <Plugin> capability.

4.5.2.1 Example

The following is an example of a dynamic collector, it reads the file 'perfdata.txt' and I specify a prefix of 'Wow'.

```
<DynamicCollector Prefix="Wow." OnlySendOnChange="True">
  <File>perfdata.txt</File>
</DynamicCollector>
```

Let's assume the file looks like this:

```
Temp=75

NumCPUs=4

NumCores=16
```

It will create three collectors with ID's of:

Wow.Temp

Wow.NumCPUs

Wow.NumCores

As it reads the file, it will re-read those ID and values and update the values within those Collectors

4.5.3 <Normalize>

Sometimes the data being collected is desired to be in a per second or per timeperiod basis. Network throughput for example is usually in a MegabitsPer Second or Gigabits Per Second resolution.

A Collector may go out and read the current # of Bytes that have been send or received over a given network interface every second. However that is raw data not normalized (or averaged).

If you specify a Normilization factor the framework will do some calculations to determine the difference from the last time the data was collected and normalize it to a per second basis.

The <Normalize> number is a float value, it should be a positive non-zero number.

A value of 1, will simply normalize the data to a per second value.

However if you wish to do other calculations, you can specify a different value. For example the build-in Network Collectors return BytesPerSecond. This is not the way most customers in the networking world think, they are used to Megabits Per Second. To convert from Bytes to second to Bits per second, a Normilize value of 0.00000008. (1Byte per second = 0.00000008 Mbps)

4.5.3.1 Example

The following example calls a built-in collector to read the network TX bytes from the 'Local Area Connection' LAN Port. Note the <Normalize> tag and value.

```
<Collector ID="TX-1" Frequency="250">
   <Executable>Collectors/Network.py</Executable>
   <Param>GetNetTx</Param>
   <Param>Local Area Connection</Param>
   <Normalize>0.00000008</Normalize>
```

4.5.4 <LockFile>

This optional tag allows you to specify a lockfile to be used when the file collector is running. It acts as a semaphore or lock. While the file exist this collector does not run. When the file is not present, it creates the file, reads the data from the file specified in <File> and creates/updates the collectors. When finished it deletes the lockfile. In this way an external program that is generating the file can use the lockfile in the same way to prevent reading only a partially updated file.

4.5.5 <Modifier>

Sometimes the data being collected in a DynamicCollector is something you may want to have treated differently than the rest of the data collected. Say for example the dynamic collector collects some data that you don't care about so you don't want to send it to Oscar, or you want to change the precision, scale or normalization of a data point. You can use a modifier.

Example:

```
<DynamicCollector DoNotSend="True">
  <File>foo.txt</File>
   <Normalize>1</Normalize>
   <Precision>2</Normalize>
   <Modifier ID="ErrorCount_TX" DoNotSend="False" SendOnlyOnChange="True">
      <Normalize>0</Normalize>
      <Precision>0</Precision>
  </Modifier>
   <Modifier ID="ErrorCount_BX" DoNotSend="False" SendOnlyOnChange="True">
      <Normalize>0</Normalize>
      <Precision>0</Precision>
  </Modifier>
   <Modifier ID="ErrorCount_RX" DoNotSend="False" SendOnlyOnChange="True">
      <Normalize>0</Normalize>
      <Precision>0</Precision>
  </Modifier>
</DynamicCollector>
```

So in this example, the DynamicCollector goes and reads data from the foo.txt file and creates dynamic collects from it. For each of those it normalizes them to a per second value (with Normalize = 1) and it sets the Precision to 2 decimal places, in addition the DynamicCollector itself specifies not to send any of the data it collects (which can be useful if it gathers 100's of pieces of data but you only care about say 1 of them).

So then we add a Modifier (you can add as many as you like). In this case I say for the ErrorCount_TX collector (read from the foo.txt file) I want you to send the data, but only if it changes from collection to collection, I want a precision of zero and I don't want the data normalized.

I do the same with the ErrorCount_BX and ErrorCount_RX collectors.

An interesting feature (if I do say so myself) is that I made it so you can specify a RegEx filter for the ID. So you could specify an ID of ErrorCount_(*.) once and be done in order to accomplish what was above:

```
<DynamicCollector DoNotSend="True">
  <File>foo.txt</File>
   <Normalize>1</Normalize>
    <Precision>2</Normalize>
   <Modifier ID="ErrorCount_(.*)" DoNotSend="False" SendOnlyOnChange="True">
      <Normalize>0</Normalize>
      <Precision>0</Precision>
  </Modifier>
</DynamicCollector>
```

4.5.6 Attributes

The <Modifier> tag supports the following attributes, which are case sensitive.

Attribute	M/O	Comments
`SendOnlyOnChange`	O	Boolean (Default is False)
`OnlySendOnChange`	O	Boolean (Default is False)
`Scale`	O	Float value

4.5.7 <Normalize>

See <Normalize>

4.5.8 <Precision>

See <Precision>

4.5.9 <Plugin>

The DynamicCollector by default reads information from a file (as specified in the <File> tag, and creates collectors based upon what is in the file.

Rather than specifying a file, you can specify a plugin where you identify a specific function to call within a python file to run. This function then can dynamically create and update Collectors using 'callback' object passed as a required parameter to the function.

All the other capabilities of a DynamicCollector remain the same, except you replace <File> with <Plugin> and the tags it requires.

Example:

```
<DynamicCollector Frequency="1000">
```

```
      <Plugin>
        <PythonFile>Collectors/Collectd.py</PythonFile>
        <EntryPoint SpawnThread="True">CollectionThread</EntryPoint>
        <Param>localhost</Param>
        <Param>3232</Param>
      </Plugin>
```

4.5.9.1 <PythonFile>

Specifies the external python file where the function to call resides. Only python is supported currently.

4.5.9.2 <EntryPoint>

Specifies the function within the python file to execute. The function specified must have at least one parameter, the first parameter will always be a frameworkInterface object that the function can use to add new collectors. Other parameters can also be added per <Param> tags.

This Tag has an option attribute of SpawnThread (case sensitive) and it takes a boolean string ("True" or "False"). If it is True, then the framework will create a new thread to run your custom DynamicCollector in. It is up to you to implement it in a thread-safe manner. The frameworkInterface object passes along a lot of useful things, including a function (KillThreadSignalled) that you can call each loop to see if you should gracefully exit.

For example the function signature for the Collectd plugin collector looks like:

```
def CollectionThread(frameworkInterface, IP, Port):
```

4.5.9.2.1 frameworkInterface object

This object is the 1st parameter passed to your function, and it contains functions and information you need for your own custom DynamicCollector.

```
frameworkInterface.DoesCollectorExist(ID) # does a collector with ID already exist
frameworkInterface.AddCollector(ID)      #  Add a new collectr
frameworkInterface.SetCollectorValue(ID,Value,ElapsedTime) # Assign the collector a
                                                            new value, along with how
                                                            long since last update
frameworkInterface.KillThreadSignalled() # returns True if signalled to end your
                                           worker thread, else False
frameworkInterface.LockFileName()  ockfile name for dynamic collector, if specified
frameworkInterface.Interval()    # the frequency from the config file
```

For the function SetCollectorValue() if you do not provide the optional ElapsedTime parameter, the framework will automatically calculate this for you.

4.6 <ProcessThread>

You can specify that a group of collectors/groups etc. all reside within a ProcessThread, which will create a new worker thread to process all of those

The <ProcessThread> tag supports the following attributes, which are case sensitive.

Attribute	M/O	Comments
Name	M	How often, in milliseconds, to collect data or OnDemand

Example:

```
<ProcessThread Name=”MyWorker”>
   Collector ID="TX-1" Frequency="250">
      <Executable>Collectors/Network.py</Executable>
   </Collector>
   <Collector ID="RX-1"
      <Executable>Collectors/Network2.py</Executable>
   </Collector>
</ProcessThread>
```

See ProcessThread attribute for more information.

4.7 Aliases

I added the ability to have Aliases within the configuration XML file. Aliases come from two places, a global <AliasList> section in the XML file (per file, not per Namespace) and also all environment variables are automatically added as Aliases.

Why would you use an Alias you may ask? An easy example is from Section 4.3.8 where a numeric value of 0.00000008 was used as a normalization value. This could be defined as an Alias and used to make it much more readable and easy to change throughout the file:

```
<Alias BytesPerSec2MBPS=".00000008"/>
   ...
<Collector ID="TX-1" Frequency="250">
   <Normalize>$(BytesPerSec2MBPS)</Normalize>
   <Executable>Collectors/Network.py</Executable>
   <Param>GetNetTx</Param>
   <Param>Local Area Connection</Param>
</Collector>
```

The use of an alias can be anywhere that you would provide a piece of data, such as Frequency, ID, Parameters etc. They are bounded by “$()”

When defining an Alias it must be within the <AliasList> tag. Each Alias is define as:

```
<Alias YourDesiredAlias=”Value to be substituted”/>
```

Another example is as follows:

```
<AliasList>
   <Alias BytesPerSec2MBPS=".00000008"/>
   <Alias ButesPerSec2GBPS=".000000008"/>
   <Alias MyFreq="500"/>
   <Alias NS="$(COMPUTERNAME)"/>
   <Alias Test="$(NS).$(MyFreq)"/>
</AliasList>
```

You may use one alias within the definition of another, so long as it has already been defined, as seen in this example:

```
<Alias NS="$(COMPUTERNAME)"/>
```

Here I create an alias of NS and associate it with the COMPUTERNAME alias – which in this case came from the environment variable on my Windows box.

You can also combine aliases:

```
<Alias Test="$(NS).$(MyFreq)"/>
```

This creates an alias of Test that results in the NS and MyFreq aliases being combined with a period between the two, which would be "Patrick-Laptop.500". This is a silly example, however it illustrates the feature.

4.7.1 Reading Alias From external File

The AliasList tag can take an optional File attribute. You can specify an external file to load additional aliases from.

```
<AliasList File="MyAliasList.txt">
   <Alias.......
</AliasList>
```

You can specify an AliasList and therefore an external Alias File for every xml file used for Minion configuration. See <ExternalFile> for more information.

4.7.2 ComputerName Alias

On a Microsoft Windows system, the Computername environment variable exits. However there is no environment variable under Linux for this. So I create one. The $(CompuerName) alias is available under both Linux and Windows.

4.7.3 Usage

It may be desirable to send a Minion with some pre-defined collectors to somebody to gather say Network statistics, you can create scripts to be called that take as a parameter the Network device that return such things as data rate, errors, packet count, queue count etc.

However you will not know what the actual system name for the port you want that person to gather data on is. For example in Windows the default name is "Local Area Connection", however the user could have changed it to something more useful for them such as "IT Connection" or "Test Network". You can create an Alias that can be changed in one place:

```
<Alias NIC="Test Network"/>
<Collector ID="TX-1" Frequency="250">
   <Normalize>$(BytesPerSec2MBPS)</Normalize>
   <Executable>Collectors/Network.py</Executable>
   <Param>GetNetTx</Param>
   <Param>$(NIC)</Param>
</Collector>
```

You could even get fancy and based upon some environment variable call different scripts depending on the OS you are running, one set for Windows and another for Linux.

4.8 Build-In Collectors

I have provided a small library of build in collectors that can be used and modeled after if you wish to make your own based upon Python. They are located in the Collectors directory.

Note: New collectors provided in releases of Minion may not be reflected here in the documentation; best to go and take a peek in there once in a while.

4.8.1 FileCollector

Located in the Collectors\FileCollector.py file. The File Collectors provide an easy mechanism to read a value from a file and use it as the dataset to be sent to Oscar.

This can be useful if you are running a long test and want to occasionally write the progress of that test to a file, you can define a collector to go read that file and send the value (presumably 0 to 100) to some Widget in the GUI.

There are two functions defined within the Collectors\FileCollector.py:

4.8.1.1 ReadFromFile

Takes a single parameter, the filename to open and read. If the file does not exist or cannot be opened, "Error" will be returned.

4.8.1.1.1 Example

The following example calls the ReadFromFile function from the FileCollector.py source file with the parameter of "Demonstration\ServerName.txt", which is the name of the file to go read the data from.

This collector also uses the OnlySendOnChange attribute.

```
<Collector ID="ServerName" OnlySendOnChange="True">
   <Executable>Collectors\FileCollector.py</Executable>
   <Param>ReadFromFile</Param>
   <Param>Demonstration\ServerName.txt</Param>
</Collector>
```

4.8.1.2 ReadFromFileWithLock

Takes two parameters, the first is the filename to open and read. If the file does not exist or cannot be opened, "Error" will be returned. The second is a semaphore file to be used for exclusivity. How this works is if the file exists, then the data file is assumed to be in the process of being updated by something else and the collector will wait for up to 1 second for the lock file to not be present.

Once the lockfile is not present, it will then create it, read the datafile, close the lockfile and return the contents of the datafile.

The algorithm another process should use to update the datafile is as follows:

```
While (Lockfile Exists)
{
   Wait
```

```
}
Create Lockfile
Open Datafile
Write data to Datafile
Close Datafile
Delete Lockfile
```

4.8.1.2.1 Example

The following example calls the ReadFromFileWithLock function from the FileCollector.py source file with the parameter of "Demonstration\ServerName.txt", which is the name of the file to go read the data from and the lock file is "TempDir\ServerNameLockFile.txt"

```
<Collector ID="ServerName">
   <Executable>Collectors\FileCollector.py</Executable>
   <Param>ReadFromFileWithLock</Param>
   <Param>Demonstration\ServerName.txt</Param>
   <Param>TempDir\ServerNameLockFile.txt</Param>
</Collector>
```

4.8.1.3 ParseFile

I've provided a kinda cool collector that will allow you to parse a file. Let's say for example that you have a worker script that is always running that is every 100ms dumping the output from Ethtool to a file. You can use this collector to specify which individual piece of data you want from that file!

Example file resulting from piping Ethtool –S:

```
NIC statistics:
     rx_bytes: 1124739465
     rx_error_bytes: 0
     tx_bytes: 12467736
     tx_error_bytes: 0
     rx_ucast_packets: 198836
     rx_mcast_packets: 686
     rx_bcast_packets: 10546993
     tx_ucast_packets: 130518
     tx_mcast_packets: 8
     tx_bcast_packets: 2097
     tx_mac_errors: 0
     tx_carrier_errors: 0
     rx_crc_errors: 0
     rx_align_errors: 0
     tx_single_collisions: 0
     tx_multi_collisions: 0
     tx_deferred: 0
     tx_excess_collisions: 0
     tx_late_collisions: 0
     tx_total_collisions: 0
     rx_fragments: 0
```

```
     rx_jabbers: 0
     rx_undersize_packets: 0
     rx_oversize_packets: 0
     rx_64_byte_packets: 8662169
     rx_65_to_127_byte_packets: 1416121
     rx_128_to_255_byte_packets: 135089
     rx_256_to_511_byte_packets: 255267
     rx_512_to_1023_byte_packets: 101485
     rx_1024_to_1522_byte_packets: 176384
     rx_1523_to_9022_byte_packets: 0
     tx_64_byte_packets: 13332
     tx_65_to_127_byte_packets: 104450
     tx_128_to_255_byte_packets: 4689
     tx_256_to_511_byte_packets: 10152
     tx_512_to_1023_byte_packets: 0
     tx_1024_to_1522_byte_packets: 0
     tx_1523_to_9022_byte_packets: 0
     rx_xon_frames: 0
     rx_xoff_frames: 0
     tx_xon_frames: 0
     tx_xoff_frames: 0
     rx_mac_ctrl_frames: 0
     rx_filtered_packets: 11408451
     rx_ftq_discards: 0
     rx_discards: 0
     rx_fw_discards: 0
```

You specify the File to open, the pattern you are searching for (such as 'rx_bytes'), the tokens to use to break the line where the pattern is found up into an array of individual string, and the index of the string you want from the resulting array, zero based.

4.8.1.3.1 **Example**

The following example calls the Parse function from the FileCollector.py source file with the parameter of "Demonstration\ethtool.txt", which is the name of the file to go read the data, searching for the rx_65_to_127_byte_packets statistic, tokenized by a colon and a space, and you want the string[1] result. Per the above example, it will return 1416121

```
    <Collector ID="ParseTest" Frequency="250">
      <Executable>Collectors\FileCollector.py</Executable>
      <Param>ParseFile</Param>
      <Param>Demonstration\ethtool.txt</Param>
      <Param>rx_65_to_127_byte_packets</Param>
      <Param>: </Param>
      <Param>1</Param>
    </Collector>
```

4.8.1.4 ParseFileWithLock

This performs the same thing as ParseFile, with the addition of a lock file, as discussed in ReadFromFileWithLock.

You specify the File to open, the lockfile, the pattern you are searching for (such as 'rx_bytes'), the tokens to use to break the line where the pattern is found up into an array of individual string, and the index of the string you want from the resulting array, zero based.

4.8.1.4.1 Example

The following example calls the Parse function from the FileCollector.py source file with the parameter of "Demonstration\ethtool.txt", which is the name of the file to go read the data,the lockfile "Demonstration\ethtool.txt.lock" searching for the rx_65_to_127_byte_packets statistic, tokenized by a colon and a space, and you want the string[1] result. Per the above example, it will return 1416121

```
    <Collector ID="ParseTest" Frequency="250">
      <Executable>Collectors\FileCollector.py</Executable>
      <Param>ParseFileWithLock</Param>
      <Param>Demonstration\ethtool.txt</Param>
      <Param>Demonstration\ethtool.txt.lock</Param>
      <Param>rx_65_to_127_byte_packets</Param>
      <Param>: </Param>
      <Param>1</Param>
    </Collector>
```

4.8.2 Network

The Collectors\Network.py file contains two routines, one to read the Network Tx data for a device and another to read the Network Rx data for a device.

This Collector file uses the PSUTIL library that is available for both Windows and LINUX based system. If you wish to use the collector, you must install PSUTIL on the system where it will be used. See http://code.google.com/p/psutil/ for details.

4.8.2.1 GetNetworkRx

Takes a single parameter, the name of the network device to go read data from. This will be OS and possibly system specific. Examples are ETH0, eth0, Local Network Connection.

The data returned will be in Total Bytes Received on that interface. Using the Normalization capability of the Minion framework, this can be converted to Bytes/Sec, Bits/Sec, Mbps,Gbps etc.

4.8.2.1.1 Example

This example reads the network RX data from the 'Local Area Connection' device and normalizes it to Gbps.

```
<Collector ID="RX-1" Frequency="250">
   <Executable>Collectors/Network.py</Executable>
   <Param>GetNetworkRx</Param>
   <Param>Local Area Connection</Param>
   <Normalize>0.00000008<Normalize>
</Collector>
```

4.8.2.2 GetNetworkTx

Takes a single parameter, the name of the network device to go read data from. This will be OS and possibly system specific. Examples are ETH0, eth0, Local Network Connection.

The data returned will be in Total Bytes Received on that interface. Using the Normalization capability of the Minion framework, this can be converted to Bytes/Sec, Bits/Sec, Mbps,Gbps etc.

4.8.2.2.1 Example

This example reads the network RX data from the 'Local Area Connection' device and normalizes it to Gbps.

```
<Collector ID="RX-1" Frequency="250">
   <Executable>Collectors/Network.py</Executable>
   <Param>GetNetworkTx</Param>
   <Param>Local Area Connection</Param>
   <Normalize>0.00000008<Normalize>
</Collector>
```

4.8.3 CPU

The Collectors\CPU.py file contains two routines, one to read the overall CPU Utilization percentage and another to read for a specific core.

This Collector file uses the PSUTIL library that is available for both Windows and LINUX based system. If you wish to use the collector, you must install PSUTIL on the system where it will be used. See http://code.google.com/p/psutil/ for details.

4.8.3.1 GetCPU_Percentage

Takes no parameters, it simply reads the overall CPU utilization for ¼ of a second and returns the utilization value percentage.

4.8.3.1.1 Example

This example reads the overall CPU utilization.

```
<Collector ID="CPU" >
   <Executable>Collectors/CPU.py</Executable>
   <Param>GetCPU_Percentage</Param>
</Collector>
```

4.8.3.2 GetCPU_Core_Percentage

Takes a single parameter – the core # to read the utilization from, it reads the CPU utilization for the specified cor for ¼ of a second and returns the utilization value percentage.

4.8.3.2.1 Example

This example reads the l CPU utilization for core 12.

```
<Collector ID="CPU_Core_12" >
   <Executable>Collectors/CPU.py</Executable>
```

```
   <Param>GetCPU_Core_Percentage</Param>
   <Param>12</Param>
</Collector>
```

4.8.4 PowerShell

This collector allows you to call a PowerShell script. Not used it much.

4.8.5 RandomVal

This collector is used for testing or simulating a data feed when a feed is not available. The RandomVal collector can generate a single integer, floating point or a comma separated integer list between a defined min and max value.

GetBoundedRandomValue(min,max) This will return a random integer between the two values, not inclusive of second value. The collector below will create a single value of 3 through 14 every second.

```
<Collector ID="StackedTx_Server1" Frequency="1000">
  <Executable>Collectors\RandomVal.py</Executable>
  <Param>GetBoundedRandomValue</Param>
  <Param>3</Param>   <!-- Min -->
  <Param>15</Param> <!-- Max -->
</Collector>
```

GetBoundedRandomList(min,max,listSize) Returns a comma separated list of random integer between the two values, not inclusive of second value. Size of list is determined by the fourth param. The collector below will create a 20 list with integer values of 1 through 9 every 250 milliseconds.

```
 <Collector ID="RandomList" Frequency="250">
  <Executable>Collectors\RandomVal.py</Executable>
  <Param>GetBoundedRandomList</Param>
  <Param>1</Param> <!-- Min -->
  <Param>10</Param>  <!-- Max -->
  <Param>20</Param>  <!-- List Size -->
</Collector>
```

GetScaledBoundedRandomValue(min,max,scale) Returns a scaled random value. So if you want values of 1.0 to 100.0 send min=10,max=100,scale=0.1 to get the float value.

```
<Collector ID="RandomList" Frequency="250">
  <Executable>Collectors\RandomVal.py</Executable>
  <Param>GetScaledBoundedRandomValue</Param>
  <Param>10</Param> <!-- Min -->
  <Param>100</Param>  <!-- Max -->
  <Param>0.1</Param>  <!-- Scale -->
</Collector>
```

4.8.6 Parrot

This collector is used for testing, not much use in a real environment. All it does is return

the string you send to it as the parameter. Is useful for testing a widget, or doing something like sending the ComputerName to the Gui by using an environment variable Alias for the single parameter.

Maybe something like:

```
<Collector ID="Computer_Name" >
   <Executable>Collectors/Parrot.py</Executable>
   <Param>Echo </Param>
   <Param>$(ComputerName)</Param>
</Collector>
```

4.8.7 IPC_Linux

This collector doesn't actually send any data down the line to Oscar and Marvin. It instead parses the CSV output from the Intel Performance Counter Monitor and creates as an output a text file with ID,Data pairs. It is designed to be used with the <DynamicCollector>.

The resulting file will have hundreds of data points.

```
    <Collector ID="GetPerfData">
      <Executable>Collectors\IPC_Linux.py</Executable>
      <Param>CreatePerfFile</Param>
      <Param>pktest.csv</Param>
      <Param>perfdata.txt</Param>
      <Param>;</Param>
      <Param>True</Param>
    </Collector>
```

If you have an outside process (or an Actor, or Collector with DoNotSend="True" Attribute) updating a CSV file (such as pktest.csv) you can then call the CreatPerfFile function from IPC_Linux.py to parse that data and write to the resulting file such as perfdata.txt.

Example:

```
    <Collector ID="GetPerfData">
      <Executable>Collectors\IPC_Linux.py</Executable>
      <Param>CreatePerfFile</Param>
      <Param>pktest.csv</Param>
      <Param>perfdata.txt</Param>
      <Param>;</Param>
      <Param>True</Param>
    </Collector>

      <DynamicCollector Prefix="foo" Suffix="bar" OnlySendOnChange="True">
        <File>perfdata.txt</File>
      </DynamicCollector>
```

These few lines will go parse the CSV file generated by the Intel Performance Counter and generate the perfdata.txt file. Which in turn is used by the DynamicCollector and results in > 300 data points generated and sent to Oscar.

You can of course generate and parse the CSV file outside of the framework just as easily.

4.9 Operator Collectors

There are times when you might like to take the results of two collectors and perform an operation on them. A good example is that you can easily go read the RX and TX bytes on a Linux system by using the build in FileCollector to read the /sys/class/net/device/statistics files. However if you want the BX (Bidirectional Value), there is no file to go read that. So I created Operators that will allow you to manipulate data from other collectors within the same namespace.

An Operator looks the same as a Collector, has an ID, and a frequency however instead of an <Executable> tag, there is an <Operator> tag, followed by 1 or more <Input> tags (instead of <Param>).

Here is an example:

```
      <Group Frequency="500">
        <Collector ID="Eth1.TX.bytes">
          <Executable>Collectors\FileCollector.py</Executable>
          <Normalize>$(BytesPerSec2GBPS)</Normalize>
          <Param>ReadFromFile</Param>
          <Param>/sys/class/net/eth1/statistics/tx_bytes</Param>
        </Collector>

        <Collector ID="Eth1.RX.bytes">
          <Executable>Collectors\FileCollector.py</Executable>
          <Normalize>$(BytesPerSec2GBPS)</Normalize>
          <Param>ReadFromFile</Param>
          <Param>/sys/class/net/eth1/statistics /rx_bytes</Param>
        </Collector>

        <Collector ID="Eth1.BX.bytes">
          <Operator>Addition</Operator>
          <Input>Eth1.TX.bytes</Input>
          <Input>Eth1.RX.bytes</Input>
        </Collector>
    </Group>
```

This example read the RX and TX bytes from standard linux files, then gives you the BX bytes by doing an Addition Operator on the data collected from the RX and TX collectors.

4.9.1 Operator <Input>

All of the Operators take 1 or more <Input>s. The inputs can be either the ID of another collector in the same namespace, or a constant value. The ID of anther collector can be a the ID from a Dynamic Collector and as such it may not be created at the time of the application initialization, if this is true then a message will be logged about the missing Collector ID.

Example:

```
<Input>Eth1.RX.bytes</Input>
```

```
<Input Constant="True">52.5<Input>
```

The above example has two inputs, one is from a collector with the ID of *Eth1.rx.bytes* and the second is a constant value.

Example:

```
<Collector ID="QueueAverage">
   <Operator>Averate</Operator>
   <Input DefaultValue="0">Queue_0_tx</Input>
   <Input DefaultValue="0">Queue_1_tx</Input>
</Collector>
```

Here the Average operator will try to read the data from the collectors with IDs of Queue_0_tx and Queue_1_tx. If those collectors have already been collected their values will be used, otherwise they will use the default value of 0 for their calculations.

4.9.1.1 Default Value

An <Input> is either a Constant as shown above, or another collector ID. However sometimes the input collector specified by the ID is not yet available (meaning the Collector has not run yet, or the value hasn't been created yet by say a DynamicCollector). Yet you will want the Operator to be run. You can specify a DefaultValue to use until the collector becomes valid.:

4.9.2 Operator Addition

This Operator will take 2 or more <Input>s and sum them up. They must be numeric values.

4.9.3 Operator Average

This Operator will take 1 or more <Input>s and average them. They must be numeric values.

If you specify but a single <Input> then the Operator will keep a history of up to 100 values for averaging.

Note: Might make it configurable for how long to keep history for single input

4.9.4 Operator MakeList

This Operator will make a comma separated list from <Input>s. This can be useful for making charts.

4.9.5 Operator Duplicate

This Operator will simply duplicate the <Input> provided. This may not sound too useful, but consider a collector that collects data say every 5 seconds, but you want to make a chart update every seconds. You could use the Duplicate Operator to accomplish this.

4.9.6 Compare Operators

There are several compare Operators that take 3 or 4 <Inputs>. The first two <Input>s are compared and if the result of the comparison operation is True, then the result of <Input> 3 is sent. If the result is False and <Input> 4 was specified, it is sent. If <Input> 4 is not specified, nothing is sent.

Example:

```
<Collector ID="TestRunning">
  <Operator>Compare_EQ</Operator>
    <Input>StatusCollector</Input>         <!—If StatusCollector == 'True' -->
    <Input Constant="True">Running</Input>
    <Input Constant="True">Yes</Input>     <!—then send 'Yes' -->
    <Input Constant="True">No</Input>       <!—else send 'No' -->
</Collector>
```

Supported Compare Operators are:

- Compare_EQ
- Compare_NE
- Compare_GT
- Compare_GE
- Compare_LT
- Compare_LE

4.9.7 Operator Compare_EQ

Provides a mechanism to compare two Inputs, if they equal, it will send the value indicated in the 3rd <Input>. If they are not equal, and there is a 4th <Input> specified, it will send that value. This make an if-then-else ability.

Example:

```
<Collector ID="TestRunning">
  <Operator>Compare_Eq</Operator>
    <Input>StatusCollector</Input>  <!—If StatusCollector == 'True' -->
    <Input Constant="True">Running</Input>
    <Input Constant="True">Yes</Input>         <!—then send 'Yes' -->
    <Input Constant="True">No</Input>            <!—else send 'No' -->
</Collector>
```

4.9.8 Operator Compare_NE

Compare Operator that checks for Not Equal (!=) between the 1st two <Input>s, if result is true then the <Input> 3 is sent, else if specified <Input> 4 is sent.

4.9.9 Operator Compare_GT

Compare Operator that checks for Greater Than (>). Compare Operator that checks for Not Equal (!=) between the 1st two <Input>s, if result is true then the <Input> 3 is sent, else if specified <Input> 4 is sent.

4.9.10 Operator Compare_GE

Compare Operator that checks for Greater Than or Equal (>=).Compare Operator that checks for Not Equal (!=) between the 1st two <Input>s, if result is true then the <Input> 3 is sent, else if specified <Input> 4 is sent.

4.9.11 Operator Compare_LT

Compare Operator that checks for Less Than (<).Compare Operator that checks for Not Equal (!=) between the 1st two <Input>s, if result is true then the <Input> 3 is sent, else if specified <Input> 4 is sent.

4.9.12 Operator Compare_LE

Compare Operator that checks for Less Than or Equal (<=).Compare Operator that checks for Not Equal (!=) between the 1st two <Input>s, if result is true then the <Input> 3 is sent, else if specified <Input> 4 is sent.

4.9.13 Greatest

Sends the greatest <Input> value for a list of <Input>s. If all values are numeric it will send the highest numeric value, otherwise it will be a string compare.

4.9.14 Least

Sends the least <Input> value for a list of <Input>s. If all values are numeric it will send the smallest numeric value, otherwise it will be a string compare

4.9.15 MaxValue

Keeps track of the numeric data sent for the <Input> collectors (1 or more) and always sends the maximum value that has been collected amongst that list since collection began.

4.9.16 MinValue

Keeps track of the numeric data sent for the <Input> collectors (1 or more) and always sends the minimum value that has been collected amongst that list since collection begain.

4.9.17 UserDefined

Pretty stoked about this one. ☺

This is an interesting Operator that is a hybrid between a Collector and an Operator. It takes an <Executable> and <Param>s as well as <Input>s used for using data from other collectors.

This can be very useful of your own logic. Take for example you want to display a DyanmicImage in the GUI based upon a state machine that has 4 inputs that are all available via Collectors. With this Operator you can send those inputs to your own externally defined operator and return an state machine state value that corresponds to the

appropriate image to be displayed in the GUI.

Example:

```
<Collector ID="BX" Frequency="250">
  <Normalize>2</Normalize>
  <Operator>Addition</Operator>
  <Input>TX</Input>
  <Input>RX</Input>
</Collector>

<Collector ID="dymmyList">
  <Operator>MakeList</Operator>
  <Repeat Count="72">
    <Input Constant="True">CORE$(CurrentValueAlias).Utilization</Input>
  </Repeat>
</Collector>

<Collector ID="foo">
  <Operator>UserDefined</Operator>
  <Executable>Test.py</Executable>
  <Param>Perftest5</Param>
  <Param>P1</Param>
  <Param>P2</Param>
  <Input>dymmyList</Input>
  <Input Constant="True">const val</Input>
  <Input>BX</Input>
</Collector>
```

The above example 'foo' Collector uses the UserDefined Operator that calls the user supplied Perftest5 Function within the user supplied Test.py file, and passes 5 parameters to the function.

The 1st,2nd and 4th parameters are constant value. The 3rd and 5th are all values from other Collectors.

4.9.18 Looping for Input

There are times when you might have a lot of input for a given Operator. Say you wanted to use the MakeList Operator to make a list of CPU utilization for all of the CPU's in your system, and you have 72 of them. You could do something like this:

```
  <Collector ID="CPU.UTIL.LIST ">
    <Operator>MakeList</Operator>
    <Input>CORE0.Utilization</Input>
    <Input>CORE1.Utilization</Input>
    <Input>CORE2.Utilization</Input>
    <Input>CORE3.Utilization</Input>
    <Input>CORE4.Utilization</Input>
….
    <Input>CORE71.Utilization</Input>
```

```
        </Collector>
```

And that would work just fine. But can get tedious and not flexible. Instead you can use the <Repeat> ability (currently just for Operator <Input>s)

```
        <Collector ID="CPU.UTIL.LIST ">
          <Operator>MakeList</Operator>
          <Repeat Count=”72”>
             <Input>CORE$(CurrentValueAlias).Utilization</Input>
           </Repeat>
        </Collector>
```

When you use Repeat, you must specify count. There is automatically going to be two aliases created:

- CurrentValueAlias – as used above, range is 0-71
- CurrentCountAlias – as used above, range is 0-71

There is another options you can specify which is “StartValue”, which indicates the starting # to begin counting at. Final number will be StartValue + Count.

```
        <Collector ID="CPU.UTIL.LIST ">
          <Operator>MakeList</Operator>
          <Repeat “Count=36” Start=”36”>
             <Input>CORE$(CurrentValueAlias).Utilization</Input>
           </Repeat>
        </Collector>
```

In this example, CurrentValueAlias has the range of 36-71 and CurrentCountAlias has range of 0-36.

4.10 Making your own collectors

While I’ve provided a few basic collectors, different demos and tests will likely want a much broader range of data to collect. The basic rule is if you create a runnable ‘thing’ that can be called by the framework, and that thing returns (if it is Python) or prints to stdout a data point the Minion framework can call it and send the data.

The collectors can be executables, .BAT files, script files, Python, Perl, bash, etc. It matters not.

For example, a .BAT version of the Parrot collector could look like:

```
Parrot.bat:
echo %1
```

4.10.1 Python

Python scripts can be called just like any other script, making the Python executable the <Executable> part of the collector.

However I’ve also made it so the Minion framework will try to dynamically load the specified python script into its own process space, rather than launching a completely new process. See Section 4.10.2 for information about performance considerations.

If you make a python script that simply runs on its own (as if it has a main()) then the dynamic load will fail. The script will still run and be launched, however it will be done so in a separate process.

In order to make your own Python script that will be dynamically loaded into the process space of the Minion framework, the script must be made up of functions, and those functions called in the framework. Refer to the build-in-collectors provided for examples.

4.10.2 Considerations

While the Minion framework is robust enough to allow you to call any external program or script you create to gather the data you wish to be displayed, each time this external program or script is run, it is done so in a completely separate process. Think of it as opening a new DOS Box, or Terminal each time you need to gather data. It works fine, but is not very efficient.

The exception to this is if you make Python scripts that can be dynamically loaded into the Minion framework process space as discussed in Section 4.10.1.

To prevent running out of memory, each Collector can only have one active instance at a time. What this means is if your collector takes say 1 second to run, yet the Frequency for the collector is set to say ½ a second, the framework will wait for the previous instance to run before launching the next one.

If the framework did not do this, it would quickly open up so many processes that the system ran out of memory and compute power.

If you need to create many collectors that gather data that are launched in a separate process (for example a bash script, or a binary executable), it may have a noticeable effect on system resources – that could skew the desired test/demo results. If this is the case, consider making your data gathering app/script/etc. run on its own and instead of printing the data to be sent to the GUI to standard out, write it to a file and then use a File Collector to read the data. It may prove much more efficient.

Note: To see a comparison of performance differences between an internally called (dynamically loaded python script) vs. launching an external script, run both the DemoConfig.xml and DemoConfig_DynaLoad.xml config files and compare the CPU utilizing of the system under test.

4.11 Mute Collector

There are times when you may want to perform a task at a regular interval, but not send any data to the GUI or Oscar. To accommodate this, make a regular collector but instead of returning a piece of data, return the string "HelenKeller" (very case sensitive). Helen may be the most famous of all mute people in history.

4.12 <Actor> (Tasks)

The Minion framework is capable of also performing tasks – which means it is capable of executing external applications to go perform tasks on demand as opposed to on a regular basis.

A Task is initiated by a GUI (such as Marvin) to go do something. For example if you want to go start a performance test of some kind. You can manually start a script from a command line, or you can assign a task to a Widget in the GUI and a message will be sent to the Minion framework to go do that task.

Tasks are defined in the configuration XML file in a manor very similar to that of a collector; there is no frequency (as it is done on demand) and since the tasks do not return any data, there is no normalization.

4.12.1 Attributes

The <Actor> tag supports the following attributes, which are case sensitive.

Attribute	M/O	Comments
`ID`	M	The ID the Task to be performed

4.12.1.1 ID

This is the ID the actor to call. As with the ID for a Collector, the ID+Namespace of an Actor should be unique within a Minion Config file.

4.12.2 <Executable>

This is nearly the same as the <Executable> tag for a Collector. The exception being that if the external program called as a Task returns any data, it is ignored and NOT sent back to the GUI.

4.12.3 <Param>

The <Executable> specified may need parameters. You may put one or more <Param> nodes in a collector to provide the parameters.

Parameters can also be sent from Marvin as part of the Task Request. Any Paramaters sent from Marvin will be added to the invocation after the ones listed in the Marvin configuration file.

4.12.4 Example

The following is an example Actor entry into the Minion configuration XML file that when invoked will run the 'launchCoreWorkload.sh' script and pass it a parameter of '0'.

```
<Actor ID="RunWorkLoadTask_Core_0">
   <Executable>launchCoreWorkload.sh</Executable>
   <Param>0</Param>
</Actor>
```

4.13 Using Additional Files

One might want to create a library of files in which you define a common set of collectors.

You can do this using the <ExternalFile> tag.

Within a namespace, you simply add this tag. Here is an example (from the DemoConfig.xml file):

```
<!-- Some others are defined externally, and use some aliases-->
<ExternalFile Rate1="250" Rate2="500">Demonstration/AdditionalFile.xml</ExternalFile>
```

Within an external file you can create an alias list (which is only valid for that file, and any files it may load externally) and additional collectors. You cannot create new Actors. All collectors will be part of the Namespace which the <ExternalFile> tag is listed within.

You can pass 'parameters' to an external file as shown above. It is really an Alias that is created just before the file is parsed, and removed when it is done parsing. So this means in the example above, Rate1 and Rate2 are aliases used within the 'AdditionalFile.xml', but they do not exist outside of that.

5 Oscar

In addition to being a character from my early youth, Oscar is the name I've given the 'middle' layer of the Bitchin Instrumentation Framework project. Oscar receives data from one or more Minions and sends that data onto one or Marvin. Oscar has the ability to save and playback the data received from minions.

Oscar can now (as of version Beta 1.20) accept input from other Oscars as well – allowing you to chain them. Be careful though, no protection is in place for circular connections ☺

Oscar is written in Python and has a GUI written in tkinter. As of Beta 1.20 you can run Oscar in a session with no gui. If it fails to load a GUI, it will default to command no Gui.

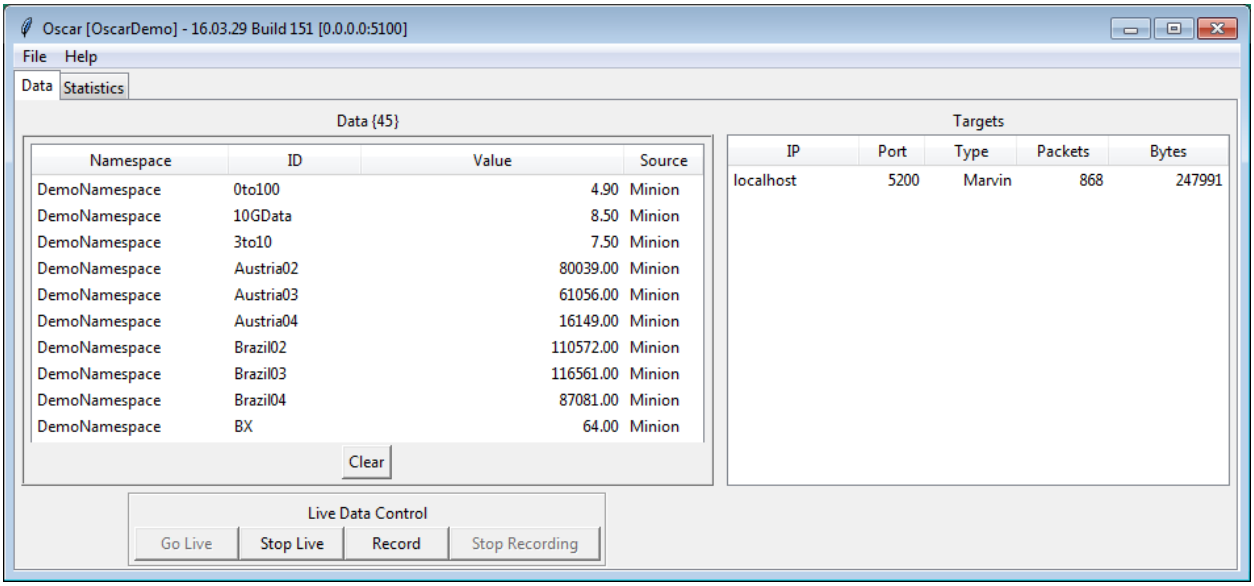


Figure 3 Oscar

5.1 Running Oscar

To run Oscar you simply type:

```
python Oscar.py
```

This will start up Oscar with the default configuration file of OscarConfig.xml.

There are many optional command line parameters when you invoke Oscar:

Parameter	Description / Usage
`-i	--input filename`	Specify a specific configuration filename
`-v	--verbose`	Print debug information to console and log file

`-l	--logfile`	Logfile name – default is OscarLog.txt
`-p	--playback`	Loads and plays the specified file
`-rp`	Repeat mode – replays the specified playback file
`-lp`	Loop mode – repeats data in specified file from points Specified by –b and –e options
`-b	--begin`	Data packet # in playback file to begin playback, used with –e option
`-e	--end`	Data packet # to stop at before returing to –begin # when looping
`-s	--speed`	Playback speed, only used with –p option
`-r	--record filename`	Records and when done recording, saves to specified file
`-t	--time`	Runs for specifed time (minutes) before exiting. Used with –r option mostly

5.2 The configuration file

Example

```
<?xml version="1.0" encoding="utf-8"?>
<Oscar ID="Oscar1">
  <IncomingMinionConnection IP="localhost" PORT ="3232"/>
  <TargetConnection IP="localhost" PORT="3234"/>
  <TargetConnection IP="patrick-pc" PORT="3234"/>
  <TargetConnection IP="javabox" PORT="3234"/>
  <SendStatus>True</SendStatus>
</Oscar>
```

5.2.1 <Oscar>

The Oscar tag is the root for the configuration file. It takes a required ID. This is used to identify the specific Oscar. This is because you can actually have more than one Oscar feeding data to Marvin(s). Since Marvin(s) need to send data to Oscar(s) this provided a mechanism by which to identify Oscar(s).

The Oscar ID needs to be different for each Oscar connected to a specific Marvin – otherwise undesired results are likely.

5.2.2 <IncomingMinionConnection>

The IncomingMinionConnection tag defines a socket where Oscar will listen for incoming data packets from one or more minions. This connection point will be for receiving data

from minions that will then be sent to Marvin.

This tag is required. This is the connection point that you specify in your Minion configuration file <TargetConnection> tag.

5.2.2.1 Attributes

The <IncomingMinionConnection> tag supports the following attributes, which are case sensitive.

Attribute	M/O	Comments
`IP`	M	Local IP Address to listen for data from Minion(s)
`PORT`	M	Local UDP Port to listen for data from Minion(s)

5.2.2.2 IP

IP Address for Oscar to listen on.

5.2.2.3 Port

Port on which the Oscar will listen for incoming data.

5.2.3 <TargetConnection>

You specify one or more <TagetConnection> tags, each one points to a Marvin Gui. You can run multiple Marvins at the same IP, but they will need different ports. What you specify in the Oscar <TargetConnection> tag should match the Marvin <Network> information.

Note: Oscar will scan the configuration file for changes while it is running. Any NEW targets added to the configuration file will be added while it is running. Only additions can be made while running. If you wish to remove a target, you must re-start the application.

5.2.3.1 Attributes

The <TargetConnection> tag supports the following attributes, which are case sensitive.

Attribute	M/O	Comments
`IP`	M	Remote IP Address to send data to a Marvin
`PORT`	M	Remote UDP Port to send data to a Marvin

5.2.3.2 IP

Remote Address to send data to a Marvin or a downstream Oscar.

5.2.3.3 Port

Remote Address to send data to a Marvin

5.2.4 <IncomingMarvinConnection>

Marvin needs to communicate with Oscar, to send Tasks as well as a heartbeat.

If you do not specify the <IncomingMarvinConnection> tag, Oscar will randomly choose a port and listen on all interfaces. If you specify all or part of <IncomingMarvinConnection> that will be used.

Oscar will send a message to Marvin informing Marvin of where to send data to Oscar.

5.2.4.1 Attributes

The <TargetConnection> tag supports the following attributes, which are case sensitive.

Attribute	M/O	Comments
`IP`	O	IP address for Oscar to listen for Marvin messages on. If not specified, will listen on all devices
`PORT`	O	UDP Port to listen for Marvin messages on. If not specified, a random port will be chosen

5.2.4.2 IP

IP address to listen for Marvin messages on.

5.2.4.3 Port

UDP Port to listen for Marvin messages on.

5.2.5 <MarvinAutoConnect>

The <MarvinAutoConnect> key is an optional way that a Marvin can automatically connect to an Oscar. This is opposed to the 'normal' mechanism by which the Oscar must explicitly point to a Marvin for Marvin to get data.

Using the MarvinAutoConnect feature a Marvin can point to an Oscar and connect automatically upon startup.

Example

```
<MarvinAutoConnect Key="PatrickKutchKey"/>
```

If a Marvin is configured for automatic connections it will upon startup (and only upon startup) send a message to Oscar with a hash of the key it has been configured with. If those keys match, then Oscar will add that Marvin to its list of targets to send data to.

Note:

If you specify a Marvin as a traditional target via <TargetConnection> and that target also connects via MarvinAutoConnect, that Marvin will receive each data point twice. So take care.

5.3 Using Oscar

5.3.1 Live Data

Once Oscar has started up, you can press the Start button to start receiving data from Minion(s) and sending it to Marvin(s).

The stop button will stop the live feed.

5.3.2 Recording Data feed

Once you have pressed the Start button, you will start to receive data from Minion(s).

Pressing the record button will keep a copy of the incoming data in memory while also sending it to Marvin(s). It will keep doing so until you press 'Stop'. At which time you can then playback the recorded data with the panel on the right, or you can save the recorded data for playback. Using the File menu.

You can save the data to either an Oscar file for playback later, or you can save it to a CSV formatted file for using in Excel.

Note: If you exit the app without saving your data, you will not be prompted, it will be gone.

5.3.3 Playing back Recorded Data

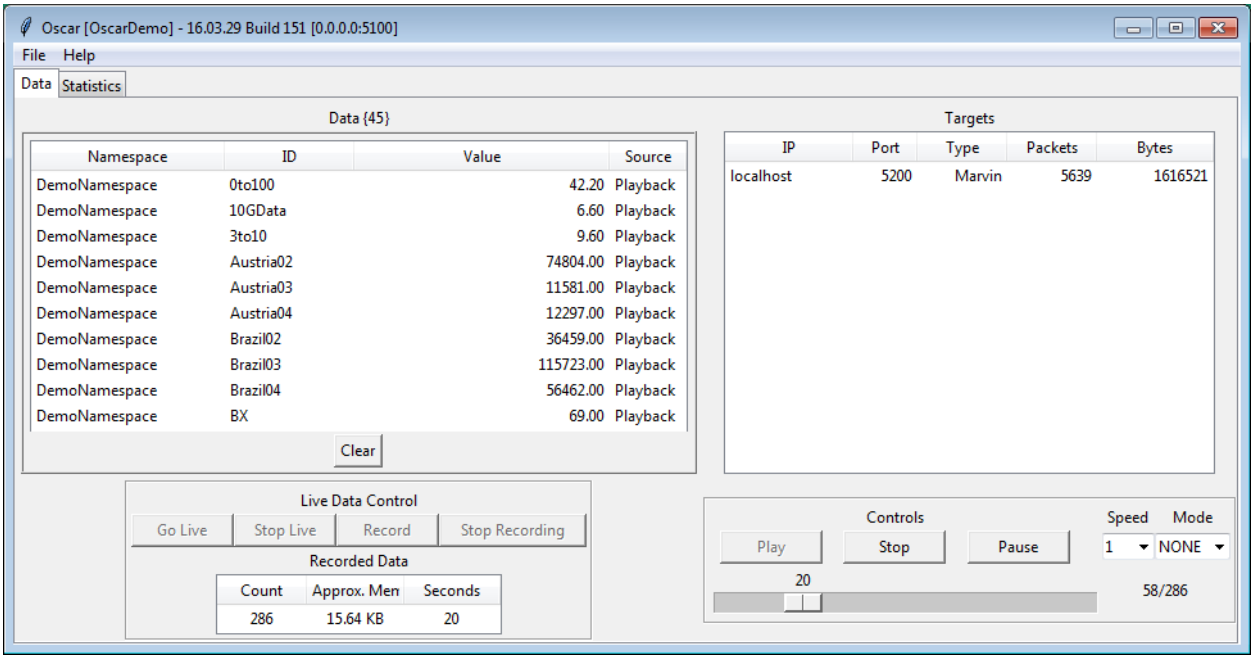


Figure 4 Oscar with Playback Pane

Once you have recorded live data as described above, or loaded a saved recorded session using the File menu, the Playback tab will appear. It works very much like A CD player.

There are some options to repeat the playback (will loop through all the data repeatedly) and to change the speed at which the playback occurs.

6 Marvin

Marvin is the code name for the Java 8 based GUI that is part of the Bitchin Instrumentation Framework . It receives a piece of data from Oscar that can be either live data or recorded that originated from a Minion. Each data packet contains a Namespace and an ID, these are used to 'connect' a data point to a 'Widget' (GUI component) to be displayed in Marvin.

Marvin has been designed to be highly configurable; everything is configurable via XML files. This includes what you display as well as how it is displayed. The what is a collection of Widgets and the how is determined by stylesheets (CSS Files). Furthermore, Marvin is designed to be agnostic to the data it is displaying – it knows nothing about the kind of data it is getting, could be CPU Utilization, network throughput or the name of the computer.

6.1 General Components

Marvin will have on or more Tabs, similar to what is shown in Figure 1. On each Tab you can place as many Widgets as you like.

Widgets are placed into Grids. Grids are very similar (pretty much idential) to HTML tables. When adding a widget to a Tab, you specify which grid position the widget should be placed.

You can layer widgets on top of each other, there is no restriction on this. You can do some advanced features doing this as discussed in Section 11.1.

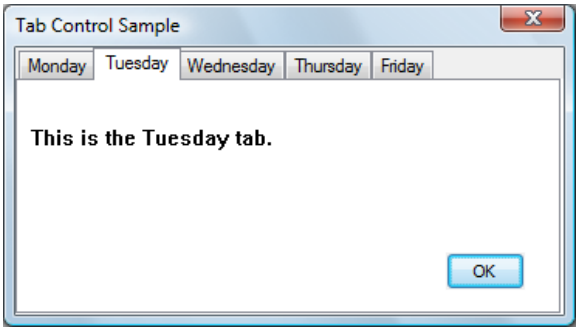


Figure 5 Tab Control

6.1.1 Grids

Grids are the basis of layouts for displaying your Widgets. Figure 6 shows a simple example of a Grid within a Tab.

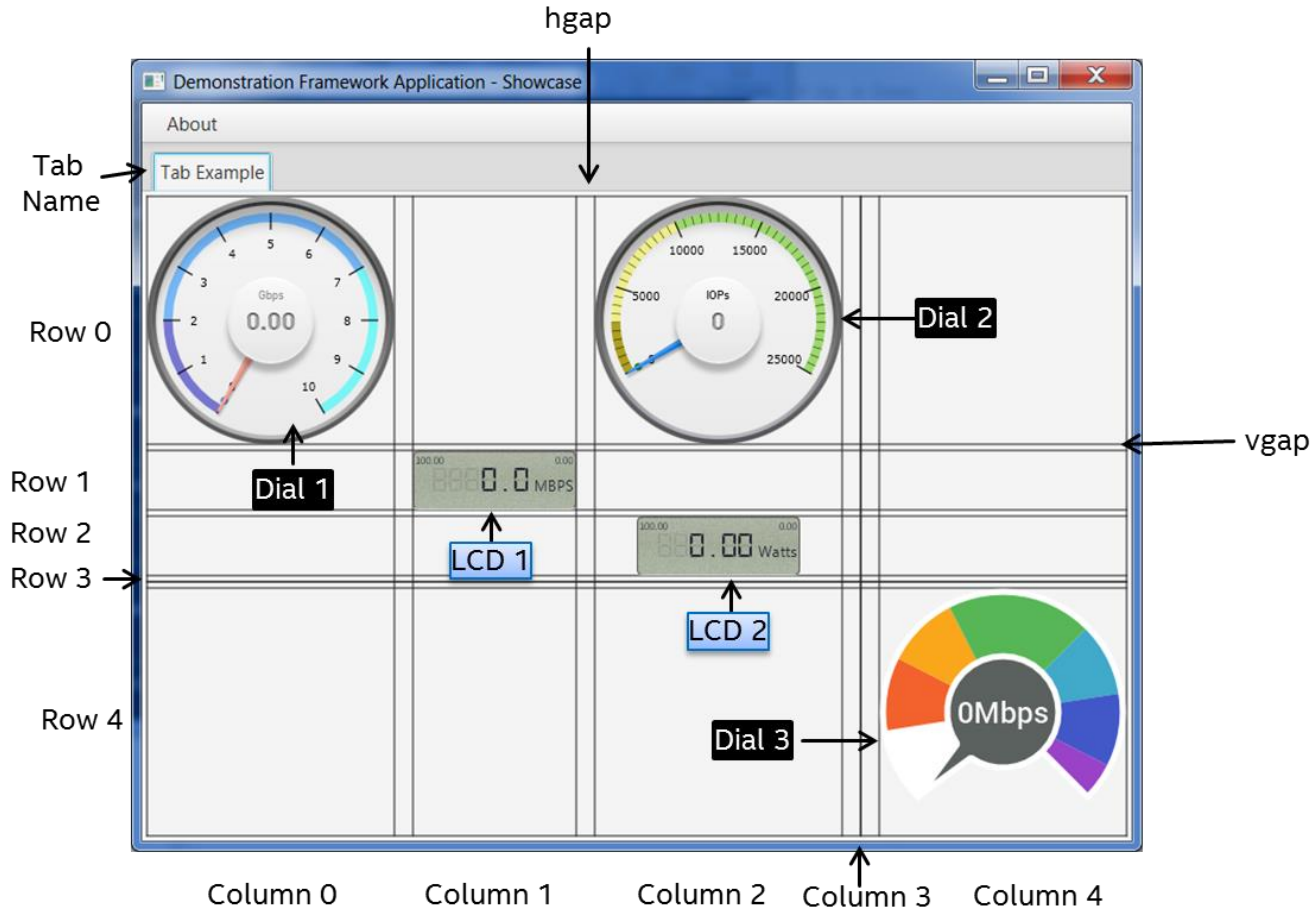


Figure 6 Sample Grid

Grid rows and columns start numbering at 0. The width and height of an individual Grid cell is determined by the largest height and width of widgets within its row and column. If there is no widget placed into a row or column, its size will be 0. The above figure features both a row and column in which no widgets are placed, thus resulting in a size of 0; this would be row 3 and column3.

In between rows and columns there are configurable gaps; hgap is for horizontal spacing (gap) between columns while vgap is the spacing between row. In the above example the hgap is set to 15 and the vgap is set to 5.

Note in Figure 6 how the width of column 0 is determined by the width of the Dial 1 Widget. The same is true for both the height or Row 1 – it is the height of the LCD 1 widget; while the width of Column 1 is the width of the LCD 1 widget.

Note how the height of rows 1 and 2 are the same, but how LCD 2 is not as wide as the column it is in.

6.1.2 Grids within Grids

Each Tab that you define has a grid automatically placed in it by default. You can add more grids within this 'base' grid in order to achieve desired layouts. The following figure provides an example of a tab with multiple grids.

Figure 7 Grids

The standard grid, or Tab Grid, is where the large dial is placed, at location 0,0 (row,column). Next there is a Grid Widget placed at location 0,1 within the Tab Grid. Within this grid widget, 8 dials are placed. Then finally another Grid Widget is placed in grid location 1,1 (the center) of the first Grid Widget and a simple colored pane placed with it.

Using Grids within grids you can achieve very sophisticated layouts – though it will take practice; I suggest reading up on best practices on HTML tables.

6.2 Running Marvin

The working directory from where you launch Marvin must be the directory where the BIFF.Marvin.jar file exists.

Command line options are:

Parameter	Description / Usage
-i	Specify application configuration file, default is Application.xml
-v,-vv,-vvv,-vvvv	Different verbosity levels for debugging

`-log`	Specify the name of the log file. Default is MarvinLog.html
`-aliasfile`	Specify an external file (See Section 6.2.1)
`-dumpalias`	Dumps all aliases at the root (main application level)
`-dumpWidgetInfo`	Dumps dimensions of widgets
`-altSplash`	Specifies an alternate splash image file to use

Example:

```
java –jar BIFF.Marvin.jar –i demo\DemoApp.xml
```

6.2.1 External Alias File

Note: No spaces between –aliasfile=inputfile

If you use the –aliasfile command line parameter you can specify an external file will be turned into aliases. The format text of the file is pretty simple:

```
Aliasname=aliasvalue
```

You can use the # sign for comments.

This is useful if you want to create a generic tab with alias values for namespaces and ID's, that are defined externally.

See the MyAliasList.txt file packaged with the example app.

6.3 Configuration File

The XML configuration file is where the magic happens for Marvin, it is where you define what data gets displayed, how it is displayed and what Tasks you might like to perform when you click on a widget.

The default XML file used by Marvin is "Application.xml" in the same directory as the .jar file. You can specify a different XML file, see Section 6.2 for details.

The basic hierarchy for the XML file is as follows:

```
<Marvin>
   <Application>
      <Network>< /Network >
      <Title></Title>
      <Tabs>
         <Tab ID="tab-1"/>
            ...
         <Tab ID="tab-n"/>
      </Tabs>
   </ Application >
   <Tab ID="tab-1>
      <Widget></Widget>
         ...
      <Widget></Widget>
   </Tab>
      ....
   <Tab ID="tab-n>
      <Widget></Widget>
         ...
      <Widget></Widget>
   </Tab>
   </Namespace>
      .....
   <TaskList ID="TaskList-1">
      <TaskItem></TaskItem>
         ...
      <TaskItem></TaskItem>
   </TaskList>
         ....
   <TaskList ID="TaskList-n">
      <TaskItem></TaskItem>
         ...
      <TaskItem></TaskItem>
   </TaskList>
   <AliasList>
      <Alias Foo="Hi Bob" Bar="Bye Bob/>
   </AliasList>
</Marvin>
```

6.3.1 <Marvin>

This is the root node for the application XML configuration file. It has no attributes.

6.3.2 <Application>

The <Application> section of the XML configuration file defined what components will be used in composing the resulting GUI. This includes the title, look and feel, network connections, tabs etc.

6.3.2.1 Attributes

The <Application> tag supports the following attributes, which are case sensitive.

Attribute	M/O	Comments
ID	O	ID of the Marvin
Mode	O	Debug or Kiosk
Scale	O	Global size change for widgets
Height	O	
Width	O	
EnableScrollBars	O	

6.3.2.1.1 ID

The attribute provide an ID for the specific instance of the Marvin. It is used for RemoteMarvinTasks.

6.3.2.1.2 Mode

If 'Debug' is specified then the gridlines in the grids will appear – very helpful for working on layouts. Additionally Spacer widgets will be red by default instead of invisible. Logging will also be at higher level.

In Debug mode, if you press shift and click on a Widget, the log file will contain information about that Widget, including the Minion Source associated with it.

If 'Kiosk' is specified, no tasks will be performed. If you have a task associated with a menu item or a Widget, nothing will happen. This is designed to be used at a kiosk or some sort of location where people can play with the Gui and look at stuff, but not manipulate anything directly.

In Debug mode, if you press shift and click on a widget, it will log that widget's information.

6.3.2.1.3 Scale

Experimental setting that will grow or shrink sizes of widgets based upon a float value (ex 0.75 or 1.25 to shrink or grow by %25)

There is a way to automatically scale the widgets. Rather than specifying a value for the Scale attribute, set it to "Auto": Scale="Auto", and use the <CreationSize> tag to try

automatically scaling.

NOTE: At this time the scaling of charts and graphs does not work.

6.3.2.1.4 Height

Height of main window. Note if not specified, will grow to the size of the screen.

6.3.2.1.5 Width

Width of main window. Note if not specified, will grow to the size of the screen.

6.3.2.1.6 EnableScrollBars

If "True", will add scroll bars to the application on every tab. Default is False.

6.3.2.2 <Title>

This specifies the title to be displayed in the title bar of the GUI.

6.3.2.3 <RefreshInterval>

Is really a debug type setting that is optional. Specifices the interval in milliseconds at which the widgets should be re-drawn. Default is 350 which is 350ms.

6.3.2.4 <Network>

The Network tag defines where the application should be listening for incoming data coming from one or more Oscars.

6.3.2.4.1 Attributes

The <Network> tag supports the following attributes, which are case sensitive.

Attribute	M/O	Comments
`IP`	O	Target IP Address
`Port`	M	Target UDP Port

6.3.2.4.2 IP

IP Address that Marvin will bind to for listening for data on the specified port. If not specified, it will listen on ALL interfaces on the specified port.

6.3.2.4.3 Port

Port on which the Marvin is listening for data.

6.3.2.4.4 Example

```
<Marvin>
   <Application>
      <Network IP="localhost" Port="3232"/>
   </Application>
</Marvin>
```

6.3.2.4.5 Oscar Settings

The <Network> Settings can include any number of additional <Oscar> Tags as in the blow

example:

```
<Network Port="5200">
   <Oscar IP="MyOscarBox.kutch.com " Port="6200" Key="PatrickKutchKey"/>
</Network>
```

In this example Marvin is listening on port 5200 on all interfaces for data from one or more Oscars. It also has an <Oscar> tag that points to a specific Oscar IP and Port as well as an identifying Key. The Oscar IP and Port are the <IncomingMinionConnection> IP and port for a specific Oscar. Using this information, upon startup Marvin will send a 'quick message' to that location with the Marvin connection information so that the Oscar so that the Oscar may in turn perform a 'dyamic connection' to this Marvin.

They Key provided is a minor security measure. A hash of the key is sent along with the message from Marvin to Oscar. If Oscar has been configured with this same Key then it allows the 'dynamic' session to be created. It also logs the connection.

Using this feature you can provide a user or a customer a copy of Marvin and have it point to a specific Oscar somewhere with a specific Key. Your customer can then remotely view your demo using a local GUI and you can see when they ran the demo (again, Oscar will log it) and you can control access by removing that supported Key from the Oscar configuration file.

6.3.2.5 <CreationSize>

CreationSize is an optional tag you can put in that will help automatically scale your widgets and still maintain the correct relative dimensions.

If you put in the Height and Width of the screen you use to create you GUI (the about box will tell you the Java dimensions. If you use the Scale="Auto" setting, then the framework will attempt to automatically determine a scaling factor based upon the <CreationSize> dimensions and the current screen resolution.

6.3.2.6 Attributes

The <CreationSize> tag supports the following attributes, which are not case sensitive.

Attribute	M/O	Comments
`Height`	O	Height of screen used when you laid out the widgets
`Width`	O	Wiedht of screen used when you laid out the widgets

6.3.2.7 Padding

Defines global padding for the space between the edge of a grid and the placement of the Widget. For example if you place a dial, and there is no padding, it will (likely) fill to the size of the grid cell it is in. If you specify a padding, then the specified spacing will be within the grid cell. This is the global default, that may be overridden on a per tab and grid basis.

6.3.2.7.1 Attributes

The <Padding> tag supports the following attributes, which are case sensitive.

Attribute	M/O	Comments
`Top`	O	Default global padding on top of cell grid, in pixels
`Bottom`	O	Default global padding on bottom of cell grid, in pixels
`Left`	O	Default global padding on left of cell grid, in pixels
`Right`	O	Default global padding on right of cell grid, in pixels

6.3.2.8 StyleSheet

Specifies the optional external stylesheet that can be provided to change the look and feel for the entire application.

6.3.2.9 IgnoreWebCerts

This Tag is for when you are using the Web widget and you point it towards a page that has security certificates that are not installed on your system (like most KVM systems in our labs). Since the Web Widget is basically a home-grown browser, I have not implemented support to prompt to continue for this type of situation. So you can use this tag and put in a value of True to ignore them.

```
<IgnoreWebCerts>True</IgnoreWebCerts>
```

This tag is optional.

6.3.2.10 Heartbeat

This is the rate (in seconds) in which Marvin will send an 'I'm Here' message to all of the Oscars sending data. This allows the Oscars to stop sending data if a Marvin goes away – prevents the sending of large amounts of data on the network when nobody is listening.

6.3.2.11 Tasks

This tag allows one to configure if Tasks will be allowed or not. Is similar to kiosk mode.

6.3.2.11.1 Attributes

The <Tasks> tag supports the following attributes, which are case sensitive.

Attribute	M/O	Comments
`Enabled`	O	Either True or False Default is True

6.3.2.12 MainMenu

Marvin provides a mechanism by which you can create menu's where a menu item is associated with a Task. Note that this feature is used with the <Tasks> tag. The MainMenu is made up of one or more Menu's.

6.3.2.12.1 Attributes

The <MainMenu> tag supports the following attributes, which are case sensitive.

Attribute	M/O	Comments
`Show`	O	Either True or False, if false hides the menu, default is True

6.3.2.12.2 Menu

This is a menu to be displayed in the menu bar (MainMenu). It contains a title and a list of menu items.

6.3.2.12.3 Attributes

The <Menu> tag supports the following attributes, which are case sensitive.

Attribute	M/O	Comments
`Title`	M	Text to be displayed on menu bar

6.3.2.12.4 MenuItem

This is the definition of the menu item. It contains two parts, the Text (what to display in the menu and the Task to be performed.

6.3.2.12.5 Example

```
<MainMenu Show="True">
   <Menu Title="Test">
      <MenuItem Text="Remote Dir" Task="RunDir"/>
   </Menu>
</MainMenu>
```

6.3.2.13 Tabs

The <Tabs> section of the <Application> definition contains the list of Tab ID's to be displayed. The definition of what is in each Tab is defined in a different location in the configuration file. See Section 6.3.3 for details on defining and individual Tab.

The <Tabs> tag can take an optional attribute of 'Side', which allows you to specify a location for the tabs to be placed on the screen. Valid options are 'Top' (the default), 'Bottom','Left' and 'Right'

The <Tabs> tag contains no attributes, only a list of one or more <Tab> tags. The Tabs will be displayed in the order listed within this section.

6.3.2.13.1 Tab

Defines the Tab to be displayed, based upon the ID provided. The <Tab> tag contains but a single mandatory Attribute of ID. The ID must have a corresponding Tab definition later in the file.

6.3.2.13.2 Example

```
<Tabs Side="Right">
    <Tab ID="DemoTab-Dials"/>
    <Tab ID="DemoTab-Indicators"/>
```

```
    <Tab ID="DemoTab-LCD"/>
    <Tab ID="DemoTab-Charts"/>
    <Tab ID="DemoTab-Charts2"/>
    <Tab ID="DemoTab-Images"/>
    <Tab ID="DemoTab-Grids"/>
    <Tab ID="DemoTab-Playback"/>
    <Tab ID="DemoTab-Demo"/>
</Tabs>
```

6.3.2.14 <UnregisteredData>

There are times when you may be capturing data from Minion but not yet setup a Widget to display that widget. Or you may simply want it displayed as text for a quick visual.

To accommodate this you can fill out the <UnregisteredData> section in the <Application>. If the feature is enabled, then a new tab will be automatically created in the Application at runtime for each Namespace for which there is unregistered data. All unregistered data for that namespace will be displayed as text within that tab. The data will be sorted in Alphabetical order by the ID.

Example:

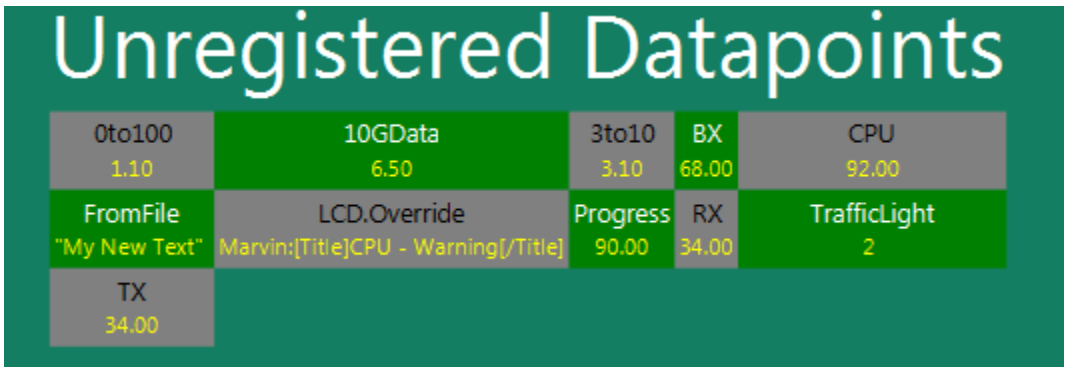


Figure 8 UnregisteredData Example

In the example above, there are nearly 300 data points being automatically displayed. This example uses the IPC_Linux.py Collector and the <DynamicCollector> to quickly gather a great deal of performance data from the system under test.

Other than the 'Enabled' attribute, everything else has a default value that can be overridden to change the visual attributes of the feature.

6.3.2.14.1 Attributes

The <Menu> tag supports the following attributes, which are case sensitive.

Attribute	M/O	Comments
`Width`	0	Maximum # of items to display in a single row. Default is 5
`Enabled`	O	True or False, default is False. Must be True to enable the feature

`Title`	O	Sets the title at top of page. Overrides the default.

6.3.2.14.2 **<TitleStyle>**

Override the display style of the Title, using standard CSS string.

6.3.2.14.3 **<EvenStyle>**

The data points are designed so that you can have alternating styles to differentiate the data points. EvenStyle defines one of the alternating styles.

6.3.2.14.4 **<Background>**

Override the background CSS style, using standard CSS string.

6.3.2.14.5 **<ID>**

Override the CSS style of the ID portion of the data set to be displayed, using standard CSS string.

6.3.2.14.6 **<Value>**

Override the CSS style of the Value portion of the data set to be displayed, using standard CSS string.

6.3.2.14.7 **<OddStyle>**

The data points are designed so that you can have alternating styles to differentiate the data points. OddStyle defines one of the alternating styles.

6.3.2.14.8 **<Background>**

Override the background CSS style, using standard CSS string.

6.3.2.14.9 **<ID>**

Override the CSS style of the ID portion of the data set to be displayed, using standard CSS string.

6.3.2.14.10 **<Value>**

Override the CSS style of the Value portion of the data set to be displayed, using standard CSS string.

6.3.2.14.11 **<Example>**

This example is what was used for the data displayed in Figure 8.

```
<UnregisteredData Width="13" Enabled="True" Title="System Info">
   <TitleStyle>-fx-font-size: 3.5em;</TitleStyle>
   <EvenStyle>
      <Background>-fx-background-color:green</Background>
      <ID>-fx-font-size: 1.0em;</ID>
      <Value>-fx-font-size: .9em;-fx-text-fill:yellow</Value>
   </EvenStyle>
   <OddStyle>
     <Background>-fx-background-color:grey</Background>
     <ID>-fx-font-size: 1.0em;-fx-text-fill:black</ID>
     <Value>-fx-font-size: .9em;-fx-text-fill:yellow</Value>
  </OddStyle>
```

```
</UnregisteredData>
```

6.3.3 Tab

The <Tab> section of the XML configuration file defines/describes what should appear on a Tab screen.

There are several components to a Tab including layout, look and feel and of course the widgets to display within the Tab.

The contents of a <Tab> may be defined wholly within the application XML configuration file, or it may also be defined in another external XML file, using the File attribute. In general, unless doing a very simple GUI, it is recommended to use an external file for each Tab to keep things simple and modular. Additionally one could create a 'library' of tab to use as needed.

Note that you may define a Tab, but not use it – meaning you can define a <Tab> section, but if you do not specify the Tab within the <Tabs> it will not be displayed. Also note that the order of the <Tab> definitions is not relevant to how they are displayed, tab display order is defined by the order listed in <Tabs>.

Each Tab is a separate application 'screen'. Each can have its own layout, color scheme, padding, Alias's etc. As mentioned in Section 6.1.1, each Tab has a built-in grid in which to place widgets.

Within the <Tab></Tab> tag is where you will place your widget

6.3.3.1 Attributes

The <Tab> tag supports the following attributes, which are case sensitive.

Attribute	M/O	Comments
`ID`	M	ID of the Tab, must be unique.
`Align`	O	Where within application the
`File`	O	Specifies external file which defines widgets within the tab
`hgap`	O	Horizontal gap within the tab grid, default is 0
`vgap`	O	vertical gap within the tab grid, default is 0

6.3.3.1.1 ID

This is the ID of the Tab, it must be unique within the XML configuration file. This ID corresponds to the ID in the <Tabs> section.

6.3.3.1.2 Align

Specifies where in the tab the tab grid should appear. Valid options are (points on a compass):

```
Center
N
```

```
NE
E
SE
S
SW
W
NW
```

6.3.3.1.3 File

Specifies an additional external file where the contents of the tab are specified. As with all additional external files, the root of the XML scheme for the external file is <MarvinExternalFile>. Widgets will then be required to be defined within the <Tab> tag. <AliasList> and <TaskList> tags are at same level as <Tab>

6.3.3.1.4 hgap

Specifies the horizontal gap to be inserted in between each column in the grid.

6.3.3.1.5 vgap

Specifies the vertical gap to be inserted in between each row in the grid.

6.3.3.2 Title

Specifies the Title of the Tab – the text to be displayed at in the Tab control near the top of the application.

6.3.3.3 PaddingOverride

Allows you to override the application global setting for the padding described in Section 6.3.2.5.

6.3.3.3.1 Attributes

The <PaddingOverride> tag supports the following attributes, which are case sensitive.

Attribute	M/O	Comments
`Top`	O	Default Tab padding on top of cell grid, in pixels
`Bottom`	O	Default Tab padding on bottom of cell grid, in pixels
`Left`	O	Default Tab padding on left of cell grid, in pixels
`Right`	O	Default Tab padding on right of cell grid, in pixels

6.3.3.4 StyleOverride

Allows you to change the style of the tab. For example the background is the background color of the Tab frame or Grid that this grid is within. You can change that here, or add a picture etc.

6.3.3.5 Widget

One or more widgets can be placed within a Tab. See Section 7 on widgets information

6.3.3.6 Grid

You may place grids within grids in order to achieve various layouts. See Section 7.15.1.5 for information about Grids. Widgets are then placed within grids.

6.3.4 AliasList

Like the Alias in Minion, Marvin provides a mechanism by which you can create an Alias. Aliases can be created in the main application XML configuration file, external Tab and external Grid files. They must be created at same level as the Tab or Grid (not within a Grid or Tab definition).

Aliases are read before the rest of the file, so you can use them in the top portion of the file, even if not defined until the end of the file.

Example AliasList

```
<AliasList>
    <Alias DownloadFont="Bold-Italic-title"/>
    <Alias TextCSS="MyText.css"/>
</AliasList>
```

The Alias will be propagated all the way down to a Wiget definition file. So if you create your own MyTextWidget.xml file and in that specify the <Style> as $(TextCSS), it will result in using MyText.css.

6.3.4.1 Scope

The scope of an alias is within the file where it is created and any external files called from within that file. So for example you can define an Alias in an external Tab file, and from within that file you can have multiple external Grid files. The alias you create in the Tab file will propagate to each of the Grid files. However it does not propagate to other Tab files – unless you define the alias in the main application XML file from where you call the external Tab Files.

This scoping also works for overriding an Alias. So if you say within one of these external Grid files you redefine the Alias, it will be available within that Grid file, and any subsequent external Grid files called from within that Grid file as well as any widgets placed within these grids that may have an Alias used within them.

6.3.4.2 Using

Using an Alias is pretty easy and is just like using in the Minion definition file – except that Marvin has multiple files that you can use the alias in, such as the main configuration file, external Tab files, external Grid files and Widget definition files.

Usage is simple, →$(AliasName). A dollar sign followed by the alias name in parenthesis. It can be used within any Tag or Attribute, but cannot be used as the Tag or attribute itself. This applies to any .XML file within the entire project.

You can do some pretty cool things with aliases and external files.

You can also combine Aliases. Such as $(ComputerName).TxRate.$(NIC). If ComputerName=”Server2” and NIC=”Eth0” the resulting string will be Server2.TxRate.Eth0.

6.3.4.3 Environment Variables

By default, the environment variables of where Marvin is running is automatically sucked in and made an Alias. So for example if you are running Marvin on a Microsoft® Windows system, there will be at your disposal an $(ComputerName) alias available for your use. You could pass this as a parameter to a MinionTask that would then write this data to a file, which the a Minion Collector would read and send back to be displayed as a text value. You could also achieve the same thing with a Marvin task that is run on startup. See Section 8.9 for details.

6.3.4.4 Creating Alias when Specifying External File

You can specify external files for Tabs and Grids. I have added the ability to also specify an alias that becomes available within the file you specify.

Example:

```
    <Tab ID="DemoTab-Grids" Align="Center" File="Demo\DemoTab_Grids.xml"
Color3="blue"/>
```

Here the Alias of Color3 is set to “blue”. This Alias is available when processing the DemoTab_Grids.xml file and any files that it subsequently references.

You can create as many aliases in this way when specify an external file as you like. This only works when calling external Tab and Grid files.

You might wonder how useful this is. Consider that you want to display the same pieces of data from 5 different servers. You could create a Tab definition file that takes an Alias for the Namespace. Then in your application xml file when you specify the external tab file, you specify the same exact external file for each, but create an alias for namespace that is passed. Then in the Tab definition file, each widget you place uses this alias for the <MinionSrc> namespace.

6.3.4.5 Generated TabID Alias

I’ve created a generated Alias called TabID that is the ID of the current <Tab> being constructed. We have found this to be useful when doing some advanced work with external grid files.

6.3.4.6 <Import>

Within <AliasList> you can specify another XML file to import that has an <AliasList> within it. If you do this then the framework will only go and read the Aliases from that file, it will do no other processing.

Example:

```
<MarvinExternalFile>
   <AliasList>
      <Import>OtherAliases.xml</Import>
      <Alias Title=”MyTitle”/>
```

```
   </AliasList>
</MarvinExternalFile>
```

Note: Be careful of circular imports – the framework makes no checks for this ☺

6.3.4.7 <DefaultAlias>

<DefaultAlias> works just like defining an <Alias> and has the same scope. The difference is that if the Alias ID specified already exists it will not create the alias. You can do some powerful overrides this way.

Example:

```
    <AliasList>
        <DefaultAlias DownloadFont="Bold-Italic-title"/>
        <Alias  FontToUse=”$(DownloadFont)”/>
    </AliasList>
```

So in the example above, the Alias FontToUse will be set to the alias defined by DownloadFont. If a level above this definition set the 'DownloadFont' alias then that value will be used, otherwise if it wasn't, the value set by DefaultAlias will be used.

6.3.5 TaskList

Being able to display instrumented data is very useful and powerful. However it isn't the complete capability that you really need. What one needs is the ability to press a button on the GUI and have it go run some script on the other end where Minion is running to go start the workload, or to change some hardware config and start a workload, or to stop the workload. This is where Tasks come in.

There are several kinds of Tasks:

- Minion Task – Sends a message to a Minion to have it run a Minion Task (Actor)
- Oscar Task – Allows a remote control of Oscar
- Marvin Task – Can insert data into the incoming <MinionSrc> datastream
- MarvinAdminTask – Special things you can do in Marvin
- RemoteMarvinTask – allows one Marvin to execute a Task within another Marvin
- ChainedTask –Allows defining a task that calls another defined task.

A task can be defined in the main application configuration file, an external Grid or external Tab file. The scope of this definition is global – so you can define it in one file and use it in another and the order does not matter; you can use it in the 1st file and define it in another file that isn't loaded until later. You can also of course use an Alias in the tasks.

Section 8 provides details on Tasks.

6.3.6 <Repeat> option

I found that there are times when you may want to repeat something many times. Such as putting down a text widget. You can certainly cut and paste, however I created a <Repeat> option that allows you to repeat things easily for widgets and grids:

```
<Repeat Count=”10” StartValue=”20”>
    <Widget File=”Text/Text.xml row=”$(CurrentValueAlias)” column=”1”>
   <InitialValue>$(CurrentCountValue)</InitialValue>
```

```
    </Widget>
</Repeat>
```

The above lines will create 10 Text Widgets, each on a separate line, start at line 20, in column1, with a value from 0 to 9.

Attribute	Description / Usage
`Count`	[required] The number of times to iterate through the repeat.
`StartValue`	[Optional default is 0] The Start value to use
`CurrentValueAlias`	automatically generated Alias, = Start + plus loop number
`CurrentCountValue`	current loop #

6.3.7 $(CurrentRowAlias), $(CurrentColumnAlias) etc.

I noticed that it can become tedious when you are placing a bunch of widgets in rows and columns and you need to go back and insert a new widget, to help with that, I automatically create some new Aliases for you. They are scoped to Tabs and grids.

Attribute	Description / Usage
`CurrentRowAlias`	The last Row value used, changes only when you use a different value.
`NextRowAlias`	Increments CurrentRowAlias every time you use it, is the CurrentRowAlias +1
`CurrentColumnAlias`	The last column value used, changes only when you use a different value.
`NextColumnAlias`	Increments CurrentColumnAlias every time you use it, is the CurrentColumnAlias + 1

7 Widgets

Widget is the term I use to refer to something that gets placed on the screen. There is a growing library of widgets available for you to use.

In general you place a widget in a specific location in a Tab/grid and usually you assign a data source (originating from a Minion) to it.

All widgets have some common attributes (such as row and column) and some have some unique settings.

To place a widget, at the minimum you specify a widget definition file and where to place the widget.

The widgets themselves are described in the Widget Definition file. These files contain the necessary information to describe the parameters for the widget. For example a Dial widget – the definition file describes (among other things) what the minimum and maximum values to display are. If you need a different range, then copy an existing widget definition file and make the changes you need, and then specify the new file in your application.

We provide a growing library of widgets and corresponding definition files; if your needs differ from what we provide then you simply make a new definition file that suits your needs.

Application or Tab xml file

```
<Widget File="MyWidget.xml" row="2" column="4">
     <Title>Tx Rate</Title>
     <MinionSrc ID="TxData" Namespace="Server-32"
</Widget>
```

Figure 9 Placing a Widget in a Grid or Tab

Figure 9 shows a simplified example of placing a widget in a tab or a grid. It specifies a Widget definition file (MyWidget.xml"), where to place the widget (row and column) as well as the title for the widget (might be a dial) and the remote data source from where the data will be fed its values.

MyWidget.xml

```
<Widget Type = "SteelGauge">
    <Style>gaugeEthernet.css</Style>
    <MinValue>0</MinValue>
    <MaxValue>10</MaxValue>
    <UnitTxt>Gbps</UnitTxt>
    <Decimals>2</Decimals>
    <DialStartAngle>300</DialStartAngle>
    <DialRangeAngle>240</DialRangeAngle>
    <MajorTicksSpace>1</MajorTicksSpace>
    <MinorTicksSpace>1</MinorTicksSpace>
</Widget>
```

Figure 10 Sample Widget Definition File

Figure 10 provides a sample (not valid) Widget configuration file. In this case it is for a SteelGauge Widget (as specified by the Type attribute. This configuration file describes the display requirements for the widget, including an external stylesheet, the min and max value to be displayed etc.

This sample widget file is for showing 0 to 10 Gbps of data. If you wanted 0 to 40 Gbps, or changed from 0 to 1000 Mbps you could change the widget definition file to reflect your needs. Or you could copy it to another name and modify it and create a library (as we have started for you).

The Type attribute is what determines what the actual widget to be displayed is, and the rest of the file is specific to that widget type – for example a Text Widget does not have angels or ticks.

7.1 Widgets

Below you will find examples of the various widgets. Click on the example to jump to the details.

Note: I might not always remember to update this section with images of new widgets, so read below or look in the Table of Contents.

7.1.1 Dials

Figure 11 Steel Gauge

Figure 12 Steel Gauge Simple

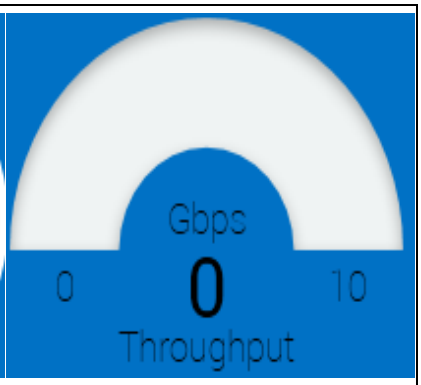


Figure 13 Steel Gauge 180

Figure 14 Steel Gauge Radial

Figure 15 Steel Radial Steel Gauge

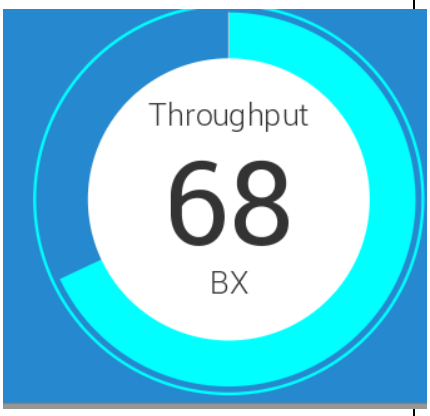


Figure 16 Bar Gauge

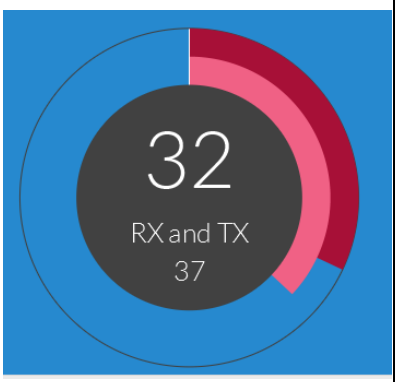
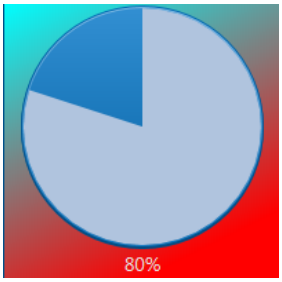
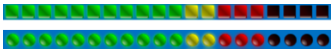
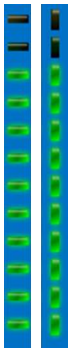


Figure 17 Double Bar Gauge

7.1.2 Indicators

			
Figure 18 Progress Bar	**Figure 19 Progress Indicator**	**Figure 20 Horzontal LED Bar**	**Figure 21 Vertical LED Bar**

7.1.3 Charts

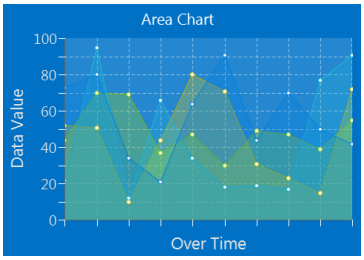
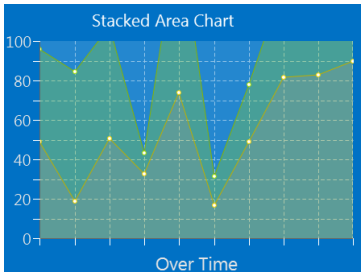
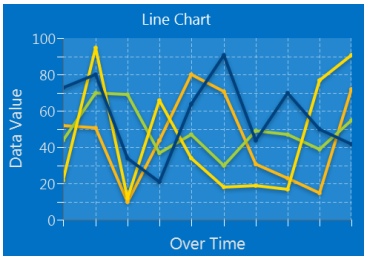
		

Figure 22 Area Chart	**Figure 23 Stacked Area Chart**	**Figure 24 Line Chart**

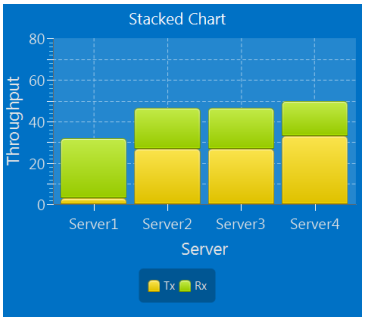
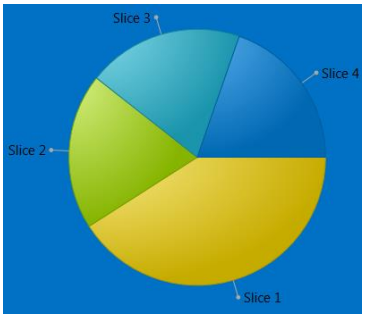
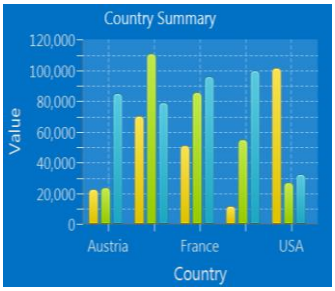

		

Figure 25 Stacked Chart	**Figure 26 Pie Chart**	**Figure 27 Bar Graph**

7.1.4 Images

Figure 28 Static Image

Figure 29 Dynamic Image

Figure 30 Animated GIF

7.1.5 Media

Figure 31 Audio Player

Figure 32 Video Player

7.1.6 Other

Figure 33 LCD Widget

Figure 34 Buttons

TEXT, Static and Dynamic

Figure 35 Text

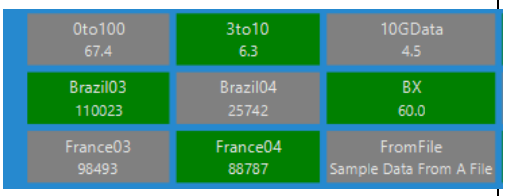


Figure 36 Quick View Widget

Figure 37 Quick View LCD Widget

Figure 38 Web View Widget

7.2 Directory Structure

The default location for widgets is in the 'Widget' directory one level below where the BIFF.Marvin.jar file exists. It is expected that the working directory is where the BIFF.Marvin.jar file exists. You may optionally specify a full path to a widget file. This option is useful for making a self-contained project with custom widgets.

CSS files must exist in the same directory where the widgets are found.

Widgets can exist in a sub-directory off of the Widget directory, such as ./Widgets/Demo. In this case any .CSS files used by any widgets in the Demo directory must also reside in the Demo directory.

7.3 Common Application Settings

7.3.1 Attributes

The <Widget> tag supports the following attributes, which are case sensitive.

Attribute	M/O	Comments
`File`	M	Specifies the widget definition file
`Row`	M	The row within a grid where the widget is to be placed
`Column`	M	The column within a grid where the widget is to be placed
`Rowspan`	O	The number of rows the widget should span – default is 1
`Colspan`	O	The number of columns the widget should span – default is 1
`Align`	O	Where within the grid cell to align the widget
`Width`	O	'Preferred' width of the widget
`Height`	O	'Preferred' Height of the widget
`Task`	O	ID of task to be performed when the widget is clicked

7.3.1.1 File

Specified the widget definition file. This file contains the description of the Widget itself.

7.3.1.2 Row

Zero based row number of where in the grid to place the Widget.

7.3.1.3 Column

Zero based column number of where in the grid to place the Widget.

7.3.1.4 Rowspan

A widget by default takes up a single cell which is in a specific row and column within a grid. Rowspan allows you to have a widget span more than one row. Used for making nice layouts.

7.3.1.5 Colspan

A widget by default takes up a single cell which is in a specific row and column within a grid. Colspan allows you to have a widget span more than one column. Used for making nice layouts.

7.3.1.6 Align

Using the Align attribute you can determine where within the grid cell the Widget will be placed.

Valid options are (points on a compass):

```
Center
N
NE
E
SE
S
SW
W
NW
```

7.3.1.7 Width

The Width attribute specifies the 'preferred' width for the widget. Desired is in quotes because this width is more of a suggestion to the underlying Java framework than a hard rule. It (Java – not Marvin itself) will try to make it this width; however there are other factors such as the size of other widgets within the same row and column etc. Also the size of the widgets can shrink and grow depending on resizing of the application.

7.3.1.8 Height

The Height attribute specifies the 'preferred' height for the widget. Desired is in quotes because this width is more of a suggestion to the underlying Java framework than a hard rule. It (Java – not Marvin itself) will try to make it this height; however there are other factors such as the size of other widgets within the same row and column etc. Also the size of the widgets can shrink and grow depending on resizing of the application.

7.3.1.9 Task

Specifies a Task ID for a tasklist to be executed when the widget is clicked. This is most commonly used with a button however there is no limitation on this, you can assign a task to any widget.

7.3.2 MinionSrc

Optional

The MinionSrc tag is where you connect a data source to a widget.

Example:

```
<Widget File="10GigGauge.xml" row="1" column="1">
     <MinionSrc ID="10GTx" Namespace="MyTestServer-2"/>
</Widget>
```

The ID and Namespace attributes of the MinionSrc Tag corresponds EXACTLY to the ID and Namespace from a Minion.

Note

7.3.3 StyleOverride

Optional

The StyleOverride tag provides you with a very powerful mechanism to override and add to the stylesheet associated with the widget and in some cases the application.

You can specify a different stylesheet, or a new stylesheet ID number for a brand new layout, or you may override/add new styles.

7.3.3.1 Attributes

The <StyleOverride> tag supports the following attributes, which are case sensitive.

Attribute	M/O	Comments
`File`	O	Specifies a new stylesheet file to apply to the Widget
`ID`	O	Specifies a new style ID that is in the stylesheet to use

7.3.3.1.1 File

Specify a new stylesheet file to apply to the widget. If you just specify a .CSS file, it will search for that file in the same directory where the Widget definition file is located. If it is an alternate path, it will search that path.

7.3.3.1.2 ID

ID of style in either default stylesheet or within new stylesheet to apply to the widget. See the LCD.css file for a good example.

7.3.3.2 Item

The <Item> tag within the <StyleOverride> tag allows you to apply different/new stylesheet settings to a Widget. These are STANDARD stylesheet settings and the format for them is per the standard.

There can be more than one <Item>, each will be applied to the widget. Note that if any of the <Items> are incorrect in any way, none will be applied. This is beyond the Marvin

application and part of Java itself. The log file should provide some hints as to the reason for failure.

Example 1:

```
            <StyleOverride >
 <Item>-fx-rotate:-90</Item>
 <Item>-fx-font-size:2.5em</Item>
            </StyleOverride>
```

You may also combine the individual lines into a single one, separated by a semi-color.

Example 2:

```
<StyleOverride >
   <Item>-fx-rotate:-90; >-fx-font-size:2.5em </Item>
</StyleOverride>
```

Example 3:

```
<StyleOverride ID="RedBackground"/>
```

7.3.4 Peekaboo

Optional

Peekaboo is a feature I added so we can dynamically hide and show widgets based upon a Minion Collector. This allows you to stack widgets on top of each other and hide and show as needed for interesting results.

For example you may have two LCD Panel Widgets both receiving data from a Minion collecting CPU utilization. One panel may have a stylesheet that makes it the familiar green-gray LCD background and the 2nd may have a bright red background. You can place both widgets at the same location, with the red one placed second (and therefore on top of the green-gray one). You can assign a peekaboo to the red one and have it hidden. Then when the CPU utilization gets above a certain threshold, say 90% a collector can show the red one, giving the appearance that the LCD pane turned red upon reaching a threshold.

The <Peekaboo> has the ID and Namespace attributes just like <MinionSrc>, however instead of displaying data, the Peekaboo will look for a specific string as the data to either hide or show a widget. The expected data to either hide or show the widget are 'Hide' and 'Show'.

In addition to hiding and showing a widget. Most widgets (where it makes sense) now support pausing and resuming widgets getting updated. If you send a 'Pause' string as the data in a Peekaboo packet, the widget(s) will pause, just as if you send a 'Resume' string they will resume. Not all widgets support this (buttons for example) as I could not think of a good reason to add support to all of them. If you have a need to 'pause' a button, then let me know. This is likely most useful for a MarvinTask that will pause a Widget(s).

The Sample application has a demo of this under the Test menu.

7.3.4.1 Attributes

The <Peekaboo> tag supports the following attributes, which are case sensitive.

Attribute	M/O	Comments
ID	M	ID to identify peekaboo action
Namespace	M	Namespace to identify peekaboo action
Default	O	"Hide" or "Show" – determines initial state, default is Show
Hide	O	Additional string to "Hide" string you can use if you like
Show	O	Additional string to "Show" string you can use if you like

Example:

```
<Widget File=" 10GigSimpleGauge.xml" row="2" column="2">
       <Title>Throughput</Title>
       <MinionSrc ID="Port1_RX_" Namespace="Hadoop_Server1"/>
       <Peekaboo ID="AltDials" Namespace="LocalNamespace" Default="Hide"/>
</Widget>
```

Note that as with the MinionSrc, you can have many widgets associated with the same Peekaboo. In this way you can hide and show many widgets at the same time.

7.3.4.2 Peekaboo Options

You can do many things with Peekaboo by sending a specific String to it:

- Hide - Hides the widget
- Show - Shows the widget if hidden
- Remove - Removes the widget from the Grid
- Insert - Re-adds a removed Widget back to the grid
- Disable - Some widgets (like buttons) can be disabled from tasks working
- Enable - Re-enables disabled widgets
- Pause - Pauses data feed for widget
- Resume - Resumes data feed for a paused widget

7.3.5 Peekaboo – Marvin

I've recently added some functionality by which data that comes in via Peekaboo can change some visual attributes of a Widget while visible. Presently that includes specify a new Title for the Widget and a new stylesheet.

Example of string send from a Minion to change the Title:

```
Marvin:[Title]New Widget Title[/Title]
```

The data following 'Marvin:' is a modified XML, where the '<>' characters are replaced with '[]'. This is needed because of the way XML works, you can't easily encode an XML payload within and XML document.

7.3.5.1 Set New Title

You can change a Widget in Marvin that has registered for Peekaboo messages during runtime with this mechanism. Most, but not all Widgets have a Title that can be dynamically updated using this method.

The source of this data can be from either a Minion data feed, or a Marvin Task.

Format:

The string sent to a Peekaboo listener to modify the Title must start with the text 'Marvin:' and be followed by [Title]New Title[/Title].

Example to change the Title:

```
Marvin:[Title]New Widget Title[/Title]
```

Note The format of the data following 'Marvin:' is a modified XML, where the '<>' characters are replaced with '[]'. This is needed because of the way XML works, you can't easily encode an XML payload within and XML document.

7.3.5.2 Change Style

You can change the Style of a Widget in Marvin that has registered for Peekaboo messages during runtime with this mechanism. Most, but not all Widgets have a Style that can be dynamically updated using this method.

The source of this data can be from either a Minion data feed, or a Marvin Task.

Format:

The string sent to a Peekaboo listener to modify the Style must start with the text 'Marvin:' and be followed by the same format as is available in <StyleOverride> in the application xml, except that the '<>' is replaced by '[]'. This includes new CSS file, ID and [Item]s.

Example to change the Style ID of a LCD (this is from the AdditionalFile.xml file in Minion Demo):

```
Marvin:[StyleOverride ID="lcd-red"][/StyleOverride]
```

Note The format of the data following 'Marvin:' is a modified XML, where the '<>' characters are replaced with '[]'. This is needed because of the way XML works, you can't easily encode an XML payload within and XML document.

7.3.6 <ValueRange>

Optional

Many (but not all) widgets have the ability to specify the range of valid values when you place them. This will override the settings within the widget definition file. In general, charts and gauges have this feature.

7.3.6.1 Attributes

The <ValueRange> tag supports the following attributes, which are case insensitive.

Attribute	M/O	Comments
Min	O	Specifies the minimum value for the widget
Max	O	Specifies the maximum value for the widget

7.4 Common Widget Definition File Definitions

This section describes the settings that are common to all widget definition files.

Example:

```
<Widget Type = "Button">
    <Style ID=”#default”>Button.css</Style>
</Widget>
```

7.4.1 Type Attribute

In the Widget definition file, the Type attribute is that actually specifies the type of Widget is defined in the rest of the file. The above example is a widget definition file for a Button.

7.4.2 Style

The <Style> Tag is where you specify the default external stylesheet for the widget. In this example we specify the Button.css stylesheet. In addition there is an optional ID attribute that can be added to specify the style ID within the specified stylesheet to apply.

Take a peek at the Button.css file to get a better understanding.

7.5 How to understand the following sections

Since you can create your own widget definition files and modify them to suit your needs it doesn’t make much sense to detail specific widget definition files as a way of describing them. So I will take the approach of providing an image example of the widget, an example widget definition file and details on each part of it and finally any widget specific options that may be used within the application configuration XML file when you add the widget to your app.

7.6 Dials

I used an open source package for all the dials. This package was originally called Steel, the author has subsequently renamed and updated the package, however I kept the name for the Widgets.

The open source package I use is called Enzo and it is available here:

https://bitbucket.org/hansolo/enzo/wiki/Home

7.6.1 SteelGauge

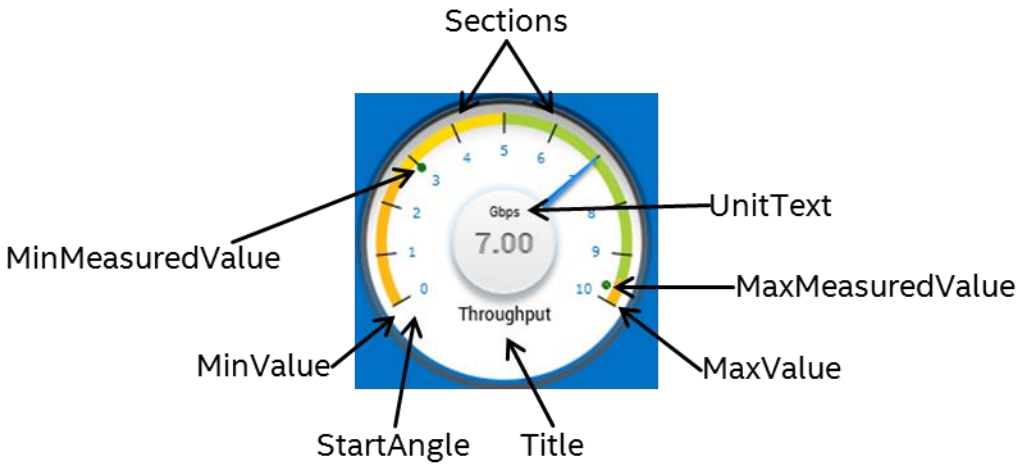


Figure 39 SteelGauge

7.6.1.1 Definition File

This section discusses what the contents of a SteelGauge Widget definition file contains.

Example:

```
<Widget Type = "SteelGauge">
    <Style>gaugeEthernet.css</Style>
    <MinValue>0</MinValue>
    <MaxValue>10</MaxValue>
    <UnitText>Gbps</UnitText>
    <Decimals>2</Decimals>
    <DialStartAngle>300</DialStartAngle>
    <DialRangeAngle>240</DialRangeAngle>
    <MajorTicksSpace>1</MajorTicksSpace>
    <MinorTicksSpace>1</MinorTicksSpace>
    <TickLableOrientation>Horizontal</TickLableOrientation>
    <EnhancedRateText>True</EnhancedRateText>
    <Shadowed>True</Shadowed>
    <ShowMaxMeasuredValue>True</ShowMaxMeasuredValue>
    <ShowMinMeasuredValue>True</ShowMinMeasuredValue>
    <Sections>
        <Section start="0" end="4" />
        <Section start="2.5" end="5" />
        <Section start="5" end="9.5" />
        <Section start="9.5" end="10" />
    </Sections>
</Widget>
```

7.6.1.1.1 <MinValue>

Required

The minimum value that can be displayed on the dial. Usually zero, but can be whatever you like.

7.6.1.1.2 <MaxValue>

Required

The maximum value that can be displayed on the dial.

7.6.1.1.3 <UnitText>

Required

The kind of data you are wanting to display, such as Gbps, Ghz, RPM etc.

7.6.1.1.4 <Decimals>

Required

The number of decimal places to be available for the current value # displayed in the middle of the dial.

7.6.1.1.5 <DialStartAngle>

Required

This specifies where the numbering on the dial begins, it is in degrees. 180 will start at the bottom of the dial, while 270 will be at 9:00 on a clock.

7.6.1.1.6 <DialRangeAngle>

Required

The angle range that the dial should utilize, in degrees.

7.6.1.1.7 <MajorTicksSpace>

Required

Numeric interval that a major Tick should be shown on the dial.

7.6.1.1.8 <MinorTicksSpace>

Required

Numeric interval that a minor Tick should be shown on the dial.

7.6.1.1.9 <TickLableOrientation>

Required

Determines the way in which the numbers on the dial are drawn. Valid values are:

```
Horizontal
Orthogonal
Tangent
```

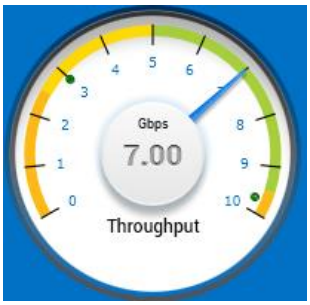
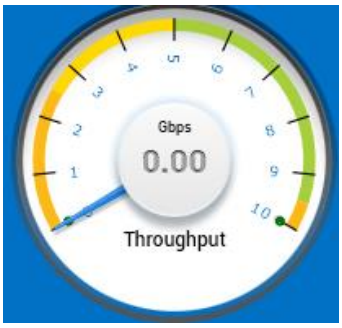
	

Figure 40 Horizontal Orientation	**Figure 41 Tangent Orientation**	**Figure 42 Orthogonal Orientation**

7.6.1.1.10 **<EnhancedRateText>**

Required

Is a Boolean value (either True or False) that determines if the value text in the middle of the dial is displayed with shadowing or not.

7.6.1.1.11 **<Shadowed>**

Required

Is a Boolean value (either True or False) that determines if the dial will be displayed with a shadow effect or not.

7.6.1.1.12 **<ShowMaxMeasuredValue>**

Required

Is a Boolean value (either True or False) that determines a small dot will appear on the dial that indicates the maximum value that has been received thus far.

7.6.1.1.13 **<ShowMinMeasuredValue>**

Required

Is a Boolean value (either True or False) that determines a small dot will appear on the dial that indicates the minimum value that has been received thus far.

7.6.1.1.14 **<Sections>**

Optional

You may create as many sections as you like (by adding a <Section> tag within the <Sections> tag. Each section will be displayed around the edge of the dial in the range you specify. All of the examples in this section of the document have Sections defined as:

```
<Sections>
    <Section start="0" end="4" />
    <Section start="2.5" end="5" />
    <Section start="5" end="9.5" />
    <Section start="9.5" end="10" />
</Sections>
```

Which contains 4 colored sections. These are only for display purposes and are optional.

Note that the color of the sections is defined within the stylesheet.

7.6.1.2 Application Settings

This section discusses the settings used to add a SteelGauges dial in the application configuration XML file.

Example:

```
<Widget File="Demo\10GigGauge.xml" row="1" column="1">
       <Title>Throughput</Title>
       <UnitsOverride>Mb per sec</UnitsOverride>
       <MinionSrc ID="3to10" Namespace="DemoNamespace"/>
</Widget>
```

7.6.1.2.1 **<Title>**

Optional

Sets the title of the Dial, shown at the bottom.

7.6.1.2.2 **<UnitsOverride>**

Optional

Allows you to use a different units type text than what is defined in the widget definition file.

7.6.1.2.3 **<ValueRange>**

Optional

Allows you to override the min and max set in the widget definition file.

Example:

```
            <ValueRange Min=”1” Max=”10”/>
```

7.6.1.2.4 **<TickCount>**

Optional sub-tag of ValueRange

You can use this tag to specify how many Major Ticks and Minor Ticks are displayed on the gauge. In the definition file you specify the interval. This will override it.

```
<ValueRange>
   <TickCount Major=”10” Minor=”20”/>
</ValueRange>
```

Will have 10 Major ticks, and 20 Minor.

7.6.2 SteelGauge180

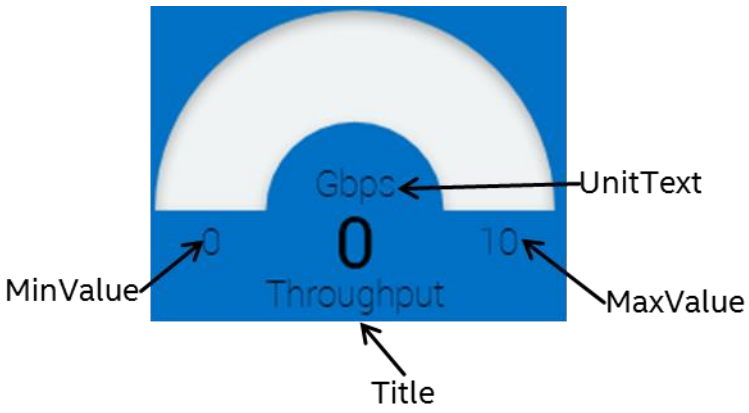


Figure 43 SteelGauge180

7.6.2.1 Definition File

This section discusses what the contents of a SteelGauge180 Widget definition file contains.

Example:

```
<Widget Type = "Steel180Gauge">
    <Style>oneeightygauge.css</Style>
    <MinValue>0</MinValue>
    <MaxValue>500</MaxValue>
    <UnitText>Gbps</UnitText>
</Widget>
```

7.6.2.1.1 **<MinValue>**

Required

The minimum value that can be displayed on the dial. Usually zero, but can be whatever you like.

7.6.2.1.2 **<MaxValue>**

Required

The maximum value that can be displayed on the dial.

7.6.2.1.3 **<UnitText>**

Required

The kind of data you are wanting to display, such as Gbps, Ghz, RPM etc.

7.6.2.2 Application Settings

This section discusses the settings used to add a SteelGauge180 dial in the application configuration XML file.

Example:

```
        <Widget File
```

7.6.2.2.1 <ValueRange>

Optional

Allows you to override the min and max set in the widget definition file.

Example:

```
            <ValueRange Min=”1” Max=”10”/>
```

7.6.3 SteelSimpleGauge

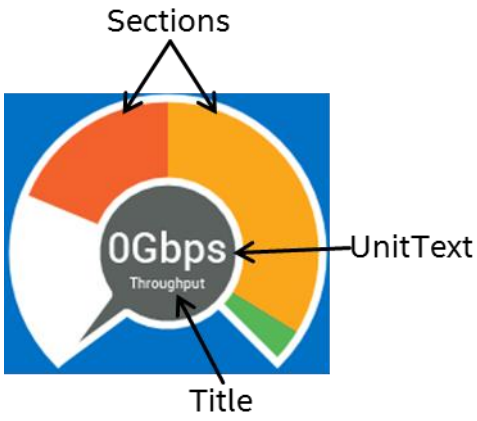


Figure 44 SteelSimpleGauge

7.6.3.1 Definition File

This section discusses what the contents of a SteelSimpleGauge Widget definition file contains.

Example:

```
 <Widget Type = "SteelSimpleGauge">
    <Style>SimpleGauge.css</Style>
    <MinValue>0</MinValue>
    <MaxValue>500</MaxValue>
    <Decimals>0</Decimals>
    <UnitText>Mbps</UnitText>
    <Sections>
        <Section start="0" end="20" />
        <Section start="20" end="100" />
        <Section start="100" end="200" />
        <Section start="250" end="500" />
    </Sections>
</Widget>
```

7.6.3.1.1 <MinValue>

Required

The minimum value that can be displayed on the dial. Usually zero, but can be whatever

you like.

7.6.3.1.2 <MaxValue>

Required

The maximum value that can be displayed on the dial.

7.6.3.1.3 <UnitText>

Required

The kind of data you are wanting to display, such as Gbps, Ghz, RPM etc.

7.6.3.1.4 <Decimals>

Required

The number of decimal places to be available for the current value # displayed in the middle of the dial.

7.6.3.1.5 <UnitText>

Required

The kind of data you are wanting to display, such as Gbps, Ghz, RPM etc.

7.6.3.1.6 <Sections>

Optional

You may create as many sections as you like (by adding a <Section> tag within the <Sections> tag. Each section will be displayed around the edge of the dial in the range you specify. All of the examples in this section of the document have Sections defined as:

```
    <Sections>
        <Section start="0" end="20" />
        <Section start="20" end="100" />
        <Section start="100" end="200" />
        <Section start="250" end="500" />
    </Sections>
```

Which contains 4 colored sections. These are only for display purposes and are optional.

Note that the color of the sections is defined within the stylesheet.

7.6.3.2 Application Settings

This section discusses the settings used to add a SteelSimpleGauge dial in the application configuration XML file.

Example:

```
<Widget File=" 10GigSimpleGauge.xml.xml" row="1" column="2" >
       <Title>Throughput</Title>
       <UnitsOverride>Bytes Per Sec </UnitsOverride>
       <MinionSrc ID="Eth0_BiDir_Data" Namespace="MadeupServer"/>
       <Size>
          <Minimum Width=”100”/>
       </Size>
</Widget>
```

7.6.3.2.1 <Title>

Optional

Sets the title of the Dial, shown at the bottom.

7.6.3.2.2 <UnitsOverride>

Optional

Allows you to use a different units type text than what is defined in the widget definition file.

7.6.3.2.3 <ValueRange>

Optional

Allows you to override the min and max set in the widget definition file.

Example:

```
            <ValueRange Min="1" Max="10"/>
```

7.6.4 SteelGaugeRadial

Figure 45 SteelGaugeRadial

7.6.4.1 Definition File

This section discusses what the contents of a SteelRadialGauge Widget definition file contains.

Example:

```
<Widget Type = "SteelGaugeRadial">
    <Style>GaugeRadial.css</Style>
    <MinValue>0</MinValue>
    <MaxValue>10</MaxValue>
    <UnitText>Gbps</UnitText>
    <Decimals>2</Decimals>
    <DialStartAngle>300</DialStartAngle>
    <DialRangeAngle>240</DialRangeAngle>
    <MajorTicksSpace>1</MajorTicksSpace>
    <MinorTicksSpace>1</MinorTicksSpace>
    <TickLableOrientation>Horizontal</TickLableOrientation>
```

```
    <EnhancedRateText>True</EnhancedRateText>
</Widget>
```

7.6.4.1.1 <MinValue>

Required

The minimum value that can be displayed on the dial. Usually zero, but can be whatever you like.

7.6.4.1.2 <MaxValue>

Required

The maximum value that can be displayed on the dial.

7.6.4.1.3 <UnitText>

Required

The kind of data you are wanting to display, such as Gbps, Ghz, RPM etc.

7.6.4.1.4 <Decimals>

Required

The number of decimal places to be available for the current value # displayed in the middle of the dial.

7.6.4.1.5 <DialStartAngle>

Optional

This specifies where the numbering on the dial begins, it is in degrees. 180 will start at the bottom of the dial, while 270 will be at 9:00 on a clock.

NOTE: The open source project for this widget does not yet use this field, so I ignore it.

7.6.4.1.6 <DialRangeAngle>

Required

The angle range that the dial should utilize, in degrees.

NOTE: The open source project for this widget does not yet use this field, so I ignore it.

7.6.4.1.7 <MajorTicksSpace>

Required

Numeric interval that a major Tick should be shown on the dial.

7.6.4.1.8 <MinorTicksSpace>

Required

Numeric interval that a minor Tick should be shown on the dial.

7.6.4.1.9 <TickLableOrientation>

Required

Determines the way in which the numbers on the dial are drawn. Valid values are:

```
Horizontal
Orthogonal
Tangent
```

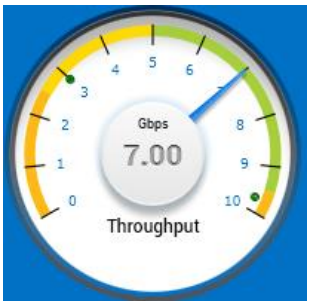
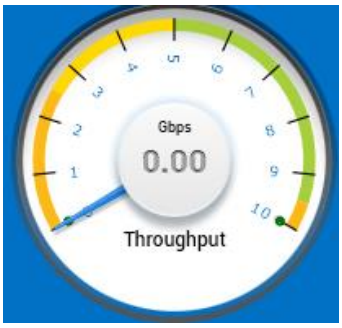
	

Figure 46 Horizontal Orientation	**Figure 47 Tangent Orientation**	**Figure 48 Orthogonal Orientation**

Note: I know – was lazy and re-used the graphic from a previous widget. However the meanings of the settings are the same.

7.6.4.1.10 <EnhancedRateText>

Required

Is a Boolean value (either True or False) that determines if the value text in the middle of the dial is displayed with shadowing or not.

7.6.4.2 Application Settings

This section discusses the settings used to add a SteelRadialGauge dial in the application configuration XML file.

Example:

```
<Widget File="Demo\GaugeRadial.xml" row="1" column="1">
       <Title>Throughput</Title>
       <UnitsOverride>Mb per sec</UnitsOverride>
       <MinionSrc ID="3to10" Namespace="DemoNamespace"/>
</Widget>
```

7.6.4.2.1 <Title>

Optional

Sets the title of the Dial, shown at the bottom.

7.6.4.2.2 <UnitsOverride>

Optional

Allows you to use a different units type text than what is defined in the widget definition file.

7.6.4.2.3 <ValueRange>

Optional

Allows you to override the min and max set in the widget definition file.

Example:

```
<ValueRange Min=”1” Max=”10”/>
```

7.6.4.2.4 <TickCount>

Optional sub-tag of ValueRange

You can use this tag to specify how many Major Ticks and Minor Ticks are displayed on the gauge. In the definition file you specify the interval. This will override it.

```
<ValueRange>
   <TickCount Major=”10” Minor=”20”/>
</ValueRange>
```

Will have 10 Major ticks, and 20 Minor.

7.6.5 SteelGaugeRadialSteel

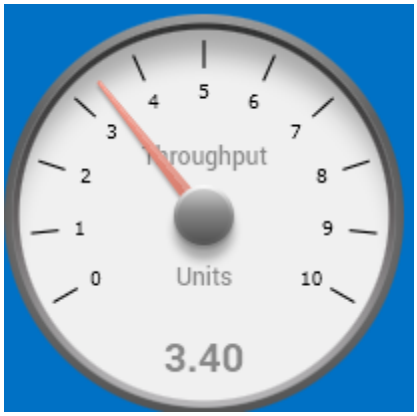


Figure 49 SteelGaugeRadialSteel

7.6.5.1 Definition File

This section discusses what the contents of a SteelRadialSteelGauge Widget definition file contains.

Example:

```
<Widget Type = "SteelGaugeRadialSteel">
    <Style>GaugeRadialSteel.css</Style>
    <MinValue>0</MinValue>
    <MaxValue>10</MaxValue>
    <UnitText>Gbps</UnitText>
    <Decimals>2</Decimals>
    <DialStartAngle>300</DialStartAngle>
    <DialRangeAngle>240</DialRangeAngle>
    <MajorTicksSpace>1</MajorTicksSpace>
    <MinorTicksSpace>0</MinorTicksSpace>
    <TickLableOrientation>Orthoginal</TickLableOrientation>
    <EnhancedRateText>True</EnhancedRateText>
</Widget>
```

7.6.5.1.1 <MinValue>

Required

The minimum value that can be displayed on the dial. Usually zero, but can be whatever you like.

7.6.5.1.2 <MaxValue>

Required

The maximum value that can be displayed on the dial.

7.6.5.1.3 <UnitText>

Required

The kind of data you are wanting to display, such as Gbps, Ghz, RPM etc.

7.6.5.1.4 <Decimals>

Required

The number of decimal places to be available for the current value # displayed in the middle of the dial.

7.6.5.1.5 <DialStartAngle>

Optional

This specifies where the numbering on the dial begins, it is in degrees. 180 will start at the bottom of the dial, while 270 will be at 9:00 on a clock.

7.6.5.1.6 <DialRangeAngle>

Required

The angle range that the dial should utilize, in degrees.

7.6.5.1.7 <MajorTicksSpace>

Required

Numeric interval that a major Tick should be shown on the dial.

7.6.5.1.8 <MinorTicksSpace>

Required

Numeric interval that a minor Tick should be shown on the dial.

7.6.5.1.9 <TickLableOrientation>

Required

Determines the way in which the numbers on the dial are drawn. Valid values are:

```
Horizontal
Orthogonal
Tangent
```

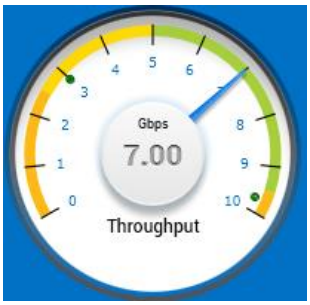
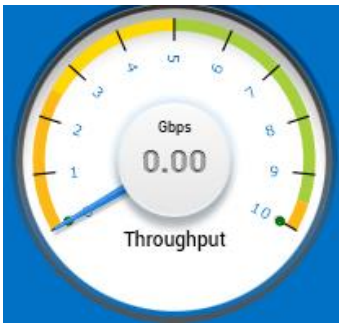
	

Figure 50 Horizontal Orientation	**Figure 51 Tangent Orientation**	**Figure 52 Orthogonal Orientation**

Note: I know – was lazy (again) and re-used the graphic from a previous widget. However the meanings of the settings are the same.

7.6.5.1.10 **<EnhancedRateText>**

Required

Is a Boolean value (either True or False) that determines if the value text in the middle of the dial is displayed with shadowing or not.

7.6.5.2 Application Settings

This section discusses the settings used to add a SteelGauges dial in the application configuration XML file.

Example:

```
<Widget File="Demo\GaugeRadialSteel.xml" row="1" column="1">
      <Title>Throughput</Title>
       <UnitsOverride>Mb per sec</UnitsOverride>
      <MinionSrc ID="3to10" Namespace="DemoNamespace"/>
</Widget>
```

7.6.5.2.1 **<Title>**

Optional

Sets the title of the Dial, shown at the bottom.

7.6.5.2.2 **<UnitsOverride>**

Optional

Allows you to use a different units type text than what is defined in the widget definition file.

7.6.5.2.3 **<ValueRange>**

Optional

Allows you to override the min and max set in the widget definition file.

Example:

```
<ValueRange Min=”1” Max=”10”/>
```

7.6.5.2.4 <TickCount>

Optional sub-tag of ValueRange

You can use this tag to specify how many Major Ticks and Minor Ticks are displayed on the gauge. In the definition file you specify the interval. This will override it.

```
<ValueRange>
   <TickCount Major=”10” Minor=”20”/>
</ValueRange>
```

Will have 10 Major ticks, and 20 Minor.

7.6.6 Bar Gauge

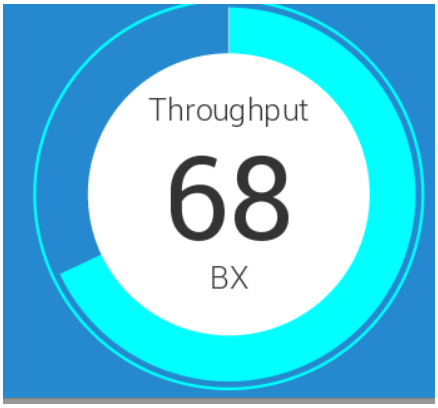


Figure 53 Bar Gauge

7.6.6.1 Definition File

This section discusses what the contents of a BarGauge Widget definition file contains.

Example:

```
<Widget Type = "BarGauge">
    <Style>GaugeBar.css</Style>
    <MinValue>0</MinValue>
    <MaxValue>100</MaxValue>
    <UnitText>Gbps</UnitText>
    <Decimals>2</Decimals>
</Widget>
```

7.6.6.1.1 <MinValue>

Required

The minimum value that can be displayed on the dial. Usually zero, but can be whatever you like.

7.6.6.1.2 <MaxValue>

Required

The maximum value that can be displayed on the dial.

7.6.6.1.3 <UnitText>

Required

The kind of data you are wanting to display, such as Gbps, Ghz, RPM etc.

7.6.6.1.4 <Decimals>

Optional

The number of decimal places to be available for the current value # displayed in the middle of the dial.

7.6.6.2 Application Settings

This section discusses the settings used to add a BarGauge dial in the application configuration XML file.

Example:

```
<Widget File="Demo\GaugeBar.xml" row="1" column="1">
       <Title>Throughput</Title>
       <UnitsOverride>Mb per sec</UnitsOverride>
       <MinionSrc ID="3to10" Namespace="DemoNamespace"/>
</Widget>
```

7.6.6.2.1 <Title>

Optional

Sets the title of the Dial, shown at the bottom.

7.6.6.2.2 <UnitsOverride>

Optional

Allows you to use a different units type text than what is defined in the widget definition file.

7.6.6.2.3 <ValueRange>

Optional

Allows you to override the min and max set in the widget definition file.

Example:

```
<ValueRange Min=”1” Max=”10”/>
```

7.6.7 Double Bar Gauge

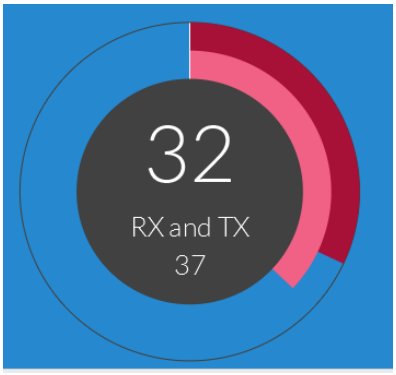


Figure 54 Double Bar Gauge

7.6.7.1 Definition File

This section discusses what the contents of a DoubleBarGauge Widget definition file contains.

Example:

```
<Widget Type = "DoubleBarGauge">
    <Style>DoubleGaugeBar.css</Style>
    <MinValue>0</MinValue>
    <MaxValue>100</MaxValue>
    <Decimals>2</Decimals>
</Widget>
```

7.6.7.1.1 <MinValue>

Required

The minimum value that can be displayed on the dial. Usually zero, but can be whatever you like.

7.6.7.1.2 <MaxValue>

Required

The maximum value that can be displayed on the dial.

7.6.7.1.3 <Decimals>

Optional

The number of decimal places to be available for the current value # displayed in the middle of the dial.

7.6.7.2 Application Settings

This section discusses the settings used to add a DoubleBarGauge dial in the application configuration XML file.

Example:

```
<Widget File="Demo\GaugeBar.xml" row="1" column="1">
```

```
        <Title>Throughput</Title>
        <InnerMinionSrc ID="RX" Namespace="DemoNamespace"/>
        <OuterMinionSrc ID="TX" Namespace="DemoNamespace"/>
/Widget>
```

7.6.7.2.1 <Title>

Optional

Sets the title of the Dial, shown at the bottom.

7.6.7.2.2 <InnerMinionSrc>

Required

Most Widgets have a MinionSrc. This widget has two sources, one for the inner bar and out for the outer bar. This one is for the Inner bar, and works the same was a <MinionSrc> but with a different name.

7.6.7.2.3 <OuterMinionSrc>

Required

Most Widgets have a MinionSrc. This widget has two sources, one for the inner bar and out for the outer bar. This one is for the Outer bar, and works the same was a <MinionSrc> but with a different name.

7.6.7.2.4 <ValueRange>

Optional

Allows you to override the min and max set in the widget definition file.

Example:

```
            <ValueRange Min=”1” Max=”10”/>
```

7.7 Indicators

Indicators are very simple widgets that take as data a value between 0 and 1. If any value is sent greater than 1, it is repeatedly divided by 10 until <= 1.

7.7.1 ProgressBar

Figure 55 ProgressBar Widget

7.7.1.1 Definition File

This section discusses what the contents of a ProgressBar Widget definition file contains.

Example:

```
<Widget Type = "ProgressBar">
    <Style ID = "default">ProgressBar.css</Style>
</Widget>
```

7.7.1.2 Application Settings

This section discusses the settings used to add a ProgressBar dial in the application configuration XML file.

Example:

```
<Widget File="ProgressBar.xml" row="1" column="1" Width="400" Height="40" colSpan="2">
 <MinionSrc ID="TestProgress" Namespace="SR-IOVSystem1"/>
</Widget>
```

7.7.2 ProgressIndicator

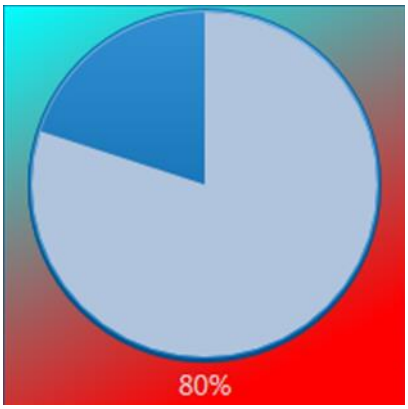


Figure 56 ProgressIndicator Widget

7.7.2.1 Definition File

This section discusses what the contents of a ProgressIndicator Widget definition file contains.

Example:

```
<Widget Type = "ProgressIndicator">
    <Style ID = "default">ProgressIndicator.css</Style>
</Widget>
```

7.7.2.2 Application Settings

This section discusses the settings used to add a ProgressIndicator dial in the application configuration XML file.

Example:

```
<Widget File="ProgressIndicator.xml" row="2" column="2" Width="200" Height="200">
      <StyleOverride ID="red"/>
      <MinionSrc ID="Progress" Namespace="DemoNamespace"/>
</Widget>
```

7.7.3 LEDBargraph

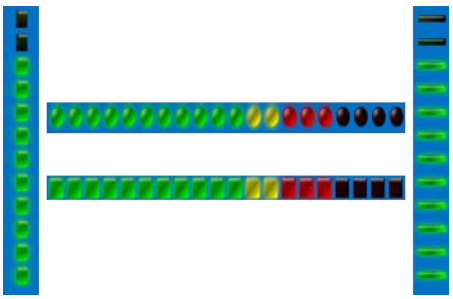


Figure 57 LEDBarGraph Widget

7.7.3.1 Definition File

This section discusses what the contents of a LEDBargraph Widget definition file contains.

Example:

```
<Widget Type = "LedBargraph">
    <Style>ledbargraph.css</Style>
    <Orientation>Vertical</Orientation>
    <LedType>Vertical</LedType>
    <ShowPeakValue>False</ShowPeakValue>
    <NumberOfLeds>12</NumoberLeds>
    <SizeOfLeds>20</SizeOfLeds>
</Widget>
```

7.7.3.1.1 Orientation

Required

Specifies if the LEDBarGraph widget is drawn Horizontal or Vertical. Valid values are "Horizontal" and "Vertical". See above figure for examples.

7.7.3.1.2 LedType

Required

Allows you to configure how the LED's should appear. Valid options (which can be seen in the above figure) are:

```
Horizontal
Vertical
Round
Square
```

7.7.3.1.3 ShowPeakValue

Required

Is a boolean value (True or False). If true, the peak value LED will remain lit for a little while before turning off when the value drops.

7.7.3.1.4 NumberOfLeds

Required

Specifies the number of LED's to display in the LEDBarGraph widget.

7.7.3.1.5 SizeOfLeds

Required

Specifies the size of each of the LED's to display in the LEDBarGraph widget.

7.7.3.2 Application Settings

This section discusses the settings used to add a LEDBarGraph dial in the application configuration XML file.

Example:

```
<Widget File="HorizontalLedBarGraph1.xml" row="3" column="1" Align="Center">
     <MinionSrc ID="Progress" Namespace="DemoNamespace"/>
</Widget>
```

Note: The LEDBarGraph widget is a great example of how you can use one widget type to create multiple different looking widgets to display by having different definition files. You can one a definition file for a vertical+round LedBarGraph and another for a horizontal+square one, etc.

7.8 Charts & Graphs

Java 8 comes with a rich library of charts and graphs. I've incorporated many of them into the Marvin Gui.

Some of these widgets can have what I refer to as 'Single Source' inputs – which is a comma separated array of values from a single <MinionSrc> as well as separate values for each series that comes from individual <MinionSrc> entries. In general I've found the single source to be easier to use and of more value.

Most charts have what I call a Series. Series will have a Label (like a key). Most charts also have a xAxis and yAxix with a label.

7.8.1 MultiSourceAreaChart

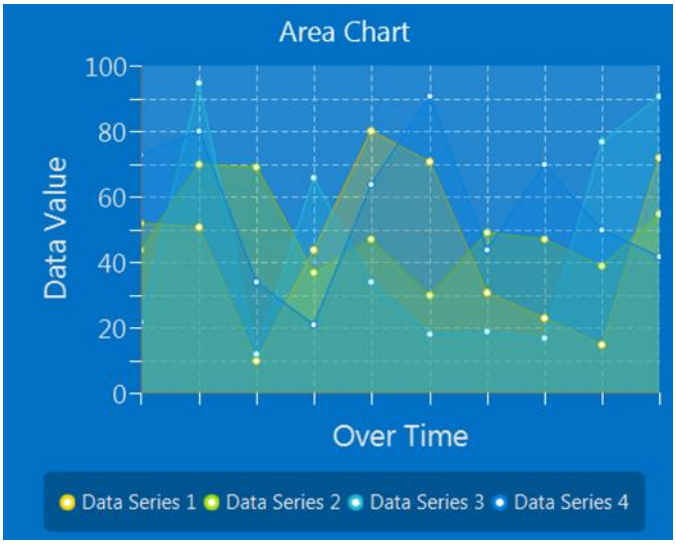


Figure 58 Area Chart

7.8.1.1 Definition File

This section discusses what the contents of a MultiSourceAreaChart Widget definition file contains.

Example:

```
 <Widget Type = "MultiSourceAreaChart">
    <Style>LineChart.css</Style>
    <Animated>False</Animated>
     <Synchronized MaxSyncWait="0">True</Synchronized>
    <yAxis MajorTickInterval="10" MinorTickInterval="5" TickLabelVisible="True"/>
    <xAxis MajorTickInterval="1" MinorTickInterval="0" TickLabelVisible="False"/>
</Widget>
```

7.8.1.1.1 < Animated >

Required

Determines if the chart will show the drawing and moving of datapoints. I usually have it off. It is a Boolean (true or false) value.

7.8.1.1.2 < xAxis>

Required

Determines look of the xAxis on the chart.

Attributes

The < xAxis > tag supports the following attributes, which are case sensitive.

Attribute	M/O	Comments

`MajorTickInterval`	M	Numeric interval for Major Ticks on xAxis
`MinorTickInterval`	M	Numeric interval for Minor Ticks on xAxis
`TickLabelVisible`	M	Boolean – display the value on major ticks

7.8.1.1.3 < yAxis>

Required

Determines look of the yAxis on the chart.

Attributes

The < yAxis > tag supports the following attributes, which are case sensitive.

Attribute	M/O	Comments
`MajorTickInterval`	M	Numeric interval for Major Ticks on yAxis
`MinorTickInterval`	M	Numeric interval for Minor Ticks on yAxis
`TickLabelVisible`	M	Boolean – display the value on major ticks

7.8.1.1.4 < Synchronized>

Optional

For charts with multiple data sources, this option allows you to specify that the chart will not be updated until all of the data sources have sent data. It takes a Boolean value (true or false). The default is true.

Attributes

The < Synchronized > tag supports the following attributes, which are case sensitive.

Attribute	M/O	Comments
`MaxSyncWait`	0	MAX time in milliseconds to wait for all data to synchronize before updating chart. A value of 0 (zero) will wait indefinitely. Default value is 0.

Note: Default values are TRUE and a MaxSyncWait is 0. This means if you have say 4 minions feeding a single chart and one of them is currently down, the chart will never update.

7.8.1.2 Application Settings

This section discusses the settings used to add a MultiSrcAreaChart in the application configuration XML file.

Example:

```
<Widget File="MultiSrcAreaChart.xml" row="1" column="0">
```

```
    <Title>Area Chart - Multisourced</Title>
    <xAxis Label="Over Time" MaxEntries="10"/>
    <yAxis Label="Data Value" MaxValue="100" MinValue=”0”/>
    <Series Label="Data Series 1">
        <MinionSrc ID="GraphSource1" Namespace="DemoNamespace"/>
    </Series>
    <Series Label="Data Series 2">
        <MinionSrc ID="GraphSource2" Namespace="DemoNamespace"/>
    </Series>
    <Series Label="Data Series 3">
        <MinionSrc ID="GraphSource3" Namespace="DemoNamespace"/>
    </Series>
    <Series Label="Data Series 4">
        <MinionSrc ID="GraphSource4" Namespace="DemoNamespace"/>
    </Series>
</Widget>
```

7.8.1.2.1 **<Title>**

Optional

Sets the title of the chart, shown at the top.

7.8.1.2.2 **<xAxis>**

Required

Defines how the xAxis should be handled. Has two attributes, Label and MaxEntries. Label is the label to display on the chart. MaxEntries specifies how many series to display before starting to scroll to the left when new data comes in.

7.8.1.2.3 **<yAxis>**

Required

Defines how the yAxis should be handled. Has two attributes, Label and MaxValue. Label is the label to display on the chart. MaxValue specifies the maximum value to be displayed. MinValue is optional, defaults to 0.0. Is the bottom of the chart, can be negative value.

7.8.1.2.4 **<Series>**

Required

The Series defines the Source of the data for a series. This is a mulit-src chart, so each series has its own MinionSrc. A Series has a Label Attribute (the name of the series to be displayed) and a MinionSrc:

```
<Series Label="Data Series 1">
        <MinionSrc ID="GraphSource1" Namespace="DemoNamespace"/>
</Series>
```

You must specify a Series for each expected MinionSrc. The example above has 4.

Note: Muliti-Source charts can be problematic unless used with care. Each data source is an independent stream and even if the collector is run with the same interval, the traffic is UDP and not guaranteed, so it can be dropped. If the collectors feeding the Widget are all from the same Minion, I recommend using the <Group> capability – it

is why it was invented.

If your data is coming from different Minions and feeding the same chart/graph then you will almost certainly see update issues. This is simply because you have separate data sources sending data over a network and they are not synchronized. As solving this issue is beyond the scope of BIFF (at this time anyhow) I recommend you coordinate the data collection into a single Minion for that Widget. Use a file share or some other mechanism to collect the desired data into a single comma separated source, or into multiple sources in a <Group>, but from a single Minion.

7.8.2 AreaChart

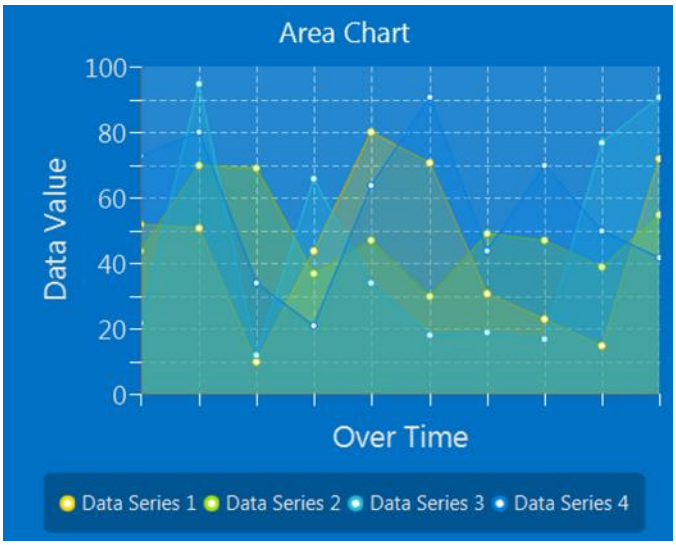


Figure 59 Area Chart

The AreaChart widget is nearly identical to the MultiSourceAreaChart, except that there is a single <MinionSrc> that is expected to send data in a comma separated string.

7.8.2.1 Definition File

This section discusses what the contents of a AreaChart Widget definition file contains.

Example:

```
 <Widget Type = "AreaChart">
    <Style>LineChart.css</Style>
    <Animated>False</Animated>
    <yAxis MajorTickInterval="10" MinorTickInterval="5" TickLabelVisible="True"/>
    <xAxis MajorTickInterval="1" MinorTickInterval="0" TickLabelVisible="False"/>
</Widget>
```

7.8.2.1.1 < Animated >

Required

Determines if the chart will show the drawing and moving of datapoints. I usually have it

off. It is a Boolean (true or false) value.

7.8.2.1.2 < xAxis>

Required

Determines look of the xAxis on the chart.

Attributes

The < xAxis > tag supports the following attributes, which are case sensitive.

Attribute	M/O	Comments
`MajorTickInterval`	M	Numeric interval for Major Ticks on xAxis
`MinorTickInterval`	M	Numeric interval for Minor Ticks on xAxis
`TickLabelVisible`	M	Boolean – display the value on major ticks

7.8.2.1.1 < yAxis>

Required

Determines look of the yAxis on the chart.

Attributes

The < yAxis > tag supports the following attributes, which are case sensitive.

Attribute	M/O	Comments
`MajorTickInterval`	M	Numeric interval for Major Ticks on yAxis
`MinorTickInterval`	M	Numeric interval for Minor Ticks on yAxis
`TickLabelVisible`	M	Boolean – display the value on major ticks

7.8.2.2 Application Settings

This section discusses the settings used to add a MultiSrcAreaChart in the application configuration XML file.

Example:

```
<Widget File="AreaChart.xml" row="1" column="0">
    <Title>Area Chart - Multisourced</Title>
    <xAxis Label="Over Time" MaxEntries="10"/>
    <yAxis Label="Data Value" MaxValue="100"/>
     <MinionSrc ID=”CombinedSource” Namespace=”DemoNamespace”/>
    <Series Label="Data Series 1"/>
    <Series Label="Data Series 2"/>
    <Series Label="Data Series 3"/>
    <Series Label="Data Series 4"/>
```

```
</Widget>
```

7.8.2.2.1 <Title>

Optional

Sets the title of the chart, shown at the top.

7.8.2.2.2 <xAxis>

Required

Defines how the xAxis should be handled. Has two attributes, Label and MaxEntries. Label is the label to display on the chart. MaxEntries specifies how many series to display before starting to scroll to the left when new data comes in.

7.8.2.2.3 <yAxis>

Required

Defines how the yAxis should be handled. Has two attributes, Label and MaxValue. Label is the label to display on the chart. MaxValue specifies the maximum value to be displayed. MinValue is optional, defaults to 0.0. Is the bottom of the chart, can be negative value.

7.8.2.2.4 <Series>

Required

The Series defines how many datapoints are to be expected from each update from the MinionSrc. It also defines the name of each series for display purposes.

```
<Series Label="Data Series 1"/>
```

7.8.3 MultiSourceStackedAreaChart

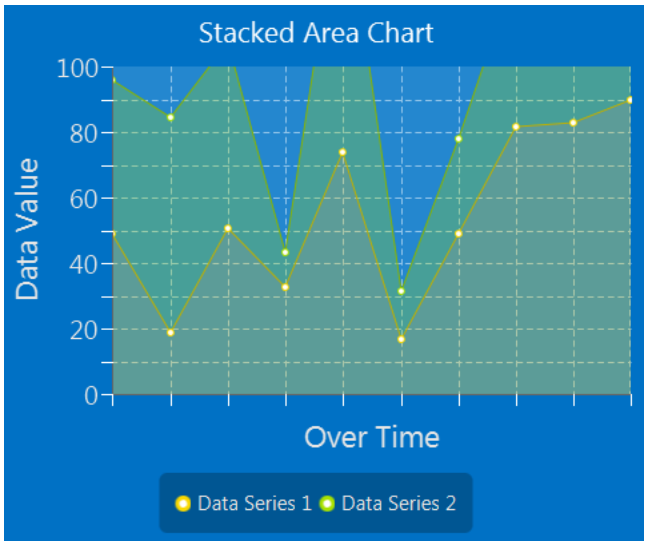


Figure 60 Area Chart

The MultiSourcedStackedArea chart is nearly exactly the same as the MultSourcedAreaChart. The only difference being that the data points are 'stacked' rather than displayed at a specify y value.

Note: These charts can be useful, however if you have multiple <MinionSrc> they can easily get out of sync and the chart can look 'messy'.

7.8.3.1 Definition File

This section discusses what the contents of a MultiSourcedStackedArea Widget definition file contains.

Example:

```
 <Widget Type = "MultiSourceStackedAreaChart">
    <Style>LineChart.css</Style>
    <Animated>False</Animated>
    <yAxis MajorTickInterval="10" MinorTickInterval="5" TickLabelVisible="True"/>
    <xAxis MajorTickInterval="1" MinorTickInterval="0" TickLabelVisible="False"/>
</Widget>
```

7.8.3.1.1 < Animated >

Required

Determines if the chart will show the drawing and moving of datapoints. I usually have it off. It is a Boolean (true or false) value.

7.8.3.1.2 < xAxis>

Required

Determines look of the xAxis on the chart.

Attributes

The < xAxis > tag supports the following attributes, which are case sensitive.

Attribute	M/O	Comments
`MajorTickInterval`	M	Numeric interval for Major Ticks on xAxis
`MinorTickInterval`	M	Numeric interval for Minor Ticks on xAxis
`TickLabelVisible`	M	Boolean – display the value on major ticks

7.8.3.1.3 < yAxis>

Required

Determines look of the yAxis on the chart.

Attributes

The < yAxis > tag supports the following attributes, which are case sensitive.

Attribute	M/O	Comments
`MajorTickInterval`	M	Numeric interval for Major Ticks on yAxis

`MinorTickInterval`	M	Numeric interval for Minor Ticks on yAxis
`TickLabelVisible`	M	Boolean – display the value on major ticks

7.8.3.1.4 < Synchronized>

Optional

For charts with multiple data sources, this option allows you to specify that the chart will not be updated until all of the data sources have sent data. It takes a Boolean value (true or false). The default is true.

Attributes

The < Synchronized > tag supports the following attributes, which are case sensitive.

Attribute	M/O	Comments
`MaxSyncWait`	0	MAX time in milliseconds to wait for all data to synchronize before updating chart. A value of 0 (zero) will wait indefinitely. Default value is 0.

Note: Default values are TRUE and a MaxSyncWait is 0. This means if you have say 4 minions feeding a single chart and one of them is currently down, the chart will never update.

7.8.3.2 Application Settings

This section discusses the settings used to add a MultiSrcAreaChart in the application configuration XML file.

Example:

```
<Widget File="MultiSrcStackedAreaChart.xml" row="2" column="0">
    <Title>Stacked Area Chart - Multisourced</Title>
    <xAxis Label="Over Time" MaxEntries="10"/>
    <yAxis Label="Data Value" MaxValue="100"/>
    <Series Label="Data Series 1">
        <MinionSrc ID="GraphSource1" Namespace="DemoNamespace"/>
    </Series>
    <Series Label="Data Series 2">
        <MinionSrc ID="GraphSource2" Namespace="DemoNamespace"/>
    </Series>
</Widget>
```

7.8.3.2.1 <Title>

Optional

Sets the title of the chart, shown at the top.

7.8.3.2.2 <xAxis>

Required

Defines how the xAxis should be handled. Has two attributes, Label and MaxEntries. Label

is the label to display on the chart. MaxEntries specifies how many series to display before starting to scroll to the left when new data comes in.

7.8.3.2.3 **<yAxis>**

Required

Defines how the yAxis should be handled. Has two attributes, Label and MaxValue. Label is the label to display on the chart. MaxValue specifies the maximum value to be displayed. MinValue is optional, defaults to 0.0. Is the bottom of the chart, can be negative value.

7.8.3.2.4 **<Series>**

Required

The Series defines the Source of the data for a series. This is a mulit-src chart, so each series has its own MinionSrc. A Series has a Label Attribute (the name of the series to be displayed) and a MinionSrc:

```
<Series Label="Data Series 1">
        <MinionSrc ID="GraphSource1" Namespace="DemoNamespace"/>
</Series>
```

You must specify a Series for each expected MinionSrc. The example above has 2.

Note: Muliti-Source charts can be problematic unless used with care. Each data source is an independent stream and even if the collector is run with the same interval, the traffic is UDP and not guaranteed, so it can be dropped. If the collectors feeding the Widget are all from the same Minion, I recommend using the <Group> capability – it is why it was invented.

If your data is coming from different Minions and feeding the same chart/graph then you will almost certainly see update issues. This is simply because you have separate data sources sending data over a network and they are not synchronized. As solving this issue is beyond the scope of BIFF (at this time anyhow) I recommend you coordinate the data collection into a single Minion for that Widget. Use a file share or some other mechanism to collect the desired data into a single comma separated source, or into multiple sources in a <Group>, but from a single Minion.

7.8.4 StackedAreaChart

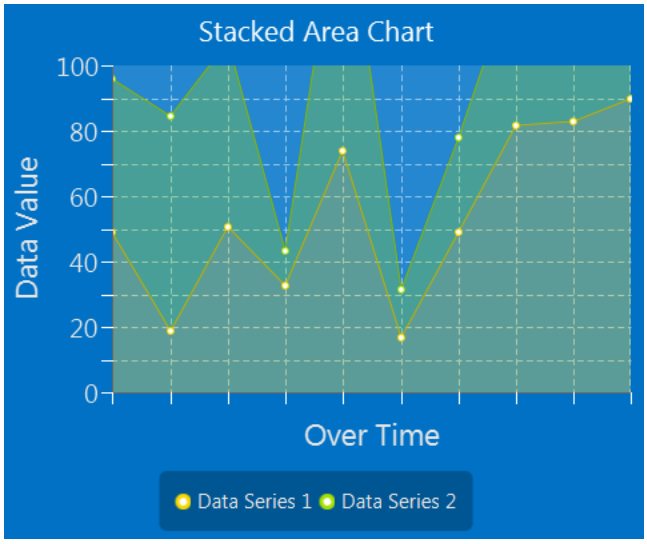


Figure 61 Area Chart

The StackedArea chart is nearly exactly the same as the AreaChart. The only difference being that the data points are 'stacked' rather than displayed at a specify y value.

7.8.4.1 Definition File

This section discusses what the contents of a StackedArea Widget definition file contains.

Example:

```
 <Widget Type = "StackedAreaChart">
    <Style>LineChart.css</Style>
    <Animated>False</Animated>
    <yAxis MajorTickInterval="10" MinorTickInterval="5" TickLabelVisible="True"/>
    <xAxis MajorTickInterval="1" MinorTickInterval="0" TickLabelVisible="False"/>
</Widget>
```

7.8.4.1.1 < Animated >

Required

Determines if the chart will show the drawing and moving of datapoints. I usually have it off. It is a Boolean (true or false) value.

7.8.4.1.2 < xAxis>

Required

Determines look of the xAxis on the chart.

Attributes

The < xAxis > tag supports the following attributes, which are case sensitive.

Attribute	M/O	Comments

`MajorTickInterval`	M	Numeric interval for Major Ticks on xAxis
`MinorTickInterval`	M	Numeric interval for Minor Ticks on xAxis
`TickLabelVisible`	M	Boolean – display the value on major ticks

7.8.4.1.3 < yAxis>

Required

Determines look of the yAxis on the chart.

Attributes

The < yAxis > tag supports the following attributes, which are case sensitive.

Attribute	M/O	Comments
`MajorTickInterval`	M	Numeric interval for Major Ticks on yAxis
`MinorTickInterval`	M	Numeric interval for Minor Ticks on yAxis
`TickLabelVisible`	M	Boolean – display the value on major ticks

7.8.4.2 Application Settings

This section discusses the settings used to add a MultiSrcAreaChart in the application configuration XML file.

Example:

```
<Widget File="StackedAreaChart.xml" row="2" column="0">
    <Title>Stacked Area Chart - Singlesourced</Title>
    <xAxis Label="Over Time" MaxEntries="10"/>
    <yAxis Label="Data Value" MaxValue="100"/>
     <MinionSrc ID=”TwoDataPts” Namespace=”DemoNamespace”\>
    <Series Label="Data Series 1"/>
    <Series Label="Data Series 2"/>
</Widget>
```

7.8.4.2.1 <Title>

Optional

Sets the title of the chart, shown at the top.

7.8.4.2.2 <xAxis>

Required

Defines how the xAxis should be handled. Has two attributes, Label and MaxEntries. Label is the label to display on the chart. MaxEntries specifies how many series to display before starting to scroll to the left when new data comes in.

7.8.4.2.3 <yAxis>

Required

Defines how the yAxis should be handled. Has two attributes, Label and MaxValue. Label is the label to display on the chart. MaxValue specifies the maximum value to be displayed. MinValue is optional, defaults to 0.0. Is the bottom of the chart, can be negative value.

7.8.4.2.4 <Series>

Required

The Series defines the Source of the data for a series. This is a single-src chart, so each series has only the label.

```
<Series Label="Data Series 1"/>
```

7.8.5 MultiSourceLineChart

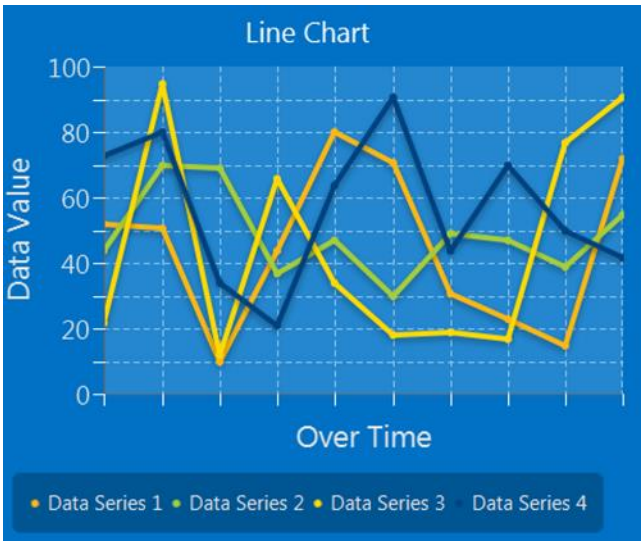


Figure 62 Line Chart

7.8.5.1 Definition File

This section discusses what the contents of a MultiSourceLineChart Widget definition file contains.

Example:

```
<Widget Type = "MultiSourceLineChart">
    <Style>LineChart.css</Style>
    <Animated>False</Animated>
    <yAxis MajorTickInterval="10" MinorTickInterval="5" TickLabelVisible="True"/>
    <xAxis MajorTickInterval="1" MinorTickInterval="0" TickLabelVisible="False"/>
</Widget>
```

7.8.5.1.1 < Animated >

Required

Determines if the chart will show the drawing and moving of datapoints. I usually have it off. It is a Boolean (true or false) value.

7.8.5.1.2 < xAxis>

Required

Determines look of the xAxis on the chart.

Attributes

The < xAxis > tag supports the following attributes, which are case sensitive.

Attribute	M/O	Comments
`MajorTickInterval`	M	Numeric interval for Major Ticks on xAxis
`MinorTickInterval`	M	Numeric interval for Minor Ticks on xAxis
`TickLabelVisible`	M	Boolean – display the value on major ticks

7.8.5.1.3 < yAxis>

Required

Determines look of the yAxis on the chart.

Attributes

The < yAxis > tag supports the following attributes, which are case sensitive.

Attribute	M/O	Comments
`MajorTickInterval`	M	Numeric interval for Major Ticks on yAxis
`MinorTickInterval`	M	Numeric interval for Minor Ticks on yAxis
`TickLabelVisible`	M	Boolean – display the value on major ticks

7.8.5.1.4 < Synchronized>

Optional

For charts with multiple data sources, this option allows you to specify that the chart will not be updated until all of the data sources have sent data. It takes a Boolean value (true or false). The default is true.

Attributes

The < Synchronized > tag supports the following attributes, which are case sensitive.

Attribute	M/O	Comments
`MaxSyncWait`	0	MAX time in milliseconds to wait for all data to synchronize before updating chart. A value of 0 (zero) will wait

		indefinitely. Default value is 0.

Note: Default values are TRUE and a MaxSyncWait is 0. This means if you have say 4 minions feeding a single chart and one of them is currently down, the chart will never update.

7.8.5.2 Application Settings

This section discusses the settings used to add a MultiSrcAreaChart in the application configuration XML file.

Example:

```
<Widget File="MultiSrcLineChart.xml" row="1" column="1">
    <Title>Line Chart - Multisourced</Title>
    <xAxis Label="Over Time" MaxEntries="10"/>
    <yAxis Label="Data Value" MaxValue="100" MinValue="0"/>
    <Series Label="Data Series 1">
        <MinionSrc ID="GraphSource1" Namespace="DemoNamespace"/>
    </Series>
    <Series Label="Data Series 2">
        <MinionSrc ID="GraphSource2" Namespace="DemoNamespace"/>
    </Series>
    <Series Label="Data Series 3">
        <MinionSrc ID="GraphSource3" Namespace="DemoNamespace"/>
    </Series>
    <Series Label="Data Series 4">
        <MinionSrc ID="GraphSource4" Namespace="DemoNamespace"/>
    </Series>
</Widget>
```

7.8.5.2.1 <Title>

Optional

Sets the title of the chart, shown at the top.

7.8.5.2.2 <xAxis>

Required

Defines how the xAxis should be handled. Has two attributes, Label and MaxEntries. Label is the label to display on the chart. MaxEntries specifies how many series to display before starting to scroll to the left when new data comes in.

7.8.5.2.3 <yAxis>

Required

Defines how the yAxis should be handled. Has two attributes, Label and MaxValue. Label is the label to display on the chart. MaxValue specifies the maximum value to be displayed. MinValue is optional, defaults to 0.0. Is the bottom of the chart, can be negative value.

7.8.5.2.4 <Series>

Required

The Series defines the Source of the data for a series. This is a mulit-src chart, so each

series has its own MinionSrc. A Series has a Label Attribute (the name of the series to be displayed) and a MinionSrc:

```
<Series Label="Data Series 1">
        <MinionSrc ID="GraphSource1" Namespace="DemoNamespace"/>
</Series>
```

You must specify a Series for each expected MinionSrc. The example above has 4.

Note: Muliti-Source charts can be problematic unless used with care. Each data source is an independent stream and even if the collector is run with the same interval, the traffic is UDP and not guaranteed, so it can be dropped. If the collectors feeding the Widget are all from the same Minion, I recommend using the <Group> capability – it is why it was invented.

If your data is coming from different Minions and feeding the same chart/graph then you will almost certainly see update issues. This is simply because you have separate data sources sending data over a network and they are not synchronized. As solving this issue is beyond the scope of BIFF (at this time anyhow) I recommend you coordinate the data collection into a single Minion for that Widget. Use a file share or some other mechanism to collect the desired data into a single comma separated source, or into multiple sources in a <Group>, but from a single Minion.

7.8.6 LineChart

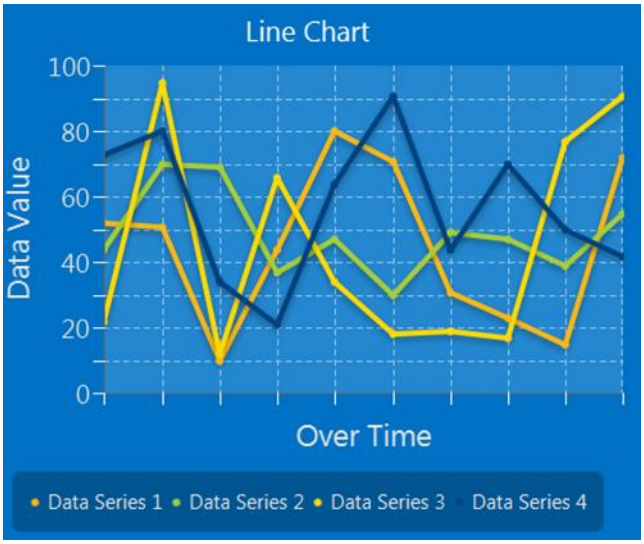


Figure 63 Line Chart

7.8.6.1 Definition File

This section discusses what the contents of a LineChart Widget definition file contains – it is pretty much identical to the other charts.

Example:

```
<Widget Type = "LineChart">
```

```
    <Style>LineChart.css</Style>
    <Animated>False</Animated>
    <yAxis MajorTickInterval="10" MinorTickInterval="5" TickLabelVisible="True"/>
    <xAxis MajorTickInterval="1" MinorTickInterval="0" TickLabelVisible="False"/>
</Widget>
```

7.8.6.1.1 < Animated >

Required

Determines if the chart will show the drawing and moving of datapoints. I usually have it off. It is a Boolean (true or false) value.

7.8.6.1.2 < xAxis>

Required

Determines look of the xAxis on the chart.

Attributes

The < xAxis > tag supports the following attributes, which are case sensitive.

Attribute	M/O	Comments
`MajorTickInterval`	M	Numeric interval for Major Ticks on xAxis
`MinorTickInterval`	M	Numeric interval for Minor Ticks on xAxis
`TickLabelVisible`	M	Boolean – display the value on major ticks

7.8.6.1.3 < yAxis>

Required

Determines look of the yAxis on the chart.

Attributes

The < yAxis > tag supports the following attributes, which are case sensitive.

Attribute	M/O	Comments
`MajorTickInterval`	M	Numeric interval for Major Ticks on yAxis
`MinorTickInterval`	M	Numeric interval for Minor Ticks on yAxis
`TickLabelVisible`	M	Boolean – display the value on major ticks

7.8.6.2 Application Settings

This section discusses the settings used to add a MultiSrcAreaChart in the application configuration XML file.

Example:

```
<Widget File="MultiSrcLineChart.xml" row="1" column="1">
    <Title>Line Chart - Multisourced</Title>
    <xAxis Label="Over Time" MaxEntries="10"/>
    <yAxis Label="Data Value" MaxValue="100"/>
     <MinionSrc ID="CPU_LineChart" Namespace="DemoNamespace"/>
    <Series Label="Data Series 1"/>
    <Series Label="Data Series 2"/>
    <Series Label="Data Series 3"/>
    <Series Label="Data Series 4"/>
</Widget>
```

7.8.6.2.1 **<Title>**

Optional

Sets the title of the chart, shown at the top.

7.8.6.2.2 **<xAxis>**

Required

Defines how the xAxis should be handled. Has two attributes, Label and MaxEntries. Label is the label to display on the chart. MaxEntries specifies how many series to display before starting to scroll to the left when new data comes in.

7.8.6.2.3 **<yAxis>**

Required

Defines how the yAxis should be handled. Has two attributes, Label and MaxValue. Label is the label to display on the chart. MaxValue specifies the maximum value to be displayed. MinValue is optional, defaults to 0.0. Is the bottom of the chart, can be negative value.

7.8.6.2.4 **<Series>**

Required

The Series defines the number and name of the series data to be sent from a single <MinionSrc> as a comma separated string.

```
<Series Label="Data Series 1"/>
```

7.8.7 PieChart

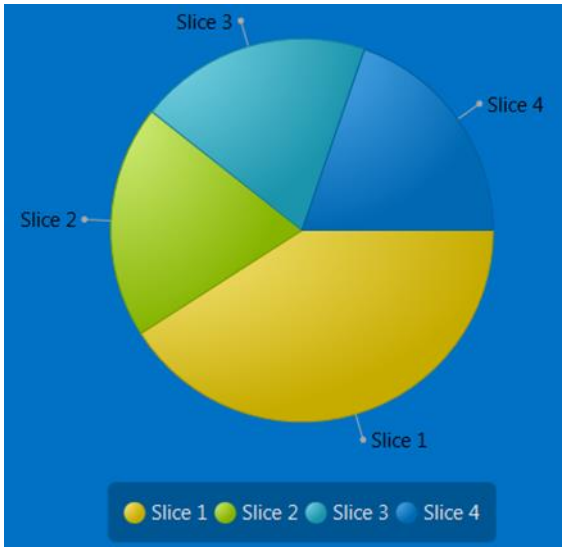


Figure 64 Pie Chart

7.8.7.1 Definition File

This section discusses what the contents of a PieChart Widget definition file contains.

Example:

```
<Widget Type = "PieChart">
    <Style>PieChart.css</Style>
</Widget>
```

Very simple definition file.

7.8.7.2 Application Settings

This section discusses the settings used to add a Pie Chart dial in the application configuration XML file.

Example:

```
<Widget File="PieChart.xml" row="3" column="1">
      <Title>Pie Chart</Title>
      <MinionSrc ID="PieSource" Namespace="DemoNamespace"/>
      <Slice Label="Slice 1"/>
      <Slice Label="Slice 2"/>
      <Slice Label="Slice 3"/>
      <Slice Label="Slice 4"/>
</Widget>
```

7.8.7.2.1 **<Title>**

Optional

Sets the title of the chart, shown at the top.

7.8.7.2.2 <Series>

Required

The Series defines the number and name of the series data to be sent from a single <MinionSrc> as a comma separated string.

```
<Series Label="Slice 1"/>
```

In the above example there are 4.

7.8.8 Bar Chart

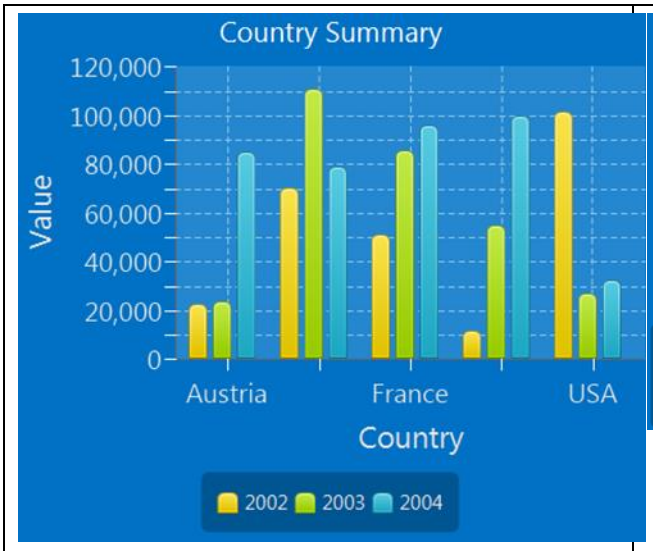


Figure 65 Multi Series Bar Chart

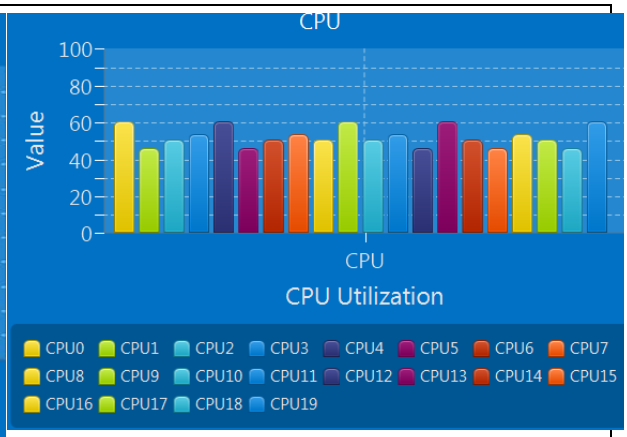


Figure 66 Bar Chart

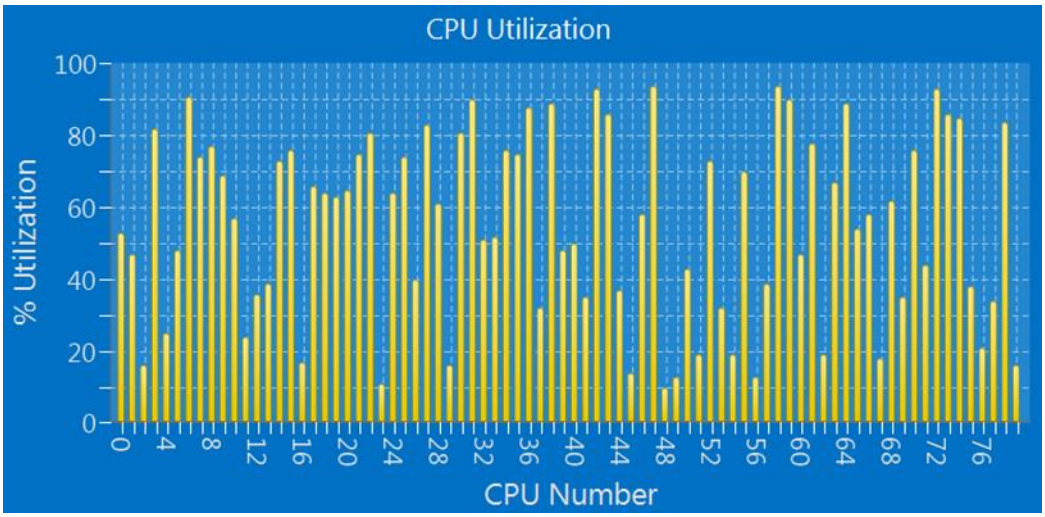


Figure 67 Bar Chart

The BarChart was the last chart widget I created. As such, it works a bit differently than

the others. Rather than have multi-src and single source widgets, there is a single widget that gets instantiated differently in the application configuration xml file. The three figures above are all BarChart widgets, but declared differently.

7.8.8.1 Definition File

This section discusses what the contents of a BarChart Widget definition file contains.

Example:

```
<Widget Type = "BarChart">
    <Style>BarChart.css</Style>
    <Animated>True</Animated>
    <yAxis MajorTickInterval="10" MinorTickInterval="0" TickLabelVisible="True"/>
</Widget>
```

7.8.8.1.1 < Animated >

Required

Determines if the chart will show the drawing and moving of datapoints. I usually have it off. It is a Boolean (true or false) value.

7.8.8.1.2 < yAxis>

Required

Determines look of the yAxis on the chart.

Attributes

The < yAxis > tag supports the following attributes, which are case sensitive.

Attribute	M/O	Comments
`MajorTickInterval`	M	Numeric interval for Major Ticks on yAxis
`MinorTickInterval`	M	Numeric interval for Minor Ticks on yAxis
`TickLabelVisible`	M	Boolean – display the value on major ticks

7.8.8.2 Application Settings

This section discusses the settings used to add a Pie Chart dial in the application configuration XML file.

Example1:

```
 <Widget File="BarChartDemo.xml" row="1" column="1">
     <Title>Country Summary</Title>
     <xAxis Label="Country"/>
     <yAxis Label="Value" MaxValue="120000"/>
     <Series ID="Series1" Label="2002"/>
     <Series ID="Series2" Label="2003"/>
     <Series ID="Series3" Label="2004"/>
     <SeriesSet Title="Austria">
```

```
        <MinionSrc ID="Austria02" Namespace="DemoNamespace" SeriesID="Series1"/>
        <MinionSrc ID="Austria03" Namespace="DemoNamespace" SeriesID="Series2"/>
        <MinionSrc ID="Austria04" Namespace="DemoNamespace" SeriesID="Series3"/>
    </SeriesSet>
    <SeriesSet Title="Brazil">
        <MinionSrc ID="Brazil02" Namespace="DemoNamespace" SeriesID="Series1"/>
        <MinionSrc ID="Brazil03" Namespace="DemoNamespace" SeriesID="Series2"/>
        <MinionSrc ID="Brazil04" Namespace="DemoNamespace" SeriesID="Series3"/>
    </SeriesSet>
    <SeriesSet Title="France">
        <MinionSrc ID="France02" Namespace="DemoNamespace" SeriesID="Series1"/>
        <MinionSrc ID="France03" Namespace="DemoNamespace" SeriesID="Series2"/>
        <MinionSrc ID="France04" Namespace="DemoNamespace" SeriesID="Series3"/>
    </SeriesSet>
    <SeriesSet Title="Italy">
        <MinionSrc ID="Italy02" Namespace="DemoNamespace" SeriesID="Series1"/>
        <MinionSrc ID="Italy03" Namespace="DemoNamespace" SeriesID="Series2"/>
        <MinionSrc ID="Italy04" Namespace="DemoNamespace" SeriesID="Series3"/>
    </SeriesSet>
    <SeriesSet Title="USA">
        <MinionSrc ID="USA02" Namespace="DemoNamespace" SeriesID="Series1"/>
        <MinionSrc ID="USA03" Namespace="DemoNamespace" SeriesID="Series2"/>
        <MinionSrc ID="USA04" Namespace="DemoNamespace" SeriesID="Series3"/>
    </SeriesSet>
</Widget>
```

Example2:

```
            <Title>CPU</Title>
            <xAxis Label="CPU Utilization"/>
            <yAxis Label="Value" MaxValue="100"/>
            <Series Label = "CPU0" ID="Series1"/>
            <Series Label = "CPU1" ID="Series2"/>
            <Series Label = "CPU2" ID="Series3"/>
            <Series Label = "CPU3" ID="Series4" />
            <Series Label = "CPU4" ID="Series5" />
            <Series Label = "CPU5" ID="Series6" />
            <Series Label = "CPU6" ID="Series7" />
            <Series Label = "CPU7" ID="Series8" />
            <Series Label = "CPU8" ID="Series9" />
            <Series Label = "CPU9" ID="Series10" />
            <Series Label = "CPU10" ID="Series11" />
            <Series Label = "CPU11" ID="Series12" />
            <Series Label = "CPU12" ID="Series13" />
            <Series Label = "CPU13" ID="Series14" />
            <Series Label = "CPU14" ID="Series15" />
            <Series Label = "CPU15" ID="Series16" />
            <Series Label = "CPU16" ID="Series17" />
            <Series Label = "CPU17" ID="Series18" />
```

```
            <Series Label = "CPU18"  ID="Series19" />
            <Series Label = "CPU19" ID="Series20" />
            <SeriesSet Title="CPU">
 <MinionSrc ID="GraphSource1" Namespace="DemoNamespace" SeriesID="Series1"/>
 <MinionSrc ID="GraphSource2" Namespace="DemoNamespace" SeriesID="Series2"/>
 <MinionSrc ID="GraphSource3" Namespace="DemoNamespace" SeriesID="Series3"/>
 <MinionSrc ID="GraphSource4" Namespace="DemoNamespace" SeriesID="Series4"/>
 <MinionSrc ID="GraphSource3" Namespace="DemoNamespace" SeriesID="Series3"/>
 <MinionSrc ID="GraphSource4" Namespace="DemoNamespace" SeriesID="Series4"/>
 <MinionSrc ID="GraphSource1" Namespace="DemoNamespace" SeriesID="Series5"/>
 <MinionSrc ID="GraphSource2" Namespace="DemoNamespace" SeriesID="Series6"/>
 <MinionSrc ID="GraphSource3" Namespace="DemoNamespace" SeriesID="Series7"/>
 <MinionSrc ID="GraphSource4" Namespace="DemoNamespace" SeriesID="Series8"/>
 <MinionSrc ID="GraphSource3" Namespace="DemoNamespace" SeriesID="Series9"/>
 <MinionSrc ID="GraphSource1" Namespace="DemoNamespace" SeriesID="Series10"/>
 <MinionSrc ID="GraphSource3" Namespace="DemoNamespace" SeriesID="Series11"/>
 <MinionSrc ID="GraphSource4" Namespace="DemoNamespace" SeriesID="Series12"/>
 <MinionSrc ID="GraphSource2" Namespace="DemoNamespace" SeriesID="Series13"/>
 <MinionSrc ID="GraphSource1" Namespace="DemoNamespace" SeriesID="Series14"/>
 <MinionSrc ID="GraphSource3" Namespace="DemoNamespace" SeriesID="Series15"/>
 <MinionSrc ID="GraphSource2" Namespace="DemoNamespace" SeriesID="Series16"/>
 <MinionSrc ID="GraphSource4" Namespace="DemoNamespace" SeriesID="Series17"/>
 <MinionSrc ID="GraphSource3" Namespace="DemoNamespace" SeriesID="Series18"/>
 <MinionSrc ID="GraphSource2" Namespace="DemoNamespace" SeriesID="Series19"/>
 <MinionSrc ID="GraphSource1" Namespace="DemoNamespace" SeriesID="Series20"/>
</SeriesSet>
</Widget>
```

Example3:

```
<Widget File="BarChart.xml" row="1" column="2">
    <Title> CPU Utilization</Title>
    <xAxis Label="CPU Number" Count="80"/>
    <yAxis Label="% Utilization" MaxValue="100"/>
    <MinionSrc ID="CPU_LIST" Namespace="DemoNamespace"/>
    <StyleOverride>
       <Item>-fx-legend-visible:false;-fx-bar-gap:1;-fx-category-gap:1;</Item>
   </StyleOverride>
</Widget>
```

7.8.8.2.1 **<Title>**

Optional

Sets the title of the chart, shown at the top.

7.8.8.2.2 **<xAxis>**

Required

Defines how the xAxis should be handled. Has two attributes, Label and MaxEntries. Label is the label to display on the chart. MaxEntries specifies how many bars to display if you don’t specify any series, as in Exampl3, which matches Figure 67.

7.8.8.2.3 <yAxis>

Required

Defines how the yAxis should be handled. Has two attributes, Label and MaxValue. Label is the label to display on the chart. MaxValue specifies the maximum value to be displayed.

7.8.8.2.4 <Series>

Optional

The Series defines the Source of the data for a series. A Series has a Label Attribute (the name of the series to be displayed, which is optional) and an ID:

```
<Series ID="Series1" Label="2002"/>
```

7.8.8.2.5 <SeriesSet>

Series set is where you can make a grouping of series, such as in Figure 65. Each Series Set has a Title Attribute that is the title of the Series. It also has a <MinionSrc> for each dataset in that series, with each <MinionSrc> having a new Attribute of SeriesID, that corresponds to the ID in the <Series> tag described above.

Example:

```
<Series ID="Series1" Label="2002"/>
<Series ID="Series2" Label="2003"/>
<Series ID="Series3" Label="2004"/>
<SeriesSet Title="Austria">
   <MinionSrc ID="Austria02" Namespace="DemoNamespace" SeriesID="Series1"/>
   <MinionSrc ID="Austria03" Namespace="DemoNamespace" SeriesID="Series2"/>
   <MinionSrc ID="Austria04" Namespace="DemoNamespace" SeriesID="Series3"/>
</SeriesSet>
```

You can define a Single SeriesSet as in Figure 66 or many as in Figure 65.

Or you can do as in Example3 above and define no series, but define in the xAxis how many datapoints you expect (with a comma separated list of values coming from your Minion Collector). Very useful for many cores ☺

7.8.9 StackedBarChart

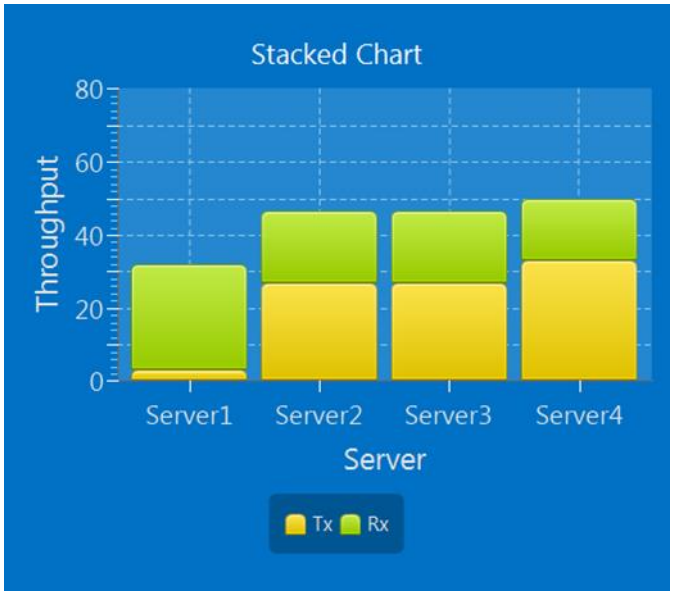


Figure 68 StackedBarChart

7.8.9.1 Definition File

This section discusses what the contents of a StackedBarChart Widget definition file contains.

Example:

```
<Widget Type = "StackedBarChart">
    <Style>BarChart.css</Style>
    <Animated>True</Animated>
    <yAxis MajorTickInterval="10" MinorTickInterval="5" TickLabelVisible="True"/>
</Widget>
```

Very simple definition file.

7.8.9.1.1 **< Animated >**

Required

Determines if the chart will show the drawing and moving of datapoints. I usually have it off. It is a Boolean (true or false) value.

7.8.9.1.2 **< yAxis>**

Required

Determines look of the yAxis on the chart.

Attributes

The < yAxis > tag supports the following attributes, which are case sensitive.

Attribute	M/O	Comments
`MajorTickInterval`	M	Numeric interval for Major Ticks on yAxis
`MinorTickInterval`	M	Numeric interval for Minor Ticks on yAxis
`TickLabelVisible`	M	Boolean – display the value on major ticks

7.8.9.2 Application Settings

This section discusses the settings used to add a StackedBarChart in the application configuration XML file.

Example:

```
<Widget File="StackedBarChart.xml" row="1" column="1">
      <Title>Stacked Chart</Title>
      <xAxis Label="Server"/>
      <yAxis Label="Throughput" MaxValue="80"/>
      <Series ID="Series1" Label="Tx"/>
       <Series ID="Series2" Label="Rx"/>
       <SeriesSet Title="Server1">
 <MinionSrc ID="StackedTx_Server1" Namespace="DemoNamespace" SeriesID="Series1"/>
 <MinionSrc ID="StackedRx_Server1" Namespace="DemoNamespace" SeriesID="Series2"/>
      </SeriesSet>
<SeriesSet Title="Server2">
 <MinionSrc ID="StackedTx_Server2" Namespace="DemoNamespace" SeriesID="Series1"/>
 <MinionSrc ID="StackedRx_Server2" Namespace="DemoNamespace" SeriesID="Series2"/>
 </SeriesSet>
<SeriesSet Title="Server3">
 <MinionSrc ID="StackedTx_Server3" Namespace="DemoNamespace" SeriesID="Series1"/>
 <MinionSrc ID="StackedRx_Server3" Namespace="DemoNamespace" SeriesID="Series2"/>
</SeriesSet>
<SeriesSet Title="Server4">
 <MinionSrc ID="StackedTx_Server4" Namespace="DemoNamespace" SeriesID="Series1"/>
 <MinionSrc ID="StackedRx_Server4" Namespace="DemoNamespace" SeriesID="Series2"/>
</SeriesSet>
</Widget>
```

7.8.9.2.1 **<Title>**

Optional

Sets the title of the chart, shown at the top.

Optional

The Series defines the Source of the data for a series. A Series has a Label Attribute (the name of the series to be displayed, which is optional) and an ID:

```
<Series ID="Series1" Label="2002"/>
```

7.8.9.2.2 <SeriesSet>

Series set is where you can make a grouping of series, such as in Figure 65. Each Series Set has a Title Attribute that is the title of the Series. It also has a <MinionSrc> for each dataset in that series, with each <MinionSrc> having a new Attribute of SeriesID, that corresponds to the ID in the <Series> tag described above.

Example:

```
<SeriesSet>
   <Series ID="Series1" Label="Tx"/>
   <Series ID="Series2" Label="Rx"/>
   <SeriesSet Title="Server1">
   <MinionSrc ID="StackedTx_Server1" Namespace="DemoNamespace" SeriesID="Series1"/>
   <MinionSrc ID="StackedRx_Server1" Namespace="DemoNamespace" SeriesID="Series2"/>
</SeriesSet>
```

Just as with the BarGraph widget, you can define a single or multiple <SeriesSet>s.

Note: Muliti-Source charts can be problematic unless used with care. Each data source is an independent stream and even if the collector is run with the same interval, the traffic is UDP and not guaranteed, so it can be dropped. If the collectors feeding the Widget are all from the same Minion, I recommend using the <Group> capability – it is why it was invented.

If your data is coming from different Minions and feeding the same chart/graph then you will almost certainly see update issues. This is simply because you have separate data sources sending data over a network and they are not synchronized. As solving this issue is beyond the scope of BIFF (at this time anyhow) I recommend you coordinate the data collection into a single Minion for that Widget. Use a file share or some other mechanism to collect the desired data into a single comma separated source, or into multiple sources in a <Group>, but from a single Minion.

7.9 Images/Video/Sound

7.9.1 StaticImage

Figure 69 Static Image

A static image is just that. You can place an image (.bmp,.jpg,.gif,.tiff, etc.) in a grid.

7.9.1.1 Definition File

This section discusses what the contents of a StaticImage Widget definition file contains.

Example:

```
<Widget Type = "StaticImage">
    <PreserveRatio>True</PreserveRatio>
    <ScaleToFit>True</ScaleToFit>
</Widget>
```

7.9.1.1.1 < PreserveRatio>

Optional

Value is either True or False. If True, the image will grow in change size in both height and width if you specify only one value when placing the Widget.

7.9.1.1.2 < ScaleToFit>

Optional

TBD - Experimental

7.9.1.2 Application Settings

This section discusses the settings used to add a StaticImage in the application configuration XML file.

Example:

```
<Widget File="Image.xml" row="1" column="1" >
    <Source>Demo\Images\ajax_loader_blue_256.gif</Source>
     <ClickOnTransparent>False</ClickOnTransparent>
</Widget>
```

The Source Tag points to the image to load. Pretty easy.

The optional <ClickOnTransparent> tag takes either True or False, and defaults to True. This is used if you want to put up an image that you assign a task to and ignore clicks to any area of the image that is transparent.

7.9.2 DynamicImage

Figure 70 Dynamic Image

The DynamicImage widget allows you to control which image to display at a location depending on a string that comes from a Minion collector.

A good example is when you go start a test, the collector (could be a file collector reading status from a file) sends an ID to make the image one that indicates test is starting. Then when the test if finished, the string ID associated with the 'finished test' image is sent and the image is changed.

In addition to the ID of the specific image you wish to display, you can also send 'Next' or

'Previous', and the next or previous image in the list will be displayed. When using 'Next' or 'Previous' the list is considered to be circular.

7.9.2.1 Definition File

This section discusses what the contents of a DynamicImage Widget definition file contains.

Example:

```
 <Widget Type = "DynamicImage">
    <PreserveRatio>True</PreserveRatio>
    <ScaleToFit>False</ScaleToFit>
</Widget>
```

7.9.2.1.1 < PreserveRatio>

Optional

Value is either True or False. If True, the image will grow in change size in both height and width if you specify only one value when placing the Widget.

7.9.2.1.2 < ScaleToFit>

Optional

TBD - Experimental

7.9.2.2 Application Settings

This section discusses the settings used to add a DynamicImage in the application configuration XML file.

Example:

```
<Widget File="DynamicImage.xml" row="3" column="1" >
  <MinionSrc ID="TrafficLight" Namespace="DemoNamespace"/>
  <Image Source="Demo\Images\yellowlight.png" ID="2"/>
  <Image Source="Demo\Images\greenlight.png" ID="1"/>
  <Image Source="Demo\Images\redlight.png" ID="3"/>
  <Initial ID="1"/>
  <Size>
     <Minimum Height="250"/>
  </Size>
</Widget>
```

The widget has three unique Tags, Image and Initial. Image takes as Attributes a Source, that points to a file containing the image and an ID. The ID is a string that the collector (identified by the MinionSrc) sends to change the image.

Initial indicates what image to display at startup.

The Optional <ClickOnTransparent> tag takes either True or False, and defaults to True. This is used if you want to put up an image that you assign a task to and ignore clicks to any area of the image that is transparent. This is the same as StaticImage.

7.9.3 VideoPlayer

<AutoStart>

7.9.3.2.2 **<InitialVolume>**

7.9.3.2.3 **<Repeat>**

7.9.3.2.4 **< PreserveRatio>**

<MinionSrc>

7.9.3.3.2 **<Video>**

7.9.3.3.3 **<Task>**

7.9.3.3.4 **<Initial>**

7.9.3.3.5 **<PlaybackControl>**

7.9.3.3.6 **<AutoStart>**

7.9.3.3.7 **<Repeat>**

7.9.4 AudioPlayer

<AutoStart>

7.9.4.2.2 **<InitialVolume>**

7.9.4.2.3 **<Repeat>**

7.9.4.3.1 **<MinionSrc>**

7.9.4.3.2 **<Audio>**

7.9.4.3.3 **<Task>**

7.9.4.3.4 **<Initial>**

7.9.4.3.5 **<PlaybackControl>**

7.9.4.3.6 **<AutoStart>**

7.9.4.3.7 **<Repeat>**

7.10 Text Display Widgets

7.10.1 Text

The Text widget allows you to place text in anyplace. This text can be associated with a <MinionSrc> and therefore change, or it can be static and never change (by not putting a <MinionSrc> when you insert the Widget.

7.10.1.1 Definition File

This section discusses what the contents of a TextWidget definition file contains.

Example:

```
<Widget Type="Text">
     <Style ID="default_text">Text.css</Style>
     <ScaleToShape>False</ScaleToShape>
</Widget>
```

Note: ScaleToShape is an experimental setting at this time.

7.10.1.2 Application Settings

This section discusses the settings used to add a Text widget in the application configuration XML file.

Example:

```
        <Widget File="Text.xml" row="0" column="0" colSpan="3">
            <InitialValue> Various Indicator and Progress Widgets</InitialValue>
            <StyleOverride ID="Title"/>
        </Widget>
```

The optional <InitialValue> tag is used to provide the text to display at startup. If you don't specify a <MinionSrc>, then this is the only text that will be displayed for this widget.

7.10.2 SteelLCD

Figure 71 LCD Widget

7.10.2.1 Definition File

This section discusses what the contents of a SteelLCD definition file contains.

Example:

```
<Widget Type = "SteelLCD">
    <Style ID="lcd-standard">lcd.css</Style>
    <Decimals>1</Decimals>
```

```
    <MinValue>0</MinValue>
    <MaxValue>1000</MaxValue>
    <UnitText>MBPS</UnitText>
    <KeepAspectRatio>True</KeepAspectRatio>
    <ShowMaxMeasuredValue>True</ShowMaxMeasuredValue>
    <ShowMinMeasuredValue>True</ShowMinMeasuredValue>
</Widget>
```

7.10.2.1.1 < Decimals >

Required

Determines how many decimals places the widet will display.

7.10.2.1.2 < MinValue>

Required

The minimum value displayed by the Widget.

7.10.2.1.3 < MaxValue>

Required

The maxiumum value displayed by the Widget.

7.10.2.1.4 < UnitText>

Required

The units text to be displayed in the widget. Can be overridden in application config.

7.10.2.1.5 <ShowMaxMeasuredValue>

Required

Is a Boolean value (either True or False) that determines a small dot will appear on the dial that indicates the maximum value that has been received thus far.

7.10.2.1.6 <ShowMinMeasuredValue>

Required

Is a Boolean value (either True or False) that determines a small dot will appear on the dial that indicates the minimum value that has been received thus far.

7.10.2.1.7 <KeepAspectRatio>

Optional

Is a Boolean value (either True or False) that determines if the aspect ratio the developer specified is maintained. Prevents you from specifying any ole height and width, should be a ratio of 2.75. Default is true.

With this value set, if you specify a Width of any kind for the widget, it will automatically calculate the Height.

If you do not specify a Width (preferred, minimum or maximum) but you do specify a Height, then the Width will be automatically calculated for you. If both Width and Height are specified, Width will be used and Height automatically re-calculated.

7.10.2.2 Application Settings

This section discusses the settings used to add a SteelLCD widget in the application configuration XML file.

Example:

```
<Widget File="LCD.xml" row="1" column="2" Width="400">
 <MinionSrc ID="CPU" Namespace="DemoNamespace"/>
 <UnitsOverride>%</UnitsOverride>
 <Title>CPU 0</Title>
</Widget>
```

7.10.2.2.1 **<Title>**

Optional

Sets the title of the LCD Panel, shown at the top.

7.10.2.2.2 **<UnitsOverride>**

Optional

Allows you to use a different units type text than what is defined in the widget definition file.

7.11 Web Widget

The Web widget will render HTML web pages. The MinionSrc can take as data a HTML link, or it can receive the HTML content. This allows you to via a Collector generate a detailed HTML page and then send it to Marvin without the need for a web server.

Note: If you want to send your own HTML page, the entire contents of that page needs to be wrapped in a CDATA wrapper – otherwise the XML parsers in Oscar and Marvin will try to parse the HTML data and complain because most HTML isn't properly formed XML.

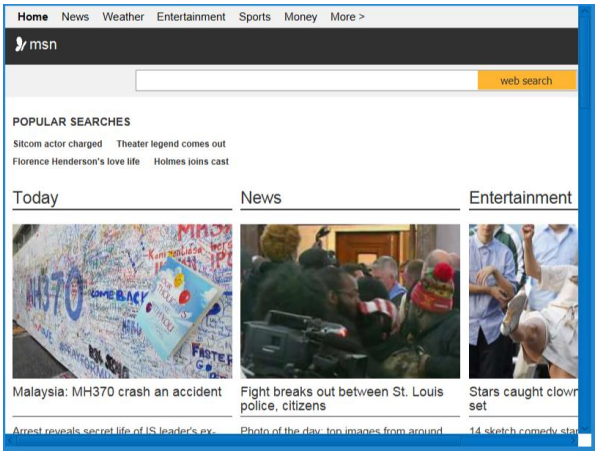


Figure 72 Web Widget

7.11.1.1 Definition File

This section discusses what the contents of a SteelLCD definition file contains.

Example:

```
<Widget Type = "Web">
    <Style ID="default">Web.css</Style>
    <ReverseContent>False</ReverseContent> <!-- fun thing, set it to true.... -->
</Widget>
```

7.11.1.2 Application Settings

This section discusses the settings used to add a SteelLCD widget in the application configuration XML file.

Example:

```
<Widget File="Web\Web.xml" Width = "800" row="0" column="0">
        <InitialValue>http://google.com</InitialValue>
     <MinionSrc="URL" Namespace="DemoNamespace"/>
</Widget>
```

You can pass a URL, or you can point to a file with a fully qualified path name by putting "file:" before the filename. (For files local to Marvin, you can specify a path relative to where Marvin is running). You may also send an entire HTML document wrapped in CDATA format.

Note: This is a fully baked Web Engine. As such if Marvin is behind a firewall or proxy, you will need to configure the proxy information. This is done via command-line parameters when you launch Marvin:

java -Dhttp.proxyHost=proxy.myproxy.company.com -Dhttp.proxyPort=911 -jar BIFF.Marvin.jar

using the –Dhttp.proxyHost and –Dhttp.proxyPort settings.

You can also use the http.nonProxyHosts option (-D http.nonProxyHosts=) to create a list of subnets that would not use the proxy.

You may need to enable the < IgnoreWebCerts> option.

7.12 QuickView Widget

The QuickView widget allows you to specify a Regular Expression (RegEx) for the ID, allowing you to easily display many data points from a single Namespace. The data is displayed in alternating Styles for easier viewing.

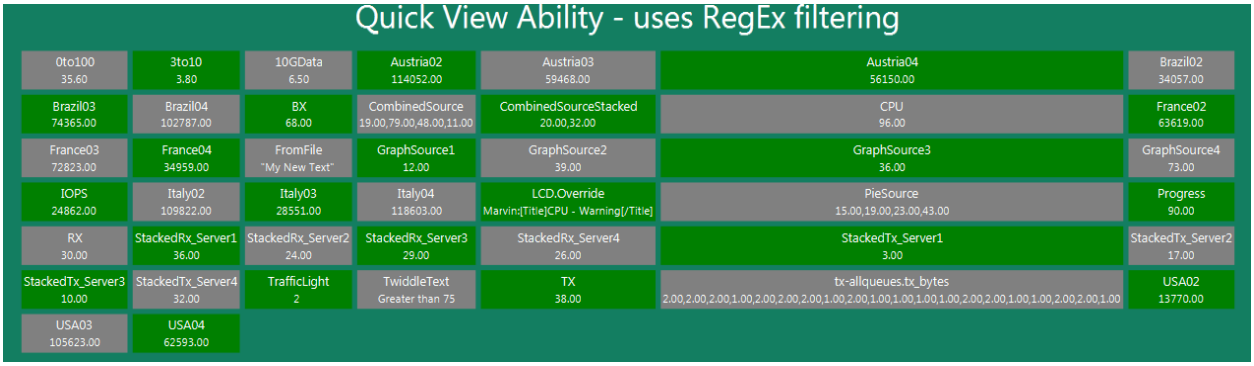


Figure 73 QuickView Widget

7.12.1.1 Definition File

This section discusses what the contents of a QuickView definition file contains.

Example:

```
<Widget Type = "QuickView">
    <RowWidth>7</RowWidth>
    <Order>Ascending</Order>
    <EvenBackgroundStyle>-fx-background-color:green</EvenBackgroundStyle>
    <EvenIDStyle>-fx-font-size: 1em</EvenIDStyle>
    <EvenDataStyle>-fx-font-size: .9em</EvenDataStyle>
    <OddBackgroundStyle>-fx-background-color:grey</OddBackgroundStyle>
    <OddIDStyle>-fx-font-size: 1em</OddIDStyle>
    <OddDataStyle>-fx-font-size: .9em</OddDataStyle>
</Widget>
```

7.12.1.1.1 < RowWidth >

Optional

The number of values to be displayed in a row before starting a new row. If not specified a default value will be used.

7.12.1.1.2 < Order >

Optional

Specifies the order the data is to be displayed. Valid options are:

- Ascending
- Descending
- None - Displayed in order received

If not specified a default value will be used.

7.12.1.1.3 < ShowID >

Optional

Boolean value. If False then the ID text is not shown. Default is True.

7.12.1.1.4 **< EvenBackgroundStyle >**

Optional

Background style to specify for every other datapoint displayed. Is a CSS string. If not specified a default value will be used.

7.12.1.1.5 **< EvenIDStyle >**

Optional

Style to specify for every other datapoint ID displayed. Is a CSS string. If not specified a default value will be used.

7.12.1.1.6 **< EvenDataStyle >**

Optional

Style to specify for every other datapoint value displayed. Is a CSS string. If not specified a default value will be used.

7.12.1.1.7 **< OddBackgroundStyle >**

Optional

Background style to specify for every other datapoint displayed. Is a CSS string. If not specified a default value will be used.

7.12.1.1.8 **< OddIDStyle >**

Optional

Style to specify for every other datapoint ID displayed. Is a CSS string. If not specified a default value will be used.

7.12.1.1.9 **< OddDataStyle >**

Optional

Style to specify for every other datapoint value displayed. Is a CSS string. If not specified a default value will be used.

7.12.1.2 Application Settings

This section discusses the settings used to add a QuickView widget in the application configuration XML file.

There is an optional <ExcludeList> tag you can use to filter out specific ID's that may be caught by your RegEx expression. Enter as many entries as you like in this list, separated by semi-colons.

Example1:

```
<Widget File="Widget\Text\QuickView.xml" row="2" column="1"  >
   <MinionSrc Namespace = "CSX-61" ID="(.*)Socket0(.*)"/>
   <ExcludeList>Core0.Socket0.sleep</ExcludeList>
</Widget>
```

This is a very easy simple example. It is the exact settings used to generate Widget shown in Figure 73.

It specifies it wants all Data from Namespace = CSX-61 that matches the RegEx pattern of "(.*)Socket0(.*)".

Example2:

```
<Widget File="Widget\Text\QuickView.xml" row="2" column="3"  >
            <MinionSrc Namespace = "CSX-61" ID="(.*)Socket1(.*)"/>
            <RowWidth>5</RowWidth>
            <Order>Descending</Order>
         <ShowID>True</ShowID>
            <EvenBackgroundStyle>-fx-background-color:blue</EvenBackgroundStyle>
            <EvenIDStyle>-fx-font-size: .7em</EvenIDStyle>
            <EvenDataStyle>-fx-font-size: .6em</EvenDataStyle>
            <OddBackgroundStyle>-fx-background-color:grey</OddBackgroundStyle>
            <OddIDStyle>-fx-font-size: .7em</OddIDStyle>
            <OddDataStyle>-fx-font-size: .6em</OddDataStyle>
</Widget>
```

This is a more complicated example where the application can override any of the settings defined in the Widget definition file.

7.12.1.2.1 **< RowWidth >**

Optional

The number of values to be displayed in a row before starting a new row.

7.12.1.2.2 **< Order >**

Optional

Specifies the order the data is to be displayed. Valid options are:

- Ascending
- Descending
- None - Displayed in order received

7.12.1.2.3 **<ShowID>**

Optional

Takes a value of "True" or "False". Default is True. If set to False, only the value associated with the RegEx ID will be displayed. The ID itself will not be shown.

7.12.1.2.4 **< EvenBackgroundStyle >**

Optional

Background style to specify for every other datapoint displayed. Is a CSS string.

7.12.1.2.5 **< EvenIDStyle >**

Optional

Style to specify for every other datapoint ID displayed. Is a CSS string.

7.12.1.2.6 **< EvenDataStyle >**

Optional

Style to specify for every other datapoint value displayed. Is a CSS string.

7.12.1.2.7 **< OddBackgroundStyle >**

Optional

Background style to specify for every other datapoint displayed. Is a CSS string.

7.12.1.2.8 **< OddIDStyle >**

Optional

Style to specify for every other datapoint ID displayed. Is a CSS string.

7.12.1.2.9 **< OddDataStyle >**

Optional

Style to specify for every other datapoint value displayed. Is a CSS string.

7.13 QuickViewLCD Widget

The QuickLCD is very similar to the QuickView Widget, allowing you to specify a Regular Expression (RegEx) for the ID. Has all the same settings for both application and widget definition. See the sample application for an example.

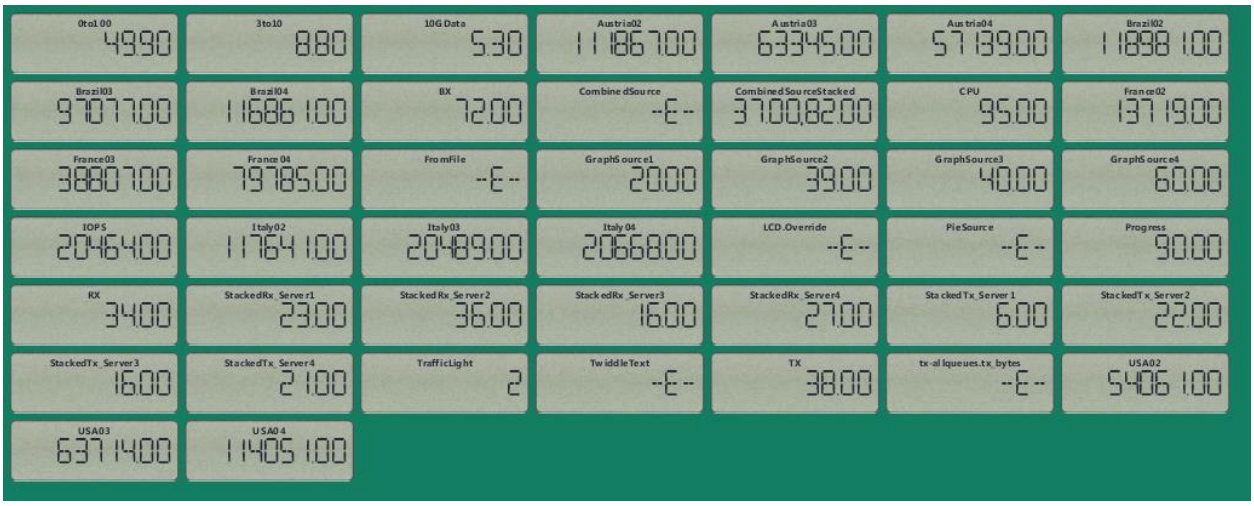


Figure 74 QuickView LCD Widget

7.14 Other

7.14.1 Button

Figure 75 Button Widget

7.14.1.1 Definition File

This section discusses what the contents of a Button definition file contains.

Example:

```
<Widget Type = "Button">
    <Style>Button.css</Style>
</Widget>
```

Not much to this one ☺

7.14.1.2 Application Settings

This section discusses the settings used to add a Button widget in the application configuration XML file.

Example:

```
<Widget File="Button.xml" row="3" column="2" Task="ShowHiddenDials">
       <Title> Click me!</Title>
       <Image Height="40" Width="40">Demo/Images/PlayerControl/LiveBtn1.png</Image>
</Widget>
```

Note the Task!

7.14.1.2.1 **<Title>**

Optional

This is the text to be displayed in the button.

7.14.1.2.2 **<Image>**

Optional

You can put an image in the button. This is where you point to the image file. You may also optionally specify a Height and Width for the image as shown above. If you don't specify, the actual height and width of the image will be used.

7.14.2 Spacer

The spacer widget is so simple it is almost not worth explaining. It is simple, but without it, making advanced looking interfaces would be nearly impossible.

Spacers are invisible (except when Mode=Debug), or you do a <StyleOverride> to give it a color.

Since the Marvin GUI uses grids for all widget layouts, if there is nothing placed in a row or column within a grid, it will have no height or width. Sometimes you really need a blank width or height to get things to align the way you want in other columns. Use the Spacer widget for this.

Example Usage

```
<Widget File="Spacer.xml" row="0" column="1" Width="50" Height="50">
   <StyleOverride>
      <Item>-fx-background-color: white</Item>
   </StyleOverride>
</Widget>
```

Note the override ☺

7.14.3 FlipPanel

A flip panel is a special kind of grid that can 'flip over'. Is kinda cool and has uses such as simplified data on one side and detailed on the other, or it can have speaker notes on the back.

The FlipPanel widget has a front and a back, that are actually grids and you place your widgets within the <Front> and the <Back> tags.

The FlipPanel will have a button on each side, which is of course can be styled and can be placed in 8 different possible locations. When the button is pressed, the panel will flip over. It can flip either horizontally or vertically, as configured.

Using StyleOverride you can change the background of the FlipPanel, just as with any other <Grid>.

7.14.3.1 Definition File

This section discusses what the contents of a FlipPanel definition file contains.

Example:

```
<Widget Type = "FlipPanel">
    <Style>FlipPanel.css</Style>
    <RotationDirection>Vertical</RotationDirection>
    <AnimationDuration>500</AnimationDuration>
    <FrontButton Text=">" Position="NE">
       <Style>FlipPanelBtn.css</Style>
    </FrontButton>
    <BackButton Text=">" Position="SW">
        <Style>FlipPanelBtn.css</Style>
    </BackButton>
</Widget>
```

7.14.3.1.1 <RotationDirection>

Required

Determines which direction the panel will rotate. Valid options are Vertical and Horizontal. This can be overridden in the application configuration XML file with the <RotationOverride> tag.

7.14.3.1.2 <AnimationDuration>

Optional

Determines the animation time (in ms) it takes to perform the flip. Valid range is 100 to 2000. Default is 700.

7.14.3.1.3 <FrontButton>

Optional

Places a button with specified text at the specified location on the panel. Valid options are (points on a compass):

- N
- NE
- E
- SE
- S
- SW
- W
- NW

There is also an ability to specify the stylesheet associated with the button. As with all stylesheet declarations in Marvin, you can specify a stylesheet and/or and ID.

When this front button is pressed, the panel will flip the direction specified by <RotationDirection> to the back side.

7.14.3.1.4 <BackButton>

Optional

Places a button with specified text at the specified location on the panel. Valid options are (points on a compass):

- N
- NE
- E
- SE
- S
- SW
- W
- NW

There is also an ability to specify the stylesheet associated with the button. As with all stylesheet declarations in Marvin, you can specify a stylesheet and/or and ID.

When this front button is pressed, the panel will flip the direction specified by <RotationDirection> back to the front side.

7.14.3.2 Application Settings

This section discusses the settings used to add a FlipPanel widget in the application configuration XML file.

Example:

```
<Widget File="FlipPanelWithButtons.xml" row="1" column="3">
    <RotationOverride>Horizontal</RotationOverride>
   <Front>
```

```
    <PaddingOverride bottom="50" top="50" left="50" right="50" />
    <Widget File="xxx" row="1" column="1"/>
    </Widget>
         …
    <Widget File="yyy" row="3" column="6"/>
    </Widget>
  </Front>

  <Back Align="Center">
    <Widget File="LineChart.xml" row="1" column="2">
      <Title>Line Chart</Title>
      <xAxis Label="Over Time" MaxEntries="10"/>
      <yAxis Label="Data Value" MaxValue="100" Count="4"/>
      <MinionSrc ID="CombinedSource" Namespace="DemoNamespace"/>
    </Widget>
  </Back>
</Widget>
```

7.14.3.2.1 <RotationOverride>

Optional

This allows you to change the direction the flip panel flips from what is defined in the widget definition file. Valid options are 'Horizontal' and 'Vertical'.

7.14.3.2.2 <AnimationDuration>

Optional

Determines the animation time (in ms) it takes to perform the flip. Valid range is 100 to 2000.

7.14.3.2.3 <Front>

Required

This is where you put all the widgets on the front of the panel. The <Front> tag can have all the same sub-tags as a <Grid>; this includes PaddingOverride, <StyleOverride> etc.

7.14.3.2.4 <Back>

Required

This is where you put all the widgets on the front of the panel. The <Back> tag can have all the same sub-tags as a <Grid>; this includes PaddingOverride, <StyleOverride> etc.

7.14.3.3 Flipping the Panel

If your widget definition file includes the <FrontButton> and <BackButton> then the buttons to flip the panel are already built in.

However this is another way to flip the panel. The FlipPanel can take a <MinionSrc> which is how you will flip the panel. Valid flip (case insensitive) strings are:

- Flip
- Flip:Horizontal
- Flip:Vertical
- Front
- Front:Horizontal
- Front:Vertical
- Back
- Back:Horizontal
- Back:Vertical

Those with a ':' allow you to override for that flip the flip direction.

Additionally you can place a button somewhere else and assign a MarvinTask to it that will result in a flip. You can even, via a MarvinTask and a RemoteMarvinTask flip it from a different computer running Marvin!

7.15 Grid

A grid isn't really a Widget as it is invisible (unless Mode=Debug), however it is the thing that all widgets actually are placed into. Each Tab and FlipPanel come equipped with a grid for your use (the FlipPanel actually has two, on on each side). In these instances you do not need to create a <Grid> tag in the XML file, it is already there.

Where you would use a <Grid> is for specific layouts. If you are familiar with HTML tables, it is the same basic principle.

A Grid is placed in a Tab, FlipPanel or another Grid just as you would any other widget, with the same options including Row, Column, StyleOverride etc. (There is no <MinionSrc> for a Grid though).

With a grid you can specify the hgap,vgap, alignment just as you can with a Tab. Like a Tab you can also specify a Grid to be defined in an external file. This will allow you to do some very interesting things, such as create a library of Grids filled with widgets that you can plop anywhere you like.

7.15.1.1 Attributes

The <Grid> tag supports the following attributes, which are case sensitive.

File	O	Specifies the external file where contents for grid are defined
Row	M	The row within a grid where this grid is to be placed
Column	M	The column within a grid where this grid is to be placed

Rowspan	O	The number of rows the grid should span – default is 1
Colspan	O	The number of columns the grid should span – default is 1
Align	O	Where within the parent grid cell to align this grid
Height	O	
Width	O	

7.15.1.1.1 Align

Specifies where in the tab the tab grid should appear. Valid options are (points on a compass):

- Center
- N
- NE
- E
- SE
- S
- SW
- W
- NW

7.15.1.1.2 File

Specifies an additional external file where the contents of the grid are specified. As with all additional external files, the root of the XML scheme for the external file is <MarvinExternalFile>. Widgets will then be required to be defined within the <Grid> tag. <AliasList> and <TaskList> tags are at same level as <Grid>

Note: you can combine both an external file and widgets when defining a grid with your application configuration file.

```
<Grid File="ExternalGrid.xml" row="3" column="2" colspan="4">
    <Widget File="SteelGauge.xml" row="1" column="1">
        <MinionSrc ID="CPU_Core1" NameSpace="Server1"/>
     <Title>Core 0</Title>
    </Widget>
</Grid>
```

7.15.1.1.3 hgap

Specifies the horizontal gap to be inserted in between each column in the grid.

7.15.1.1.4 vgap

Specifies the vertical gap to be inserted in between each row in the grid.

7.15.1.2 PaddingOverride

Allows you to override the application global setting for the padding described in Section 6.3.2.5.

7.15.1.2.1 Attributes

The <PaddingOverride> tag supports the following attributes, which are case sensitive.

Attribute	M/O	Comments
Top	O	Default Tab padding on top of cell grid, in pixels
Bottom	O	Default Tab padding on bottom of cell grid, in pixels
Left	O	Default Tab padding on left of cell grid, in pixels
Right	O	Default Tab padding on right of cell grid, in pixels

7.15.1.3 StyleOverride

Allows you to change the style of the grid. For example the background is the background color of the Tab or Grid that this grid is within. You can change that here, or add a picture etc.

7.15.1.4 Widget

One or more widgets can be placed within a Grid. See Section 7 on widgets for more information.

7.15.1.5 <Grid>

You may place grids within grids in order to achieve various layouts.

7.15.1.6 <Peekaboo>

A grid can have a <Peekaboo> that works just like a Widget <Peekaboo>, though you cannot 'Pause' and 'Resume'.

7.16 DynamicGrid

The DynamicGrid is just like the <Grid>, except that it also allows you to specify a list of other grids (defined in external grid files) with an associated ID, then select which one is visible. This works along the same way as the DynamicImage widget.

```
<DynamicGrid row="1" column="0">
    <GridFile Source="Demo/DemoTab_FlipGrid1.xml" ID="0" Color="Yellow" />
    <GridFile Source="Demo/DemoTab_FlipGrid2.xml" ID="1" Color="Green TaskOnActivate=”RunTest"/>
    <GridFile Source="Demo/DemoTab_FlipGrid3.xml" ID="2" Color="Blue" hGap=”5” vGap=”10” />
    <Initial ID="0"/>
    <MinionSrc ID="DynaGrid" Namespace="DynaGrid"/>
</DynamicGrid>
```

The list of external grid files is specified by having multiple <GridFile> tags, each of which has a required Source attribute which must point to an external <Grid> file.

As you can see in the above example, you can also pass aliases (parameters) to the grid files.

The <Initial> tag work just like the <DynamicImage>, it indicates the default grid to be visible.

In addition to the ID of the specific grid you wish to display, you can also send 'Next' or 'Previous', and the next or previous grid in the list will be displayed. When using 'Next' or 'Previous' the list is considered to be circular.

7.16.1 Attributes of <GridFile>

As you can see in the example above you can specify things other than just the external GridFile. Anything specified other than what is listed below is an Alias passed to the Grid.

The following are reserved attributes when specifying a Grid within the dynamic grid:

- hGap – Just like any grid, can specify horizontal gap within the grid
- vGap – Just like any grid, can specify vertical gap within the grid
- TaskOnActivate – Task to perform when the Grid becomes the active Grid. Does NOT apply to the initial grid when the application first begins.

7.16.2 Transitions

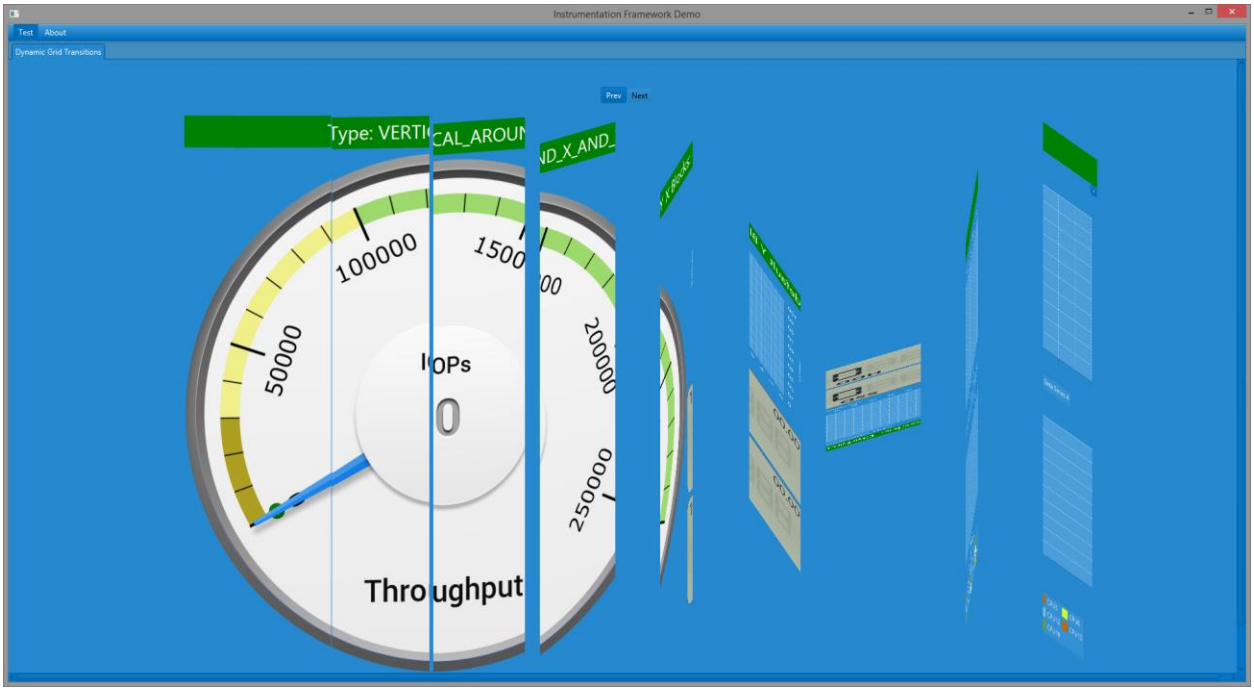


Figure 76 Example Transition

Optional

I thought it would be fun to have the ability to have transition effects when you go from one dynamic grid to another. Much like going from one slide to another in a presentation using PowerPoint or other such application.

To do this, there is a <Transition> tag you can add to the <GridFile> declaration.

```
<GridFile Source="Demo/Grid2.xml" ID="1">
      <Transition>VERTICAL_AROUND_X</Transition>
</GridFile>
```

The specified transition is what the transition to that grid will be – regardless of what the previous grid was.

7.16.2.1.1 <Transition> Attributes

There are default values for all of these, however you can change the way each of the individual transitions look. You can achieve some interesting results by the modification of these settings.

Attribute	M/O	Comments
`xGrids`	O	Number of columns to divide the transition effect into
`yGrids`	O	Number of rows to divide the transition effect into
`Duration`	O	Time for each of the individual animations to run
`Delay`	O	Time to wait after one animation begins until the next starts

Note: Not all transitions use both xGrids and yGrids.

7.16.2.1.2 Transition Types

The <Transition> Tag needs an actual Transition to use. The following are valid transitions:

- VERTICAL_AROUND_X
- VERTICAL_AROUND_Y
- VERTICAL_AROUND_X_AND_Y
- HORIZONTAL_AROUND_X
- HORIZONTAL_AROUND_Y
- HORIZONTAL_AROUND_X_AND_Y
- RECTANGULAR_AROUND_X
- RECTANGULAR_AROUND_Y
- RECTANGULAR_AROUND_X_AND_Y
- DISSOLVING_BLOCKS
- CUBE
- FLIP_HORIZONTAL
- FLIP_VERTICAL

8 Tasks

This section provided details on Tasks defined in Marvin.

8.1 Defining a Task

Tasks are defined at the same XML level as Tab ,Grid and AliasList. You cannot define a task within any of those tags, must be at the same level.

Each Task definition is created within a <TaskList> Tag, and contains a <TaskItem> Tag. Each Task has a required ID.

Example Task Definition

```
<TaskList ID = "HideX_21">
 <TaskItem Type="Marvin">
    <DataToInsert ID="x_21" Namespace="DemoTicTacToe" Data="Hide"/>
 </TaskItem>
</TaskList>
```

The above example is from the DemoTab_Grids.xml file. The TaskList has an ID that must be unique within the scope of the running application, and 1 or more TaskItems. You can define multiple things to happen when this task is run. The example above only performs a single task, which is a Marvin task and it inserts some data into the datastream for processing by the GUI.

NOTE: <TaskList> is case sensitive. If you don't have the case correct, it will be ignored.

Another Example

```
<TaskList ID="ResetPressed">
          <TaskItem Type="OtherTask" ID="ShowBlank_00"/>
          <TaskItem Type="OtherTask" ID="HideX_00"/>
          <TaskItem Type="OtherTask" ID="HideO_00"/>
          <TaskItem Type="OtherTask" ID="ShowBlank_01"/>
          <TaskItem Type="OtherTask" ID="HideX_01"/>
          <TaskItem Type="OtherTask" ID="HideO_01"/>
          <TaskItem Type="OtherTask" ID="ShowBlank_02"/>
          <TaskItem Type="OtherTask" ID="HideX_02"/>
          <TaskItem Type="OtherTask" ID="HideO_02"/>
          <TaskItem Type="OtherTask" ID="HideO_22"/>
</TaskList>
```

This example shows multiple actions to be performed when the 'RestPresssed' task is executed. They all happened to be the same kind (ChainedTask) in this example, however it could be any kind of task.

8.2 Calling/Executing a Task

Every widget has the ability to specify a Task to be run when clicked. So if you add a

Button and assign a Task to it, when that button is pressed the corresponding Task will be run. The task you specify in the Task attribute of the Widget is the ID defined above.

Example:

```
<Widget File="Button.xml" row="3" column="2" Task="ShowHiddenDials">
    <Title> Click me!</Title>
</Widget>
```

Here is an example from the DemoTab_Dials.xml file. A Button widget is placed and a Task is associated with it. When this button is clicked the task with ID "ShowHiddenDials" is run.

A Task can also be set to execute from a MenuItem.

Note: You can associate the same Task with as many widgets as you like!

8.3 Minion Task

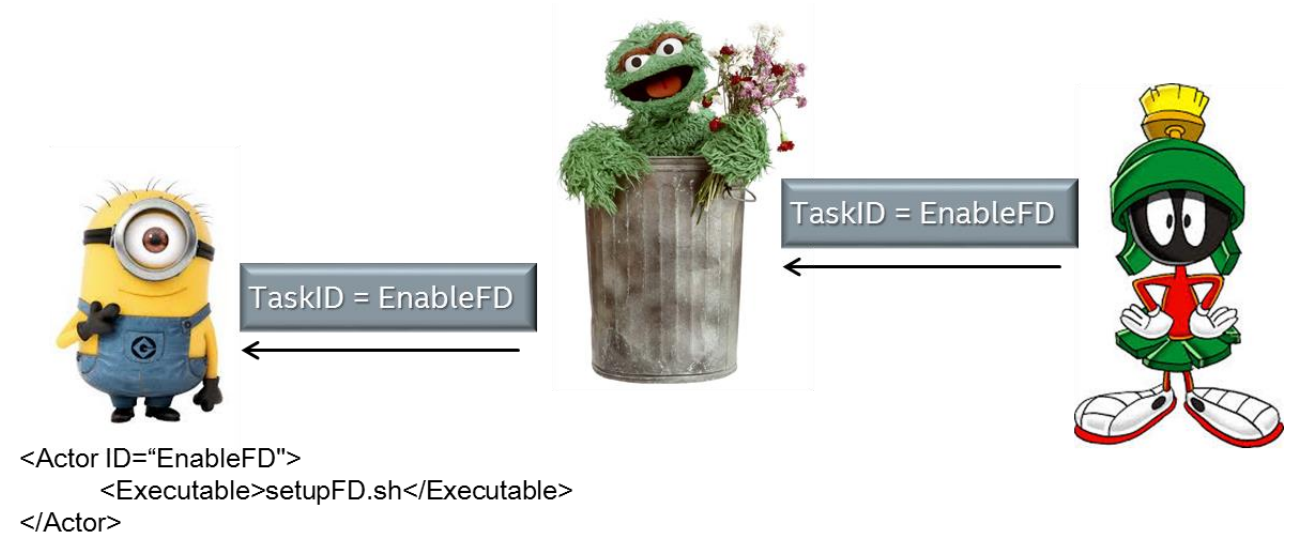


Figure 77 Minion Task Flow

A Minion task is one in which you want to run some external program/script where the Minion is running. When you execute a MinionTask (by clicking a Widget, or a MenuItem) the Marvin framework will send that TaskID to the Minion. The Minion in turn looks up the Task ID (Actor) and executes the task associated.

Example:

```
<TaskList ID="EnableFD_On_2_Servers">
   <TaskItem Type="Minion">
    <Actor Namespace="Server-22" ID="EnableFD"/>
```

```
   </TaskItem>
   <TaskItem Type="Minion">
    <Actor Namespace="Server-11" ID="EnableFD"/>
   </TaskItem>
</TaskList>
```

The above example has a Task with an ID of EnableFD_On_2_Servers that you might assign to a Button, MenuItem or any other widget. When pressed, the framework will send two packets to Oscar, who in turn will send it to every minion using the namspaces of Server-22 or Server-11.

If a minion receives a task to perform that hasn't been defined for it, it will log it and ignore – no response is ever sent from a task.

Note: Care should be taken when defining the namespace of your Minions. You can have them all with the same namespace, however that could lead to complications, especially when doing tasks.

8.3.1 Defining a Minion Task in Marvin

```
<TaskList ID="EnableRSSTask">
   <TaskItem Type="Minion">
    <Actor Namespace="Server-22" ID="EnableFD"/>
   </TaskItem>
```

The TaskItem tag requires the 'Type' attribute. A minion task has a type of "Minion". A minion task also requires an <Actor> tag.

The <Actor> tag takes a Namespace and ID. These correspond to the Namespace in the Minion and the Actor ID in the configuration file.

Note: Again – the definition of the Task can occur in any of the Marvin configuration files except for a Widget definition file.

8.3.1.1.1 Scope of Minion Task

Keep in mind that there can be multiple Oscars connected to Marvin, and each Oscar can have multiple Minions, and further, each Minion can have multiple Namespaces. Oscar keeps track of the Namespaces of each Minion, when it receives a Minion Task, it will send the task to all Minions matching the Namespace you define in the <Actor > as described above.

8.3.2 Minion Task Parameters

As discussed in Section 4.12.3, when you define an Actor for a Minion (in Marvin it is a Minion Task) the Actor can have parameters assigned to it that will be used when invoking

the Actor script.

You can also pass parameters from Marvin when it sends the Minion Task:

Example

```
<TaskList ID=”EnableRSSTask”>
   <TaskItem Type=”Minion”>
   <Actor Namespace=”Server-22” ID=”EnableFD”/>
       <Param>eth0</Param>
</TaskItem>
```

When Minion receives this and invokes the Actor associated with the ID of “EnableFD”, it will pass the ‘eth0’ parameter to the externally invoked script.

8.3.3 Mixing Minion Task Parameters

A minion Actor can define parameters to send to the external script when invoked. Likewise a <MinionTask> definition in Marvin allows you to send parameters that are used when invoking the script.

You can utilize both methods to invoke a script. All parameters defined within the minion Actor (in the Minion configuration file) are used first, in the defined order, followed by any and all parameters defined in the <MinionTask> definition in the Marvin configuration files.

8.3.4 Using a MinionSrc as a Parameter

You may want to use a piece of data collected from a collector as an input to a <Task>. To do that you can Define your <Param> as follows:

```
<Param Namespace=”MinionSrcNamespace” ID=”MinionSrcID”/>
```

8.4 Oscar Task

Figure 78 Oscar Task Flow

Oscar Tasks allow you to do things such as start and stop live data capture, load a saved file, start, pause, restart, stop playback of a Oscar from the Gui.

Oscar Tasks have a TaskItem Type of "Oscar". Each Task requires a OscarID and a task to be performed and may take parameters.

Example Task Definition:

```
<TaskItem Type="Oscar">
   <Task OscarID="Oscar1">Load File</Task>
   <Param> SaveFile8.biff</Param>
</TaskItem>
```

An Oscar Task requires a <Task> tag that must have a OscarID attribute and the task to be performed. The OscarID corresponds to the ID within the Oscar configuration file. It is recommended that each Oscar connected to a Marvin have its own ID, otherwise each will be sent the same task, which may nor not be desirable.

Valid Oscar Tasks, defined by the <Task> tag currently are:

- LoadFile
- StartPlayback
- Playback
- PausePlayback
- StartLive
- StopLive
- StartRecording
- StopRecording

Note: Marvin does no verification what you place in the <Task>. It will send whatever task you specify with whatever Parameters to the Oscar(s). Oscar will be the one that verifies what it receives. Oscar will never send back a response, only log unknown or invalid requests.

8.4.1 LoadFile

Example:

```
<TaskItem Type="Oscar">
    <Task OscarID="Oscar1">LoadFile</Task>
    <Param>c:\MyDemoFiles\BetterTogetherDemo.biff</Param>
</TaskItem>
```

The LoadFile Oscar Task takes a single parameters, which is file to load. Oscar will receive this, and load the specified file. If it is a bad or incorrect filename, it will fail to load and no indication will be sent to Marvin.

8.4.2 Playback

The Playback task is the most powerful of the Oscar Tasks. Is has a great number of options to perform the kind of playback you desire.

Example:

```
<TaskItem Type="Oscar">
   <Task OscarID="Oscar1">Playback</Task>
   <Param>speed=2</Param>
</TaskItem>
```

The Play Oscar task takes a OscarID and Task of 'Playback'. It will play the currently loaded file.

The Playback command can also take optional parameters:

- Speed - specifies the playback speed
- Repeat - play the entire file again when end reached
- Loop - repeatedly play between the start and end packets
- Start - used with 'loop' option, is packet to start playing at, if not specified, will be zero
- End - used with 'loop' option, is packet to stop playing at, if not specified, will be last packet available

Example:

```
<TaskItem Type="Oscar">
   <Task OscarID="Oscar1">Playback</Task>
    <Param>speed=10</Param>
    <Param>loop</Param>
    <Param>start=230</PAram>
    <Param>end=1230</PAram>
</TaskItem>
```

8.4.2.1 Speed

Indicates the playback speed. Can be a real (with decimals) value >0 and <= 100. Indicates a multiplier of how fast to play the data. So a value of .25 will play at ¼ speed. A value of 10.0 will playback at 10x speed.

Example:

```
<TaskItem Type="Oscar">
   <Task OscarID="Oscar1">Playback</Task>
   <Param>speed=2</Param>
</TaskItem>
```

Notice that the speed parameter indicates the speed with an equals sign.

8.4.2.2 Repeat

This indicates that the playback should repeat the entire dataset in an endless loop until told to stop. It will do so at the specified speed (default is 0).

Example:

```
<TaskItem Type="Oscar">
```

```
    <Task OscarID="Oscar1">Playback</Task>
    <Param>speed=0.75</Param>
    <Param>repeat</Param>
</TaskItem>
```

8.4.2.3 Loop

Loop is similar to Repeat, except that it takes a start and stop location within the dataset to loop.

Example:

```
TaskItem Type="Oscar">
    <Task OscarID="OscarDemo">Playback</Task>
   <Param>loop</Param>
   <Param>start=123</Param>
   <Param>end=750</Param>
   <Param>speed=10</Param>
</TaskItem>
```

Note start and end are like the optional speed parameter, number is indicated with an equals sign. The start and end values indicate data packet # within the dataset.

If you do not specify a start value, the start default is packet 0. Similarly if you do not specify an end value the default is the last packet in the dataset.

8.4.3 StopPlayback

Example:

```
<TaskItem Type="Oscar">
    <Task OscarID="Oscar1">StopPlayback</Task>
</TaskItem>
```

The StopPlayback Oscar task will stop playback of the current file. Starting it again will restart from starting point.

8.4.4 PausePlayback

Example:

```
<TaskItem Type="Oscar">
    <Task OscarID="Oscar1">PausePlayback</Task>
</TaskItem>
```

The Pause Oscar task will pause the playback of a loaded file. Starting again (with just a playback task) will resume from current position.

8.4.5 StopLive

Example:

```
<TaskItem Type="Oscar">
    <Task OscarID="Oscar1">StopLive</Task>
</TaskItem>
```

The StopLive Oscar task will stop reading live data.

8.4.6 StartLive

Example:

```
<TaskItem Type="Oscar">
    <Task OscarID="Oscar1">StartLive</Task>
</TaskItem>
```

The StartLive task will stop playing a loaded file and start receiving live data from Minions or other Oscars.

8.4.7 StartRecording

Example:

```
<TaskItem Type="Oscar">
    <Task OscarID="Oscar1">StartRecording</Task>
</TaskItem>
```

The StartRecording task will begin recording the live data feed. It will continue recording until the app ends or you indicate it should stop.

8.4.8 StopRecording

Example:

```
<TaskItem Type="Oscar">
    <Task OscarID="Oscar1">StartRecording</Task>
    <Param>File=C:\MyRecordings\Session1.biff</Param>
</TaskItem>
```

The StopRecording task will stop an active recording session and save it to the file specified by the File parameter.

8.5 Marvin Task

A Marvin Task is a way to achieve some interesting visual things locally to your GUI. To understand how it works, I need to explain a bit of the internals of how I handle incoming data.

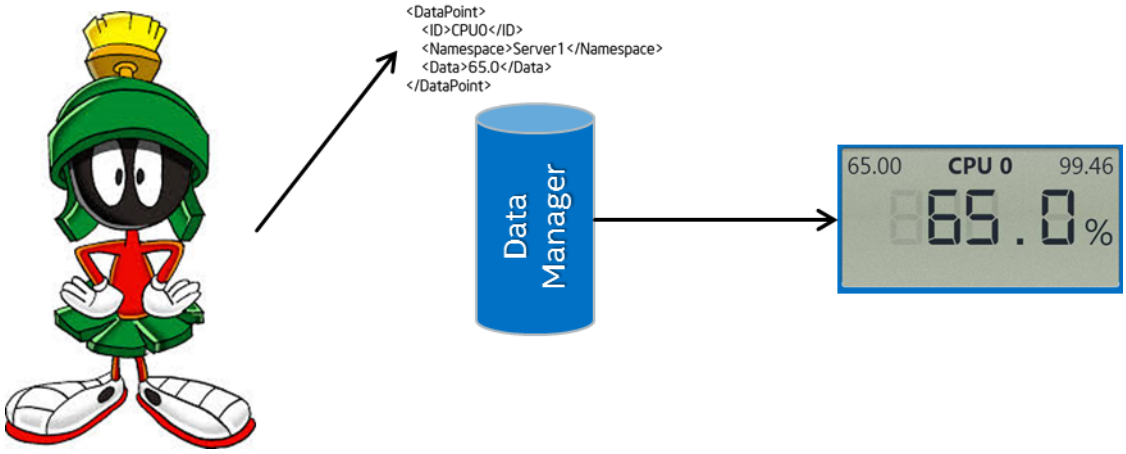


Figure 79 Data Handling

When Marvin receives a piece of data from Oscar, it hands it off to the Data Manager component, which in turn updates all of the widgets that are registered for the Namespace and ID that was associated with the data that was received.

This is the same way both data for <MinionSrc> and <Peekaboo> are handled.

A Marvin Task is a way of inserting data into the Data Manager yourself, without the need for a Oscar at all. In this way you can set some local text, set the value of a dial, hide and show (using <Peekaboo>) widgets. For example you want to have a button you press to go start a script via a Minion Task, you might also have the <TaskList> have a task that will show a big image saying 'Test Running' using <Peekaboo> to show the image that was previously hidden.

A good example of this can be seen in the DemoTab_Images.xml file, where by clicking a button you seem to go through a series of images. In reality what happens is there are many many different Image and Button widgets that using <Peekaboo> get hidden and shown to give the appearance of displaying different images.

Example:

```
<TaskList ID="TestTask">
   <TaskItem Type="Marvin">
      <DataToInsert ID="3to10" Namespace="DemoNamespace" Data="3.4"/>
   </TaskItem>
</TaskList>
```

The example above shows that a Marvin Task required a Type of "Marvin" and a

<DataToInsert> tag which has 3 attributes:

- ID - <MinionSrc> and <Peekaboo> ID
- Namespace - <MinionSrc> and <Peekaboo> Namespace
- Data - The data you wish to insert.

Note that Data can be either an Element as shown above, or a Tag within the <DataToInsert> tag as show here:

```
<TaskList ID="TestTask">
   <TaskItem Type="Marvin">
       <DataToInsert ID="3to10" Namespace="DemoNamespace">
          <Data>3.4</Data>
       </DataToInsert>
   </TaskItem>
</TaskList>
```

8.6 Marvin Admin Task

Marvin Admin Task is an EXPERIMENTAL mechanism to do some manipulation of the GUI. Currently it allows you to, via a task, change the active Tab being displayed in the GUI, and allows you to hide and show a Tab.

8.6.1 SetActiveTab

Examples:

```
<TaskList ID="TabSwitch-1" >
        <TaskItem Type="MarvinAdmin">
            <Task ID="SetActiveTab"  Data="StartTab"/>
        </TaskItem>
</TaskList>

<TaskList ID="TabSwitch-2">
        <TaskItem Type="MarvinAdmin">
            <Task ID="SetActiveTab"  Data="DemoTab"/>
        </TaskItem>
</TaskList>
```

The above two examples create a <TaskItem> with Type=”MarvinAdmin”. The Marvin Admin task takes a <Task> Tag that has two required Attributes:

- ID – the type of Task to do,
- Data – In this case (only one implemented) it is the Tab ID to switch to.

A MarvinAdmin Task isn’t too exciting or of great use by itself. One usage is that you can use the PerformOnStartup option to set the default Tab to be displayed when your application starts.

8.6.2 SetTabVisibility

Examples:

```
<TaskList ID="Hide Charts1Tab">
        <TaskItem Type="MarvinAdmin">
            <Task ID="SetTabVisibility" Data="DemoTab-Charts:False"/>
        </TaskItem>
    </TaskList>
    <TaskList ID="Show Charts1Tab">
        <TaskItem Type="MarvinAdmin">
            <Task ID="SetTabVisibility" Data="DemoTab-Charts:True"/>
        </TaskItem>
        <TaskItem Type="MarvinAdmin">
            <Task ID="SetActiveTab"  Data="StartTab"/>
        </TaskItem>
    </TaskList>
```

The above two examples create two tasks, one that hides a tab, with ID of 'DemoTabl-Charts' and one that will show the same tab. The ID is the Marvin action to take, in this case SetTabVisibility.

The usage is that the Data portion has the name of the Tab (DemoTab-Charts in this case) followed by a color and a Boolean (True or False) value that indicates to make that tab visible or invisible.

8.7 Remote Marvin Task

This task is very interesting, and extremely powerful. It allows you to send a message from a Marvin application to all other Marvin's connected to the same Oscar and tell them to perform a specific task. If the remote Marvin doesn't have that task defined it will ignore the request ; if however it has defined the task, it will perform that task, no matter what kind of task it is. This would be the same as pressing a Button widget with a task associated with it.

Example:

```
<TaskItem Type="RemoteMarvinTask">
    <MarvinID>MainMarvin</MarvinID>
    <Task ID="TabSwitch-1"/>
</TaskItem>
```

The TaskItem Type = "RemoteMarvinTask" The <Task> tag takes but a single Attribute, the ID of the task to be run on the remote Marvin(s).

The <MarvinID> tag identifies the specific Marvin to target the task to. The task will be sent to all Marvins, and each Marvin will check to see if it matches the ID of the Marvin as defined in the ID attribute of the <Application> tag. Optionally you can also use BROADCAST as the Marvin ID :

```
<TaskItem Type="RemoteMarvinTask">
```

```
    <MarvinID>Broadcast</MarvinID>
    <Task ID="TabSwitch-1"/>
</TaskItem>
```

And it will send the message to all Marvins, and any that have a Task defined as TabSwich-1, will run that task.

This can be very powerful. Consider you have two Marvins running, one on a giant display behind you at a conference, the 2nd on a Tablet. From the tablet you can have buttons that allow you to change the displayed tab on the giant display using the Marvin Admin Task.

Take a peek at the RemoteDemo_Controller.xml and RemoteDemo_Controlee.xml files for examples.

8.8 Chained Task

Say you have a Task (<TaskList> defined to zero out all of your widgets (using Marvin Tasks) and another one to hide a bunch of Widgets when your demo was over. You may have two different Buttons for MenuItems for these. There may be a time when you want to run both of these tasks together and other times you want to run them independently.

Rather than having 3 separate <TaskList>s, one for zeroing out things, one for hinding and one that does both, you can reuse the 1st two in the 3rd one using Chained Tasks.

Note: the name Chained isn't very good, and is not even what I call it in the config file, may change/update later, but for now it works ☺

Example:

```
<TaskList ID="ResetPressed">
  <TaskItem Type="OtherTask" ID="ShowBlank_00"/>
  <TaskItem Type="OtherTask" ID="HideX_00"/>
  <TaskItem Type="OtherTask" ID="HideO_00"/>
  <TaskItem Type="OtherTask" ID="ShowBlank_01"/>
</TaskList>
```

The above is a snippet from the DemoTab_Grids.xml file where I created a Tic-Tac-Toe game. When you click on a square successively I use Tasks to hide/show 'X' 'O' and Blank images in a square. Each square has a hide and show task for each of the three possible images to show in that square.

There is also a Button widget that has a task of 'ResetPressed' ID. This is the task defined above, that in turn will call already defined tasks. In this case to go hide all but the blank images.

Take a look at the DemoTab_Grids.xml for an example.

The chained task takes a TaskItem with a Type of "Other Task" an ID of the other task to run. Can even be another chained task, or a Marvin Task, or Remote Marvin task etc.

8.9 Running a Task at Startup

A recent addition is when you create a Task, you can specify that it be run when your application starts. This is done with an additional attribute to the <TaskList> tag of PerformOnStartup and it takes a value of either "True" or "False". If you do not specify this attribute it is the same as specifying False.

Example:

```
<TaskList ID="TestTask" PerformOnStartup="true">
   <TaskItem Type="Marvin">
       <DataToInsert ID="3to10" Namespace="DemoNamespace" Data="3.4"/>
   </TaskItem>
</TaskList>
```

The above example is a Marvin Task that sets some dials (listing for MinionSrc with ID=3to10 and Namespace=DemoNamespace) to a value of 3.4. This task is done as soon as the application is up and running.

You do not even need to assign this task to a Widget, it will run automatically. Take a look at the DemoTab_Dials.xml for an example.

Note: Tasks that are performed on startup are really done on startup. The network communication between Marvin and Oscar are likely to not have occurred yet. As such it is not recommend to rely on performing any tasks other than local ones such as Marvin and Marvin Admin tasks using the PerformOnStartup ability.

8.10 User Prompts

I added the ability to prompt the user for input. This is envisioned to be mostly useful for Tasks, where you want to say send a parameter value as a task that isn't always hard-coded in your XML file somewhere, or if it is, it comes from a list of possibilities.

There are two type of prompt methods. One where the user is presented with a list of items to select from and another where an input box is presented and whatever the user types in is used.

8.10.1 Defining a Prompt

Prompt methods are similar to Tasks. They must be defined and given an ID before they can be used. As with tasks, once a prompt is defined, it is global.

8.10.1.1 ListBox Prompt

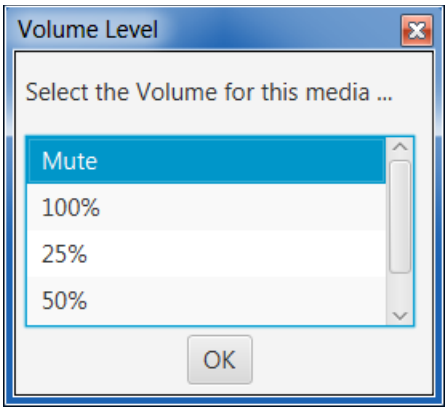


Figure 80: Example of a ListBox Prompt

Example definition:

```
<Prompt ID="Volume Selection" Type="ListBox">
    <Title>Volume Level</Title>
    <Message>Select the Volume for this media player</Message>
    <List>
        <Item Text="Mute">Volume:0</Item>
        <Item Text="100%">Volume:100</Item>
        <Item Text="25%">Volume:25</Item>
        <Item Text="50%">Volume:50</Item>
        <Item Text="75%">Volume:75</Item>
    </List>
</Prompt>
```

8.10.1.1.1 ID

Specifies the unique ID of the prompt. If used again, a warning will be logged, and the new ID ignored.

8.10.1.1.2 Type

Specifies the type of the prompt, currently only "ListBox" and "InputBox" are supported.

8.10.1.1.3 <Title>

Optional

Specifies the Title of the listox.

8.10.1.1.4 <Message>

Optional

Explanatory message to be displayed.

8.10.1.1.5 <List>

This is where you define the <Items> to be displayed in the list.

8.10.1.1.6 <Item>

One or more Items should be defined as part of the <List>.

The value of the Item is what is returned to the framework. So in the above example, if the first item in the list is selected by the user, the string "Volume:0" will be returned.

The optional "Text" attribute provides a mechanism by which you can put a more user-friendly string to be displayed in the listbox. If the Text attribute is not used, then the string used with the <Item> will be displayed.

8.10.1.2 InputBox Prompt

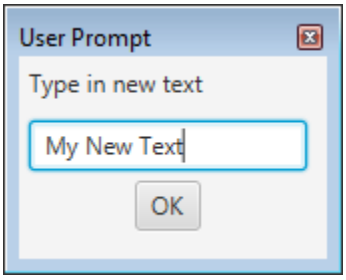


Figure 81: Example of an InputBox Prompt

Example definition:

```
<Prompt ID="NewTextPrompt" Type="InputBox">
       <Title>User Prompt</Title>
       <Message>Type in new text</Message>
</Prompt>
```

8.10.1.2.1 ID

Specifies the unique ID of the prompt. If used again, a warning will be logged, and the new ID ignored.

8.10.1.2.2 Type

Specifies the type of the prompt, currently only "ListBox" and "InputBox" are supported.

8.10.1.2.3 <Title>

Optional

Specifies the Title of the listox.

8.10.1.2.4 <Message>

Optional

Explanatory message to be displayed.

8.10.2 Prompting the user

Now that you have defined a prompt of some kind, you need to use it.

You can use a prompt for any part of a Task. Be it <MinionSrc> or parameters etc.

The usage is pretty simple, just use the ampersand (@) symbol in front of the piece of data you want to prompt for.

As an example:

```
<TaskList ID = "Video_Volume_Control">
   <TaskItem Type="Marvin">
   <DataToInsert ID="VidPlayer" Namespace="VidPlayerNS"  Data="@Volume Selection"/>
   </TaskItem>
</TaskList>
```

If you associate the TaskID with a button, then click on that button, it will see that the Prompt with ID Volume Selection has been requested (the @). The framework will display the following list box:

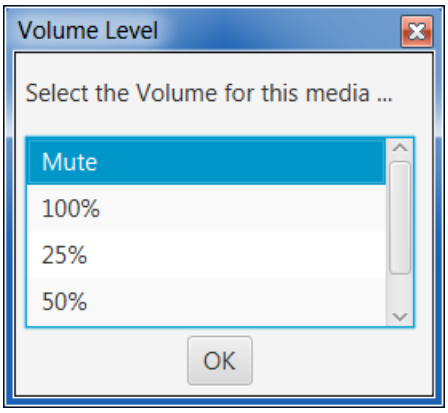


Figure 82: Example listbox

If the Video Player has a <PlaybackContol> with ID="VidPlayer" and Namespace="VidPlayerNS" , then the desired volume setting will be sent to it and changed as requested.

8.11 Postponing Task Action

There may be times when you want to click on a button and have a task take place just a bit later. For example you may want to reveal an image by removing a series of covering panels in a sequential way (See the demo application, Flipping tab).

This can be accomplished by adding a Postpone attribute to the TaskItem declaration and giving it a value, which is a postpone time in milliseconds.

```
    <TaskList ID="FlipIt">
        <TaskItem Type="Marvin" Postpone="500">
            <DataToInsert ID="FlipItPanel" Namespace="local" Data="DummyData"/>
        </TaskItem>
    </TaskList>
```

In the example above, the Marvin Task will be executed to flip a flip panel. The task will be executed approximately 500ms after the task was initiated.

9 Conditionals

This section provided details on Conditionals defined in Marvin. A Conditional is a 'If-Then-Else' mechanism that you can create that will compare a MinionSrc value with another value, if the comparison evaluates to True it will execute the task associated with the then, otherwise if defined it will execute the task associated with the else.

9.1 Defining a Conditional

Conditionals are defined at the same XML level as Tab, Grid and AliasList. You cannot define a task within any of those tags, must be at the same level.

Each Task definition is created within a <Conditional> Tag. There is no ID associated with a Conditional, so you could define the same Conditional repeatedly.

Just like Tasks, Conditionals can define in external files, grids etc, however once defined has a global scope.

Example Conditional Definition

```
<Conditional Type="IF_GT">
   <MinionSrc ID="CPU" Namespace="DemoNamespace"/>
   <Value>75</Value>
   <Then>greater</Then>
   <Else>less</Else>
</Conditional>
```

The above example results in the following (in pseudocode):

```
Whenever the MinionSrc data with ID="CPU" & Namespace of "DemoNamespace" is updated,
check to see if it is greater than (>) the value of 75.  If it is, then go execute the
task with the ID of 'greater', otherwise execute the task with the ID of 'less'.
```

Note: There is an example of this in the Widget Demonstration, the LCD tab.

9.1.1 Type

Required

Every conditional require a type to be specified. Supported types are:

- If_EQ - If Equal (==)
- If_NE - If Not Equal (!=)
- If_GT - If Greater Than (>)
- If_GE - If Greater Than or Equal (>=)
- If_LT - If Less Than (<)
- If_LE - If Less Than or Equal (<=)

9.1.2 <MinionSrc>

Required

This is the same as <MinionSrc> used for widgets. This is the data source that when updated triggers the conditional to be evaluated.

9.1.3 <Value>

Required

This is the value to be compared against the <MinionSrc>. It can be a constant value as below:

```
<Conditional Type="IF_GT">
   <MinionSrc ID="CPU" Namespace="DemoNamespace"/>
   <Value>75</Value>
   <Then>greater</Then>
   <Else>less</Else>
</Conditional>
```

Or it can be another <MinionSrc> (declared inside the <Value> tag) as below:

```
<Conditional Type="IF_GE">
   <MinionSrc ID="CPU" Namespace="DemoNamespace"/>
   <Value><MinionSrc ID=”WarningLevel” Namespace=”DemoNamespace”/></Value>
   <Then>greater</Then>
   <Else>less</Else>
</Conditional>
```

In this example the Value is a Minion Src. You could have a Minion collector that sets this value depending on the system configuration.

9.1.4 <Then>

Required

Identifies the Task to be executed if the conditional evaluates to True.

9.1.5 <Else>

Optional

Identifies the Task to be executed if the conditional evaluates to False. If not defined then the conditional will do nothing.

10 Connectivity Overview

This section describes the various network connections used amongst Minion,Oscar and Marvin. I add this section mostly for my own reference, it gets confusing sometimes.

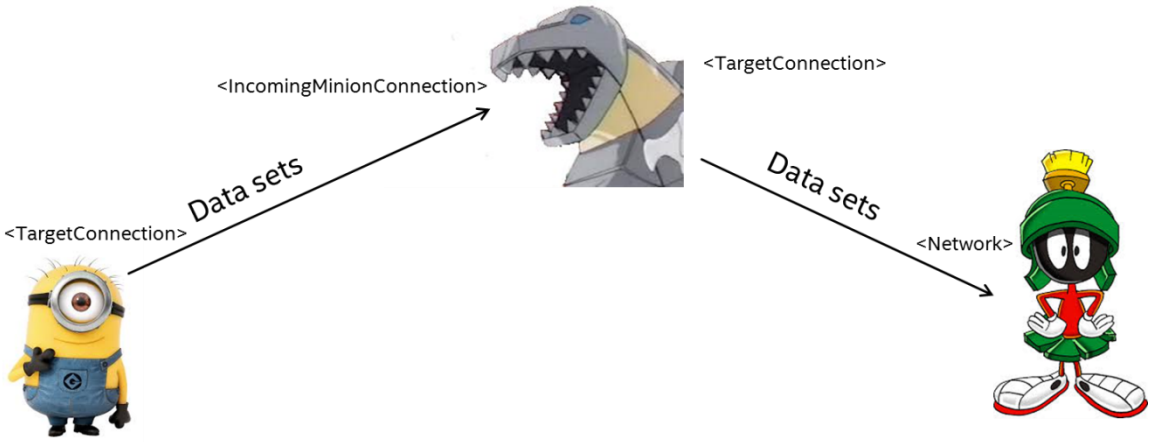


Figure 83 Primary Communication Channels

Figure 83 shows the primary communication paths between Minion and Oscar and between Oscar and Marvin.

Oscar has two primary channels, the path between itself and Minion and between itself and Marvin. Both are defined within the Oscar configuration file and are required. The Oscar-Minion connection is defined within the <IncomingMinionConnection> tag. What you put in here must match what you place in the <TargetConnection> tag in the Minion config file. Oscar's second primary channel (I know that didn't sound right) is defined in the <TargetConnection> tag within the Oscar configuration file. It must match the <Network> settings within the Marvin configuration file.

These primary channels provide the data from Minion to Oscar, which in turn re-packages and sends it on to Marvin.

10.1 Secondary communication Channels

As shown in Figure 84 there is a 2nd set of communication channels used by the Bitchin Instrumentation Framework.

This secondary channel is used to send information such as heartbeats from Marvin (to keep Oscar from blasting data to a system not running Marvin). Tasks are also sent over this channel.

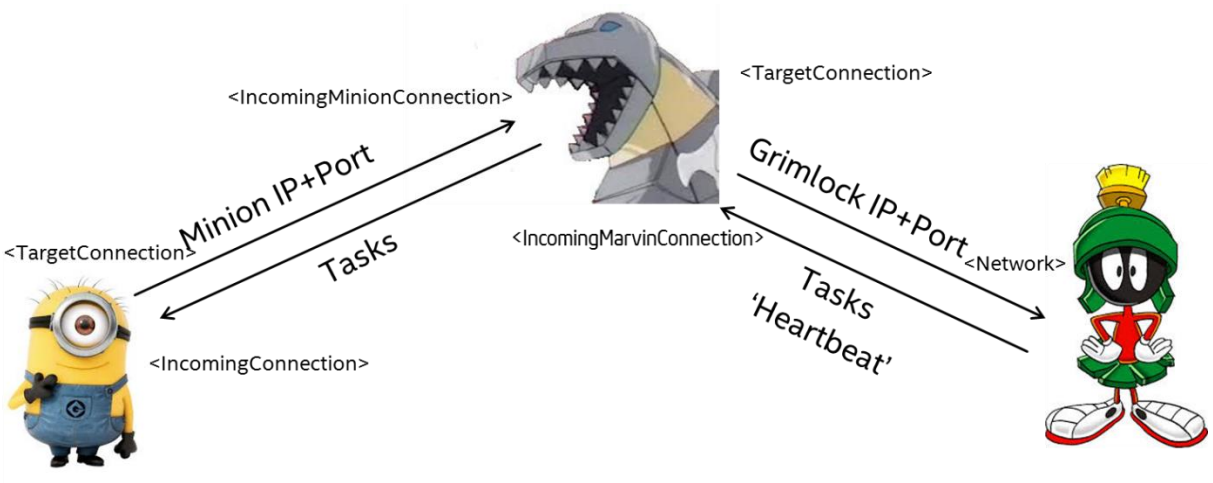


Figure 84 Secondary Channel

Both Minion and Oscar create network connections for use the secondary channels. Both Oscar and Minion can create these channels automatically, or can be specified within the configuration files. Oscar uses the <IncomingMarvinConnection> tag and Marvin uses the <IncomingConnection> tag. Both of these are optional, if you don't use the tags the IP and ports will be automatically selected.

You may note that Oscar does not have a configuration as to the secondary channel for Minion, nor does Marvin have any configuration to know where to send Tasks and heartbeats to Oscar. This is because they are 'told' this information over the primary channels. Minion periodically sends a message to Oscar indicating the IP and Port that it is listening for Tasks on, in addition to its namespace. Likewise Oscar periodically sends a message to Marvin informing it what IP and Port (along with the Oscar ID) it is listening for Heartbeats and tasks on.

If you are having troubles with firewalls, you might want to specify <IncomingMarvinConnection> and <IncomingConnection> to ease network debugging issues, or to open specific ports in the firewall.

11 Advanced Tactics

11.1 Widget Stacking

You can place as many widgets in the same location as you like. You may not like the results though ☺

One thing you can do is to stack widgets but selectively hide and show them as needed to achieve some interesting effects. For example, if you look in the DemoTab_LCD.xml file you may see that there are two widgets placed in the same location:

```
<Widget File="LCD.xml" row="1" column="2" Height="200" Width="400">
    <MinionSrc ID="CPU" Namespace="DemoNamespace"/>
    <UnitsOverride>%</UnitsOverride>
    <Title>CPU 0</Title>
</Widget>
<Widget File="LCD.xml" row="1" column="2" Height="200" Width="400">
    <MinionSrc ID="CPU" Namespace="DemoNamespace"/>
    <UnitsOverride>%</UnitsOverride>
    <Title>CPU 0 - Warning</Title>
    <StyleOverride ID="lcd-red"/>
    <Peekaboo ID="ShowWarning" Namespace="DemoNamespace_LCD" Default="Hide"/>
</Widget>
```

Both LCD widgets have the same <MinionSrc>, which is showing CPU utilization. The 2nd one has a slightly different title (adds 'Warning') and changes the LCD color to red. It also has a <Peekaboo> associated with it and by default is hidden.

I've setup a task to show the 2nd widget when I press a button. Since the 2nd LCD widget is defined after the 1st one, it will be displayed on top of the 1st one when made visible.

Using this technique you could, on your Minion side have two Collectors always running. One that is constantly feeding the <MinionSrc> for both of these LCD widgets and another that when the CPU utilization is below a certain threshold always sends the <Peekaboo> with the data of "Hide". However when the CPU utilization goes above a certain level, it will send "Show", which would then cause the red LCD widget to be visible and give a very noticeable change to the appearance of your application.

11.2 Show Current Computer Name

Using the Alias ability of Marvin and the fact that I suck in all of the environment variables in the system as Aliases, you could display the name of the computer running Marvin:

```
<Widget File="Text.xml" row="2" column="1" >
    <InitialValue>$(ComputerName)</InitialValue>
</Widget>
```

11.3 Changing the Images being shown

TBD

12 Support

Despite my best efforts to document the pieces of the Bitchin Instrumentation Framework project – I know that it is a complicated beast. It was designed to be 'stupid' (not know anything about what it is processing) and highly flexible – both of which make it actually kinda complicated ☺

If you have bugs that you have found or questions (after reading this doc) please contact me and I will do my best to help as time allows.

Please keep in mind that this is my 'spare time' project and not what I get paid me to do. So plese be patient.

13 Summary

So here we are near the end of the doc that I think has more lines than both Minion and Oscar. If you made it this far – thank you!

The overriding design strategy for this 'shot from the hip', 'make it up as I go' project was to make it ignorant and agnostic to where the data is coming from. This includes everything from Minion to Marvin. I think that goal was met pretty well. The other goal was to make the GUI completely configurable from a text file (XML File) and be very versatile. While there are a few widgets that harder to use and understand than others (some of the charts), in general I think it's pretty flexible.

Flexibility comes at a cost of complexity in both code and configuration files. Hopefully this document will help some with the configuration files. The code – well if I had it to do over and know what I know now, or if I had done this as a real sanctioned project rather than a 'hmm, what could I do' skunk-works project it would be better. As it is, it works and does everything I've wanted it to do thus far.

This organic project will, I truly hope continue to grow with new features and refinements over time.

I hope you find the Bitchin Instrumentation Framework project useful and have as much fun using it as I did writing it.

14 Troubleshooting

This section will try and cover known issues and challenges.

14.1 Stack overflow error

Symptom: you have a pretty complex GUI with a lot (hundreds) of Widgets. When you run the app you get a stackoverflow error. The app may or may not still run.

This is because Java only reserves a certain amount of memory by default for such gui components. You need to tell Java that you need more memory. To do this add the –Xss option to the invocation of the application, and specify more memory.

Try:

```
Java –Xss1M –jar BIFF.Marvin.jar
```

That will reserve one MB of ram for threads and such. If this is not enough, increase the number. Only pick enough to get it to run, you pick too much and it will be a waste of system memory.

14.2 Getting Audio and Video working in a VM

If you are trying to get the GUI working in a Hyper-V VM, you need to specify in the VM

settings to get Desktop Experience.

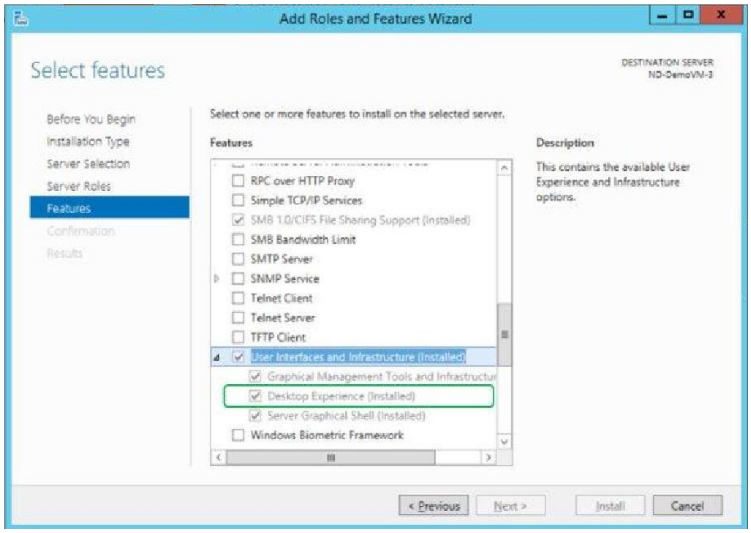


Figure 85: Allowing Video and Sound for a VM

14.3 Connectivity Problems

Sometimes you may see that Marvin gets data for about a minute before it stops getting updated. This is usually an indicator that there is a firewall blocking communication from Marvin to Oscar. Marvin periodically sends a message to Oscar it is a 'heartbeat' indicating to Oscar that there is actually something consuming the data it is sending. If Oscar does not get a notification every 60 seconds, it will nearly stop sending data until a Marvin responds with a heartbeat. If a firewall is blocking the response, you will see data blast for 60 seconds in Marvin right after you start transmitting from Oscar. To test this, exit Oscar and restart. If you get data in Marvin for a short while and then nothing despite Oscar showing new data arriving from Minion then it is likely a firewall problem.

See Section 9 for more details on the various connectivity channels.

14.4 The Dynamic type Widget isn't working

So you have a Dynamic Image or Dynamic Grid etc. type of Widget and your collector is sending the ID that looks correct (you can see it in Oscar), but the widget isn't changing in Marvin.

One possible reason for this is that you are using the 'built-in' FileCollector to read some file that would contain the ID for your widget. The File collector read the entire file, including any interesting OS specific CR/LF characters. If the widget is looking for and ID of 'foo' and the collector sends 'foo' + and invisible character, the comparison will fail.

14.5 The Web Widget isn't working all the time

The Web widget may need proxy information configured. This is done via command-line arguments to the Java VM (JVM) as shown below:

java -Dhttp.proxyHost=proxy.myproxycom -Dhttp.proxyPort=911 -jar BIFF.Marvin.jar

using the –Dhttp.proxyHost and –Dhttp.proxyPort settings.

14.6 Slow network performance, tasks not getting run in a timely manner

We recently found a frustrating, yet interesting problem. For a demo we were instrumenting > 12,000 data points and also running some tasks to start and stop workloads. The systems under test were located in a lab and the demo was running off of the corporate network. We found very poor and bursty performance. It turned out to be a mis-alignment of MTU between the systems under test, the switch in the lab and the main network. Once we set them all to the standard 1500 on the systems under test and lab switch, these issues went away.

14.7 Collector Data not showing up in Oscar or Marvin

Sometimes you can create a collector that sends a lot of data (for example the FileCollector), or you can <Group> a bunch of collectors together. If the resulting packet size is too large (greater than the MTU) the packet will likely not make it to the destination. If logging is turned on, then you should get a warning message about the specific Collector that is possibly having the problem.

14.8 Multi-Source Widgets not Updating properly

Muliti-Source Widgets can be problematic unless used with care. Each data source is an independent stream and even if the collector is run with the same interval, the traffic is UDP and not guaranteed, so it can be dropped. This can result in data being out of sync and looking poorly.

This is why I added the <Synchronized> capability to the multi-source charts/graphs. The default settings for this option is to synchronize the data and wait for all data sources to

send a data update before updating the chart. The problem with this is if you have a data source that is 'dead' (say a minion that isn't running) then the chart will never update. To get around this set <Synchronized> to false, or change the MaxSyncWait time to something reasonable for the data rate to have the data that is coming in synchronized.

14.9 Error: Could not find or load main class kutch.biff.marvin.Marvin

This usually occurs if you are trying to run a non-Oracle version of Java 8, usually OpenJDK. OpenJDK does not include the JavaFX features, which is a requirement for Marvin.

For example doing a java –version will tell you what is going on:

```
# java -version
 openjdk version "1.8.0_91"
OpenJDK Runtime Environment (build 1.8.0_91-8u91-b14-3ubuntu1~16.04.1-b14)
OpenJDK 64-Bit Server VM (build 25.91-b14, mixed mode
```

Try installing openjfx. Using apt-get it would look like:

```
sudo apt-get install openjfx
```

That should get you moving forward.

15 Thanx and Recognitions

Brian Johnson has been instrumental in this project. While he doesn't write code, he has been my tester and provided more ideas than I can name. Most of which I rejected as idiotic before I took a moment and realized it was a great idea. He also has taught himself a lot about CSS styling and provided a lot of the fun styles.

Gerrit Grunwald (http://harmoniccode.blogspot.com/) has been somewhat of an inspiration for me. I leverage his awesome gauges (https://bitbucket.org/hansolo/enzo/wiki/Home) for a great number of my Widgets. I muddle through his code to learn new things every chance I get.

My family has been very patient with me. I've spent untold nights and weekends working on his project over the past many years. The first year was pretty brutal and I had to pry myself away on occasions to spend much needed time with them.

16 About Me

I enjoy fishing, reading, video games and getting schooled at basketball by my 11 year old.

I still have a passion for writing code; I just don't get to do it for pay anymore. Thus another reason I decided to write this project during my off time.

This project has been my passion for years now.

I hope you find it of use.

Thanx,

Patrick Kutch

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