AXIGEN Mail Server Reporting Service
Usage and Configuration

The article describes in full details how to properly configure and use the AXIGEN reporting service, as well as the steps for integrating it with the Cacti application.

As with all modern email servers, AXIGEN also provides graphical reporting charts to monitor the server's health and display its status in a quick fashion. This feature has been designed to provide servers administrators with great flexibility and an extensive range of parameters to monitor. For this purpose, a graphical representation offers a faster and more detailed view of what exactly is going on with the services provided by the AXIGEN Mail Server.

Another alternative would be using complicated command-line tools and commands to search for the needed information, a time consuming action that would also take a lot of server resources that could otherwise be redirected to other tasks. In this respect, the reporting feature does not cause a visible overhead since it is based on data that is recorded in real-time at an user adjustable interval, and not on processing log files. It offers access to the information in a fine-grained fashion, with a low resource usage.

By reading this article, you will find out how to make best use of the AXIGEN reporting service, including the steps for adding AXIGEN performance charts, configuring SNMP parameters and integrating the AXIGEN Mail Server reports within the Cacti network graphing solution.

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1. Reporting Configurations based on Frequently Used Parameters

1.1 Enabling the AXIGEN Reporting Service

First, you need to enable the Reporting service using the Web Administration interface (**WebAdmin**):
- Login to the **WebAdmin** interface and click on the **Services** drop-down menu;
- Click on the **Services Management** tab at the top;
- Locate the **Reporting** service in the displayed list of AXIGEN running services and click on its corresponding **START** button.

Fig. 1 Enabling the AXIGEN Reporting Service

1.2 Charts Configuration Steps

Now that the **Reporting** service is enabled, you can further navigate to the **Status & Monitoring** tab in WebAdmin and configure your first chart:
- Click on the **Status & Monitoring** drop-down menu;
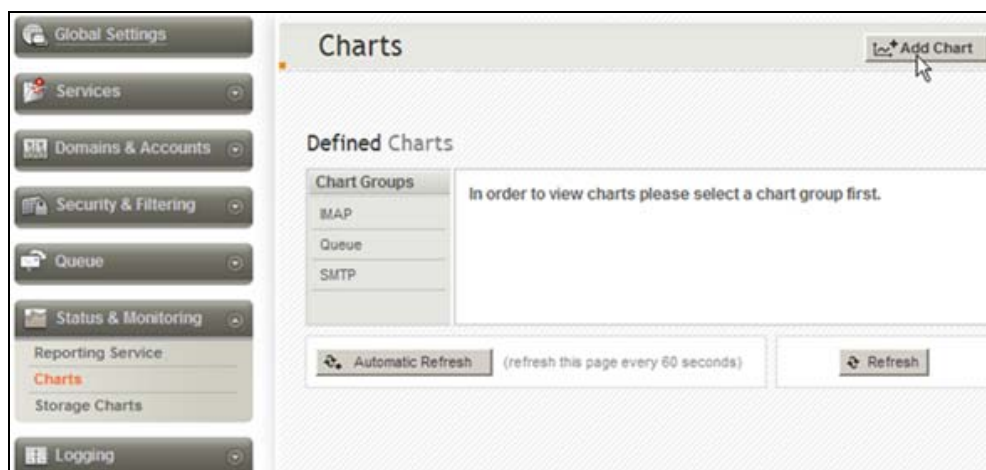- Click on the **Charts** tab.

Fig. 2 Accessing the Charts Section

When first viewing the **Charts** page, a list of pre-configured charts and their corresponding groups will be displayed. These charts are automatically created by AXIGEN and record information based on common parameters that frequently interest server administrators, such as the system load average, the quantity of messages stored in the queue or number of HTTP user messages read, SMTP inbound messages, SMTP outbound total connections, IMAP total connections, POP3 total connections and much more.

Clicking on one of the **Chart Groups** on the left will result in displaying all the charts assigned to that specific group and enable you to edit or delete them.

As a note, these pre-made charts may not meet every administrator's requirements right from the beginning, but they can be used as a starting point for creating additional ones, of great help for sysadmins.

1.2.1 Adding Charts in AXIGEN

As previously explained, the AXIGEN reporting service can be configured to monitor various parameters of interest. As a hands-on example, the following charts will detail the quantity of messages processed by the **SpamAssassinBundled** filter, depending on their status.

> ➢ **Example no. 1**

Defining a chart that displays the quantity of messages passing the **SpamAssassinBundled** filter with the verdict of **Spam**:

- Login to the **WebAdmin** interface;
- Click on the **Status & Monitoring** drop-down menu;
- Click the **Charts** link;
- Click the **Add chart** button;
- Type the name of the new chart group: **Spam**, in this example;
- In the **Chart Name** field, type the name of the chart to be created (in our case **Spam_messages**);

Fig. 3 Adding the Spam_messages Chart

- Within the **Data Aggregation** section, select the **Built-in Filter: SpamAssassinBundled Match** parameter to collect.
- As **Aggregation function**, select **Total**;
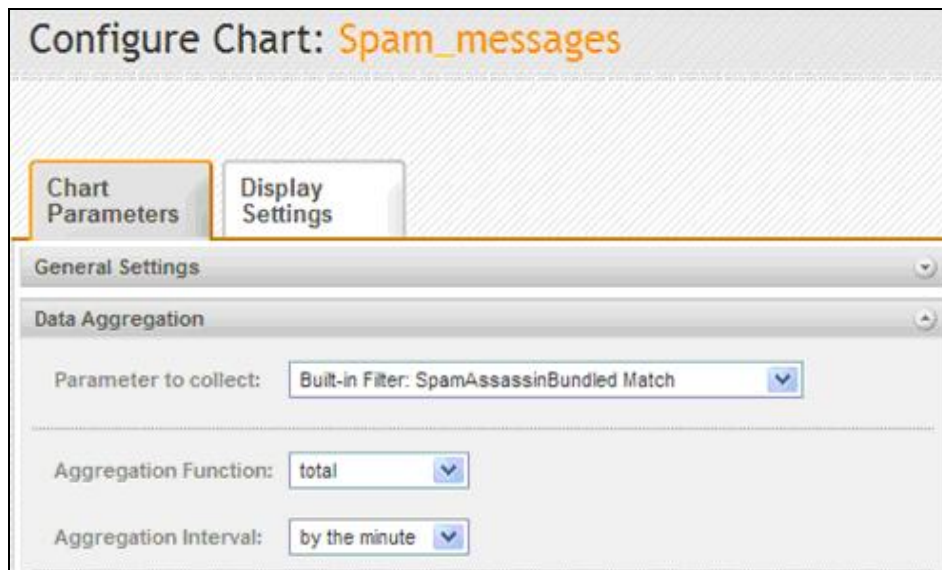- As **Aggregation interval** select **by the minute**;

Fig. 4 Configuring the Chart

- Click the **Save configuration** button at the bottom to save the newly-introduced data;
- Click the **OK** button from the warning message box to complete the creation of the chart; since this is a new chart, there is no data stored regarding the specified parameter.

Please note that any changes to a chart's data recording settings will lead to a reset of the chart's information.

➢ **Example no. 2**

Defining a chart that displays the quantity of messages passing the **SpamAssassinBundled** filter with the verdict of **Not Spam**:

- Click on the **Add Chart** button in the **Charts** page;
- Select the already created **Spam** chart group from the drop-down list;
- In the **Chart Name** field, fill in the name of the chart to be created; in this case, you can type **Clean_messages**;
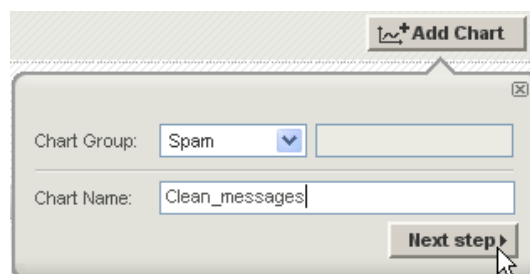

Fig. 5 Adding the Clean_messages Chart

- Click on the **Next step** button. You will then access a new page, with further configuration options regarding the chart parameters and display settings;
- In the **Chart Parameters** tab, **Data Aggregation** section, select the **Built-in Filter: SpamAssassinBundled Pass** parameter to collect;

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- As **Aggregation function**, select **Total**;
- As **Aggregation interval**, select **by the minute**;
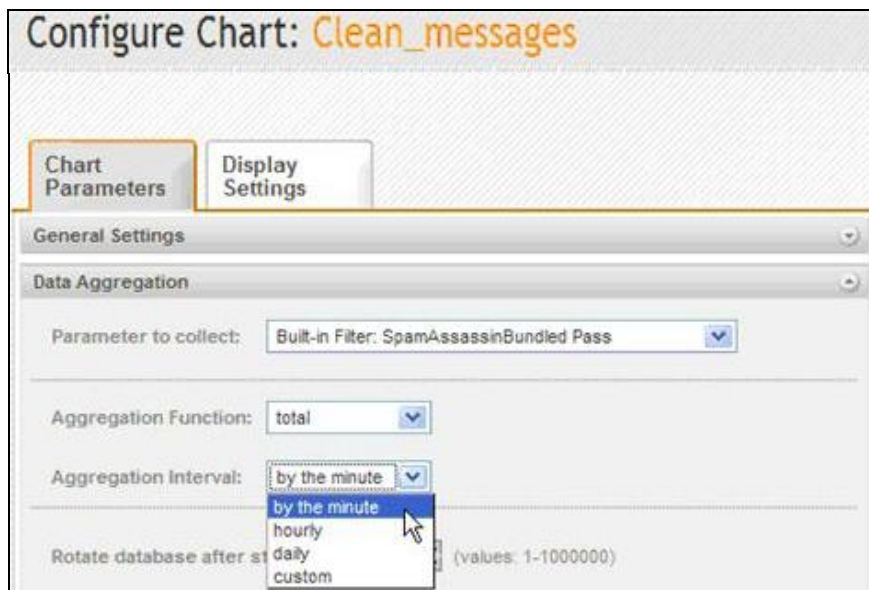

Fig. 6 Configuring the Chart

- Click the **Save configuration** button at the bottom to save the newly-introduced data;
- Click the **OK** button from the warning message box to complete the creation of the chart; since this is a new chart, there is no data stored regarding the specified parameter.

The above charts are mentioned as a guideline of the required steps to create and configure a chart.

1.2.2 Chart Display Settings

In the **Predefined Styles** section, you can use different chart types, filling and outlining colors for configuring the graph details of the chart.
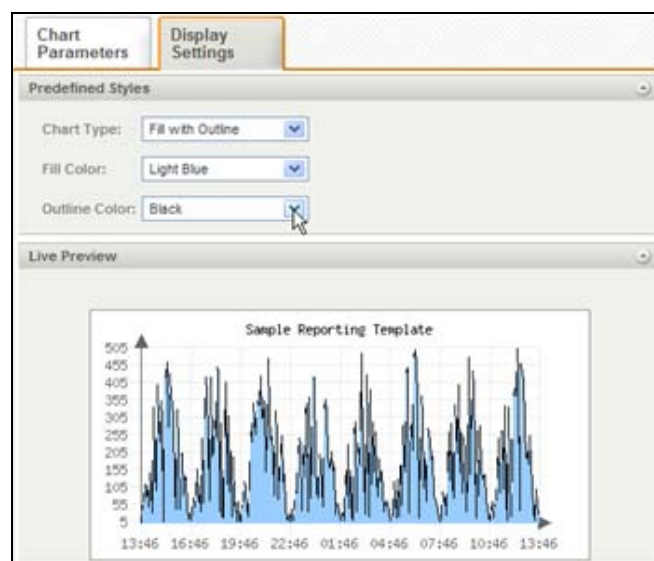

Fig. 7 Chart Display Settings

Additionally, a live preview of the current chart is available. In the example below, you can view some of the available charts for the **Spam** group.
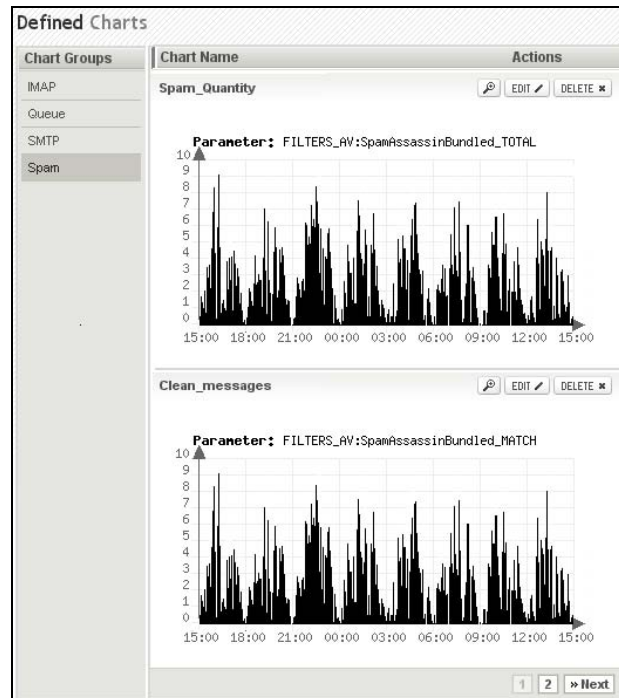

Fig. 8 Charts Available for the Spam Group

1.2.3. Additional Info on Chart Configuration Parameters

Now we will focus on the different configurations we have mentioned above, especially on the ones determining how a chart looks like and how information is displayed in a chart.

> **Data Collection Interval**

The AXIGEN Mail Server uses a default setting of 60 seconds for polling information on the charts' parameters. This means that once per minute (this being the smallest configurable interval of time) the AXIGEN Reporting service polls for data regarding all parameters that can be used for creating charts.

This configuration setting can be set to more than 60 seconds but, for performance reasons, it cannot be smaller than the 60 second default value. You can locate this configuration setting by following the next steps:
- Login to the **WebAdmin** interface;
- Click on the **Status & Monitoring** drop-down menu;
- Click on the **Reporting service** tab;
- The configuration option can be found under the **Data collection** section and it is expressed in seconds.

Fig. 9 Setting the Data Collection Interval

The above described configuration setting will be referred from now on as the **Sample interval**. We also consider a sample interval of 60 seconds (the default AXIGEN sample interval) for the following examples and explanations.

> ➢ **Data Aggregation**

The next configuration setting is the **Aggregation Interval**. This option controls when a line in a chart is drawn based on the sample interval and recorded data. It is recommended that the value of the parameter should be a multiple of the sample interval. Although a fine adjustment of this setting can be made, AXIGEN will always round the value to a multiple of the sample interval. This behavior is caused by a third configuration setting which determines how the chart will look like, the **Aggregation Function**.
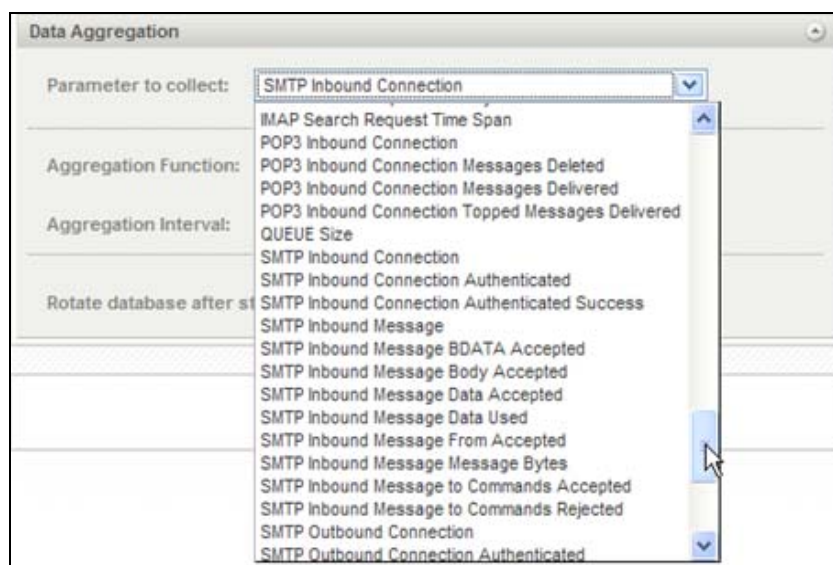

Fig. 10 Setting the Data Aggregation Interval

The **Aggregation function** is applied to the values recorded in the sample interval from one aggregation interval to another. If the sample interval is equal to the aggregation interval, the **Average** aggregation function will not be applied.

2. How Chart Information Is Collected & Processed

Now we will detail how the AXIGEN Mail Server collects and processes chart data and how various settings can influence the display of the charts. This will help you in the process of understanding and reading the defined charts, and further help in the process of creating new charts based on the available parameters.

When the sample interval is reached (default: once every minute), AXIGEN performs the following operations:

- Increases or decreases all the SNMP counters based on the read parameter information;
- Stores all the parameter information based on which charts can be created;
- The AXIGEN configuration file is checked for defined charts;
- After all the defined charts are inventoried. The remaining parameter data that does not correspond to a defined chart is discarded;
- If the aggregation interval is reached, the aggregation function is applied on the previously recorded values of the remaining parameters. The resulted value is written in the defined chart's database used for displaying charts;
- If the aggregation interval is not reached, then the recorded values of the parameters are stored in memory with each sample interval until the aggregation interval is reached.

3. SNMP Configuration Steps

In addition to the charts displayed in the WebAdmin interface, starting with the AXIGEN release version 6, a **SNMP service** (Simple Network Management Protocol) has been implemented. This service can be used as an agent that can be queried using the SNMP protocol. The SNMP agent is read-only for the AXIGEN configuration settings.

**Fig. 11 SNMP Service Configuration Page**

Additionally, the SNMP service is able to send trap signals to configured hosts in one of the following situations:
- Server start
- Server reloading
- Server shutdown

This feature can be used to notify other monitoring tools about the status of the server. In their turn, these tools can be configured to notify the system administrator about the status of the server, by e-mail, phone, pager or other means

The **SNMP Send Traps To All Managers** option will determine the AXIGEN Mail Server to send trap signals to all the hosts that queried the server using the SNMP protocol when one of the previously mentioned conditions are met.
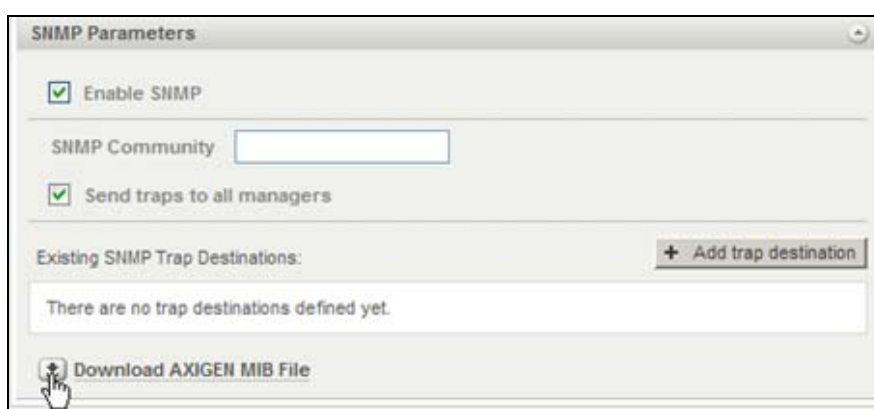
Fig. 12 Configuring the SNMP Service

In order to find the parameters that can be monitored using the SNMP protocol, a **MIB** file can be downloaded by navigating to the following location:
- Login to the **WebAdmin** interface;
- Click on **Status & Monitoring**;
- Click the **Reporting service** link;
- Within the **SNMP Parameters** section, there is a link for downloading the mentioned file.

Generally, this type of file can be viewed using specialized tools that are able to interpret the format of the file and display it in a human readable form, most often as a tree. These tools are also called MIB browsers and they can be used as SNMP managers; meaning that they can query AXIGEN for information regarding its reporting parameters' values. The MIB browsing tools can also be used to send and receive trap signals.

In practice, the tool for interpreting the MIB file is not necessarily required since MIB files are essentially text files that can be viewed using a text editor also.

The MIB file is used for associating a reference tag (also called **OID**), used to query AXIGEN for the value of the parameter, with the name of the parameter in a human readable way.

For example, the **OID 1.3.6.1.4.1.29463.2.1** represents the reference tag for the **Total mails placed in the queue** parameter that returns a value which is interpreted as described below.

By querying the reporting parameters using the SNMP protocol, an odd behavior can be observed: the returned values are always increasing instead of reflecting the actual status of the reporting parameter being queried. The explanation is that the tools that retrieve information from AXIGEN using the SNMP protocol create charts based on the changes from the previous value of the parameter being queried, and not its actual value.

The SNMP reporting feature of the AXIGEN Mail Server was designed with the purpose of creating performance representation charts, based on the information provided by the server, in a centralized solution where multiple other services are also monitored.

A typical example is a Network Operations Center where multiple machines and devices are monitored in a centralized way and all the information is consolidated using a SNMP managing tool that interprets trap signals when critical events occur or generates charts reflecting the usage of the managed devices.

4. Integrating the AXIGEN Reports within Cacti

For example, the Web application Cacti (http://www.cacti.net) can be used to generate charts based on the AXIGEN SNMP service and reported information. The following example is for the current release of Cacti (0.8.7b); thus, the presented options are subject to change in the future versions of Cacti.

If the status and usage of multiple machines or devices is already monitored using the Cacti application, AXIGEN can also be easily integrated in the set of monitored services.

4.1 Adding the AXIGEN Machine as a Monitored Host

Below we will detail the process of configuring an AXIGEN machine into the Cacti application. Please keep the AXIGEN MIB file close so that the configuration of Cacti can be made easier. Also, have in mind that the steps below are basic, but representative:

We will skip the Cacti installation instructions as they are fully detailed in the Cacti Manual (http://docs.cacti.net/node/439) and get directly to the process of adding a new host to the pool of monitored systems and devices.

After logging into the Cacti Web administration interface with the administrator account, click on the **Devices** link found in the left pane.

In the upper right corner there is a link called **Add** which is used to add the new host to be monitored. By default, if there are no hosts configured and this is a fresh installation of Cacti, the **localhost** is already monitored and graphs of locally available information are already created.

After clicking on the **Add** link, a parameter form is displayed to allow the configuration of the host's parameters. We will mention the most important parameters which are relevant to AXIGEN:

- The **Description** field is required by Cacti to be used in the hosts list and graph names. We suggest a name that includes the word **AXIGEN** in order to easily identify the correct host in case multiple devices/hosts are displayed in this list.

- The **Host** field tells Cacti to which hostname or IP address to connect to in order to retrieve graph information.

- The **Host template** parameter contains the type of the host to be added. It is recommended to set this parameter to **Generic SNMP-enabled Host**, although it can have the value **none**. This value can be of help since Cacti will save you from additional configuration by automatically setting the appropriate parameters specific to a SNMP enabled host, without requiring a manual configuration.

- The **SNMP Version** parameter tells Cacti which SNMP protocol version to use in the process of communicating with the configured host. AXIGEN uses a SNMP version 2 protocol implementation. You need to set this parameter before configuring the **Downed Device Detection** setting.

- The **SNMP Community** parameter must match the **SNMPCommunity** configuration setting made in the AXIGEN WebAdmin interface in order for Cacti to be able to contact the AXIGEN SNMP agent.

- It is recommend to set the **Downed Device Detection** parameter to the value **SNMP**. This will tell Cacti to check for the host's availability through the SNMP protocol rather by the ping system tool that, in many cases, cannot run since the Cacti application is running as the same user as the web server. Running ping in most cases requires root user privileges which constitutes a high security risk if the machine running Cacti can be reached from the Internet.

Please note that other configuration parameters that were not mentioned are to be used with the default values provided by Cacti.

After clicking the **Create** button, the new host will be added to the list of hosts and the screen will display the settings of the freshly created host.

As a troubleshooting option, Cacti tries to contact the SNMP agent of the host and displays in the upper left corner, next to the menu pane, a status message of the SNMP agent similar to the one below:

```
SNMP Information
System: AXIGEN Mailserver version 6.0.0 (Linux/i686)
Uptime: 116001700 (13 days, 10 hours, 13 minutes)
Hostname: axi6.loc
Location:
Contact:
```

If you receive a **SNMP Error** message, please review the settings of the host, especially the **SNMP Version** and **SNMP Community** parameters.

4.2 Creating Graphs

After adding the AXIGEN machine as a monitored host, you need to create graphs based on the SNMP information provided by AXIGEN. To do that, click on the **Create Graphs for this Host** link, after the host was added.

The next screen will require you to provide information regarding the configuration of the new graph. For now, only the graph template information is required, in order to let Cacti know what type of information you are interested in.

From the **Graph Templates** section, select the **SNMP - Generic OID template** using the provided drop-down menu and click on the **Create** button.

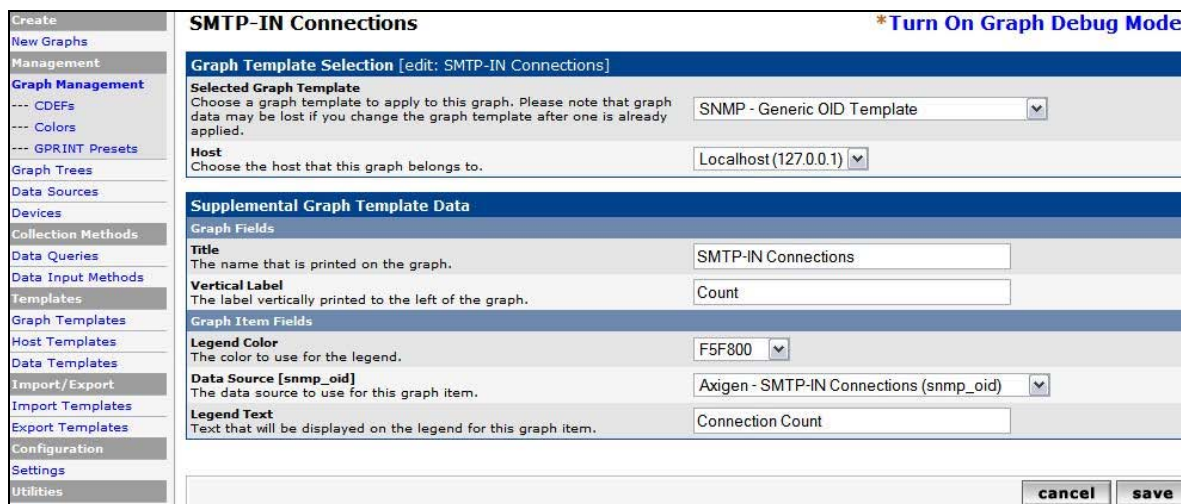The next screen will require more details about the looks of the graph and how the information is displayed:

Fig. 13 Adding a Graph
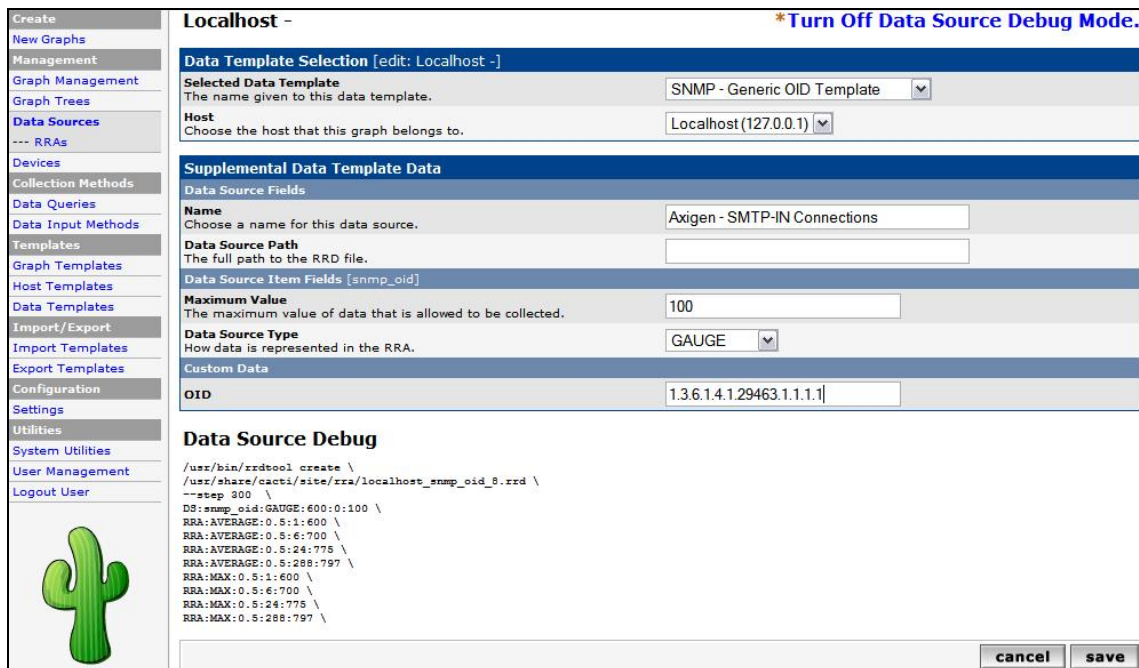
- The **Title** parameter contains the text displayed, of course, as the title of the graph. It is recommended that you add the name of the service to be monitored next to the **|host_description| -** text. For example, if you would like to create a graph that displays the number of SMTP connections, the **Title** parameter should then have the following value: **|host_description| - SMTP connections**.

- The **Vertical Label** parameter determines the text displayed vertically, in order to let the user know the type of values displayed on the **Y** axis. In the given example, the term **Connections** will be used.

- The **Legend** color parameter determines the color of the graphic display, while the **Legend Text** determines the display of a colored box and the specified text next to it on the graph - useful in case the graph displays multiple values. These are non-critical parameters of the graph; they were mentioned only for your information.

- In the **Data Source** section, you can find the parameters that determine some of the configuration settings of a typical Cacti data source, since the chosen way to create a graph in Cacti is considered to be a wizard which automatically creates all the required elements of a graph.

The **Name** parameter in this section is similar to the graph **Title** parameter only that, in this case, it determines the data source name rather than the graph name. There is no problem using the same value as the graph name since these two values are used for different purposes.

Fig. 14 Adding a Data Source

- The **Maximum Value** parameter is required to let Cacti know the upper limit of the value represented on the **Y** axis. This is important since the **X** axis value represents the time, and you already know the maximum value for the **X** axis, but the vertical axis can take any value depending on the resource being monitored.

- The **Data Source Type** parameter will tell Cacti how to interpret the values read from the data input. Since AXIGEN uses an incremental value, it required to set this parameter to the **COUNTER** value.

- In order to tell Cacti what OID value you want to monitor, you need to check the AXIGEN MIB file.

Below, you can find a piece of the MIB file to help in explaining in more detail how to find the OID value and what AXIGEN parameter is representing:

```
-- 1.3.6.1.4.1.29463.1.1.1.1   <-- This is the OID value for the parameter
displayed under the "DESCRIPTION" item
smtpInputConnectionCount OBJECT-TYPE
    SYNTAX  INTEGER (1..2147483647)
    MAX-ACCESS read-only
    STATUS  current
    DESCRIPTION
        "incoming SMTP total number connections"
    ::= { smtpInput 1 }
```

After copying the OID value from the MIB file, you need to paste it in the **OID** field of the Cacti configuration screen. The final step in creating this first graph is to press the **Create** button.

You will then see the same screen with the configuration settings to create more graphs for the selected host. Repeat the process as many graphs as required.

Please note that the graphs are rendered only when the sample interval of Cacti is reached; the default being 5 minutes, it may take as long as 5 minutes for any graph data to be actually seen.

Here is how graphs will look like:
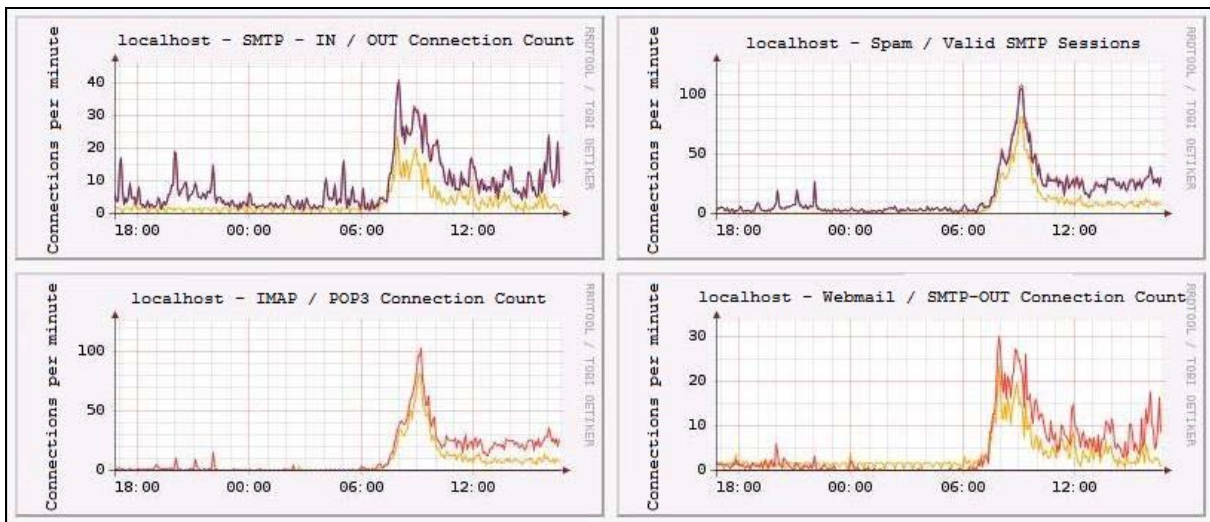
Fig. 15 Graph Examples

This concludes our article about AXIGEN Mail Server's reporting service and its usage. Since Cacti deals with a complex process of creating graphs, we will provide a little appendix with some graph customization tips.

➢ Customizing Graphs

In the above instructions we learned how to use the default options available in Cacti, now we will learn how to tweak different settings that allow us to further understand how Cacti and the **RRDTool** function.

First we used the generic templates, now we will learn how to create and customize templates.

The first step is to create a duplicate of the above used generic template and then further customize it as necessary. This step is required only to preserve the default templates and to not alter Cacti's data:

- Click the **Graph Templates** link under the **Templates** section;
- Select the **SNMP - Generic OID Template**;
- Select the **Duplicate** option from the drop-down menu in the lower right corner of the screen and click on the **Go** button.
- Type **AXIGEN graph template** in the **Title Format** field and click on the **Yes** button to create a duplicate template of the **SNMP - Generic OID Template**.

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The customization steps described below require the creation of additional graphs based on the customized template; until new graphs using the modified template are created the current ones will look the same since they are based on the generic template.

The first customization consists in a display adjustment since, as you may notice, the graph created using the generic template displays the legend on the same line with the current, average and maximum values reached. This causes the maximum value to do not fit the graph and thus cause the absence of this value.

Let's proceed:

- After creating the duplicate template, the list of templates will also display this freshly created template;
- Click on the template previously created to display its options;
- In the **Graph item** list, click on the first item;
- Check the **Insert Hard Return** box and click on the **Save** button;
- Click the **Save** button found at the bottom right of the page to save the now modified custom template;
- Resolve any errors that may appear. In our our tests, the **Lower limit** value had not been set, but specifying the value **0** fixed the error message.

To see the results, you must create a graph by following the steps mentioned above in the article, only that, this time, you will reference the modified template instead of the generic one. After creating your graph, you must wait for Cacti to poll data (also included in the graph) and see the differences between the graphs.

You will notice that although being displayed, the graph does not contain any data. This is caused by the fact that the graph is created at the polling interval and you will need to wait for the next polling (5 minutes) in order to actually see any data being graphed.

The next customization is also related to the way a graph is displayed. As you may notice, the graph created using the generic template also exhibits a display peculiarity. The number values do not correspond with the actual data. This is caused by the fact that Cacti is designed to work with average values, meaning that the displayed values are averages of the actual data reported by AXIGEN. This averages are made by comparing the previous value of the graph with the new provided from AXIGEN.

With the exception of the current and maximum values displaying the value read when data was polled and the maximum value ever recorded, all the values displayed, including the graph, are average values.

Besides the number values, there is another artifact caused by the generic orientation of Cacti to network devices; its data is, in many cases, represented by a decimal number and a multiple (b, B, k, m, g, t) which is used to represent the multiple or sub-multiple of a bit value (e.g. value of bits transferred or gigabytes downloaded).

As you will often need a decimal value that does not represent bits and you will not want to be bothered by the attached letter of the multiple computed by Cacti, here are the steps to configure the newly-created custom template so as to display the decimal value only:
- Navigate to the graph templates section as previously described;
- Open the custom template;

- Click on the first item in the graph item list;
- For the **CDEF Function** value, select the **Make Per 5 Minutes** setting;
- For the **GPRINT Type** value, select the **Load average** setting for decimal values with two decimal places or the **Exact numbers** setting for integer decimal values;
- Click on the **Save** button and repeat the same step for all the graph items before saving the graph template.

This last step concludes this little appendix on graph customization and ends the present article.

Author:
Daniel Toma, AXIGEN Technical Consultant

www.axigen.com