

Cacti

„Aggregate Graph“ Plugin

Usage Guide

Brought to you by

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The Cacti Group



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Installing the Plugin

As a prerequisite, the **Plugin Architecture** is required. This is not described here, please see <http://cactiusers.org/> for help regarding this topic. Then, please download this plugin to the <path_cacti>/plugin directory. Next, unpack the .tgz file. All files will now reside in the <path_cacti>/plugin/aggregate directory.

CAVEAT: Please make sure not to leave an old version of „aggregate“, e.g. <path_cacti>/plugin/aggregate_old!

When using old Plugin Architecture (pre PIA2.x):

Edit <path_cacti>/include/global.php (or config.php if running cacti 086 code) and add aggregate in the plugin section as usual.

When using Plugin Architecture 2.x:

Assuming, you already have provided authorization to **Plugin Management**, please go to that menu item and hit „Install“.

aggregate	
Directory:	aggregate
Version:	0.73
Author:	Reinhard Scheck
Home Page:	
Status:	Not Installed
	Install Uninstall Enable Disable Check

Illustration 1: Install Aggregate, Step 1

Then, please hit „Enable“. It should now look like

Create Aggregate Graphs	
Directory:	aggregate
Version:	0.73
Author:	Reinhard Scheck
Home Page:	http://docs.cacti.net/plugin:aggregate
Status:	Installed
	Install Uninstall Enable Disable Check

Illustration 2: Install Aggregate, Step 2

The final result looks like

Create Aggregate Graphs	
Directory:	aggregate
Version:	0.73
Author:	Reinhard Scheck
Home Page:	http://docs.cacti.net/plugin:aggregate
Status:	Active
	Install Uninstall Enable Disable Check

Illustration 3: Installation, Step 3 (final)

Providing Authorization to Users

Everybody who has **Console** access is allowed to create new aggregate graphs.

But there's a second section, that comes with Aggregate, the **Color Templates**. To provide access to create, delete or modify color templates, please go to **User Management** and select the correct userid. Now, check the Aggregate checkbox.

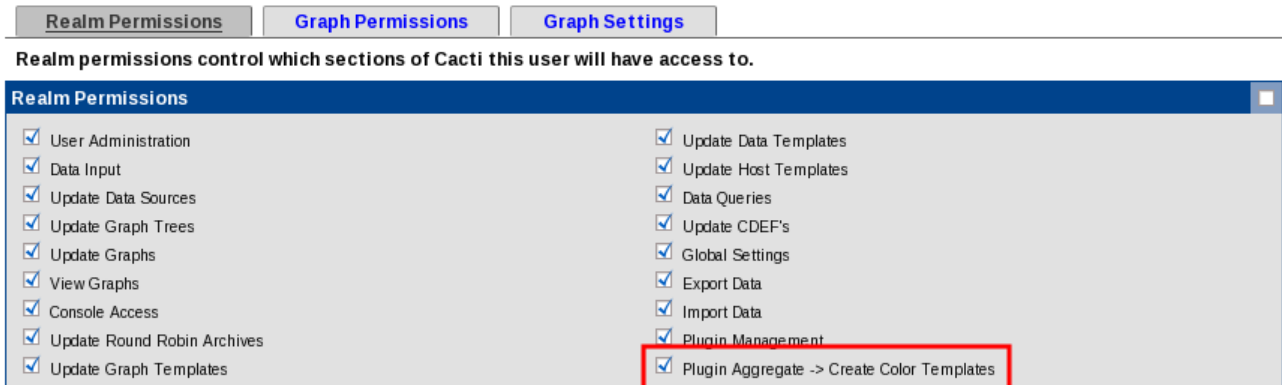


Illustration 4: Realm Permission for Aggregate Color Templates

Basic Usage

Now, turn to **Graph Management**. First, you will have to select the graphs you want to aggregate.

The screenshot shows the 'Graph Management' interface. At the top, there are filters for 'Host' (set to 'Any') and 'Template' (set to 'Any'), along with 'go' and 'clear' buttons. Below this is a 'Rows' dropdown set to '30 Rows' and a search box. The main area is a table with columns: Graph Title**, ID, Template Name, Size, and a checkbox. The table shows 13 rows of data. A context menu is open over the table, listing actions: Delete, Change Graph Template, Change Host, Reapply Suggested Names, Resize Graphs, Duplicate, Convert to Graph Template, Create Aggregate Graph (highlighted), and Place on a Tree (Default Tree). At the bottom, there is a 'Choose an action:' dropdown set to 'Delete' and a 'go' button.

Graph Title**	ID	Template Name	Size	
gandalf - CPU Usage	23	ucd/net - CPU Usage	120x500	<input type="checkbox"/>
gandalf - Load Average	24	ucd/net - Load Average	120x500	<input type="checkbox"/>
gandalf - Memory Usage	25	ucd/net - Memory Usage	120x500	<input type="checkbox"/>
gandalf - Traffic - eth0	26	Interface - Traffic (bits/sec)	120x500	<input checked="" type="checkbox"/>
gandalf - Traffic - eth0	27	Interface - Traffic (bits/sec, 95th Percentile)	120x500	<input type="checkbox"/>
gandalf - Traffic - eth0	28	Interface - Traffic (bits/sec, Total Bandwidth)	120x500	<input type="checkbox"/>
Localhost - Load Average	2	Unix - Load Average	120x500	<input type="checkbox"/>
Localhost - Logged in Users	3	Unix - Logged in Users	120x500	<input type="checkbox"/>
Localhost - Memory Usage	1	Linux - Memory Usage	120x500	<input type="checkbox"/>
Localhost - Processes	4	Unix - Processes	120x500	<input type="checkbox"/>
Localhost - Traffic - eth0	33	Interface - Traffic (bits/sec)	120x500	<input checked="" type="checkbox"/>
Localhost - Traffic - eth0	34	Interface - Traffic (bits/sec, 95th Percentile)	120x500	<input type="checkbox"/>
Localhost - Traffic - eth0	35	Interface - Traffic (bits/sec, Total Bandwidth)	120x500	<input type="checkbox"/>

Illustration 5: Select Graphs from Graph Management

CAVEAT: Please only select graphs based on a single graph template (see column „Template Name“). Else you will get funny looking aggregates!

Now, please hit **Create Aggregate Graph** to see

Are you sure you want to aggregate the following graphs?

- gandalf - Traffic - eth0
- Localhost - Traffic - eth0

The following data sources are in use by these graphs:

- gandalf - Traffic - 192.168.1.53 - eth0
- Localhost - Traffic - 192.168.1.53 - eth0

Title
The new Title of the aggregated Graph.

Prefix
A Prefix for all GPRINT lines to distinguish e.g. different hosts.

Graph Type
Use this Option to create e.g. STACKed graphs

Keep Graph Types
 Make it an AREA/STACK Graph
 Make it a LINE1 Graph

GPRINT Totals
Please check required Items of Total Columns

No Totals
 Total Similar Data Sources
 Total All Data Sources

Reorder Type
Reordering of Graphs.

Graph Item	Data Source	Graph Item Type	CF Type	Item Color	Color Template	Skip	Total
Item # 1	Inbound	AREA	AVERAGE	00CF00	None	<input type="checkbox"/>	<input type="checkbox"/>
Item # 2	Current:	GPRINT	LAST			<input type="checkbox"/>	<input type="checkbox"/>
Item # 3	Average:	GPRINT	AVERAGE			<input type="checkbox"/>	<input type="checkbox"/>
Item # 4	Maximum:<HR>	GPRINT	MAX			<input type="checkbox"/>	<input type="checkbox"/>
Item # 5	Outbound	LINE1	AVERAGE	002A97	None	<input type="checkbox"/>	<input type="checkbox"/>
Item # 6	Current:	GPRINT	LAST			<input type="checkbox"/>	<input type="checkbox"/>
Item # 7	Average:	GPRINT	AVERAGE			<input type="checkbox"/>	<input type="checkbox"/>
Item # 8	Maximum:<HR>	GPRINT	MAX			<input type="checkbox"/>	<input type="checkbox"/>

Please confirm

Illustration 6: Default Prompt for Aggregating Graphs

Clicking for **help** opens this pdf file. Let me have some words on the quite complex data on that screen. On the upper left, you'll see the **list of graphs** selected previously. Please verify, that all needed graphs are included.

On the upper right, please notice the **list of related data sources**. The sequence may deviate from the graph list. Don't bother to see the same IP in this example, both graphs relate to my laptop's traffic.

The **Title** is pre-filled. The prefix always is „Aggregate“. Next comes the title taken from the first graph in raw format, that is e.g. „|host_description| - Traffic - |query_ifDescr|“. As neither host nor query related variables make much sense for an aggregate, all |host_*| and |query_*| stuff is removed silently.

Prefix allows you to distinguish graph items on the aggregate. Imagine aggregating traffic, like this example does, without it you won't be able to distinguish between all those aggregated graph items. You may discard the prefix, though. It is allowed, to use all available |host_*| variables here and/or any plain text you like. Pay attention not to spend too many characters in order to avoid line wrap of the legend.

Graph Type is quite important to use. You may wonder why it is defaulted to create AREA/STACK graphs. Here's the reason why: Assume, you're aggregating an AREA graph. Without STACKing the second, third, ... graph item, all of them will overlap. Thus, only the last one will be seen (and perhaps parts of previous ones, if their values are higher). Sometimes, it is recommended to have LINEx graphs instead. That's the third radio button. The first one keeps graph types as is.

CAVEAT: It is recommended to change the standard Graph Template for „Traffic“. Please

switch e.g. Traffic OUT to the negative y-axis. Else, Traffic IN and Traffic OUT will overlap on the positive y-axis (see Chapter “Changing the Default Traffic Graph Templates“ below!

GPRINT Totals is an option, that automatically generates totaling lines not yet present on any of the selected graphs. It comes is useful, you you want to total traffic of e.g. interfaces of different hosts. There are two different options: „Total Similar Data Sources“ and „Total All Data Sources“. Please see examples below on how to use them.

Reorder Type allows you to change the order of the graph items in the resulting aggregate. The default order results from appending the graphs to be aggregated one by one, graph item by graph item. The alternate method groups graph items related to the same data source (e.g. all “Traffic Input” are grouped first, then all “Traffic Output”).

Graph Templates Items is build based on the first graph selected. Please pay attention to this section to make the most of your new aggregate. There are three columns to pay attention to.

Color Template governs the coloring of the aggregated graph items. Why's this? Using a single graph template will usually result in graph items like e.g. „Traffic In“ having same color on all graphs. On an aggregate, you would thus now be able to distinguish between them. That's where color templates come in. They simply define a sequence of colors, each of them assigned to an aggregated graph item in turn. Creating a color template like a „rainbow“ of colors allows you now to assign a set of colors in a single run! Do not forget to assign different color templates to different graph items!

Skip allows you to skip the checked item in the aggregate. There's a new, automatic <HR> mechanism to cope with <hard_returns> that now will be dropped. A skipped <HR> will percolate up the list to the previous item to keep line feeds in place. The mechanism will even introduce new <HR>'s at end of a graph template. Else, concatenating two graphs without <HR> in between will create ugly legends. This is required as well to make automatic legend adjustment work (but be aware, that this requires always a fixed sized font for legends).

Total governs the magic of totaling graph items. I did not make up my mind to create an algorithm for it. So you are required to check exactly those lines you want to see on the total legend.

CAVEAT: It is recommended to check required items! It is NOT sufficient to simply check the radio button!

On the first run, you may want to check each line. That does not make sense, in general. Totaling similar data sources creates e.g. a total of each different data source referred to in the graph. E.g. In this example, there are two: „Traffic In“ and „Traffic Out“. So you want to check at least the AREA/LINEx graph items and all additional gprint items.

But for totaling all data sources, the data source type is not taken into account. Again checking the same graph items as done with „similar data sources“ will result in two (or more) identical totaling legend entries.

And when using e.g. 95th percentile graphs or bandwidth COMMENTS, you will want to skip

them on the total.

Please see examples below for more.

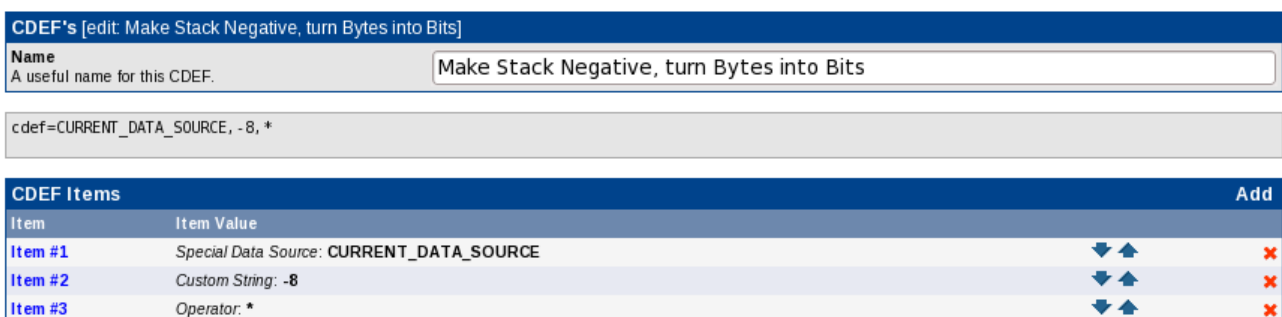
Changing the Default Traffic Graph Templates

The default Cacti Graph Templates are mimicked after some very famous templates like those used by MRTG. Traffic In and Traffic Out are both plotted to the positive y-axis, the latter as a LINE1.

For use with Aggregate, this is not the best choice. And people often want to plot outbound traffic to the negative y-axis for a better understanding.

You may either copy the graph templates you're going to change to preserve standard templates or change the standard to apply changes to all existing graphs with a simple swish of your magic wand called knowledge.

As a first step, a CDEF is required to “Make Stack negative, turn Bytes into Bits”:

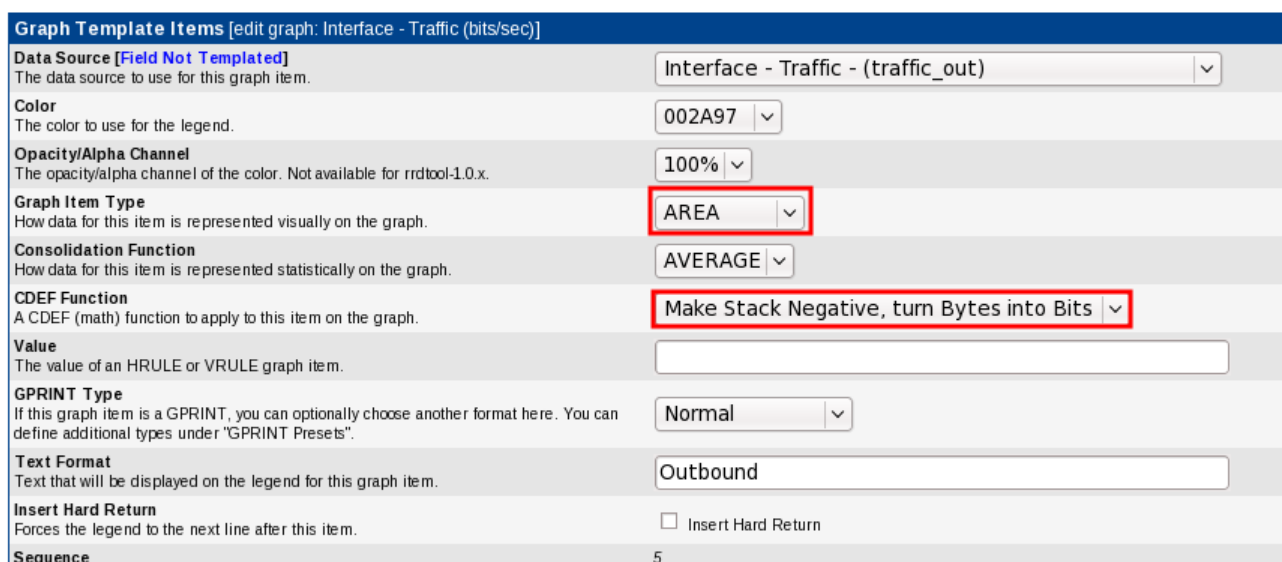


The screenshot shows the CDEF configuration interface. At the top, there's a title bar: "CDEF's [edit: Make Stack Negative, turn Bytes into Bits]". Below it, a "Name" field contains "Make Stack Negative, turn Bytes into Bits". Underneath, the CDEF expression is shown: "cdef=CURRENT_DATA_SOURCE, -8, *".

CDEF Items		Add
Item	Item Value	
Item #1	Special Data Source: CURRENT_DATA_SOURCE	⬇️⬆️ ✖️
Item #2	Custom String: -8	⬇️⬆️ ✖️
Item #3	Operator: *	⬇️⬆️ ✖️

Illustration 7: Make Stack negative, turn Bytes into Bits

Please apply this CDEF to the outbound traffic item and make it an AREA as well:



The screenshot shows the "Graph Template Items" configuration interface for "Interface - Traffic - (traffic_out)". The "Graph Item Type" is set to "AREA" and the "CDEF Function" is set to "Make Stack Negative, turn Bytes into Bits". Both of these fields are highlighted with red boxes.

Data Source [Field Not Templated]	Interface - Traffic - (traffic_out)
Color	002A97
Opacity/Alpha Channel	100%
Graph Item Type	AREA
Consolidation Function	AVERAGE
CDEF Function	Make Stack Negative, turn Bytes into Bits
Value	
GPRINT Type	Normal
Text Format	Outbound
Insert Hard Return	<input type="checkbox"/> Insert Hard Return
Sequence	5

Illustration 8: Apply CDEF to Outbound Traffic Item

Now, one more tweak is required for the template itself. The default auto-scaling option does not allow for negative numbers to be plotted on the graph. That's why we now switch to `--alt-autoscale` (ignore given limits). See

The screenshot shows a 'Graph Template' configuration form. It includes fields for Title, Image Format, Height, Width, Slope Mode, and Auto Scale. The 'Auto Scale Options' section is highlighted with a red box, showing the following options:

- Use `--alt-autoscale` (ignoring given limits)
- Use `--alt-autoscale-max` (accepting a lower limit)
- Use `--alt-autoscale-min` (accepting an upper limit, requires rrdtool 1.2.x)
- Use `--alt-autoscale` (accepting both limits, rrdtool default)

Illustration 9: Use `--alt-autoscale`

You may want to apply those changes to all traffic graph templates using bits. That makes

- [Interface - Traffic \(bits/sec\)](#)
- [Interface - Traffic \(bits/sec, 95th Percentile\)](#)
- [Interface - Traffic \(bits/sec, Total Bandwidth\)](#)

Examples

Color Templates Usage

In this example, both AREA/LINE items were related to different color templates by means of the dropdown.

Create Aggregate Graph

Are you sure you want to aggregate the following graphs?

- gandalf - Traffic - eth0
- Localhost - Traffic - eth0

The following data sources are in use by these graphs:

- gandalf - Traffic - 192.168.1.53 - eth0
- Localhost - Traffic - 192.168.1.53 - eth0

Title
The new Title of the aggregated Graph.

Prefix
A Prefix for all GPRINT lines to distinguish e.g. different hosts.

Graph Type
Use this Option to create e.g. STACKed graphs

Keep Graph Types
 Make it an AREA/STACK Graph
 Make it a LINE1 Graph

GPRINT Totals
Please check required Items of Total Columns

No Totals
 Total Similar Data Sources
 Total All Data Sources

Graph Template Items							
Graph Item	Data Source	Graph Item Type	CF Type	Item Color	Color Template	Skip	Total
Item # 1	Inbound	AREA	AVERAGE	00CF00	Green: dark -> light, 16 colors	<input type="checkbox"/>	<input type="checkbox"/>
Item # 2	Current:	GPRINT	LAST			<input type="checkbox"/>	<input type="checkbox"/>
Item # 3	Average:	GPRINT	AVERAGE			<input type="checkbox"/>	<input type="checkbox"/>
Item # 4	Maximum:<HR>	GPRINT	MAX			<input type="checkbox"/>	<input type="checkbox"/>
Item # 5	Outbound	LINE1	AVERAGE	002A97	Red: light -> dark, 16 colors	<input type="checkbox"/>	<input type="checkbox"/>
Item # 6	Current:	GPRINT	LAST			<input type="checkbox"/>	<input type="checkbox"/>
Item # 7	Average:	GPRINT	AVERAGE			<input type="checkbox"/>	<input type="checkbox"/>
Item # 8	Maximum:	GPRINT	MAX			<input type="checkbox"/>	<input type="checkbox"/>

Please confirm

Illustration 10: Use of Color Templates

The results shows different colors assigned to all colored graph items. You may also notice, that the *Graph Item Type* was changed to AREA/STACK as required.

Aggregate - Traffic - Color Select

*Turn On Graph Debug Mode.

Graph Template Selection [edit: Aggregate - Traffic - Color Select]

Selected Graph Template
 Choose a graph template to apply to this graph. Please note that graph data may be lost if you change the graph template after one is already applied.

Host
 Choose the host that this graph belongs to.

Graph Item	Data Source	Graph Item Type	CF Type	Item Color		Add
Item # 1	(traffic_in): gandalf Inbound	AREA	AVERAGE	004359	↕ ↗	✖
Item # 2	(traffic_in): Current:	GPRINT	LAST		↕ ↗	✖
Item # 3	(traffic_in): Average:	GPRINT	AVERAGE		↕ ↗	✖
Item # 4	(traffic_in): Maximum:<HR>	GPRINT	MAX		↕ ↗	✖
Item # 5	(traffic_out): gandalf Outbound	AREA	AVERAGE	EACC00	↕ ↗	✖
Item # 6	(traffic_out): Current:	GPRINT	LAST		↕ ↗	✖
Item # 7	(traffic_out): Average:	GPRINT	AVERAGE		↕ ↗	✖
Item # 8	(traffic_out): Maximum:<HR>	GPRINT	MAX		↕ ↗	✖
Item # 9	(traffic_in): 127.0.0.1 Inbound	STACK	AVERAGE	005D57	↕ ↗	✖
Item # 10	(traffic_in): Current:	GPRINT	LAST		↕ ↗	✖
Item # 11	(traffic_in): Average:	GPRINT	AVERAGE		↕ ↗	✖
Item # 12	(traffic_in): Maximum:<HR>	GPRINT	MAX		↕ ↗	✖
Item # 13	(traffic_out): 127.0.0.1 Outbound	STACK	AVERAGE	FFAB00	↕ ↗	✖
Item # 14	(traffic_out): Current:	GPRINT	LAST		↕ ↗	✖
Item # 15	(traffic_out): Average:	GPRINT	AVERAGE		↕ ↗	✖
Item # 16	(traffic_out): Maximum:<HR>	GPRINT	MAX		↕ ↗	✖

Illustration 11: Result of using Color Templates

Please notice, that even the items “(traffic out): Maximum” now have <HR> even if the original graphs don't.

Create an Aggregate Graph using „Total All Data Sources“

We now select the totaling option “Total All Data Sources”. As already said, it is necessary to check required items for this options from *Graph Template Items* table.

As we want to see the total as a line within the graph, item#1 is checked. Totals will always be represented as a LINE1.

To created legend entries for total numbers, *current*, *average* and *maximum*, items#2-4 are checked as well.

Create Aggregate Graph

Are you sure you want to aggregate the following graphs?

- gandalf - Traffic - eth0
- Localhost - Traffic - eth0

The following data sources are in use by these graphs:

- gandalf - Traffic - 192.168.1.53 - eth0
- Localhost - Traffic - 192.168.1.53 - eth0

Title
The new Title of the aggregated Graph.

Prefix
A Prefix for all GPRINT lines to distinguish e.g. different hosts.

Graph Type
Use this Option to create e.g. STACKed graphs

Keep Graph Types
 Make it an AREA/STACK Graph
 Make it a LINE1 Graph
 No Totals
 Total Similar Data Sources
 Total All Data Sources

GPRINT Totals
Please check required Items of Total Columns

Graph Template Items							
Graph Item	Data Source	Graph Item Type	CF Type	Item Color	Color Template	Skip	Total
Item # 1	Inbound	AREA	AVERAGE	00CF00	Green: dark -> light, 16 colors	<input type="checkbox"/>	<input checked="" style="border: 2px solid red;" type="checkbox"/>
Item # 2	Current:	GPRINT	LAST			<input type="checkbox"/>	<input checked="" style="border: 2px solid red;" type="checkbox"/>
Item # 3	Average:	GPRINT	AVERAGE			<input type="checkbox"/>	<input checked="" style="border: 2px solid red;" type="checkbox"/>
Item # 4	Maximum:<HR>	GPRINT	MAX			<input type="checkbox"/>	<input checked="" style="border: 2px solid red;" type="checkbox"/>
Item # 5	Outbound	LINE1	AVERAGE	002A97	Red: light -> dark, 16 colors	<input type="checkbox"/>	<input type="checkbox"/>
Item # 6	Current:	GPRINT	LAST			<input type="checkbox"/>	<input type="checkbox"/>
Item # 7	Average:	GPRINT	AVERAGE			<input type="checkbox"/>	<input type="checkbox"/>
Item # 8	Maximum:	GPRINT	MAX			<input type="checkbox"/>	<input type="checkbox"/>

Please confirm

Illustration 12: Create an Aggregate with Total All Data Sources

Please find the result below. The automatically created total graph items are marked. Please notice, that the graphed item (item#17) is created as a LINE1.

Aggregate - Traffic - Total All Data Sources

***Turn On Graph Debug Mode.**

Graph Template Selection [edit: Aggregate - Traffic - Total All Data Sources]

Selected Graph Template
 Choose a graph template to apply to this graph. Please note that graph data may be lost if you change the graph template after one is already applied.

Host
 Choose the host that this graph belongs to.

Graph Items [edit: Aggregate - Traffic - Total All Data Sources] Add

Graph Item	Data Source	Graph Item Type	CF Type	Item Color		
Item # 1	(traffic_in): gandalf Inbound	AREA	AVERAGE	004359	↕ ↗	✘
Item # 2	(traffic_in): Current:	GPRINT	LAST		↕ ↗	✘
Item # 3	(traffic_in): Average:	GPRINT	AVERAGE		↕ ↗	✘
Item # 4	(traffic_in): Maximum:<HR>	GPRINT	MAX		↕ ↗	✘
Item # 5	(traffic_out): gandalf Outbound	AREA	AVERAGE	EACC00	↕ ↗	✘
Item # 6	(traffic_out): Current:	GPRINT	LAST		↕ ↗	✘
Item # 7	(traffic_out): Average:	GPRINT	AVERAGE		↕ ↗	✘
Item # 8	(traffic_out): Maximum:<HR>	GPRINT	MAX		↕ ↗	✘
Item # 9	(traffic_in): 127.0.0.1 Inbound	STACK	AVERAGE	005D57	↕ ↗	✘
Item # 10	(traffic_in): Current:	GPRINT	LAST		↕ ↗	✘
Item # 11	(traffic_in): Average:	GPRINT	AVERAGE		↕ ↗	✘
Item # 12	(traffic_in): Maximum:<HR>	GPRINT	MAX		↕ ↗	✘
Item # 13	(traffic_out): 127.0.0.1 Outbound	STACK	AVERAGE	FFAB00	↕ ↗	✘
Item # 14	(traffic_out): Current:	GPRINT	LAST		↕ ↗	✘
Item # 15	(traffic_out): Average:	GPRINT	AVERAGE		↕ ↗	✘
Item # 16	(traffic_out): Maximum:<HR>	GPRINT	MAX		↕ ↗	✘
Item # 17	(traffic_in): ALL ITEMS	LINE1	AVERAGE	157419	↕ ↗	✘
Item # 18	(traffic_in): Current:	GPRINT	LAST		↕ ↗	✘
Item # 19	(traffic_in): Average:	GPRINT	AVERAGE		↕ ↗	✘
Item # 20	(traffic_in): Maximum:<HR>	GPRINT	MAX		↕ ↗	✘

Illustration 13: Created Aggregate with Total All Data Sources

Create an Aggregate Graph using „Total Similar Data Sources“

Next, we select the totaling option “Total Similar Data Sources”. We want to see totals on inbound and outbound traffic as well as on the legend. Thus, all items are checked.

Create Aggregate Graph

Are you sure you want to aggregate the following graphs?

- gandalf - Traffic - eth0
- Localhost - Traffic - eth0

Title
The new Title of the aggregated Graph.

Prefix
A Prefix for all GPRINT lines to distinguish e.g. different hosts.

Graph Type
Use this Option to create e.g. STACKed graphs

GPRINT Totals
Please check required Items of Total Columns

The following data sources are in use by these graphs:

- gandalf - Traffic - 192.168.1.53 - eth0
- Localhost - Traffic - 192.168.1.53 - eth0

Title:

Prefix:

Graph Type:

 Keep Graph Types

 Make it an AREA/STACK Graph

 Make it a LINE1 Graph

GPRINT Totals:

 No Totals

 Total Similar Data Sources

 Total All Data Sources

Graph Template Items							
Graph Item	Data Source	Graph Item Type	CF Type	Item Color	Color Template	Skip	Total
Item # 1	Inbound	AREA	AVERAGE	00CF00	Green: dark -> light, 16 colors	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Item # 2	Current:	GPRINT	LAST			<input type="checkbox"/>	<input checked="" type="checkbox"/>
Item # 3	Average:	GPRINT	AVERAGE			<input type="checkbox"/>	<input checked="" type="checkbox"/>
Item # 4	Maximum:<HR>	GPRINT	MAX			<input type="checkbox"/>	<input checked="" type="checkbox"/>
Item # 5	Outbound	LINE1	AVERAGE	002A97	Red: light -> dark, 16 colors	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Item # 6	Current:	GPRINT	LAST			<input type="checkbox"/>	<input checked="" type="checkbox"/>
Item # 7	Average:	GPRINT	AVERAGE			<input type="checkbox"/>	<input checked="" type="checkbox"/>
Item # 8	Maximum:	GPRINT	MAX			<input type="checkbox"/>	<input checked="" type="checkbox"/>

Please confirm

Illustration 14: Create an Aggregate with "Total Similar Data Sources"

The result is shown below. The automatically created total graph items are marked. Please notice, that the graphed item (item#17 and 21) is created as a LINE1.

Graph Template Selection [edit: Aggregate - Traffic - Total Similar Data Sources]

Selected Graph Template
 Choose a graph template to apply to this graph. Please note that graph data may be lost if you change the graph template after one is already applied.

Host
 Choose the host that this graph belongs to.

Graph Item	Data Source	Graph Item Type	CF Type	Item Color		Add
Item # 1	(traffic_in): gandalf Inbound	AREA	AVERAGE	004359	▼ ▲	✘
Item # 2	(traffic_in): Current:	GPRINT	LAST		▼ ▲	✘
Item # 3	(traffic_in): Average:	GPRINT	AVERAGE		▼ ▲	✘
Item # 4	(traffic_in): Maximum:<HR>	GPRINT	MAX		▼ ▲	✘
Item # 5	(traffic_out): gandalf Outbound	AREA	AVERAGE	EACC00	▼ ▲	✘
Item # 6	(traffic_out): Current:	GPRINT	LAST		▼ ▲	✘
Item # 7	(traffic_out): Average:	GPRINT	AVERAGE		▼ ▲	✘
Item # 8	(traffic_out): Maximum:<HR>	GPRINT	MAX		▼ ▲	✘
Item # 9	(traffic_in): 127.0.0.1 Inbound	STACK	AVERAGE	005D57	▼ ▲	✘
Item # 10	(traffic_in): Current:	GPRINT	LAST		▼ ▲	✘
Item # 11	(traffic_in): Average:	GPRINT	AVERAGE		▼ ▲	✘
Item # 12	(traffic_in): Maximum:<HR>	GPRINT	MAX		▼ ▲	✘
Item # 13	(traffic_out): 127.0.0.1 Outbound	STACK	AVERAGE	FFAB00	▼ ▲	✘
Item # 14	(traffic_out): Current:	GPRINT	LAST		▼ ▲	✘
Item # 15	(traffic_out): Average:	GPRINT	AVERAGE		▼ ▲	✘
Item # 16	(traffic_out): Maximum:<HR>	GPRINT	MAX		▼ ▲	✘
Item # 17	(traffic_in): TOTAL Inbound	LINE1	AVERAGE	157419	▼ ▲	✘
Item # 18	(traffic_in): Current:	GPRINT	LAST		▼ ▲	✘
Item # 19	(traffic_in): Average:	GPRINT	AVERAGE		▼ ▲	✘
Item # 20	(traffic_in): Maximum:<HR>	GPRINT	MAX		▼ ▲	✘
Item # 21	(traffic_out): TOTAL Outbound	LINE1	AVERAGE	EA8F00	▼ ▲	✘
Item # 22	(traffic_out): Current:	GPRINT	LAST		▼ ▲	✘
Item # 23	(traffic_out): Average:	GPRINT	AVERAGE		▼ ▲	✘
Item # 24	(traffic_out): Maximum:<HR>	GPRINT	MAX		▼ ▲	✘

Illustration 15: Created Aggregate with "Total Similar Data Sources"

Create an Aggregate Graph off of „95th Percentile“

This is a quite advanced example, touching different features of Aggregate. I selected two graphs, both based on the 95th percentile traffic graph template.

Title
The new Title of the aggregated Graph.

Prefix
A Prefix for all GPRINT lines to distinguish e.g. different hosts.

Graph Type
Use this Option to create e.g. STACKed graphs

Keep Graph Types
 Make it an AREA/STACK Graph
 Make it a LINE1 Graph

GPRINT Totals
Please check required Items of Total Columns

No Totals
 Total Similar Data Sources
 Total All Data Sources

Graph Template Items							
Graph Item	Data Source	Graph Item Type	CF Type	Item Color	Color Template	Skip	Total
Item # 1	Inbound	AREA	AVERAGE	00CF00	Green: dark -> light, 16 colors	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Item # 2	Current:	GPRINT	LAST			<input type="checkbox"/>	<input checked="" type="checkbox"/>
Item # 3	Average:	GPRINT	AVERAGE			<input type="checkbox"/>	<input checked="" type="checkbox"/>
Item # 4	Maximum:<HR>	GPRINT	MAX			<input type="checkbox"/>	<input checked="" type="checkbox"/>
Item # 5	Outbound	LINE1	AVERAGE	002A97	Red: light -> dark, 16 colors	<input type="checkbox"/>	<input type="checkbox"/>
Item # 6	Current:	GPRINT	LAST			<input type="checkbox"/>	<input type="checkbox"/>
Item # 7	Average:	GPRINT	AVERAGE			<input type="checkbox"/>	<input type="checkbox"/>
Item # 8	Maximum:<HR>	GPRINT	MAX			<input type="checkbox"/>	<input type="checkbox"/>
Item # 9	COMMENT: <HR>	COMMENT	AVERAGE			<input checked="" type="checkbox"/>	<input type="checkbox"/>
Item # 10	HRULE: [95:bits:0:max:2]	HRULE	AVERAGE	FF0000	None	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Item # 11	COMMENT: ([95:bits:6:max:2] mbit in+out)	COMMENT	AVERAGE			<input type="checkbox"/>	<input type="checkbox"/>

Please confirm

Illustration 16: Create an Aggregate Graph off of „95th Percentile“

The totaling option is selected as “Total All Data Sources”. So we have to check all required graph items; this makes items#1-4.

But we want to skip the empty COMMENT and the red HRULE.

The result is as follows:

Aggregate - Traffic 95th Percentile - Total All

[*Turn On Graph Debug Mode.](#)

Graph Template Selection [edit: Aggregate - Traffic 95th Percentile - Total All]

Selected Graph Template
 Choose a graph template to apply to this graph. Please note that graph data may be lost if you change the graph template after one is already applied.

Host
 Choose the host that this graph belongs to.

Graph Items [edit: Aggregate - Traffic 95th Percentile - Total All]						Add
Graph Item	Data Source	Graph Item Type	CF Type	Item Color		
Item # 1	(traffic_in): gandalf Inbound	AREA	AVERAGE	004359	⬇ ⬆	✖
Item # 2	(traffic_in): Current:	GPRINT	LAST		⬇ ⬆	✖
Item # 3	(traffic_in): Average:	GPRINT	AVERAGE		⬇ ⬆	✖
Item # 4	(traffic_in): Maximum:<HR>	GPRINT	MAX		⬇ ⬆	✖
Item # 5	(traffic_out): gandalf Outbound	AREA	AVERAGE	EACC00	⬇ ⬆	✖
Item # 6	(traffic_out): Current:	GPRINT	LAST		⬇ ⬆	✖
Item # 7	(traffic_out): Average:	GPRINT	AVERAGE		⬇ ⬆	✖
Item # 8	(traffic_out): Maximum:<HR>	GPRINT	MAX		⬇ ⬆	✖
Item # 9	COMMENT: gandalf ([95:bits:6:max:2] mbit in+out)<HR>	COMMENT	AVERAGE		⬇ ⬆	✖
Item # 10	(traffic_in): 127.0.0.1 Inbound	STACK	AVERAGE	005D57	⬇ ⬆	✖
Item # 11	(traffic_in): Current:	GPRINT	LAST		⬇ ⬆	✖
Item # 12	(traffic_in): Average:	GPRINT	AVERAGE		⬇ ⬆	✖
Item # 13	(traffic_in): Maximum:<HR>	GPRINT	MAX		⬇ ⬆	✖
Item # 14	(traffic_out): 127.0.0.1 Outbound	STACK	AVERAGE	FFAB00	⬇ ⬆	✖
Item # 15	(traffic_out): Current:	GPRINT	LAST		⬇ ⬆	✖
Item # 16	(traffic_out): Average:	GPRINT	AVERAGE		⬇ ⬆	✖
Item # 17	(traffic_out): Maximum:<HR>	GPRINT	MAX		⬇ ⬆	✖
Item # 18	COMMENT: 127.0.0.1 ([95:bits:6:max:2] mbit in+out)<HR>	COMMENT	AVERAGE		⬇ ⬆	✖
Item # 19	(traffic_in): ALL ITEMS	LINE1	AVERAGE	157419	⬇ ⬆	✖
Item # 20	(traffic_in): Current:	GPRINT	LAST		⬇ ⬆	✖
Item # 21	(traffic_in): Average:	GPRINT	AVERAGE		⬇ ⬆	✖
Item # 22	(traffic_in): Maximum:<HR>	GPRINT	MAX		⬇ ⬆	✖

Illustration 17: Created Aggregate Graph „95th Percentile“

Please again notice, that the COMMENT now has a <HR>, even if the graph doesn't.

Create a Re-ordered Aggregate Graph

Let's go back to the basic Traffic Graph example. In chapter “Color Templates Usage“, you've seen how to create a basic Traffic Aggregate. The sequence of data results of “concatenating” the basic graphs:

- Graph 1, Input
- Graph 1, Output
- Graph 2, Input
- Graph 2, Output

You may prefer something like:

- Graph 1, Input
- Graph 1, Output
- Graph 2, Input
- Graph 2, Output

This is how you do it:

Create Aggregate Graph
[\[Click here for Help\]](#)

Are you sure you want to aggregate the following graphs?

- gandalf - Traffic - eth0
- Localhost - Traffic - eth0

The following data sources are in use by these graphs:

- gandalf - Traffic - 192.168.1.53 - eth0
- Localhost - Traffic - 192.168.1.53 - eth0

Title
The new Title of the aggregated Graph.

Prefix
A Prefix for all GPRINT lines to distinguish e.g. different hosts.

Graph Type
Use this Option to create e.g. STACKed graphs.

Keep Graph Types
 Make it an AREA/STACK Graph
 Make it a LINE1 Graph

GPRINT Totals
Please check required Items of Total Columns.

No Totals
 Total Similar Data Sources
 Total All Data Sources

Reorder Type
Reordering of Graphs.

Graph Template Items							
Graph Item	Data Source	Graph Item Type	CF Type	Item Color	Color Template	Skip	Total
Item # 1	Inbound	AREA	AVERAGE	00CF00	Green: dark -> light, 16 colors	<input type="checkbox"/>	<input type="checkbox"/>
Item # 2	Current:	GPRINT	LAST			<input type="checkbox"/>	<input type="checkbox"/>
Item # 3	Average:	GPRINT	AVERAGE			<input type="checkbox"/>	<input type="checkbox"/>
Item # 4	Maximum:<HR>	GPRINT	MAX			<input type="checkbox"/>	<input type="checkbox"/>
Item # 5	Outbound	AREA	AVERAGE	002A97	Red: light -> dark, 16 colors	<input type="checkbox"/>	<input type="checkbox"/>
Item # 6	Current:	GPRINT	LAST			<input type="checkbox"/>	<input type="checkbox"/>
Item # 7	Average:	GPRINT	AVERAGE			<input type="checkbox"/>	<input type="checkbox"/>
Item # 8	Maximum:<HR>	GPRINT	MAX			<input type="checkbox"/>	<input type="checkbox"/>

Please confirm

Illustration 18: Create a Graph with Graph Items reordered

The result looks like:

Graph Template Selection [edit: Aggregate - Traffic - eth0]

Selected Graph Template
 Choose a graph template to apply to this graph. Please note that graph data may be lost if you change the graph template after one is already applied.

Host
 Choose the host that this graph belongs to.

Graph Items [edit: Aggregate - Traffic - eth0]

Graph Item	Data Source	Graph Item Type	CF Type	Item Color		Add
Item # 1	(traffic_in): gandalf Inbound	AREA	AVERAGE	004359	↕	✖
Item # 2	(traffic_in): Current:	GPRINT	LAST		↕	✖
Item # 3	(traffic_in): Average:	GPRINT	AVERAGE		↕	✖
Item # 4	(traffic_in): Maximum: <HR>	GPRINT	MAX		↕	✖
Item # 5	(traffic_in): 127.0.0.1 Inbound	STACK	AVERAGE	005D57	↕	✖
Item # 6	(traffic_in): Current:	GPRINT	LAST		↕	✖
Item # 7	(traffic_in): Average:	GPRINT	AVERAGE		↕	✖
Item # 8	(traffic_in): Maximum: <HR>	GPRINT	MAX		↕	✖
Item # 9	(traffic_out): gandalf Outbound	AREA	AVERAGE	EACC00	↕	✖
Item # 10	(traffic_out): Current:	GPRINT	LAST		↕	✖
Item # 11	(traffic_out): Average:	GPRINT	AVERAGE		↕	✖
Item # 12	(traffic_out): Maximum: <HR>	GPRINT	MAX		↕	✖
Item # 13	(traffic_out): 127.0.0.1 Outbound	STACK	AVERAGE	FFAB00	↕	✖
Item # 14	(traffic_out): Current:	GPRINT	LAST		↕	✖
Item # 15	(traffic_out): Average:	GPRINT	AVERAGE		↕	✖
Item # 16	(traffic_out): Maximum: <HR>	GPRINT	MAX		↕	✖

Illustration 19: Result of Reordered Graph Items

A Word on CDEFs

Well, until now everything's seems to be quite straightforward. CDEFs were already mentioned in Chapter “Changing the Default Traffic Graph Templates“. What's wrong with them?

Well, when aggregating graph items, this is more or less beading them one after another, mostly just as they are in the selected graphs. Then, there is some color magic, skipping code, prefixing text and <HR> stuff.

But totaling is worse, much worse. The graph items themselves do not require any change. But the totaling line requires a CDEF that holds something like “TOTAL_ALL_DATA_SOURCES_NODUPS” or “SIMILAR_DATA_SOURCES_NODUPS” where currently “CURRENT_DATA_SOURCE” is listed.

So this plugin generates new CDEFs. It fetches the CDEF from the original graph item and resolves it to plain text. Then, depending on the totaling action selected, “CURRENT_DATA_SOURCE” is replaced.

Now we have a new CDEF. To avoid storing duplicate CDEFs, all existing CDEFs now are scanned and compared to the new CDEF. On match, the existing CDEF is used. If no match is found, the new CDEF is stored.

The title of the new CDEF is taken from the original CDEF, but a string is prepended. Either “_AGGREGATE ALL “ or “_AGGREGATE SIMILAR” is used to distinguish. The underscore is used for sake of sorting them to the bottom of the CDEF list.

Please find attached the list of CDEFs on my system after having created all the examples from above.

CDEF's	Add
Name	
kPa (kilo Pascal) to hPa (Hekto Pascal)	x
Make Per 5 Minutes	x
Make Stack Negative	x
Make Stack Negative, turn Bytes into Bits	x
Multiply by 1024	x
Total All Data Sources	x
Total All Data Sources, Multiply by 1024	x
Trendline 2hrs	x
Turn Bytes into Bits	x
_AGGREGATE ALL Turn Bytes into Bits	x
_AGGREGATE SIMILAR Make Stack Negative, turn Bytes into Bits	x
_AGGREGATE SIMILAR Turn Bytes into Bits	x

Illustration 20: CDEFs

This is “_AGGREGATE ALL Turn Bytes into Bits”

CDEF's [edit: _AGGREGATE ALL Turn Bytes into Bits]

Name
A useful name for this CDEF.

cdef=ALL_DATA_SOURCES_NODUPS, 8, *

CDEF Items		Add
Item	Item Value	
Item #1	Custom String: ALL_DATA_SOURCES_NODUPS, 8,*	↓ ↑ ✕

Illustration 21: AGGREGATE ALL Turn Bytes into Bits

Now “_AGGREGATE SIMILAR Make Stack negative, turn Bytes into Bits”

CDEF's [edit: _AGGREGATE SIMILAR Make Stack Negative, turn Bytes into Bits]

Name
A useful name for this CDEF.

cdef=SIMILAR_DATA_SOURCES_NODUPS, -8, *

CDEF Items		Add
Item	Item Value	
Item #1	Custom String: SIMILAR_DATA_SOURCES_NODUPS, 8,*	↓ ↑ ✕

Illustration 22: AGGREGATE SIMILAR Make Stack negative, turn Bytes into Bits

Last “_AGGREGATE SIMILAR Turn Bytes into Bits”

CDEF's [edit: _AGGREGATE SIMILAR Turn Bytes into Bits]

Name
A useful name for this CDEF.

cdef=SIMILAR_DATA_SOURCES_NODUPS, 8, *

CDEF Items		Add
Item	Item Value	
Item #1	Custom String: SIMILAR_DATA_SOURCES_NODUPS, 8,*	↓ ↑ ✕

Illustration 23: AGGREGATE SIMILAR Turn Bytes into Bits

Caveat when using different Graph Templates

In previous version of Aggregate, there was no verification of graph templates used. This may lead to buggy graphs, because always the first graph is used as a model for all other graphs. Thus, if the first graph as eight items (default traffic graph template) and the second one has eleven (95th percentile traffic template), funny things will happen.

To prevent this, Aggregate now checks the templates used for the graphs. See example below.

The screenshot shows the 'Graph Management' interface. At the top, there are search filters for 'Host' (set to 'Any') and 'Template' (set to 'Any'), along with 'go' and 'clear' buttons. Below this is a 'Rows' dropdown set to '30 Rows' and a search input field. The main area is a table with columns: 'Graph Title**', 'ID', 'Template Name', 'Size', and a checkbox. The table lists 13 graphs, including 'gandalf - CPU Usage', 'gandalf - Load Average', 'gandalf - Memory Usage', and several 'gandalf - Traffic - eth0' entries with different templates. A context menu is open over the table, listing actions like 'Delete', 'Change Graph Template', 'Change Host', 'Reapply Suggested Names', 'Resize Graphs', 'Duplicate', 'Convert to Graph Template', 'Create Aggregate Graph', and 'Place on a Tree (Default Tree)'. The 'Create Aggregate Graph' option is highlighted. Below the table, there is a 'Choose an action:' dropdown set to 'Delete' and a 'go' button.

Graph Title**	ID	Template Name	Size	
gandalf - CPU Usage	23	ucd/net - CPU Usage	120x500	<input type="checkbox"/>
gandalf - Load Average	24	ucd/net - Load Average	120x500	<input type="checkbox"/>
gandalf - Memory Usage	25	ucd/net - Memory Usage	120x500	<input type="checkbox"/>
gandalf - Traffic - eth0	26	Interface - Traffic (bits/sec)	120x500	<input type="checkbox"/>
gandalf - Traffic - eth0	27	Interface - Traffic (bits/sec, 95th Percentile)	120x500	<input checked="" type="checkbox"/>
gandalf - Traffic - eth0	28	Interface - Traffic (bits/sec, Total Bandwidth)	120x500	<input type="checkbox"/>
Localhost - Load Average	2	Unix - Load Average	120x500	<input type="checkbox"/>
Localhost - Logged in Users	3	Unix - Logged in Users		<input type="checkbox"/>
Localhost - Memory Usage	1	Linux - Memory Usage		<input type="checkbox"/>
Localhost - Processes	4	Unix - Processes		<input type="checkbox"/>
Localhost - Traffic - eth0	33	Interface - Traffic (bits/sec)		<input checked="" type="checkbox"/>
Localhost - Traffic - eth0	34	Interface - Traffic (bits/sec, 95th Percentile)		<input type="checkbox"/>
Localhost - Traffic - eth0	35	Interface - Traffic (bits/sec, Total Bandwidth)		<input type="checkbox"/>

Illustration 24: Wrong Graph Selection

In this example, I purposely made a mistake. The result screen will be as follows

The screenshot shows a dialog box titled 'Create Aggregate Graph'. The main content is a red error message: 'The Graphs chosen for AGGREGATE refer to different Graph Templates. This will break AGGREGATE'. Below the message, there is a list of two selected graphs: 'Interface - Traffic (bits/sec, 95th Percentile)' and 'Interface - Traffic (bits/sec)'. The text 'Please click NO' is displayed in red, followed by 'and choose different Graphs'. At the bottom right, there are 'no' and 'yes' buttons.