Cacti-ReportIt v0.6.1

A small introduction to the use of ReportIt

Dear Cacti Community,
2.5 years ago I wrote my thesis at the University of Applied Sciences**,** Cologne**,** and I never thought that this project would become one of my hobbies.

This exercise concentrates on the steps, which are necessary to set up a report by solving a typical problem:

> *"I have to report each month over utilized network links to our customer. My threshold value is 80%". How can I solve that issue using ReportIt?*

From my point of view it's a good way to get an overview about ReportIt even though not all available flags and configuration parameters will be discussed within this script.

Thanks to all those who have spent a lot of time to improve ReportIt! This exercise is long overdue, so I braced myself up to fulfill your wish for help. I'll extend it from time to time with some new topics.

Best regards
-Andreas-

Purpose

ReportIt is designed as a plugin for Cacti, the RRDtool-based graphing solution. It provides the fast creation of customized reports with thousands of data items, self-defined measurands and variables - particularly with regard to individual working days and working hours.

Features

- Definition of individual report templates by using measurands and variables in a mathematical way
- Definition of report configurations depending on report templates and with different data items
- Individual configuration of working days, working time, time zone and subhead per data item
- Scheduled reporting with sliding time frames
- Rounding with binary or decimal SI-Prefixes
- Export to CSV and XML
- Different ways of connecting RRDtool
- Working in local time supports change to DST and vice versa
- Auto dispatch of scheduled reports via email
- Creation of top 10 charts
- Report history

Installation

The installation of ReportIt is simular to other plugins based on Plugin Architecture 1.x, so we only have to extract the archive file to Cacti's plugin folder.
Furthermore it is necessary to activate this plugin by editing one of the following files.

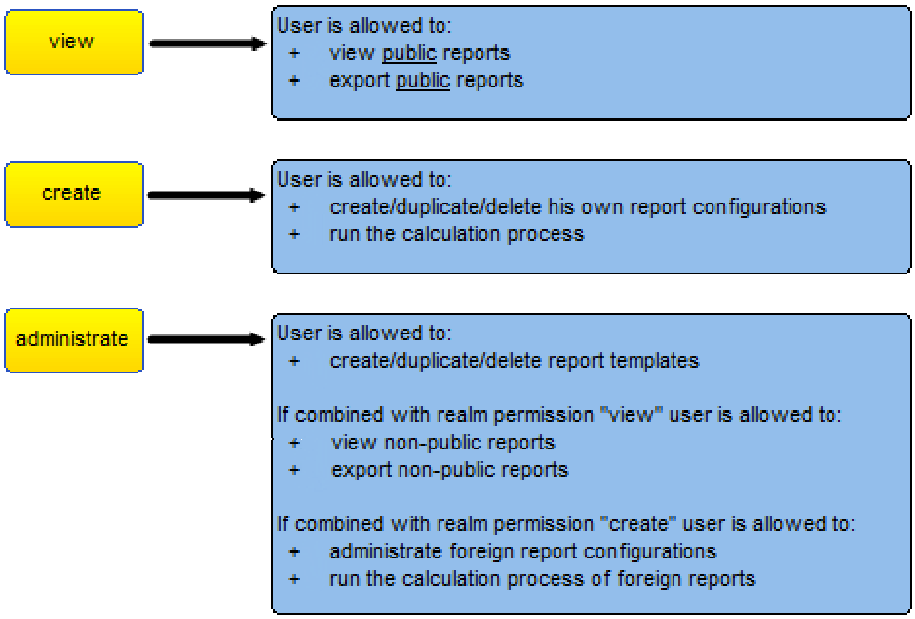
Cacti 0.8.6x: /cacti/include/config.php
Cacti 0.8.7x: /cacti/include/global.php

Near the top of the right configuration file we will find the section where plugins can be registered:

```
$plugins     = array();
//$plugins[] = 'thold';
$plugins[]   = 'settings';
$plugins[]   = 'reportit';
```

User Groups:

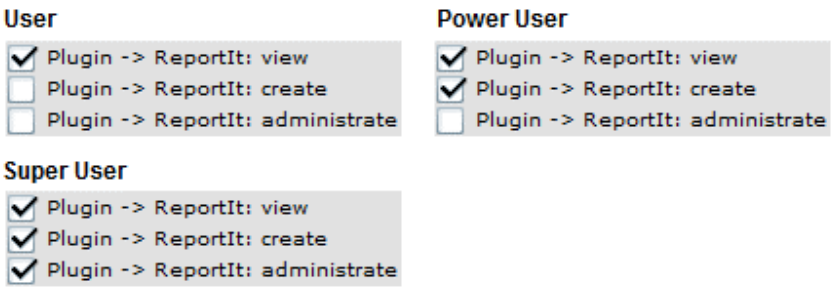
The user rights can be defined by the following realm permissions under Cacti's user management:



Please note that the realm permissions will be renamed in release 0.7.0:

“Power User Configuration”	becomes “administrate”
“Owner Configuration“	becomes “create“
“View“	becomes „view“

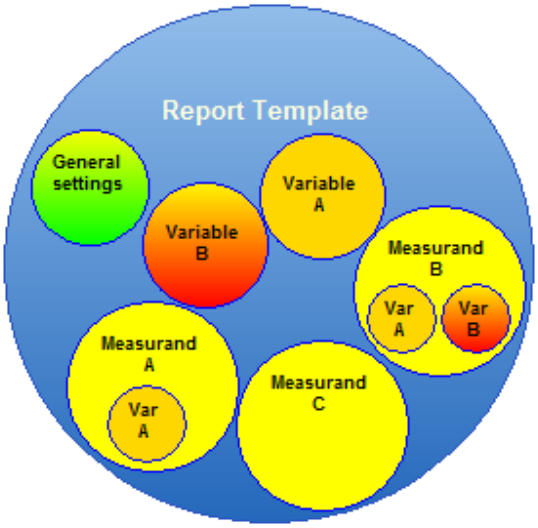
Theoretically this allows creating 7 different types of user accounts. However, for a typical use of ReportIt (in a multi-user environment) the following combinations are the most interesting:



Please note that in this case a super user has the right to create report templates, which requires a sufficient knowledge about the internal structure of RRD files.

What is a report template?

A report template is the base plate for creating reports. It contains the definition of measurands, which should be displayed in every derived report. Furthermore it's allowed to use variables within the definition of a measurand, which have been declared before.



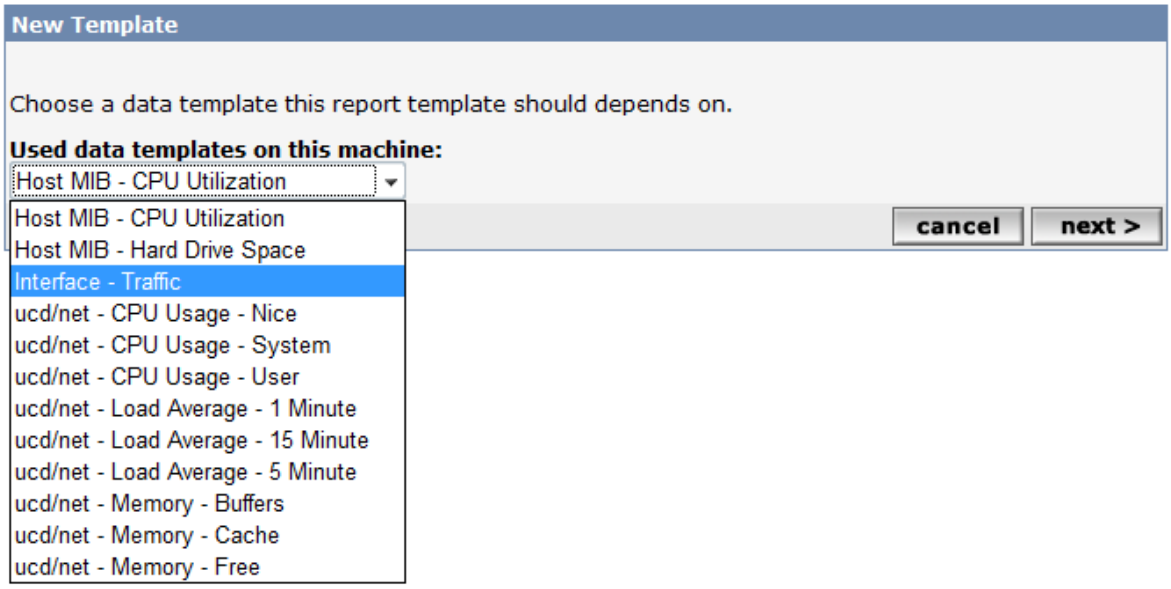
This allows us to create a lot of different templates for several scenarios like the analysis of "CPU Utilization", "Interface Traffic" and so on. Honestly, creating new report templates is not so easy, because it is indispensable to have a fundamental knowledge about RRDtool and your environment as well. That's the point where a lot of Cacti users begin to struggle and the reason why it is important to concentrate on the basics first.
For this very reason it is advisable that a simple user should not have access to that section.

What is a report configuration?

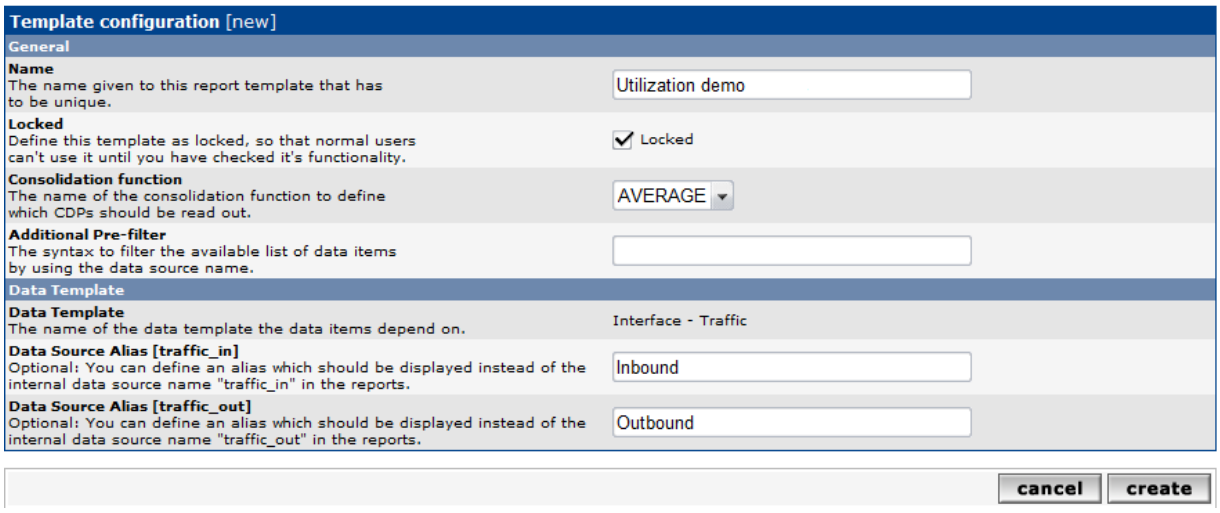
A report configuration combines a report template with the right data items (e.g. network interfaces), which should be part of the report. Therefore a power user has the permission to select a template, to define the reporting period, to set up variables (defined within the report template) and to add several data items besides changing a bunch of additional settings.
ReportIt supports different types of users and makes a distinction between different ownerships. The creator of a report configuration becomes automatically the owner of it and is entitled to make it public or not. Additionally it’s possible to set up office hours, time zones, email recipients and so on.

Let's go! We want to create a report template!

After we have ensured the correctness of our permissions we will find new entries in Cacti's console. At first we take a look at the section called "Templates" and we select "Report Templates".
Now we have to fill up the empty table with our first report template. A simple click on "Add" in the right upper corner opens the dialogue box. As you can see below ReportIt offers us a lot of data templates, which are all in use. We choose data template "Interface Traffic" from the drop down list.



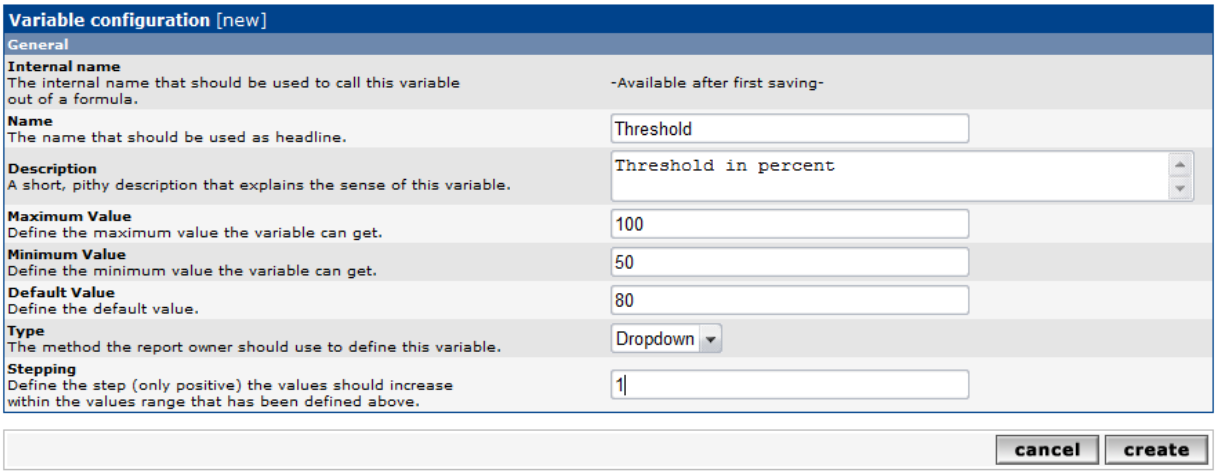
With a short click on "next" we arrive an individual configuration page where we can name our new template. Until we have not finished the whole template configuration including a minimum of one new measurands, the template will be automatically locked. So it will be unusable for power users during that time.



As we know RRDtool supports several functions to consolidate measured values. Excluding ReportIt 0.7.0 it becomes necessary that we choose which CDPs (Consolidated Data Points) should be readout during the calculation process. (With the upcoming release this selection will be shifted to the measurand configuration to increase the flexibility)

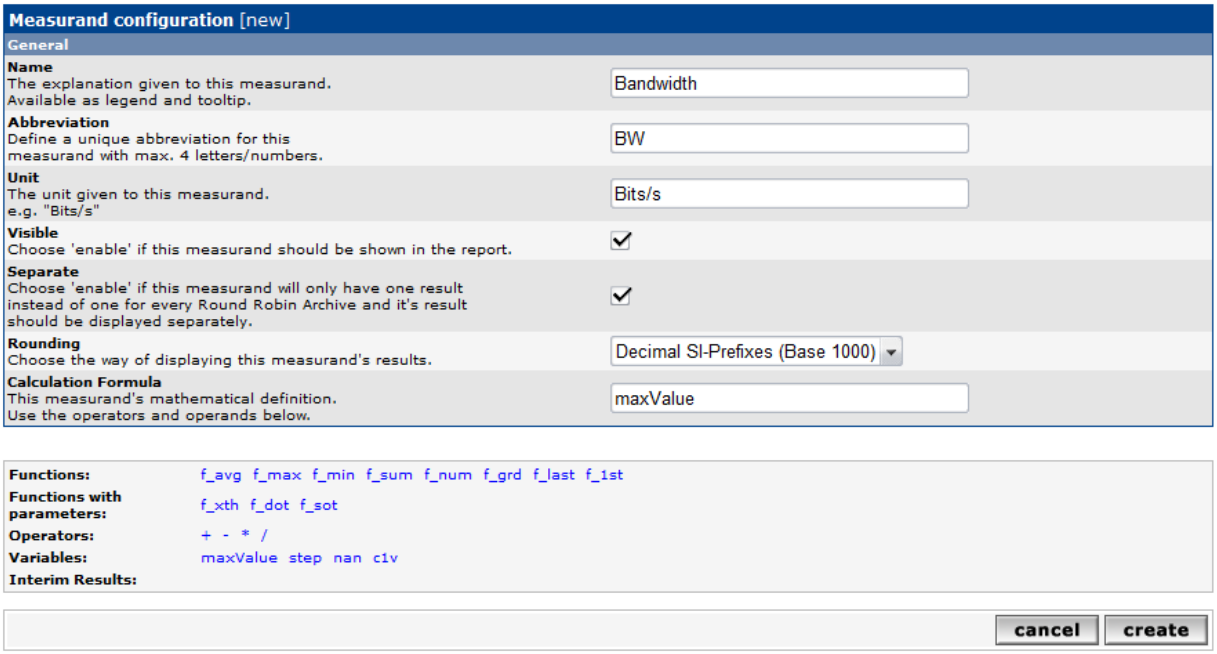
Under “Data Template” we see the data template chosen within the last step and the included data source items. The names of these items will be used automatically within the report. In certain circumstances it will make sense we define an aliases instead of using the original name.

After fulfilling the form as shown above and a click on “create”, two new (blue) links will appear in the right upper corner. We want to create directly a flexible template instead of using a static threshold value of 80%. So we select "Create a new variable" to create our first variable.
This variable will define the threshold value selectable for all power users (and super users as well) within their report configurations. Therefore we want to offer them a drop-down list that shows values from 50 to 100 % with a step size of 1. The description will explain power users the sense of the variable.

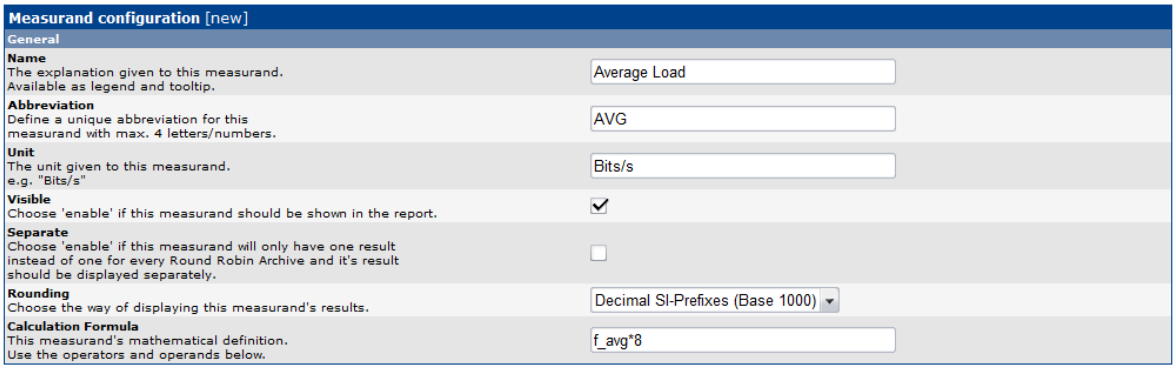


With the successful creation of that variable we can see the list with all defined variables for our report template. Okay, we have only a single one till now, but we can take a look at the internal (unique) name given for it (e.g. "c1v"). We will need this information later, but we do not have to write it down. ☺
By using the yellow link "Utilization demo" shown in the table header we will get back to the configuration of our template. Let’s create our first measurand that will show us the bandwidth of every interface. Therefore we select the second link called “Create a new measurand”.
A measurand will be calculated automatically for every data source defined in Cacti’s data template. In this exercise it will return two results per data item: one for the inbound and one for the outbound traffic. So it becomes important to find a good name and a better unique abbreviation, because that abbreviation will allow us to address these interim results within the calculation process of subsequent measurands.
ReportIt also provides the possibility of creating auxiliary calculations, which can be

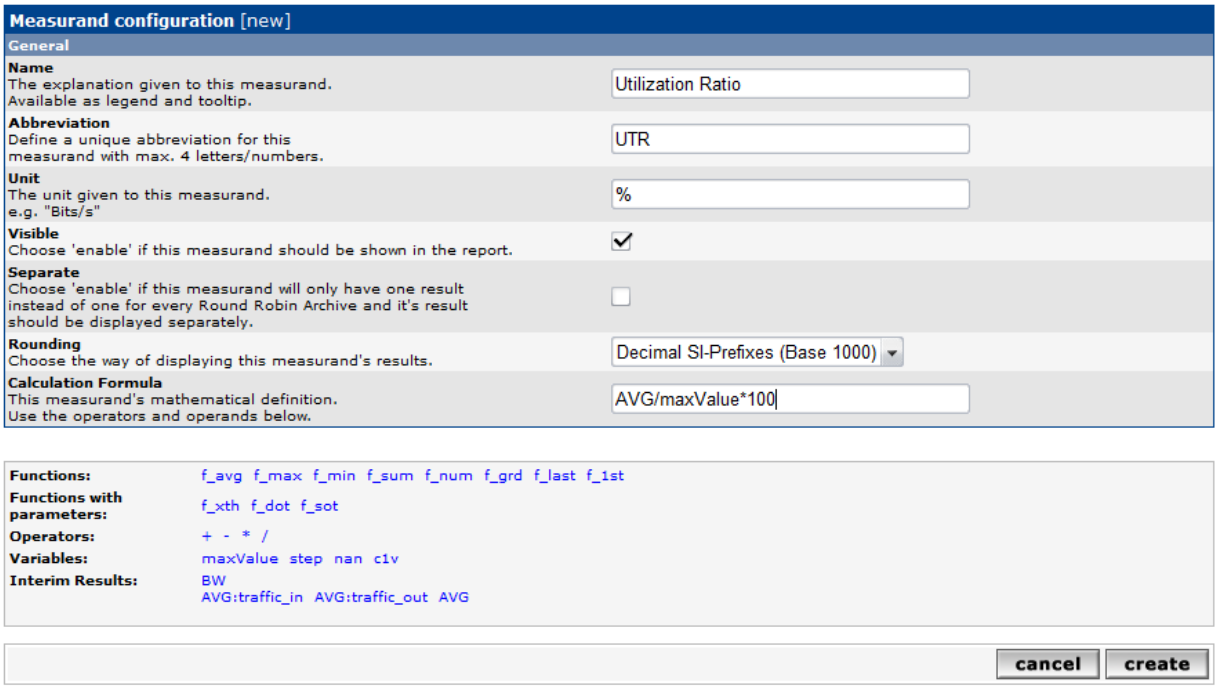
hidden within the report through the deactivation of the “visible” flag. If we need only a single result instead of one for every data source then we have to select “separate”.



The calculation formula describes in a “pseudo” - mathematical way what ReportIt has to do with the measured values readout of the RRD file. Therefore we are allowed to combine functions, constants and variables with operators. Don’t be reluctant to improve the readability of your formula by using round brackets! And moving the pointer over the different functions will display us more information about it. ☺
Clicking on these items will automatically add them to our calculation formula. After we fulfilled all fields and clicked on “create” we will see a list of defined measurands for your report template. The “Add” link allows proceeding with another new measurand.

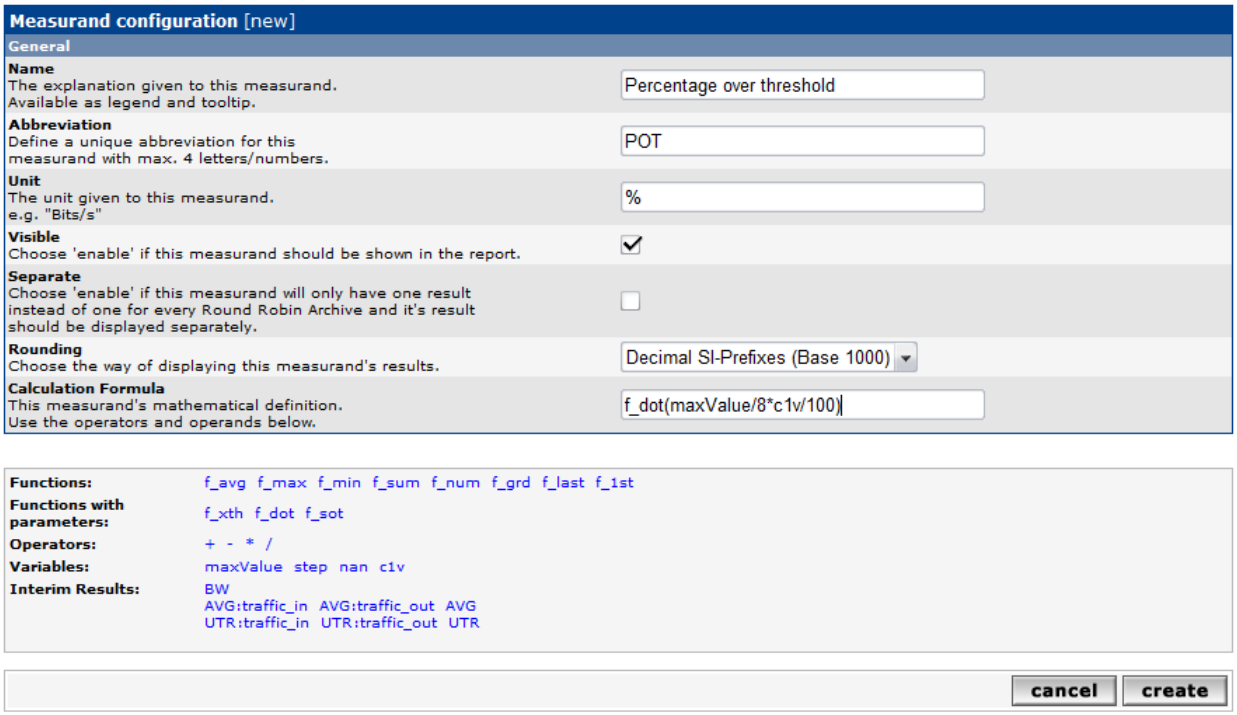


The second measurand should display the average load of every data source, which will be “traffic _in” (alias Inbound) and “traffic_out” (alias Outbound) in our case:
"f_avg*8" means that ReportIt has to calculate the average of all valid measured values per data source during a reporting period. As you know routers use to count "Bytes/s", instead of "Bits/s". So we have to multiply it with 8 being inline with our traffic graphs.

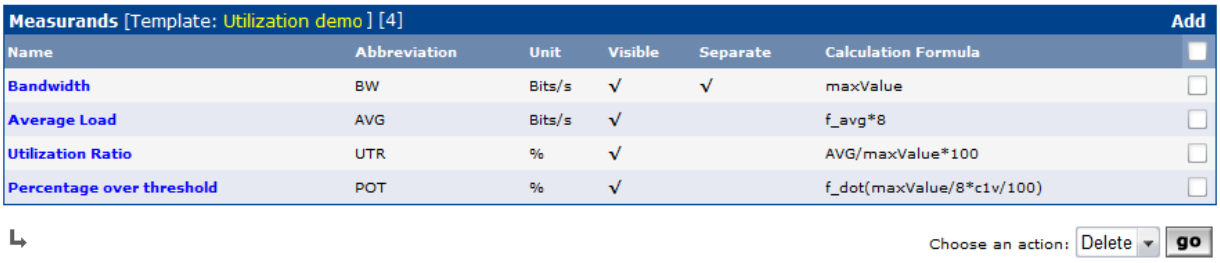


Here comes the third measurand that should display the "Utilization Ratio. Take a look at the bottom of the screenshot. Did you recognize the variable we have defined at the beginning? We will use it soon, but we have to concentrate on the interim results first. ☺
This plugin permits us to bring back into use, what have been calculated before: Using the abbreviation of another measurand within the calculation formula instructs ReportIt to fill in automatically the corresponding result per data source. If the calculation of that older measurand will only return a single result (We remember the separate flag!), then this one will be filled in. Furthermore it can be very helpful to address directly these results returned per data source. For example we can calculate the sum of the averaged inbound and outbound traffic with a simple “AVG:traffic_in+AVG:traffic_out”.
Last but not least we should get back to the sense of that measurand.
This measurand will return separately the averaged utilization ratio of inbound and outbound, which we have during the reporting period.

Okay, let's create our last and most important measurand "Percentage over threshold" or “POT” for short. So, what does this mean? It will reveal how many percent of our business time was the threshold for inbound and outbound exceeded during the reporting period. That sounds complicated.
ReportIt supports working hours within a report configuration. The default is always set to 24 hours, but e.g. we use to work for 8 hours. So if we created a report over the last month with a “POT” of 60%, then we would know that 60% of our working hours the interface utilization was over the threshold we’ve defined (e.g. 90% of max bandwidth). With 8 working hours, the guys of our district office could not work properly for around 4,8 hours per business day. In that case we should ask the upper management for money to increase the bandwidth of our WAN link or we have to find the guy who tries to backup the Internet.



As you see above there's our variable used within the calculation formula and with a click on “create” we will get back to the overview of our measurands. Click once again on the yellow link and disable the checkbox "locked" within the template configuration. Cool! Now we finished the most difficult part!

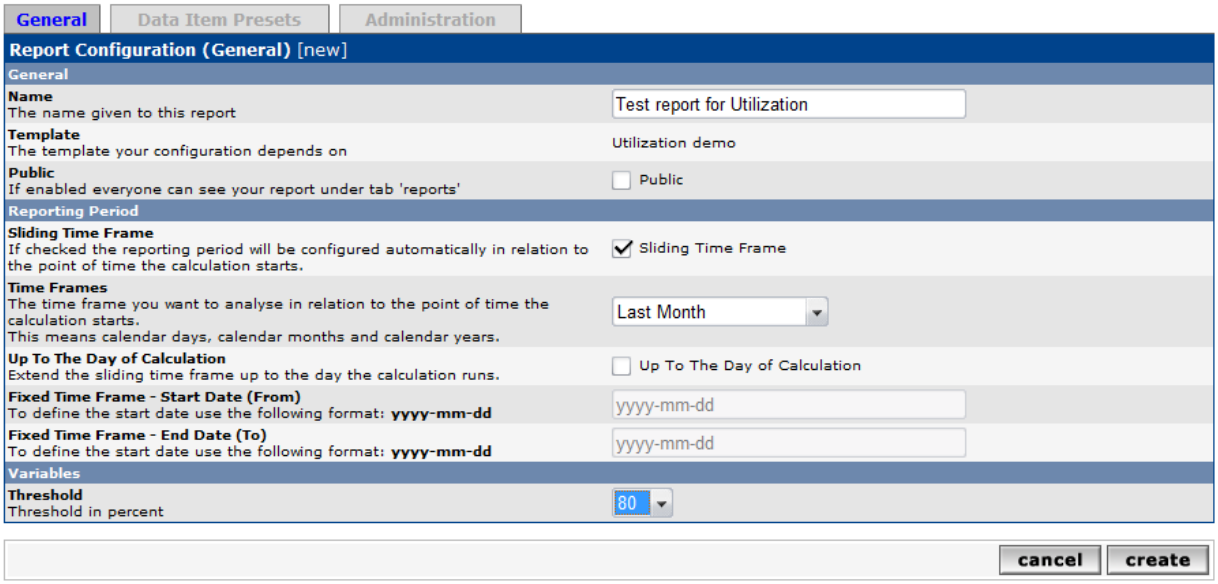


Come on! Let's set up a new report configuration:

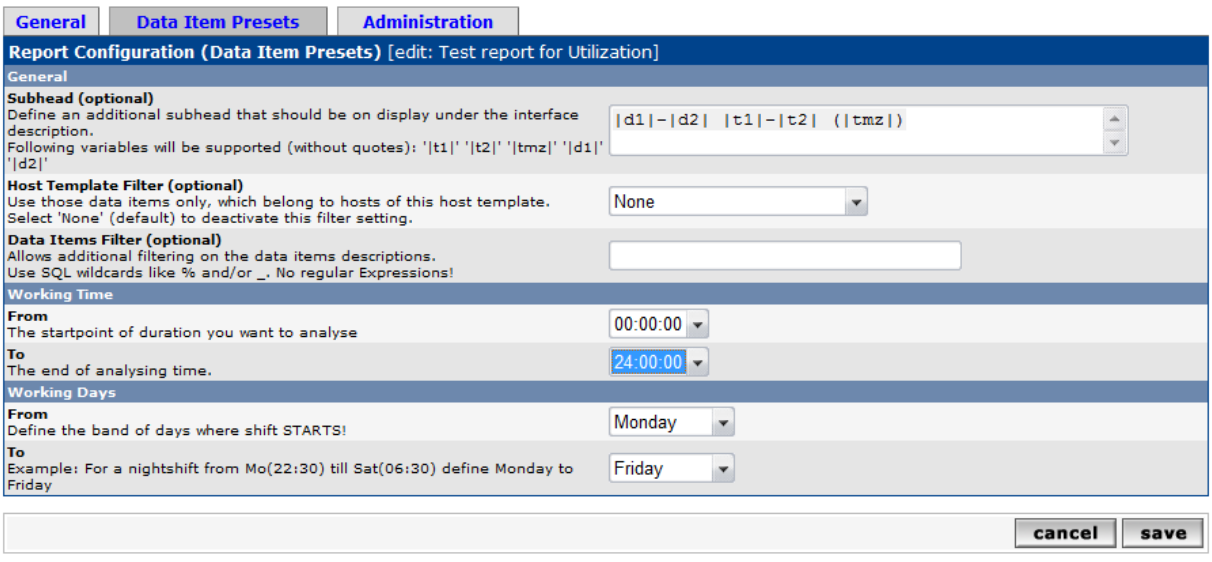
At first we select “Report Configuration” under Cacti’s Console to get an overview of all defined report configuration. The table is empty so we click on “Add” to fill it up now.
Within the next dialogue box we are requested to select the report template we would like to use. We choose the report template "Utilization demo" from the drop down list and go on with “next”.
After we typed in a name, we have to decide if our report should be public or restricted.

The reporting period can be divided into two different types: Using a sliding time frame means that ReportIt automatically calculates the start and the end date in relation to the predefined time frame selected by us. This is very useful if you want to schedule the report. The second type allows us to define a static time frame.

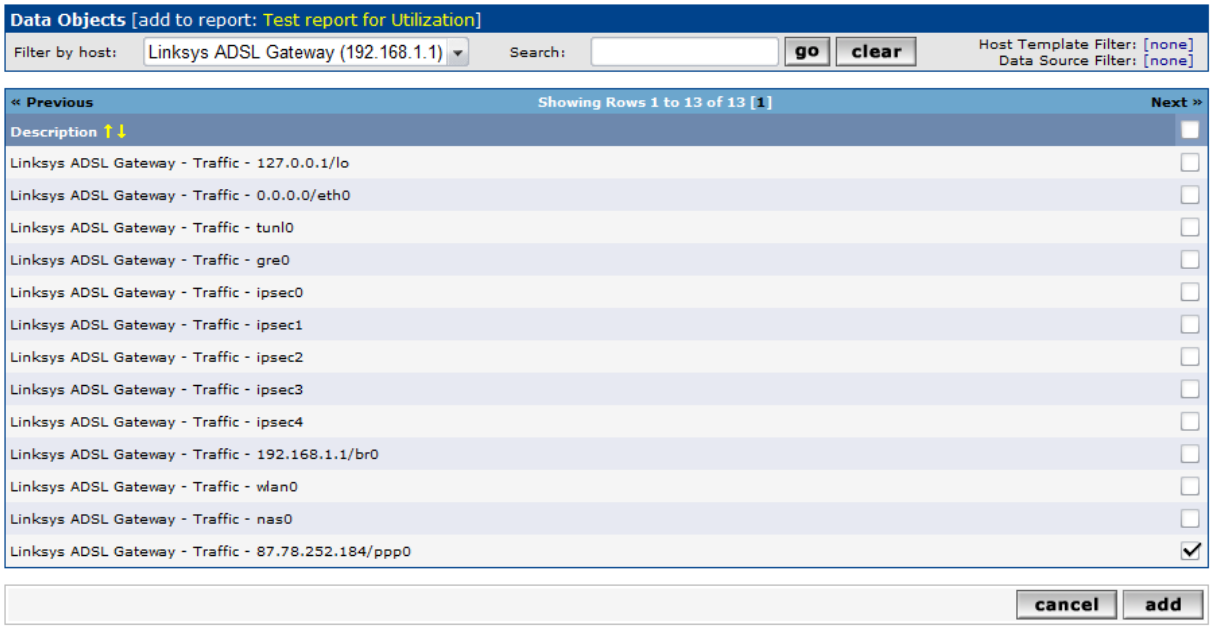
The threshold variable enters the stage at the end and she's pre-configured to 80% as requested.



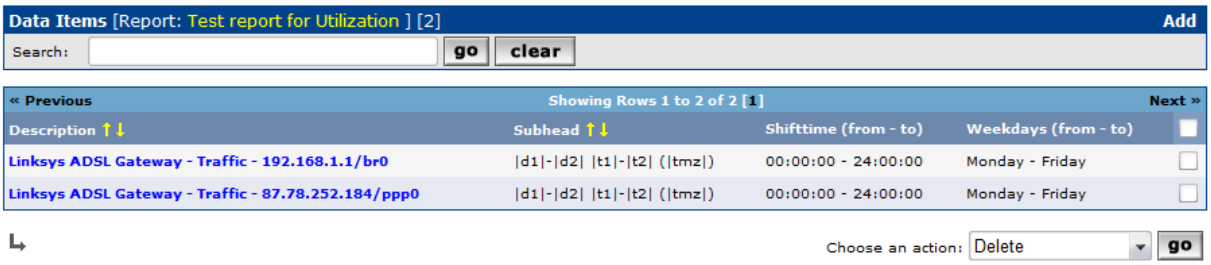
After saving our settings for the first time the other tabs will be activated automatically. Now we choose the second tab called "Data Item Presets" to define presets, which will be used to pre-configure automatically new data items (here we've network interfaces) for this report.



Maybe we are not interested in the data traffic over a weekend, because a district office will be opened only on weekdays. If there are no backup jobs running at night it might make sense to reduce our working time. Using the whole day instead will distort the results in that case, because the threshold value cannot be exceeded at night under these circumstances. We should keep this in mind!



Additional information of a data item can be display within the subhead. Now we have to add some data items: With a click on "Add data items" in the right upper corner we will get an overview of the network interfaces. All of them are matching the data template used within our report template.

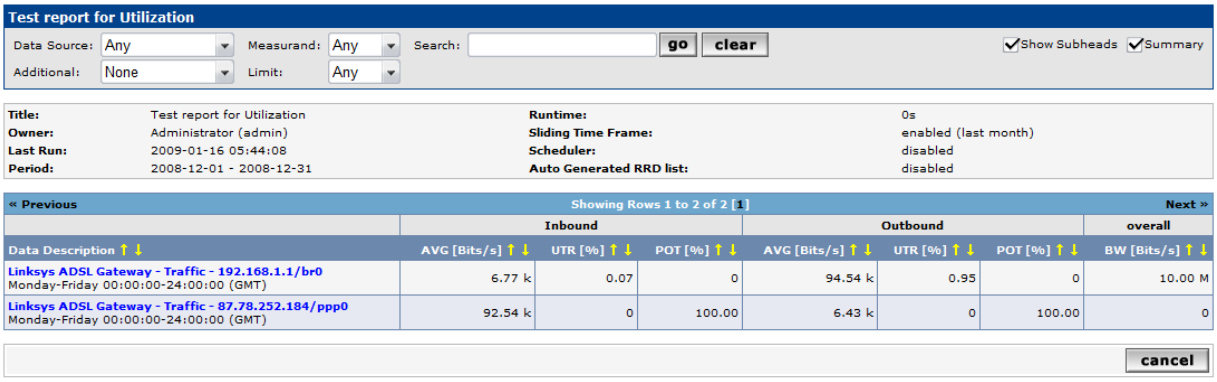


Having all interesting interfaces added we can get a list of all selected data items with a short click on “cancel”. To edit the working days and working time individually we can select the name of the interface.

Mmmh...We created a report configuration and added some pre-configured data items. Let's go! We are keen on seeing some results!
So we change to section “Report Configurations” once again, where we select our report configuration and choose “Run Report” from the drop-down list. Go! ☺

Perfect! ReportIt has nothing to grumble about and we go on with a click on "view".

Here we have our report:
We move the mouse over the abbreviations of the measurands to get a tool tip with their description.



Test report for Utilization

Data Source: Any | Measurand: Any | Search: | go | clear | Show Subheads | Summary
Additional: None | Limit: Any

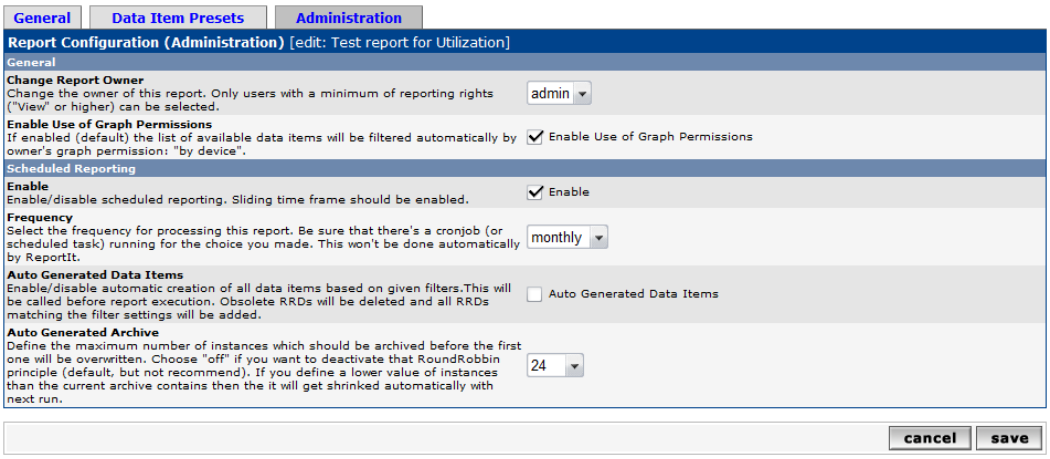
Title:	Test report for Utilization	**Runtime:**	0s
Owner:	Administrator (admin)	**Sliding Time Frame:**	enabled (last month)
Last Run:	2009-01-16 05:44:08	**Scheduler:**	disabled
Period:	2008-12-01 - 2008-12-31	**Auto Generated RRD list:**	disabled

« Previous — Showing Rows 1 to 2 of 2 [1] — Next »

	Inbound			Outbound			overall
Data Description	AVG [Bits/s]	UTR [%]	POT [%]	AVG [Bits/s]	UTR [%]	POT [%]	BW [Bits/s]
Linksys ADSL Gateway - Traffic - 192.168.1.1/br0 Monday-Friday 00:00:00-24:00:00 (GMT)	6.77 k	0.07	0	94.54 k	0.95	0	10.00 M
Linksys ADSL Gateway - Traffic - 87.78.252.184/ppp0 Monday-Friday 00:00:00-24:00:00 (GMT)	92.54 k	0	100.00	6.43 k	0	100.00	0

cancel

Very interesting! Can we explain why POT stays at 100% in the second row? Take a look at the bandwidth. There's no “ifspeed” parameter available and the maximum value is configured to zero within Cacti.
Okay, we configured a report, we have seen results, but we do not want to run it manually (and old reports should be saved in an archive automatically). For this purpose we can activate a feature called “Auto Archiving” within the global configuration of that Plugin. Therefore we go to Cacti’s global settings and select the tab called “Reports”.
After that we edit our report configuration and activate “Scheduled Reporting” within the admin tab. Frequency has to be set to “monthly”. Under “Auto generated Archive” we use the possibility to define the maximum size of our report archive. Set to “24” means that ReportIt has to save a maximum of 24 report instances before the oldest one will be overwritten automatically after two years.



General | Data Item Presets | Administration

Report Configuration (Administration) [edit: Test report for Utilization]

General

Change Report Owner
Change the owner of this report. Only users with a minimum of reporting rights ("View" or higher) can be selected. — admin

Enable Use of Graph Permissions
If enabled (default) the list of available data items will be filtered automatically by owner's graph permission: "by device". — Enable Use of Graph Permissions

Scheduled Reporting

Enable
Enable/disable scheduled reporting. Sliding time frame should be enabled. — Enable

Frequency
Select the frequency for processing this report. Be sure that there's a cronjob (or scheduled task) running for the choice you made. This won't be done automatically by ReportIt. — monthly

Auto Generated Data Items
Enable/disable automatic creation of all data items based on given filters.This will be called before report execution. Obsolete RRDs will be deleted and all RRDs matching the filter settings will be added. — Auto Generated Data Items

Auto Generated Archive
Define the maximum number of instances which should be archived before the first one will be overwritten. Choose "off" if you want to deactivate that RoundRobbin principle (default, but not recommend). If you define a lower value of instances than the current archive contains then the it will get shrinked automatically with next run. — 24

cancel | save

Now there is only a scheduled task missing that executes our calculation automatically.
Therefore the configuration depends on the OS running at your server!
If it executes the following command all monthly reports will be recalculated:
php <path_to_the_reportit_folder>\runtime.php -m

e.g. "php c:\Apache2\htdocs\cacti\plugins\reportit\runtime.php -m"

We can leave the parameter away to see all features of that CLI script, but I will explain them in a later article. ☺

After the scheduled task has run a similar message can be found in the Cacti log: