

SolarWinds Technical Reference

Understanding Orion Report Writer

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This paper examines how Reports work in SolarWinds Orion NPM and related NPM modules. It also includes information on building reports and understanding the Report Writer interface.

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Orion Reporting

Orion gives you the option of using built-in reports or creating custom reports. More than one hundred built-in reports are available in Orion NPM. These reports allow you to access and distribute tabular and chart-based reports on a variety of information, such as top N utilization for interfaces, memory CPU, NetFlow top N, applications, inventory, compliance, node status, events, and virtual servers.

The Orion Report Writer is used for creating custom reports or for applying or modifying built-in reports. Report Writer allows the user to select report parameters, using the Report Writer GUI, or enter a complete SQL query. When the GUI is used, a SQL query is created in the background. This query can be viewed for all reports, but can only be edited in custom SQL reports. Both built-in reports and Report Writer-created reports are executed by querying the Orion SQL database, giving unfettered access to any data stored in the database.

Reporting Components

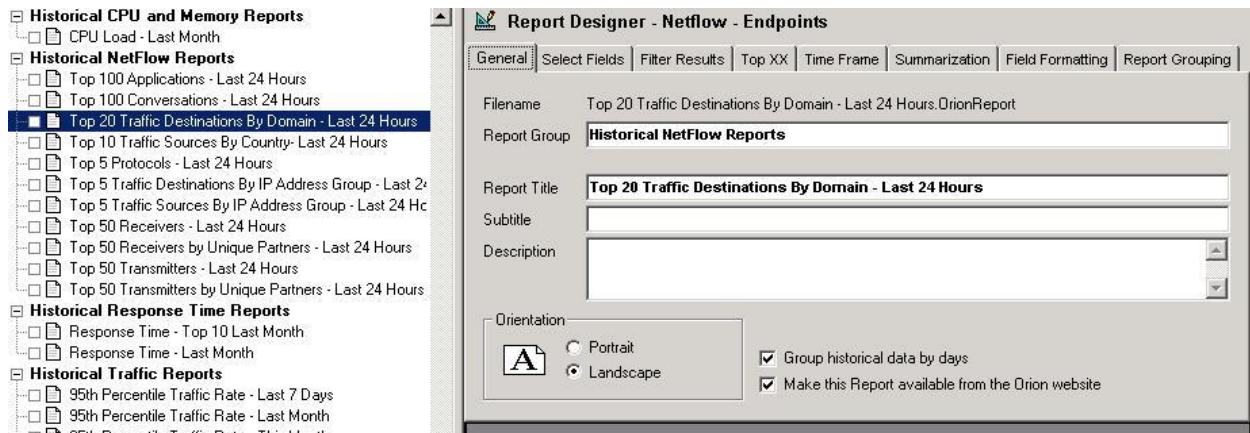
Several components work together to allow for built-in reporting, custom report creation, and report delivery.

- Report Writer
 - Acts as a framework for report structure
 - Contains the main interface for configuring, creating, and editing reports
 - Runs queries against the Orion database when requested
 - Stores reports
 - Calculate values as required, such as 95th percentile
- SQL Database - Stores and delivers information for Orion
- Orion Core - Provides Web Console, report delivery, and other core functions
- Windows Event Scheduler - Provides regularly scheduled report actions
- Email - Provides a delivery mechanism for reports

Working with Report Writer

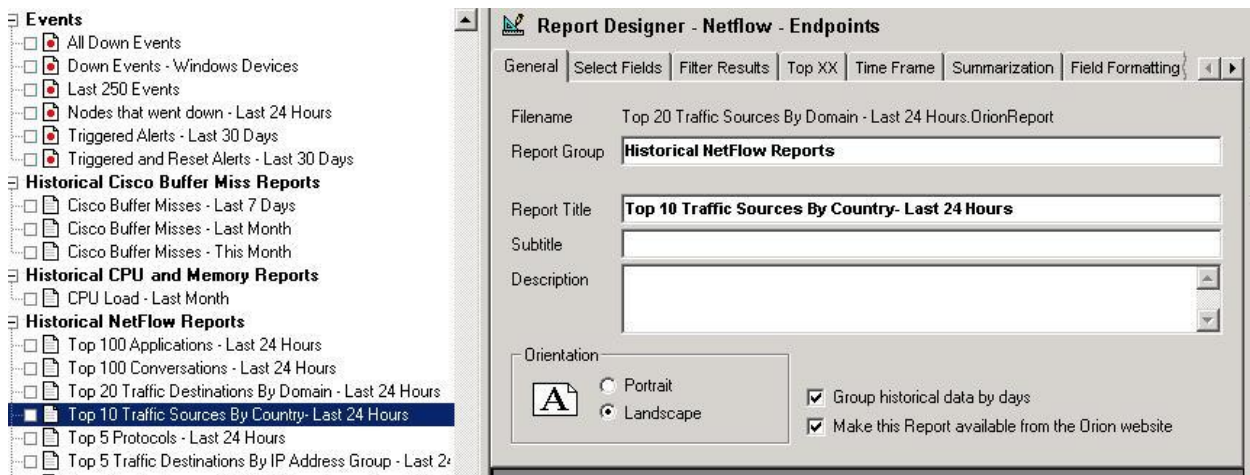
Existing Reports

You can open and modify any of the built-in reports in Report Writer. When modifying an existing report, it is best to find a report that already has most of the elements you require and start from there. Doing so will help to minimize the time and complexity of creating your custom report. For example there is a prebuilt NetFlow report for “Top 10 Traffic Destinations by Domain”. The Top N domains resource in Orion NetFlow Traffic Analyzer is one of many top N resources including Endpoints, Applications, Conversations, and Countries. So, if we want to create a report for the Top N traffic by Country, it is reasonable to start with a similar report, such as the domain report.

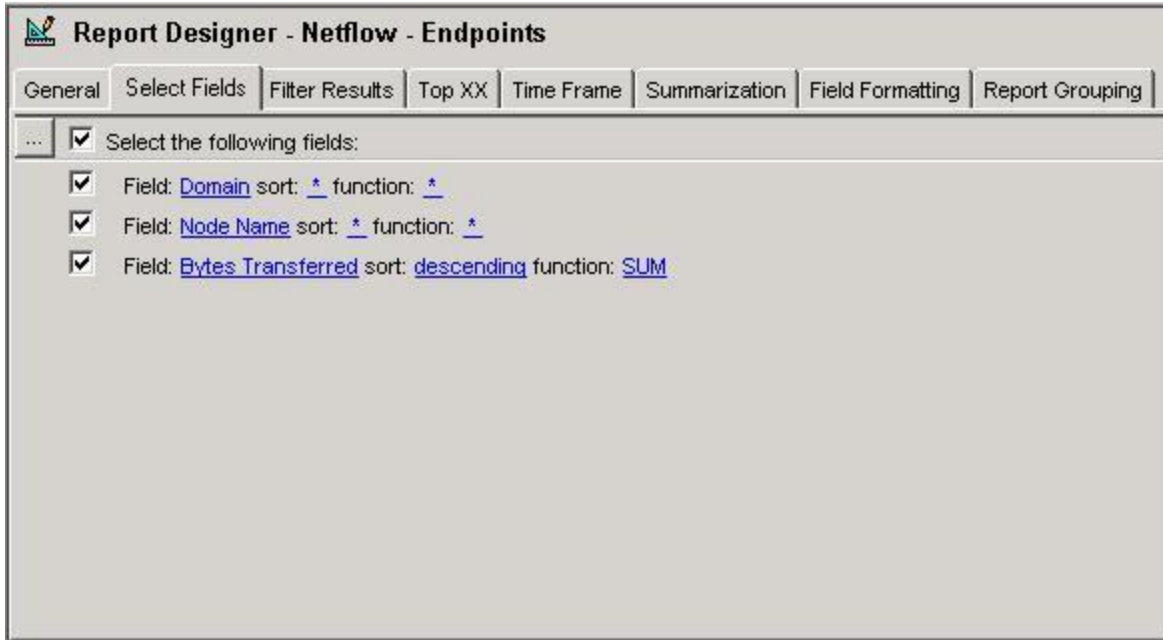


Once we begin altering this report to create the Top Country report, save the report with a new name. This way you can rest assured that you have not altered the Top Domain report. If you get hopelessly lost at some point, you can simply stop creating the Top Country report and go back to the Top Domain report and start over.

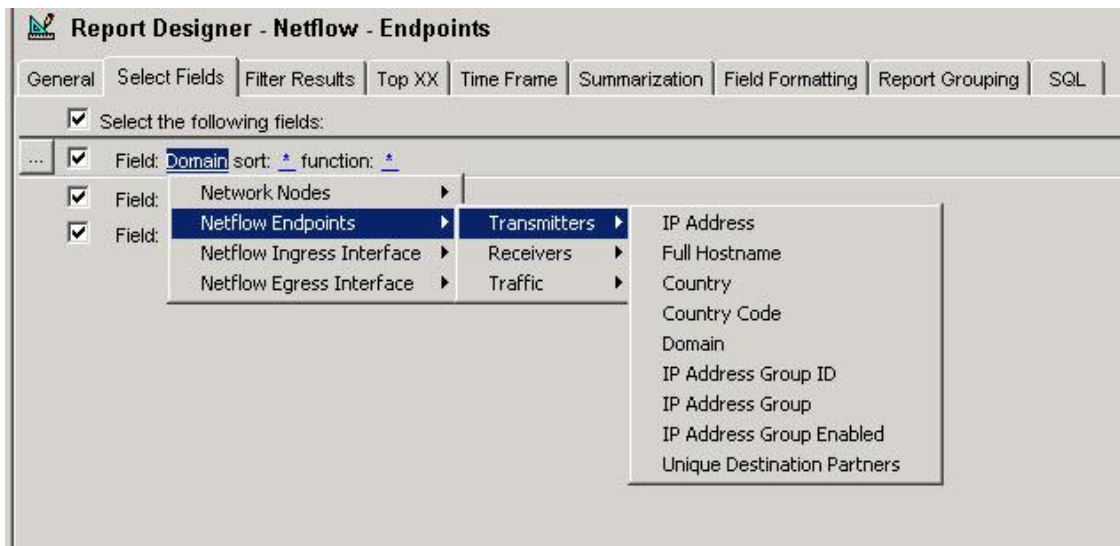
The General tab in Report Writer is very simple. You can assign the report to a group, create a new group by using a non-existent group name, edit the report title and subtitle as well as add notes in the description field..



Next we move to the Select Fields tab and alter the report to show what we want to see, Top Countries.



This tab allows you to select objects from the Orion database without having to dig through the database or create SQL queries. When you modify fields in this tab, report writer creates a SQL query in the background. By clicking on **Report > Show SQL** from the Report Writer Menu bar, the query is run and shown in a new tab called SQL. The results are also displayed. Depending on how much data you have and the complexity of the query, it can take a couple of minutes to run the full query.



The field that was used to create the Top N Domain source report was **NetFlow Endpoints > Transmitters > Domain**. By selecting **Country** instead of **Domain**, we will alter the query partially. Take a look at the SQL query below with Country chosen in the place of Domain.

```

SELECT TOP 10
FlowCorrelation_Source_FlowCorrelation.Country AS Country,
Nodes.Caption AS NodeName,
SUM(NetflowSummary.TotalBytes) AS SUM_of_Bytes_Transferred
FROM
(NetflowSummary LEFT OUTER JOIN FlowCorrelation Source_FlowCorrelation
ON
(NetflowSummary.SourceIPSort = FlowCorrelation_Source_FlowCorrelation.IPAddressSort))
INNER JOIN Nodes ON (NetflowSummary.NodeID = Nodes.NodeID)
WHERE
( DateTime BETWEEN 40313.4583333333 AND 40314.5 )
AND
((FlowCorrelation_Source_FlowCorrelation."Domain" IS NOT NULL) AND
(FlowCorrelation_Source_FlowCorrelation."Domain" <> ''))
AND
((EXISTS(SELECT 1 FROM NetFlowSources WITH(nolock) WHERE
NetFlowSources.InterfaceID=InterfaceIDRx AND NetFlowSources.Enabled=1)))
GROUP BY FlowCorrelation_Source_FlowCorrelation.Country, Nodes.Caption
ORDER BY 3 DESC

```

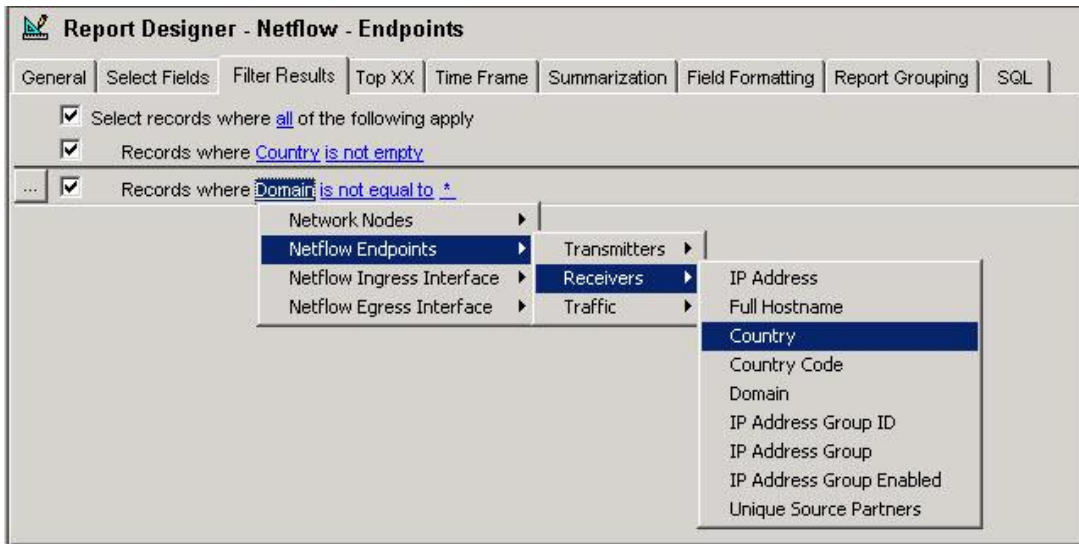
This query can be broken down into three sections:

1. Data selection – Begins at the `SELECT TOP 10` statement
2. Data filtering – Begins at the `WHERE` statement
3. Grouping and ordering – begins at the `GROUP BY` statement

So far the query is selecting **Country** data, but if you look further into the above query, the query still refers to **Domain**. This is because we still need to go into the remaining tabs and clean up references to **Domain**..



By clicking on the **Domain** references we can change them to **Country**, just as we did in the Select Fields tab. The shot below shows this change being made.



Now here is the filtering section of the query after changing the Filter to refer to Countries.

```
(FlowCorrelation_Source_FlowCorrelation.Country IS NOT NULL) AND
(FlowCorrelation_Source_FlowCorrelation.Country <> '')
```

The first item in the filtering section of the SQL is the applicable time frame. This is specified in the Report Writer Time Frame tab and converted to the SQL Object Linking and Embedding (OLE) time. SQL OLE time is a standard way of represent time in days since an arbitrary day zero, Midnight, December 30, 1899. Counting dates as a time since day zero offers the advantage of the date being represented as just a number. So, it can be processed without regard to time increments, such as minutes and seconds. This eliminated converting and processing seconds to minutes, minutes to hours, days to months, and so forth. The date can be translated into the OLE date, manipulated and then converted back to a date. As the OLE date can have an infinite number of decimal places, it can accurately measure any time increment. When a query is run which contains an OLE date, the date is updated on the fly to the proper date range.

Consider the following examples. When we look at the SQL for a report using the time frame of “Yesterday”, note the OLE date referenced.

```
WHERE
( DateTime BETWEEN 40300 AND 40301 )
```

Now, when we run the query the next day, here are the results of the same “Yesterday” date.

```
WHERE
( DateTime BETWEEN 40301 AND 40302 )
```

If we change the date to “Today”, which will include a partial day as today has not completed, we can see the decimal notation for fractions of a day.

```
WHERE
( DateTime BETWEEN 40302 AND 40302.5833333333 )
```

Historical reports will often use the OLE format. Also note that reports for the current state of items, such as the “Current Volume Statistics” will have no reference to time, they will only query for the current values requested.

The remaining tabs in the Report Writer interface are fairly simple and well documented in the appropriate *Administrator Guide* for your product.

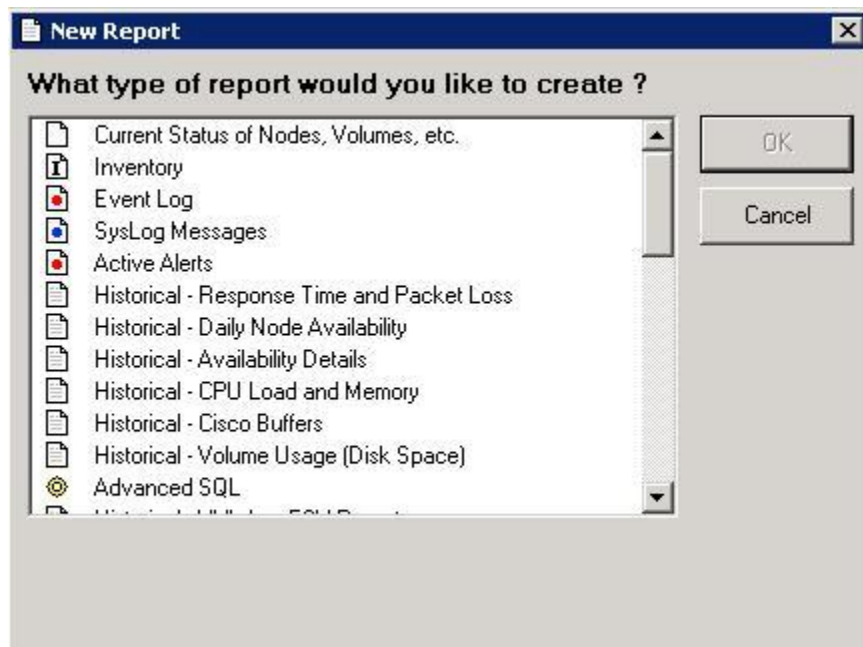
Building a Report

One of the best ways to learn how anything works is to take it apart and build it back up from its parts. We can do this with Orion Report Writer and gain an insight to its inner workings. It should be noted that there is more than one path to take when creating new reports:

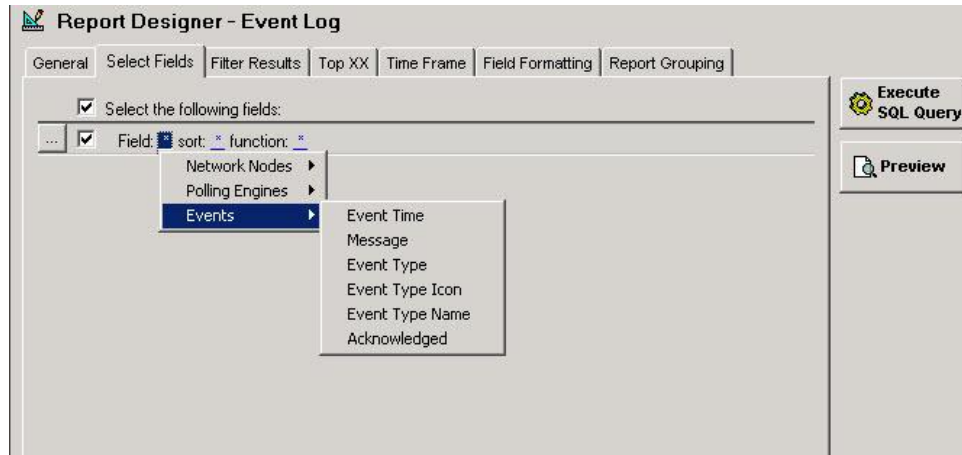
- The pre-built reports can be opened and edited as shown in the previous section
- A completely new report can be created using the Report Writer GUI
- A new report can be created by entering SQL queries into an Advanced SQL report

The first two are very similar; while the Advanced SQL report requires a deep level of SQL knowledge and experience.

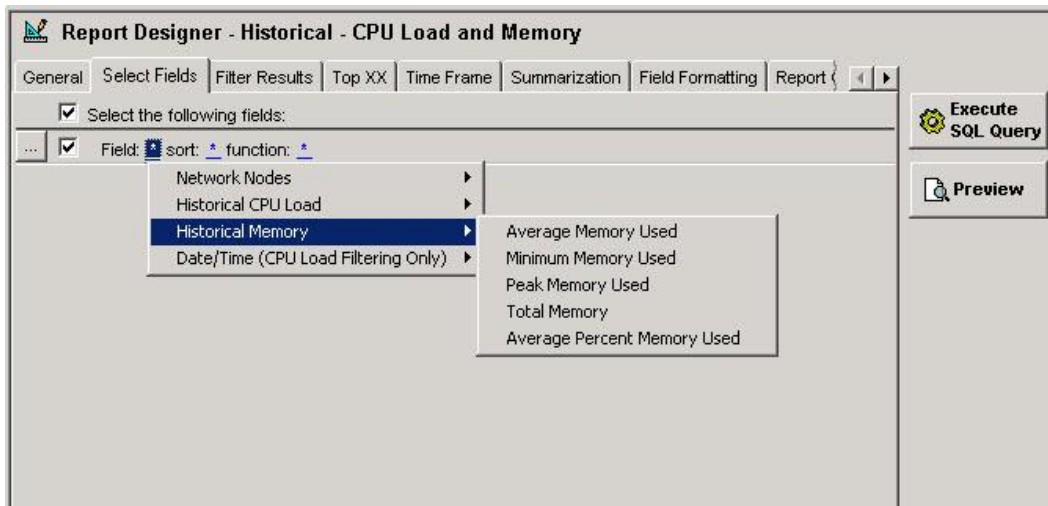
Clicking on **New**, or the **Create a new report** button to go to the first New Report screen.



At first glance, it might seem strange that we are creating a new report yet we are asked to choose a report type. This is done to assist you in locating the report variables for the type of report you are creating. For example, if we choose the **Event Logs** type, the Event related fields are made available.

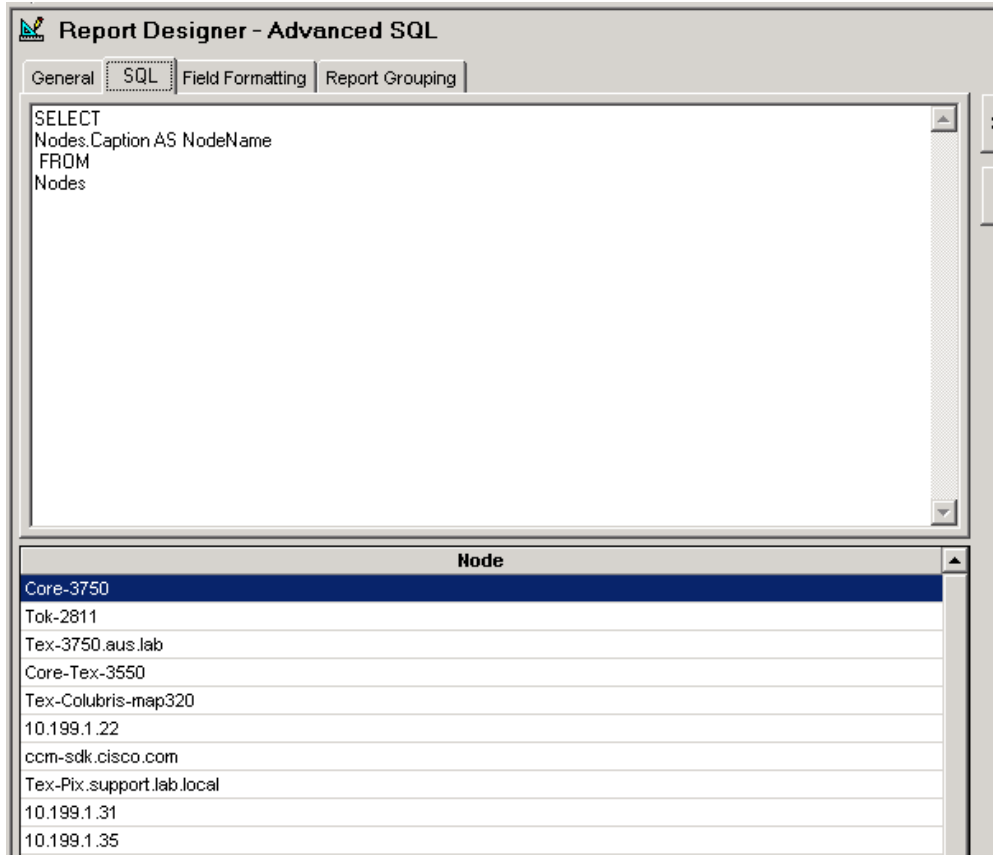


Likewise, if we choose **Historical CPU Load and Memory**, we are given the appropriate fields to select.

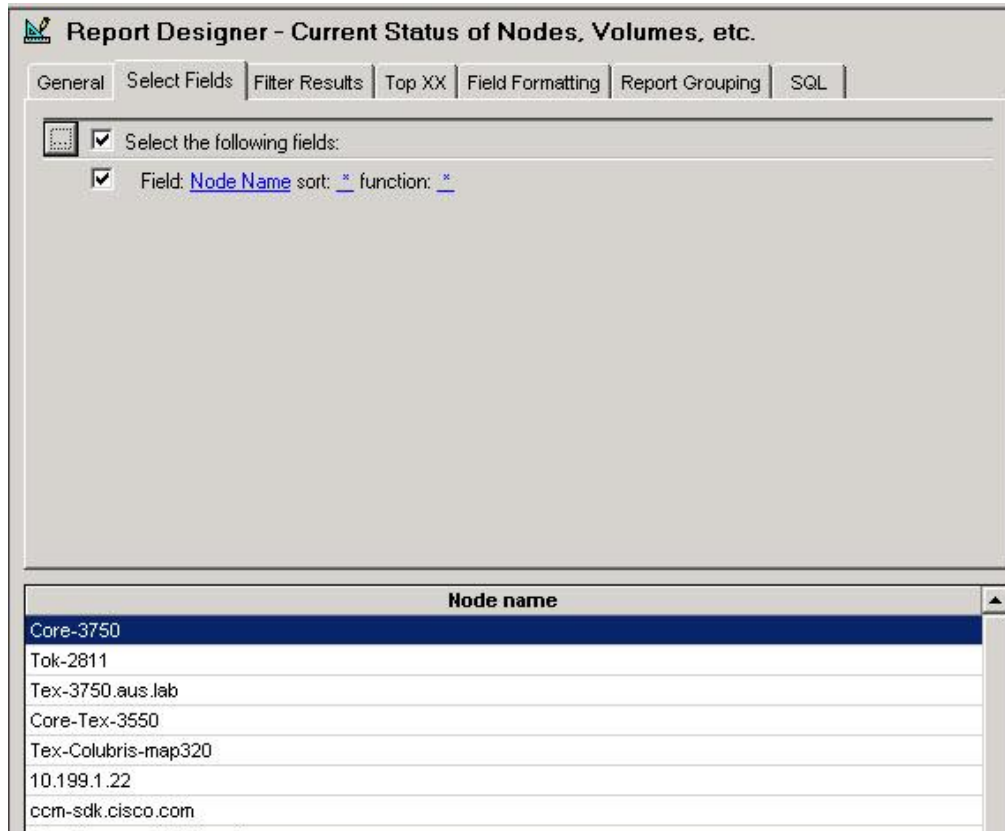


This simplifies the report creation process for existing report types by not requiring you to search through every possible element.

What if you need to create a report that does not fall into any of these categories? Selecting the Advanced SQL report type provides a completely blank slate from which you can create any type of report you need, assuming you have access to sufficient SQL skills and are selecting data contained in the Orion database. The Advanced SQL report type does not include Time Frame, Top XX, and other tabs. All the information that these tabs create must be contained in the SQL query.



The example above selects the existing nodes and lists them by node name. The same report can be created using the New Report GUI option.



When using the New Report GUI, the tabs, such as **Top XX** and **Filter Results**, are available. These will build the SQL query in the background as you specify options in each tab. For historical reports, the **Time Frame** tab will also be available. Also note that the SQL tab in the GUI is read only – you cannot enter SQL directly into the SQL tab unless you are using an Advanced SQL report.

Filters operate like the conditions in Orion Advanced Alerts and include All, Any, Not All, and None options. Using the Any option I will see nodes that are either up or down. If I had used the All option the report would be for nodes that are up and down at the same time, an impossibility. For details on the All, Any None and Not All options see the *Understanding Orion Advanced Alerts* paper located on the SolarWinds Support page (<http://www.solarwinds.com/support/orion/orionDoc.aspx>). Here is an example of a filter:



And here is the resulting report.



New Day, New Report

By Celine Dion

Note name	Status	Vendor
Core-3750	Up	
Tok-2811	Up	
Tex-3750.aus.lab	Up	
Core-3750	Up	
Tex-Colubris-map320	Up	
10.199.1.22	Up	
ccm-sdk.cisco.com	Up	
Tex-Pix.support.lab.local	Up	
10.199.1.31	Up	
10.199.1.35	Up	
LAB-VM-EXC10	Up	
fedora.six	Up	
SOLARWIN-HGP2M4	Up	
lab-win7x64	Up	
lab-win7x86	Up	
P390SVR-DT	Up	
10.199.1.115	Up	
W2003-TMVM-IP1	Down	
LAB-VM01-TEXDC	Up	

After you have created or modified a report. That report will be available in the NPM Web console in the Reports view.

Understanding (some) SQL

Orion Reports often contain advanced SQL statements. Here is a brief overview of some of the statements and what they do.

Time Frames or datetime

SQL OLE Time - As seen previously SQL can use the `datetime` calculation in SQL OLE format for easy manipulation. This is seen in reports with a variable `datetime` reference such as Yesterday. An example of this type of `datetime` statement is:

```
WHERE ( DateTime BETWEEN 40120.5 AND 40121.5416666667 )
```

BETWEEN – This format is used in Advanced SQL reports to specify a report period of the “last X”, here the last month. This is accomplished by referring to the time between this month and a month ago (`MONTH-1`). This would be used as a portion of a `WHERE` (equijoin) statement.

```
BETWEEN dbo.Date (YEAR (GETDATE ()), MONTH (GETDATE ()) -1, 1) AND
dbo.Date (YEAR (GETDATE ()), MONTH (GETDATE ()), 1)
```

SET @StartDate and SET @EndDate – This can be used to set the date field for certain periods defined in SQL such as `dd` for two digit day, `yyyy` for four digit year and `qq` for quarter. The below example uses date difference (`DIFF`) to set the time frame for last quarter.

```
SET @StartDate = DATEADD(qq, DATEDIFF(qq, 0, GETDATE()) - 1, 0)
SET @EndDate = DATEADD(qq, DATEDIFF(qq, -1, GETDATE()) - 1, -1)
```

JOINS

A `JOIN` allows the return of related data from multiple tables using a single `SELECT` statement. `WHERE` is used to create a simple equijoin. This type of join can also be created with an `INNER JOIN` statement.

Sometime joined tables will not have one-for-one matches in all records from both tables. An `OUTER JOIN` allows you to specify which table will include all rows and which table will not have related rows. These are always expressed as `LEFT` or `RIGHT OUTER JOIN`. Using a `LEFT OUTER JOIN` states that the table referenced to the left of the `JOIN` statement will include all records.

Aliases

An alias allows you to shorten a table reference and to use the same table multiple times within a single select statement. An alias is implemented using `AS`.

Report Scheduler

The Orion Report Scheduler is a WIN32 application that allows you to schedule the distribution of reports by email or the printing of a report. The report Scheduler features are well documented in the *Administrator Guide* of your product. The Report Scheduler creates a Windows Event Scheduler Event. Event Scheduler then acts independently to request the job from Orion. Report

The Export feature in Report Writer will export the results of the report in several different formats. This can be useful for analyzing the report results with external tools. To share the report framework, go to the `\Program Files\SolarWinds\Orion\Reports` directory and simply copy the `OrionReport` file you want to share with other NPM user. To add reports others have created, simply paste the new `OrionReport` file into the reports directory. The `OrionReports` files contain the SQL query and the associated formatting for a complete report. It is recommended that you share this file type rather than just the SQL statements.

Creating and Distributing Graphical Reports

As of NPM 10.1 you have the option of including graphics in reports. This ability is best explained in a couple of very good Orion Product Blog Posts.

<http://thwack.com/blogs/orion-product-team-blog/archive/2010/09/02/hey-chart-get-in-my-report-part-1/>

<http://thwack.com/blogs/orion-product-team-blog/archive/2010/10/21/hey-chart-get-in-my-report-part-2/#116940>

Truncated versions of these posts are also included in this paper as “Appendix A – Placing Graphical Charts in Reports” on page 12.

thwack Community

The thwack community has thousands of users who regularly exchange ideas and solutions. Chances are that if you are trying to create a complex alert and having issues, there is a thwack user who has already solved that issue. SolarWinds employees from Development, Support and Product Management regularly interact with SolarWinds product users on thwack, so we may also be able to help you solve your problem there too.

The Content Exchange portion of thwack can be used for uploading and downloading report templates. These templates can be imported to your Orion system and customized to fit your environment.

Appendix A – Placing Graphical Charts in Reports

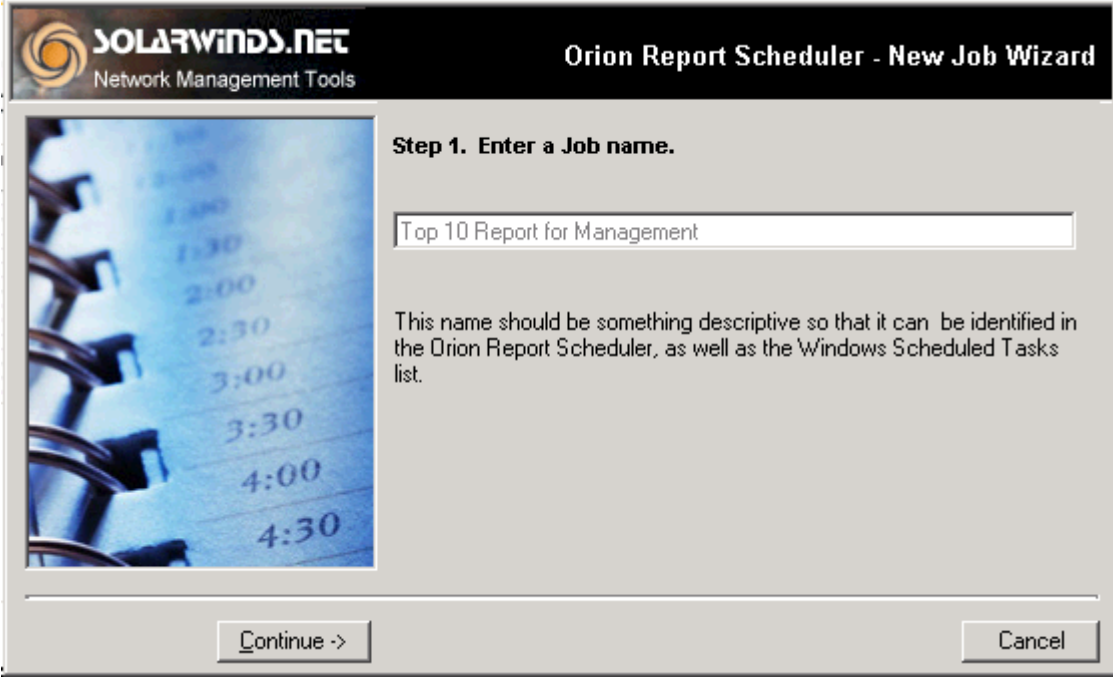
Hey Chart, get in my Report! (Part 1)

That was an old Austin Powers reference for those who missed it ;-) So, what do I mean by this? Well, a question we get asked all the time by customers is “How do I get the pretty charts I see on my Orion website into a report that I can send to my boss on a regular basis to make him/her happy?”. Seems like a reasonable request, right? But, before I dive into this topic, you’ll need to ask yourself what types of reports does your boss care about seeing? Does she want the charts as well as the detailed data behind the charts? Or, would she be perfectly happy with the Orion website pages she’s seen while looking over your shoulder?

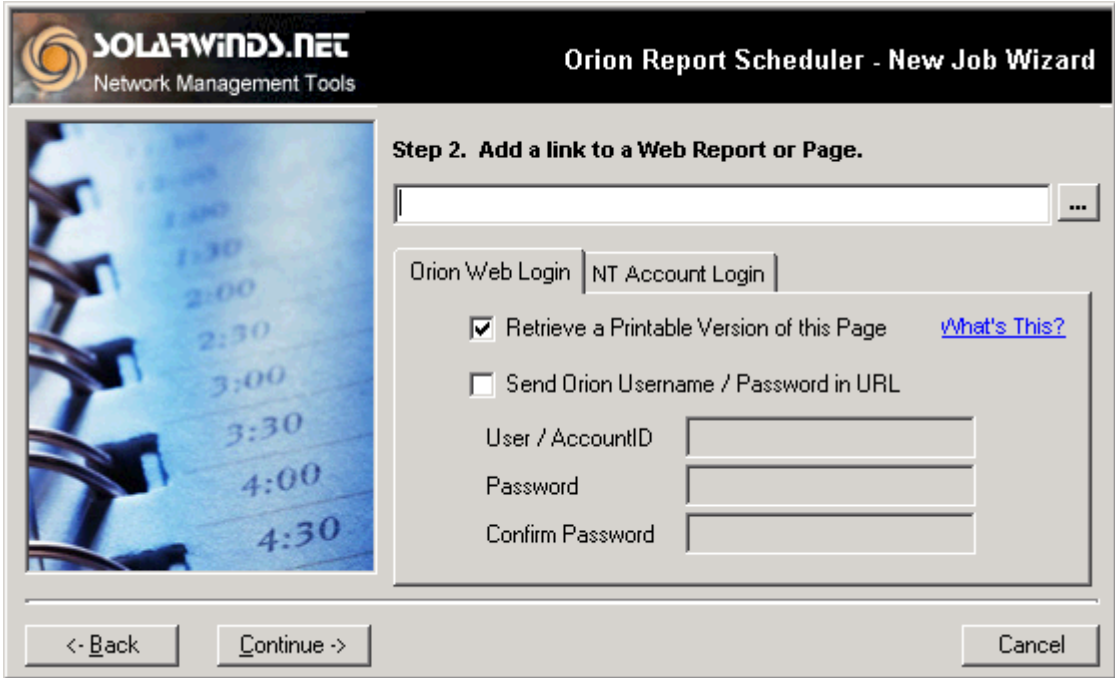
Let’s start with the latter use-case since it’s the simplest and requires only a few steps in Orion Report Scheduler.

How to send an existing Orion website page as a scheduled HTML email to your boss:

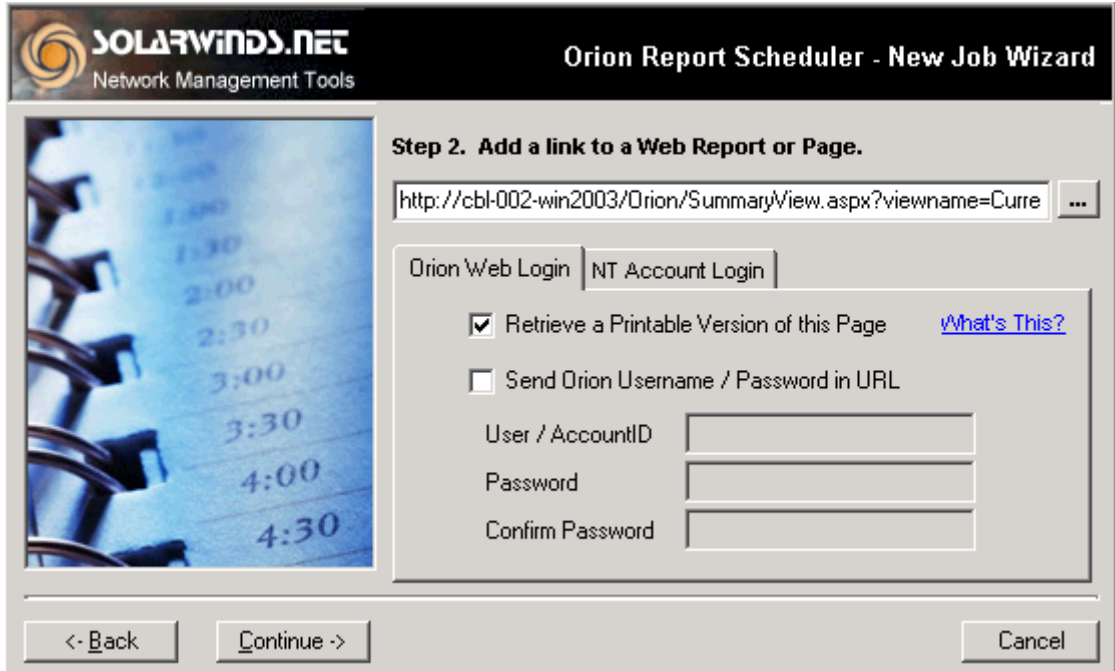
To begin, you’ll need to open the Report Scheduler app on your Orion server (Start > All Programs > SolarWinds Orion > Alerting, Reporting, and Mapping > Orion Report Scheduler). Click the Add+ button to create a new report job. You’ll see the following screen where you’ll want to fill in the job name and click Continue.



On the next screen, you’ll see a prompt to add a link to a Web Report or Page in Orion.



When you click the “Use Current URL” button, this will automatically populate the previous screen as you can see below. Notice that I’ve also checked the “Retrieve a Printable Version of this Page” option. This will remove the banner and the menu bar from the page. BTW, if you’re like me and you can’t stand to wait, try adding “&printable=true” to the URL in Orion to see what the page will look like when it’s sent.



When I click “Continue”, you’ll see I can set up my schedule. In this case, I’m going to send it every morning at 8am. You can also schedule it to be sent weekly, monthly, or just this once.

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Orion Report Scheduler - New Job Wizard

Step 3. Select when the job is to be run.

Schedule Job: Start Time:

Starting On: Ending On:

Every day(s)

<- Back Continue -> Cancel

Finally, you'll need to enter the email address of the folks you want to send it to. If you want the email to actually go anywhere ;-), make sure to also fill out field on the "Email From" and "SMTP Server" tabs.

SOLARWINDS.NET
Network Management Tools

Orion Report Scheduler - New Job Wizard

Step 4. Select an action to perform.

Email the Web Page Print the Web Page

Email To | Email From | SMTP Server

E-Mail Recipients

To:

CC:

BCC:

Subject:

<- Back Continue -> Cancel

Click "Continue" one more time, enter the Windows credentials you want this job to run under (use a service account whose password doesn't change often), and then you're done! You should see your new job listed in the Report Scheduler window. If you want to run it now to test, simply right-click and select "Run Selected Job Now". Just be aware that if it works, your boss will be getting the email each time you run the job!

Hey Chart, get in my Report! (Part 2)

I've gotten a lot of requests for part 2 of my [original post](#), so this follow-up is certainly long past due. Just as a recap for new readers, we were discussing two highly-requested use-cases:

1. Getting the pretty charts in the Orion website into a report that you can send to your boss on a regular basis
2. Getting the pretty charts in the Orion website + the detailed data (which Report Writer provides) and send that to your boss on a regular basis

For those who have been following along, you'll remember that the first use-case was covered in my original post back in September.

So, was there a method to my madness in waiting so long to do part 2? I certainly think so. In case you haven't heard, Orion NPM v10.1 is currently in [Release Candidate](#) phase and provides a number of cool new features that will make creating specialized reporting views much simpler and faster (and not coincidentally, a much easier blog post ;-)

Custom Object Resource - this resource allows you to select any object in Orion (e.g. node, interface, volume) and choose an associated resource to display. This means you can add resources for different nodes and interfaces to the same page. For example, you may want a page that shows bandwidth utilization charts for all of your WAN interfaces. Now you can do this with a just a few clicks. This should eliminate the need to use the custom HTML resource for this purpose (hopefully, some of you are smiling already).

Multi-Interface and Multi-UnDP Chart Resources - these highly requested resources give you the ability to chart multiple interfaces or multiple UnDPs respectively in a single chart resource, including the option to display the sum/aggregate.

Scheduled PDF Reports - this new capability allows you to schedule the export of any page or report in Orion as a PDF. This eliminates the problems with sending HTML pages and the images getting gobbled by your email servers.

So, in this final post in the series, I'll walk through how you use these new 10.1 features to address the final graphical reporting use-case (#2 above).

1. First, you'll need to create a new "report" view:

Go to Admin > Manage Views and create a new view. Let's call this one "Critical Network Links Management View".

Orion[®]

1 product in evaluation. [» Details](#)

HOME NETWORK VIRTUALIZATION

i VMware discovery: 14 VMware servers found. [» More Details](#) [Dismiss Message](#)

[Admin](#) > [Views](#) > [Manage Views](#) >

Add New View

Name of New View

Type of View

VIEW TYPES:

Summary
Summary views display network-wide information.

Node Details
Node Details views display information about a single node.

Volume Details
Volume Details views display information about a single volume.

Group Details

2. Next, you'll want to add and configure resources on the view to represent the required charts and data:

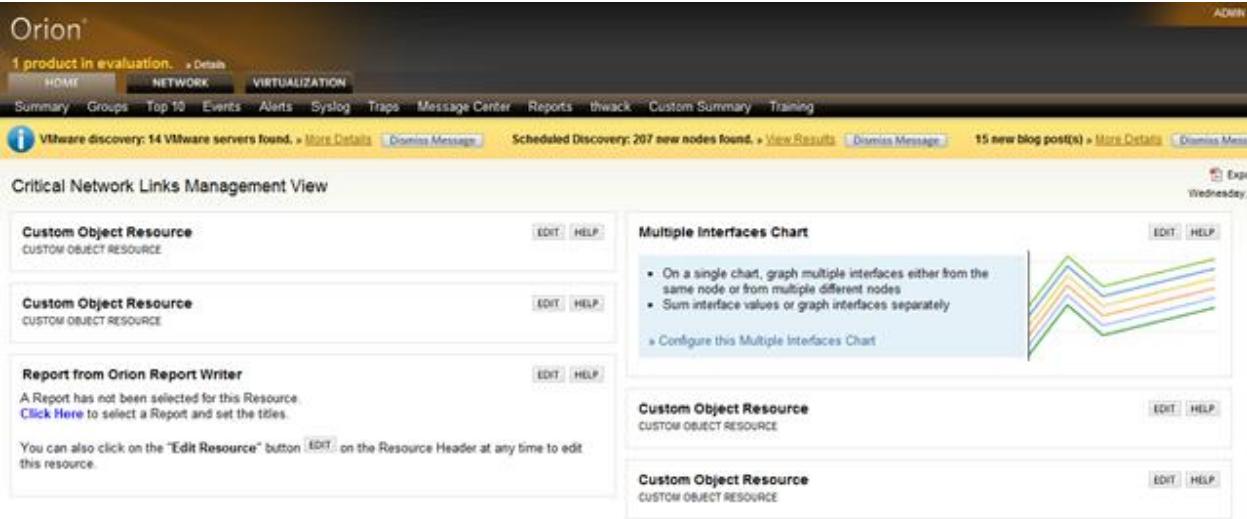
For this Critical Network Link Management View, I'm going to add several individual interface charts, a multiple interface chart, and a data table report. This will require the resources shown checked below.

- Multiple Series Charts - Multiple Interfaces Chart & Multiple Universal Device Pollers Chart for a Single Node or Summary Page
 - Multiple Interfaces Chart
 - Multiple Universal Device Pollers Chart
- Network Maps - Network Maps, Nodes on Maps, Lists of Maps, etc.
- Inventory - Various Network Inventory Reports
- Report Writer - Turn a Report from Report Writer into a Web Resource
 - Report from Orion Report Writer
 - Custom List of Reports
- thwack - thwack Resources
- Miscellaneous - Miscellaneous Resources
 - Custom Object Resource
 - Polling Engine Status
 - Search for Nodes
 - Short Blank Space
 - Tall Blank Space
 - Custom HTML

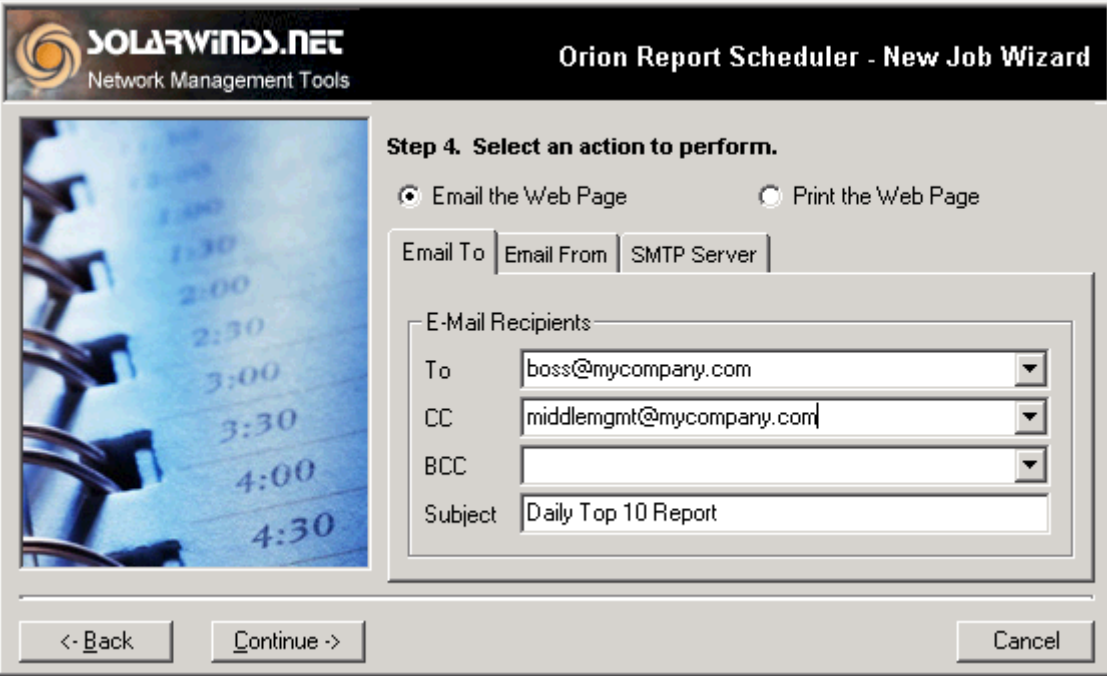
As you can see below, I've added enough Custom Object Resources to cover my 4 critical WAN links in addition to the Multiple Interfaces Chart and Report from Report Writer resources.

The screenshot shows the 'Manage Views' section in Orion Report Writer. The main heading is 'Customize Critical Network Links Management View'. Below this, there is a 'Name' field containing 'Critical Network Links Management View' and an 'UPDATE' button. The 'Type of view' is set to 'Summary'. Column widths are specified as 'Column 1 Width: 500' and 'Column 2 Width: 400', with an 'Edit' button next to them. The interface is divided into two columns: 'Resources in Column 1' and 'Resources in Column 2'. Column 1 contains three items: 'Custom Object Resource', 'Custom Object Resource', and 'Report from Orion Report Writer'. Column 2 contains three items: 'Multiple Interfaces Chart', 'Custom Object Resource', and 'Custom Object Resource'. Each item has a plus sign to add, a minus sign to remove, and a refresh icon. There are also up/down arrows for reordering and left/right arrows for moving between columns. At the bottom, there is a 'View Limitation' section with the text 'No View Limitation Defined.' and an 'Edit' button. Finally, there are 'DONE' and 'PREVIEW' buttons.

Now, you'll want to click Preview so you can see what the view will look like and edit the resources. If you don't like the layout, you can always click Customize Page again and change the column width.



Next, you'll want to edit each resource to select the appropriate interface or interfaces. I'm not going to walk-through the step-by-step on this because the resources are very straight forward to configure. If you're interested in seeing what this looks like for the Multiple Interfaces Chart. As you can see below, I've configured all the chart resources. Now, all that's left is the report resource.



For the Report resource, I'll select the Top 25 Interfaces by Utilization report. This way, in addition to my 4 critical WAN links, I can see details regarding the health of other interfaces with high bandwidth utilization in my environment. You can always use Report Writer to easily

filter this report to specific interfaces, show other columnar data, or create a custom report specific to your environment

Current Percent Utilization - Top 25 Interfaces

NODE	INTERFACE	AVERAGE SM/RECY PERCENT UTILIZATION	STATUS	TRANSMIT TRAFFIC	RECEIVE TRAFFIC
SP-leafhand-01	bond0	12 %	●	1.4 Mbps	1.1 Mbps
lab-esx-01	lo	9 %	●	960.9 Kbps	960.9 Kbps
SP-leafhand-02	bond0	6 %	●	79.1 Kbps	1.1 Mbps
Lab-Vm-03 labcore.local	Broadcom BCM5709C NetXtreme E GigE (NDG VSD Client) #2	1 %	●	1.1 Mbps	1.5 Mbps
lab-esx-04	lo	1 %	●	137.3 Kbps	137.3 Kbps
lab-esx-05	lo	1 %	●	102.3 Kbps	102.3 Kbps
lab-esx-06	lo	1 %	●	137.4 Kbps	137.4 Kbps
lab-esx-09	lo	1 %	●	125.4 Kbps	125.4 Kbps
LAB-VIA labcore.local	Intel 21140-Based PCI Fast Ethernet Adapter (Emulated)	1 %	●	1.4 Mbps	402.4 Kbps
LAB-VIA labcore.local	Intel 21140-Based PCI Fast Ethernet Adapter (Emulated)-QoS Packet Scheduler-0000	1 %	●	1.2 Mbps	108.6 Kbps
LAB-VIA labcore.local	Intel 21140-Based PCI Fast Ethernet Adapter (Emulated)-WFP Lightweight Filter-0000	1 %	●	1.1 Mbps	429.3 Kbps
ST-P-2300	fe-0/0/0	1 %	●	1.5 Mbps	750.1 Kbps
ST-P-2300	fe-0/0/1	1 %	●	602.7 Kbps	1.4 Mbps

FastEthernet0/0 - link to tok-foundry - Min/Max/Average bits per second - Today

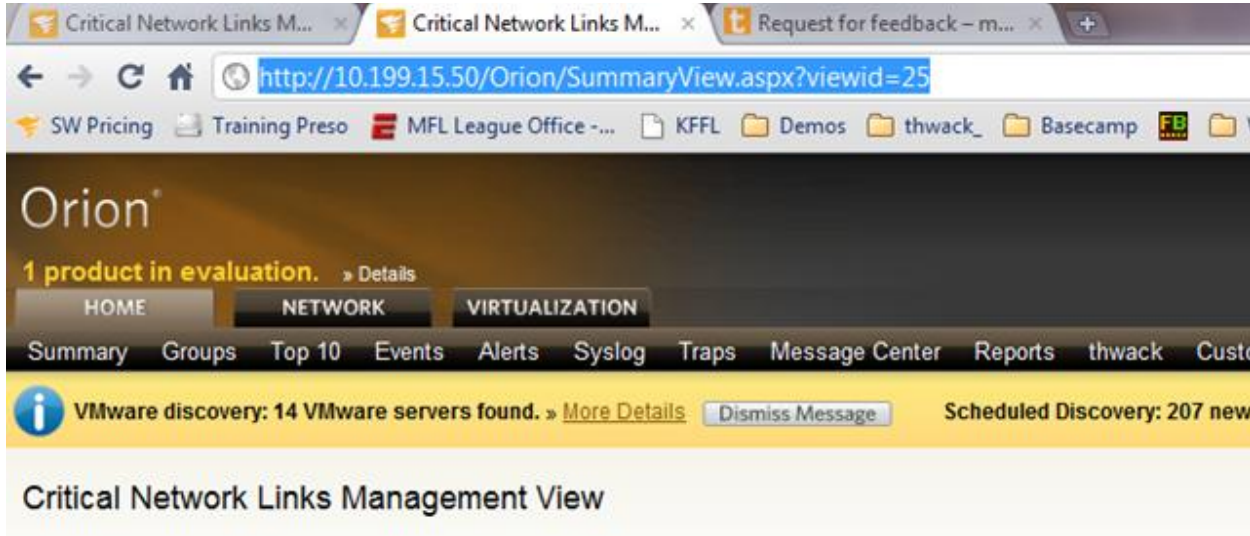
Min/Max/Average bps of Recv 100.0 Mbps Xmit 100.0 Mbps

Oct 2010
95th Percentile: Average Receive bps is 37.2687 Kbps, Average Transmit bps is 45.3027 Kbps
SolarWinds Orion Core Services 2010.2

Oct 2010
95th Percentile: Average Receive bps is 14.3392 Kbps, Average Transmit bps is 5492.339 bps
SolarWinds Orion Core Services 2010.2

3. Finally, you'll want to schedule this page to be sent as a PDF report via email to your boss.

To do this, you'll need to copy the URL from the browser



Then, open the Report Scheduler app on your Orion Server (Start > All Programs > SolarWinds Orion > Alerting, Reporting, and Mapping > Orion Report Scheduler). Click on the Add+ button to create a new report job. Fill out the job details and paste this URL into the required field when prompted as shown below.



Finally, you'll want to enter the SMTP server info, your boss's email address of course, and the appropriate scheduling details. At the end, you'll see the new option in 10.1 to schedule the page to be emailed as a PDF. Select that, and you're done!!