

ViPR SRM Advanced Reporting

January 2015

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Lab Exercise 1: Discovering Available Datasets

Purpose:	This lab discovers the available datasets for a given ViPR SRM M&R setup, using various features and tools of the UI. • Part 1: Using Advanced Search engines • Part 2: Using Management of Database Metric tools • Part 3: Using Report Wizard tools
Tasks:	In this lab, you will: • Practice using the presented tools and features of the User Interface (UI).

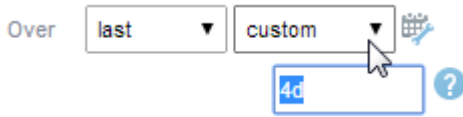
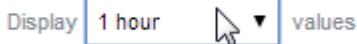
Lab 1: Part 1 - Familiarize Yourself with the Advanced Search Engine Tool

Purpose:	This lab discovers the available datasets for a given ViPR SRM M&R setup, using an Advanced Search engine. It will also allow you to use various features of the UI.
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Tasks:	In this lab, you will: • Practice using Filter Wizard in entering simple and complex filter expression. • Practice and familiarize with Advanced Search engine feature in order to explore available dataset. • Practice with some integrated features of Display menu: Time range selection, padlock icon, Aggregates, Dynamic vs Static graph.
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Step	Action
0	Login to portal with the provided username/password to the indicated class' ViPR SRM M&R portal.

Step	Action
1	Locate the Advanced Search engine icon and click on it. An overlay menu will show up. Using the wizard, create the following filter expression: Filter  Or choose to type in the following filter expression: <pre>source=='VMAX-Collector' & !vstatus=='inactive' & parttype=='Disk' & device=='888973588710' & part=='DF-10A:C 1' & (name=='ReadRequests' name=='WriteRequests')</pre> Click Apply button.
2	Look at the result in the report area. What do you see? Click the available item in the report (888973588710). You should see a graph showing up.

Step	Action
3	Using Display menu, one at a time (i.e. hit “Apply” button), experiment: a) In the second drop down menu, next to “Over”, select “custom”. In the new text box showing up, enter “4d”. This will change the time range selection to the last 4 days of data.  Note: yes there is a way to globally define this kind of custom period. Ask your instructor. b) In the “Display” drop down menu, select 1-hour aggregate. Notice the difference.  c) In the “Using” text box, select max aggregation level. Notice the difference.  d) Change Rendering from static to dynamic charts. Notice the difference.  Click Apply button. Hover the mouse over the chart. Can you tell the exact value of Read and Write Requests at midnight (00:00) on July 21st? ReadRequests: _____ WriteRequest: _____ e) Zoom over a shorter time period of the graph report. Click on the magnifier icon (top right). Select another time period using the whole overview. Notice how easy you can zoom in different time range period from the initial one. f) Hit the Padlock Icon before you leave this lab step.

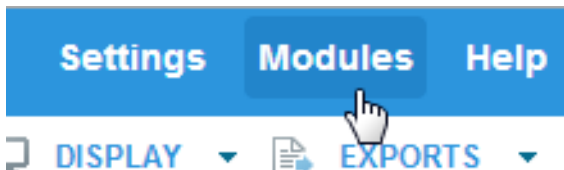
Step	Action
4	Return back to Filter expression under Advanced Search. Remove the piece of the expression that select metric “ReadRequests”. Click Apply button. Select the Array serial number in order to show up the graph report.
5	a) From Display menu, under Summary Statistics selector, choose Composite. Notice the views. List the various graph time range you see: 1- _____ 2- _____ 3- _____ 4- _____ 5- _____ Notice how your default time range selection is still the last 4 days (Padlock icon). b) From Display menu, click “View in full page”. Report displays in a separate tab of the browser. Notice. c) Return back to original browser tab. From Display menu, select “Revert to Default Report”. Notice.
6	Return back to Advanced Search engine menu. Erase the Filter expression (leave empty = Everything) From the expansion text box, type the following list of metric properties, separated by a single space (be careful, property names are case sensitive): source devtype device parttype part name Hit Apply button.

Step	Action
7	Drill down the various reports, one by one from, let's say "VMAX-Collector". How many types of objects (parttype) does Array serial number 888973588710 have? _____ How many disks in this array? _____ How many LUNs in this array? _____ How many metrics does LUN 0015 have? _____ What is the Capacity of LUN 0016? _____
8	Drill down under "Cisco-Collector" source. How many Cisco devices are listed? _____ What do you get from CurrentUtilization of System Processor of switch named "mptcf175"? _____ Why this is showing this way? _____ _____
9	Edit Advanced Search engine filter and add a criteria: Filter vstatus is active vstatus=='active' Click Apply button.

Lab 1: Part 2 - Using Management of Database Metrics

Purpose:	This lab discovers the available dataset for a given ViPR SRM M&R setup, using a second tool named Management of Database Metrics.
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Tasks:	In this lab, you will: • Practice the Management of Database Metrics modules to explore available metrics and the list of associated properties.
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Step	Action
0	Login to portal with the provided username/password to the indicated class' ViPR SRM M&R portal.
1	From the main report page, click Modules button from the top right hand menu bar, as follows: 
2	From the new page, find and click Management of Database Metrics module, as follows: 

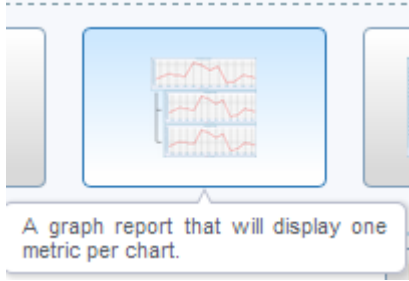
3	From the new page, using filter wizard, set the a context filter as follows:  Or type in the expression: <pre>devtype=='Array' & !part & device=='888973588777'</pre> Click Query button
4	Click on the “name” column header in order to re-order the list.] Locate and click on the “RawCapacity” metric. Notice the list of attached properties to the metric. How many properties are available to the RawCapacity metric? _____ What is the array type? _____ What is the array model? _____
5	Edit the filter and remove the device name constraint (device=='888973588777'). Add the following to the filter expression (AND): select only RawCapacity metric name (name=='RawCapacity'). Click Query button How many “RawCapacity” metric satisfy the filter expression? _____ What is the list of various models that offers the RawCapacity metric? _____ _____ Is there an array where the Raw Capacity metric is inactive (if so, which one)? _____ Note: RawCapacity is a global metric, per array

Lab 1: Part 3 - Practice Using Report Wizard

Purpose:	This lab explores the possibilities of discovering the available dataset for a given ViPR SRM M&R setup. It will allow you to use base reporting tools - namely the Report Wizard - a basic context-based report creator.
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Tasks:	In this lab, you will: • Practice report creation using Report Wizard.
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Step	Action
0	Login to portal with the provided username/password to the indicated class' ViPR SRM M&R portal.
1	From Tools menu (top right), select Report Wizard button. This will bring you to starting point of creating a report using the Report Wizard tool.
2	From View Type drop down, make sure to select "Device Browser". This option entitles you to the drill down process of report creation using the Wizard. ⇒ The goal of our report is to list the CPU usage of some selected hypervisor hosts over time. This will then be a graph report.
3	From "Device Types" selection, choose "Hypervisor"s From "Hostname", put a check box next to all of the hostnames whose name starts with "mqq" (there are 6). From "Component type", choose "Processor". From "Component", choose "System". From "Available Metrics", choose "UsageMHz".
4	Choose " Add Metrics " button.

5	Unfold “Optional Report Settings”, select children format, as follows: 
6	From “Display” selection, choose report time range to be 1-week (default if 1 day). Notice how aggregate switches from real-time to 1-hour. Click Run button.
7	Edit your report settings by unfolding the “Report Wizard” bar (top). Click on the single graph report icon: that will put all metrics on the same, single graph report. Click Run button.
8	Edit your report setting: Open the “Report Wizard” bar. Add new metrics: Memory’s CurrentUtilization of the same hypervisor selection (you basically do same steps as in step 3 but for CurrentUtilization metric). Since UsageMHz and CurrentUtilization are of different magnitude, let’s put CurrentUtilization on a separate Y-Axis: Under “Optional Report Settings”, click “Add a secondary axis”. Pick and move “CurrentUtilization” from the Main Axis to the Secondary Axis, on the yellow placeholder. Click Run button.
9	Save your final report to your local report sandbox: My Report. Click “Save in ‘My Report’” button. A pop up will prompt you for the report name. Use “Hypervisor CPU and Memory status” Click Ok. You report is now moved from Report Wizard to your local report sandbox, under the given name.

	Notes:

End of lab exercise

Lab Exercise 2: Organizing a Report Structure

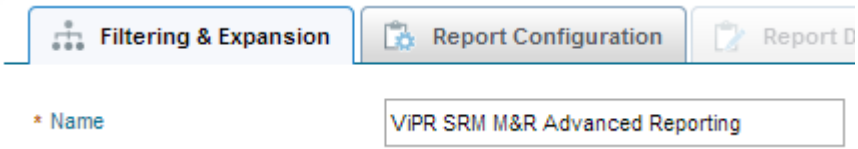
Purpose:	This lab will allow you to practice the organization of a report structure. It will also allow you to become familiar with key base features of reporting. This lab has four parts: • Part 1: Setting your initial report structure • Part 2: Practice of report structure • Part 3: Using the pin a report feature • Part 4: Copy and Paste a report
Tasks:	In this lab, you will: • Set the base starting point of your personal report structure used for all upcoming labs of this course. • Create some basic reports from default configuration. • Familiarize yourself with the appropriate tool for the task.

Lab 2: Part 1 - Set the Starting Point

Purpose:	This lab will allow you to better integrate the concept behind report structure. This lab also sets the base for the report organization for the remainder of the course.
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Tasks:	In this lab, you will: • Practice creation of report nodes and structure and set base report organization. • Create report placeholder and name such reports. • Create parallel and drill down report structure. • Experiment the purpose of “My Reports” entry.
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Step	Action
0	Login to portal with the provided username/password to the indicated class' ViPR SRM M&R portal.
1	Make sure to be in Browse Mode. From this mode, locate the “My Reports” report node. Found it? _____ Click Edit Mode button, at top of the page.
2	(in Edit Mode) From this mode, locate the “My Reports” report node. Found it? _____ (you might need to scroll down the navigation tree panel) Explain what happened: _____ _____ Hint: look at the Display Policy option of the Filtering & Expansion tab. Click on “My Reports” report node.

Step	Action
3	Create the first child report that will make the first entry of our report structure. Click Add a new report icon:  “New Report” node entry should show up under “My Reports”. Rename this report with “ViPR SRM Advanced Reporting”:  Click Save.
4	Make sure to select the ViPR SRM Advanced Reporting report node. Add a new report under this one and name this new report node “Module 02”. Click Save.
5	Repeat step 4 for “Module 03” through “Module 06” (don’t forget to save, each time). Those should be considered as static report nodes.
6	Add more report nodes: • Report Wizard • Testing yard • Pinned reports • Module 01 Click Browse Mode.

Step	Action
7	Look at the presentation and structure in browse mode. Drill down and notice what the report page says. “This report does not select any data,” means that for the default report type selected (list), nothing has been defined to show up. Metric context is still the full content of the database, but Report Engine has nothing to generate. Notice the report ordering. Is the list of reports under “ViPR SRM ...” presented in a convenient/logical order? _____ Click Edit Mode.
8	Select “ViPR SRM ...” report node. Under Filtering & Expansion tab, unfold “Child Node Ordering” section. One by one, move (drag and drop) reports from “Ordered by Name” to “Ordered by Position”, in your preferred order of appearance in the list. Click Save. Click Browse Mode. How about the report order under “ViPR SRM ...” is it better? _____

Step	Action
9	Now, return back to Edit Mode and define the remaining of your base report structure, as follows: • Module 01 ○ [no labs - nothing to do here] • Module 02 ○ Lab 1 - Part 3 - Report Wizard • Module 03 ○ Lab 2 - Part 1 - Set the base under My Reports ○ Lab 2 - Part 2 - Practice report structure ○ Lab 2 - Part 3 - Pinned reports ○ Lab 2 - Part 4 - Copy and paste report Note: Use “Child Node Ordering” (under Filtering and Expansion tab) for re-ordering the list, when required. Optionally, return back to Browse Mode to look at the result. When done, return back to Edit mode for the next step of this lab.
10	Locate and select the report you created from Lab 1 - Part 3 of module 2 using the Report Wizard: “Hypervisor CPU and Memory status” Click the scissors icon (cut):  From report tree, unfold “ViPR SRM ...” unfold “Module 02”, select “Lab 1 – Part 3 – Report Wizard” report node. Click the paste pad icon (paste): 

Step	Action
11	Since we created two report entries for Report Wizard, place a copy of the report created with the report Wizard, under “Report Wizard” report node. Select original report ““Hypervisor CPU and Memory status”. Click the document icon (copy):  Select Report Wizard report entry, right under “ViPR SRM ...” report node. Click the paste pad icon (paste). Now you have a separate copy of the same report on both places. Return back to Browse Mode in order to look at your work. When done, return back to Edit mode for the next step of this lab.

Step	Action
12	Before closing this lab, let's add some report description. Select "ViPR SRM..." report entry. Under "Report Configuration" tab,, unfold "Description and Properties" section. In the text box next to "Report Description", enter some text of your own. If you want to better format the content, use <div> tags. As an example: <pre> <div> <h3>This is [your name] report structure for ViPR SRM M&R Advanced Reporting class</h3>
You can write any description you want and even add some fancy type face using standard html codes. Quick examples:
&lt;br/&gt; tag adds a line break
&lt;b>tag is used to bold text
&lt;u>tag is used to underline <u>text</u>
&lt;i>tag is used for italic <i>text</i>

Visit www.w3schools.com for more details. </div> </pre> Return back to Browse Mode and look at the presentation of the main report "ViPR SRM ...".

Lab 2: Part 2 - Practice Report Structure

Purpose:	This lab allows you to practice the organization of a report structure: parent and child and sub children reports.
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Tasks:	In this lab, you will: • Practice more report structure.
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Step	Action
0	Login to portal with the provided username/password to the indicated class' ViPR SRM M&R portal. Hint: if required, refer to the "ViPR SRM M&R Advanced Reporting" ReportPack in order to visualize the final result of this lab.

Step	Action
1	Click Edit Mode. Unfold your base report structure up to the following: All>>ViPR SRM Reporting class>>Module 03>>Lab 2 – part 2 - Practice report structure Create a new report node under “Lab 2 – part 2- ...” and name it “Report structure example”, click Save. Select this new report node. Create new report nodes and name them as follows: • Drilldown structure • Parallel report nodes • Parent Child Reports (list) Make sure they are ordered as listed above. Return back to Browse Mode and visualize the result. When done, return back to Edit mode for the next step of this lab.
2	From the first (1st) report entry named “Drilldown structure”, create the following report structure, right under: <pre> Parent 001 Child 001 Sub Child 001 Sub Sub Child 001 And so on... 001 </pre> Return back to Browse Mode and visualize the result. When done, return back to Edit mode for the next step of this lab.

Step	Action
3	From the second (2nd) report entry named “Parallel report nodes”, create the following report structure, right under: <pre> Report 001 Report 002 Report 003 Report 004 </pre> Return back to Browse Mode and visualize the result. When done, return back to Edit mode for the next step of this lab.
4	From the third (3rd) report entry, named “Parent Child Reports (list)”, create the following report structure, right under: <pre> Report 001 - Parent Report 001-01 - Child Report 001-02 - Child Report 001-03 - Child Sub Report 02-001 - Child Sub Report 02-002 - Child Report 002 - Parent Report 002-01 - Child Report 002-02 - Child </pre> Return back to Browse Mode and visualize the result. When done, return back to Edit mode for the next step of this lab.

Lab 2: Part 3 - Pin a Report

Purpose:	This lab allows you to practice the copy and pasting of reports using “pin a report” feature. Exploring how the UI processes the copied reports.
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Tasks:	In this lab, you will: • Take a copy of reports from standard library using “pin a report” feature. • Discover the how “pin a report” works and decide whether this feature is for you.
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Step	Action
0	Login to portal with the provided username/password to the indicated class' ViPR SRM M&R portal.
1	Make sure you are in Browse Mode. Drill down to the following report: All>>Report Library>>Physical Hosts>>Host Information>>MHMPC111>>FileSystems Average Capacity
2	Locate and click report's pin icon. Select “New Personal View”.
3	When prompted for the name of the Personal View, enter “Temp Personal View”. Click Ok.
4	Now, under “My Reports” you have a new entry named “Temp Personal View” where the pinned report is placed. Select the report “FileSystems Average Capacity”. Click Edit Mode.

5	Comment on how the report is defined? What happens if you click on the white arrow on the black icon?
6	Return back to the “FileSystems Average Capacity” report in your personal pin space. Select the parent report node (MHMPC111). Describe the filter applied: Can you explain where this filter comes from?

7	Click on report “FileSystems Average Capacity”. Click on the white on black arrow, allowing you to locate the original report node definition: Linked to File Systems Average Capacity  On report destination, make sure to select Filtering & Expansion tab. Take note of the filter expression:
8	Click on the Parent report node of “File Systems Average Capacity”, which is on the following node: All>>Physical Hosts>>Host Information>>Host devices (do not refer to <<TEMPLATE>> report node for this case) Select Filtering & Expansion tab. Take note of the filter expression (Host devices): Note: there is an expansion set on this report node. Remember that expansion bring an implicit filter expression at browse time.

9	Click on the Parent report node of “Host devices”, which is “Host Information”. Select Filtering & Expansion tab. Take note of the filter expression (Host Information):
10	Click on the Parent report node of “Host Information”, which is “Physical Hosts” Select Filtering & Expansion tab. Take note of the filter expression (Physical Hosts):
11	From the previous steps, 7 through 10, if you join the filter expressions with an AND clause, how this compare with the filter expression from step 6? What’s your conclusion?

	Notes:

End of lab exercise

Lab 2: Part 4 - Copy and Paste a Report

Purpose:	This lab allows you to practice the copy and pasting of reports and compare with the Pin report feature.
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Tasks:	In this lab, you will: • Copy reports from standard library and put them under your own report organization. • Notice and take a copy of required context filter when performing copy of reports.
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Step	Action
0	Login to portal with the provided username/password to the indicated class' ViPR SRM M&R portal.
1	Locate and view the following report in Browse Mode: All>>Report Library>>VMware vCenter>>Datacenters Summary>>CSE 176 Lab>>Hosts Notice how many elements you now have for this report: _____ Click on Edit Mode. Take note of the current report path: _____
2	You should be on a link report node. Follows the link by clicking on the white on black arrow icon, next to "Hosts". Take note of where the Hosts report is defined, write down the path: _____

3	Click on Copy icon. Locate and select the following destination report structure: All>>My Reports>>ViPR SRM Reporting class>>Module 03 Select report “Lab 2 – part 4 - Copy and paste report” Click Paste icon. Change name of the report to “Hosts of DC <CSE 176 lab>” Return back to Browse Mode.
4	Notice how many elements you now have for this report: _____ Note: you have more items than just the host of DataCenter named “CSE 176 lab”. Can you explain the difference? _____
5	Now, browse again to the original report (step 2): All>>Report Library>>VMware vCenter>>Datacenters Summary>>CSE 176 Lab>>Hosts Return in Edit Mode. Go up one report node (memberof). Select Filtering & Expansion tab. Take note of the filter expression: _____ Is there an expansion set? _____ Take note of the property name used for the expansion: _____ You want to list hosts that only belong to DataCenter named “CSE 176 lab”. Build up the filter expression based on the information you got from this step: _____

6	Now, move up one report node up (Datacenters Summary). Select Filtering & Expansion tab. Take note of the filter expression:
7	Now, move up one more report node (VMware vCenter). Select Filtering & Expansion tab. Take note of the filter expression:
8	Now it's time to gather all those filter expressions from various drill-down nodes. Using AND (&) clause, build up the final expression that will makes the expected report context. Final filter expression:

9	Select the copied report node: All>>My Reports>>ViPR SRM Reporting class>>Module 03>> Lab 2 – part 4 - Copy and paste report>>Hosts of DC <CSE 176 Lab> Select Filtering & Expansion tab. Paste the final filter expression you defined in step 8. This should be something like: <pre>devtype=='Hypervisor' & ((source=='VMWareCollector' source=='RSC-ESXPowerPathPerformance') & #APG-DB:ALL source='VSPHERE-EVENTS%' source='VSPHERE-TASKS%') & !vstatus=='inactive' & (devtype=='Hypervisor' devtype=='VirtualMachine' devtype=='Datastore') & memberof=='CSE 176 Lab'</pre>
10	Run the report (Browse Mode). How many host entries do you have? _____
11	Filter cleanup. Look carefully at the filter expression. Are there any extraneous items? Yes, there are. At first, for this report, you don't need anything from the EVENTS dataset. The pieces about VSPHERE-EVENTS% or VSPHERE-TASKS% are then not required. Second, notice the initial <i>devtype=='Hypervisor'</i> and later there is an AND with a clause that also includes <i>VirtualMachine</i> or <i>Datastore</i>. You can keep only <i>Hypervisor</i>. The final cleaned filter expression then becomes: <pre>devtype=='Hypervisor' & (source=='VMWareCollector' source=='RSC-ESXPowerPathPerformance') & #APG-DB:ALL & !vstatus=='inactive' & memberof=='CSE 176 Lab'</pre>

Notes	Why does the initial filter expression filter twice on the same properties or have some contradiction in their form? Because report nodes are sometimes generic and re-used over many places, depending on the parent report. Report designer cannot assume report origin select the expected metric context. This way of copying report is important to understand. This way you can have a complete and separate copy of a given report that you can now start to re-work and customize without affecting the original report. It is strongly recommended that you don't alter/change/edit original reports from either the standard library or from the generic report set. Those are always eligible to be updated by a system upgrade. The copy you make will be left untouched by system upgrade.
Extra	Extra practice for Copy and Paste reports: - All>>Physical Hosts>>Host Information>>Host devices>>HBAs - All>>Dashboards>>Storage>>Enterprise Capacity Dashboard>>Usable Capacity by Pool
	Notes:

End of lab exercise

Lab Exercise 3: Expansion in Reporting

Purpose:	This lab explores expansion in reporting and how the search engine creates its default report structure. This lab has four parts: • Part 1: Listing assets of the database • Part 2: Listing VMAX arrays from the database content • Part 3: Listing SAN switches from the database content • Part 4: Listing the hosts from the database content
Tasks:	In this lab, you will: • Practice understanding the Expansion concept. • Experiment the default list report type. • Familiarize yourself with the appropriate tool for the task.

Lab 3: Part 1 - Drill Down Collection Inventory

Purpose:	This lab explores expansion in reporting and how the search engine creates its default report structure.
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Tasks:	In this lab, you will: • Practice defining a generic drill down inventory report based on the expansion feature. • Experiment the default list report type.
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Step	Action
0	Login to portal with the provided username/password to the indicated class' ViPR SRM M&R portal. Note: the use of square bracket for report name (edit mode) is used as a lab convention meaning this report node is an expansion and thus the report name will be replace by the expansion result. It has no obligation nor has any interpretation by the report engine.

1	Select Edit Mode. Drill-down the following destination report structure: All>>My Reports>>ViPR SRM Reporting class>>Module 03 Select “Filtering and Expansion” tab. Create a new report node and name it as follows: “Lab 3 – part 1 - Adv Search like report” Set a filter in order to set the metric context, as follows: devtype is Array or devtype is FabricSwitch devtype=='Array' devtype=='FabricSwitch' devtype=='Array' devtype=='FabricSwitch' Click Save.
2	Create a child report under “Lab 3 – part 1 – Adv ...” report node. Name that new report: “[Per Source]” (see note in step 0, above). Under “Expansion” section, click Add a Property button. In the new pop up, look for the search text box and start entering the word “source”. From the refined list, locate and put a check box next to “Source collector name”. Click Ok. Click Save in order to save you report definition.
3	Under the last report node you just created, add a new report node. Name that report “[Per devtype]”. Under “Expansion” section, click “Switch to Input Field” and in the textbox, enter “devtype”. Click Save in order to save you report definition.

4	Repeat step 3 with the remaining report levels: <table border="1"> <thead> <tr> <th>Report name</th><th>Property name to use for Expansion</th></tr> </thead> <tbody> <tr> <td>[Per device]</td><td>device</td></tr> <tr> <td>[Per parttype]</td><td>parttype</td></tr> <tr> <td>[Per part]</td><td>part</td></tr> <tr> <td>[Per name]</td><td>name</td></tr> </tbody> </table> Note: property name is case sensitive; all letters must be lower case.	Report name	Property name to use for Expansion	[Per device]	device	[Per parttype]	parttype	[Per part]	part	[Per name]	name
Report name	Property name to use for Expansion										
[Per device]	device										
[Per parttype]	parttype										
[Per part]	part										
[Per name]	name										
5	On the very last report in the chain ([Per name]), click Report Configuration tab and under Report Type, select “simple chart”. Click Save.										
6	Return to Browse Mode to look at the result. Drill down various entries. Notice the scope of source. How many sources you have? _____										
7	Some items appear in double “CiscoCollector” and “Cisco-Collector”. This is due to some initial “polluted” collection while recording the data set for the demo server you are using. Click Edit Mode Add a top filter (with an AND), limiting the scope to the active data set. AND the current filter with the following: <pre> graph LR A["devtype is Array"] -- and --> B["vstatus is active"] </pre> vstatus=='active' Click Save and return to Browse Mode.										

8	Now, how many source report nodes do you have? _____
9	How would you include VMware data collection to this report list? _____ _____ Refine devtype=='Array' devtype=='Fabric Switch' Please enter a value for property source source is VMWareCollector Or by ORing: devtype=='Hypervisor' or devtype=='VirtualMachine' or devtype=='DataStore'
	Notes: _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____

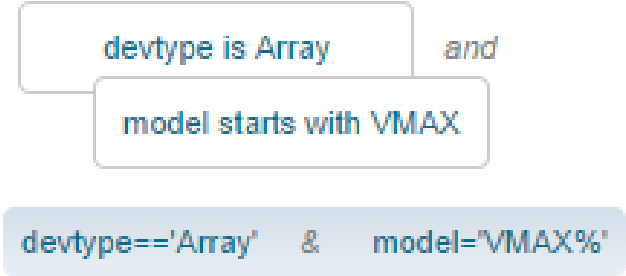
End of lab exercise

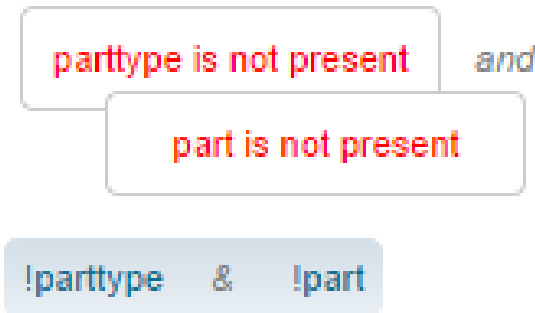
Lab 3: Part 2 - Inventory of Arrays

Purpose:	This lab defines a simple inventory report on arrays while combining filtering, expansion, and report structure definition.
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Tasks:	In this lab, you will: • Create report structure • Set filter to set the correct metric context.
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Step	Action
0	Login to portal with the provided username/password to the indicated class' ViPR SRM M&R portal. From the previous lab, you should note that presented data set must comply with the listed property names along the structure in order to end up with the metric list. There are cases where some of these properties are not present. This is the case with metric directly attached to the device, the box itself: it has no part or parttype.

1	Select Edit Mode. Drill-down the following destination report structure: All>>My Reports>>ViPR SRM Reporting class>>Module 03 Select “Filtering and Expansion” tab. Create a new report node and name it as follows: “Lab 3 – part 2 - Inventory of arrays” Set a filter in order to set the metric context, as follows:  devtype=='Array' & model='VMAX%' Click Save.
---	--

2	Create the following report structure (indentation shown parent-child structure): Lab 3 – part 2 - Inventory of arrays [per array] Metric directly attached to array [per metric] [per component type] [per component] [per metric] <table border="1"> <thead> <tr> <th>Report name</th><th>Property name to use for Expansion</th></tr> </thead> <tbody> <tr> <td>[per array]</td><td>device</td></tr> <tr> <td>[per component type]</td><td>parttype</td></tr> <tr> <td>[per component]</td><td>part</td></tr> <tr> <td>[per metric]</td><td>name</td></tr> </tbody> </table>	Report name	Property name to use for Expansion	[per array]	device	[per component type]	parttype	[per component]	part	[per metric]	name
Report name	Property name to use for Expansion										
[per array]	device										
[per component type]	parttype										
[per component]	part										
[per metric]	name										
3	Under “Metric directly attached to array” report node, set the following filter:  !parttype & !part										
4	For each of the report node named [per metric], click Report Configuration tab and under Report Type, select “simple chart”. Click Save.										
5	Return to Browse Mode to look at the results.										

6	What are those metrics under “Metric directly attached to array”? Can you explain why you have metrics listed under “Metric directly attached to array”?
	Notes:

End of lab exercise

Lab 3: Part 3 - Inventory of Switches

Purpose:	This lab defines a simple inventory report on SAN switches while combining filtering, expansion, and report structure definition. It also allows you to experience the double expansion on a single report node.
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Tasks:	In this lab, you will: • Create report structure • Set filter to set the correct metric context. • Set correct double expansion: device name and model
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Step	Action
0	Login to portal with the provided username/password to the indicated class' ViPR SRM M&R portal.

1	Select Edit Mode. Drill-down the following destination report structure: All>>My Reports>>ViPR SRM Reporting class>>Module 03>> Lab 3 – part 2 - Inventory of arrays Take a complete copy of report “Lab 3 – part 2 - Inventory of arrays”. And paste right under Module 03. Select this new report and then select “Filtering and Expansion” tab. Rename this pasted report with the following: “Lab 3 – part 3 - Inventory of SAN switches” Replace the filter expression for the following: devtype is FabricSwitch devtype=='FabricSwitch' devtype=='FabricSwitch' Click Save.
2	Select the “[per array]” report node and rename for “[per SAN switch]”. Under Expansion section, set the double expansion expression using ‘device’ and ‘model’. 2 possible ways: 1) Select “Add a Property” button: a. From the pop-up menu, one property after the other, use search textbox to locate the property. b. Check the check box next of the property name. Notice the “Selected properties:” towards the top of the pop up. c. When both of the properties selected, click Ok button. 2) Select “Switch to Input Field”: a. Manually type in the property names separated by a comma. Click Save.

Lab 3: Part 4 - Inventory of Hosts: Split VMs from Physical

Purpose:	This lab introduces a small concept of report definition re-usability and template.
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Tasks:	In this lab, you will: • Create report structure. • Set filter for in order to set the correct metric context. • Set correct expansion
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Step	Action
0	Login to portal with the provided username/password to the indicated class' ViPR SRM M&R portal.

1	Select Edit Mode. Drill-down the following destination report structure: All>>My Reports>>ViPR SRM Reporting class>>Module 03 Select “Filtering and Expansion” tab. Create a new report node and name it as follows: “Lab 3 – part 4 - Inventory of hosts” Set a filter in order to set the metric context, as follows: devtype is VirtualMachine or devtype is Host or devtype is Hypervisor devtype=='VirtualMachine' devtype=='Host' devtype=='Hypervisor' devtype=='VirtualMachine' devtype=='Host' devtype=='Hypervisor' Click Save.
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2	a) Take a copy of report structure under Lab 3 – part 2 ([per array] report node). And paste right under “Lab 3 – part 4 – Inventory...” report. Rename report with [per host/VM]. b) Right under “Lab 3 – part 4” report, create 2 new report entries (parallel). Name those, respectively “Physical” and “Virtual”. c) Copy and paste as a Relative Link the [per host/VM] under both reports you just created in b). The above should create the following structure: Lab 3 – part 4 – Inventory of hosts [per host/VM] Metric directly attached [per component type] Physical [per host/VM] Virtual [per host/VM]
3	Select the top [per host/VM] report node and change Display Policy to “hide except when it’s the target of a link” option. Click Save.
4	Select “Physical” report entry. Edit filter and set to: devtype is Host or devtype is Hypervisor devtype=='Host' devtype=='Hypervisor' devtype=='Host' devtype=='Hypervisor' Click Save.

Lab Exercise 4: Using Table Report Types

Purpose:	This lab will allow you to practice using table report types. This lab has 7 parts: • Part 1: Repurposing a table report • Part 2: Creating a table report and understanding its underlying structure • Part 3: Multiple expansion on a single report node • Part 4: Discovering the available metrics attached to an array device, using a standard table report type • Part 5: Selecting value types columns • Part 6: Event listing in a standard table • Part 7: Using a multi-column feature of a standard table report Remember: NEVER work directly on a report from the default report library. Always take a copy first.
Tasks:	In this lab, you will: • Familiarize yourself with tables report types. • Familiarize yourself with various options of a table report • Experiment with use of various table report type: ○ List report type ○ Standard table report

Lab 4: Part 1 - Adding a Column to an Existing Report

Purpose:	This lab allows you to practice report modification from an existing report. In this lab, you will add columns to an existing report. Remember: NEVER work directly on a report from the default report library. Always take a copy first.
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Tasks:	In this lab, you will: • Take a copy of reports from standard library. • Add some columns to the base table report.
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Step	Action
0	Login to portal with the provided username/password to the indicated class' ViPR SRM M&R portal.
1	Go in Edit Mode. Navigate to the following report: All>>My Reports>>ViPR SRM Reporting class>>Module 04 Add a new report node and name this one "Lab 4 - Part 1 - add Host column to HBA inventory report" Click Save.
2	Navigate to the following report node: All>>Physical Hosts>>Host Information>>Host devices>>HBAs Take a copy and paste <u>under</u> the report node just created in the previous step "Lab 4 - Part 1 – add ..."

3	Edit “HBAs” report: - From Filtering & Expansion tab, erase the Unique Identifier. Note: the effect of leaving this Unique Identifier might cause some confusion to the Report Engine from reports that re-use this report. Plus, when a report update is applies, it will update/replace this report as well, losing all modifications you’ll make.
4	Go back to the originally copied report, and walk up the node tree, copying and pasting the filters as required to duplicate the original report. You can look at the complete expression and simplify (removing redundant statements). Edit “Lab 4 - Part 1 – add ...” report by setting the filter correctly so HBAs report will select the right metric context. You might end up with the following: <pre>datagrpr='LMD-%' & devtype=='Host' & !vstatus=='inactive'</pre> Discuss about your finding (compare to the above):
5	The HBAs report lists the ports of any host device (including Hypervisors in our case). The lack with this report is that you don’t know which Host is belongs to. We’ll fix that by adding a new property column. Select HBAs report. Select “Report Details: Table” tab. Click Property button. At the bottom where the new column shows, expand the details and set: - Column Name: Host Name - Property: device - (leave other parameters as they appear) Move the column between Name and Driver. Click Save.
6	Return in Browse Mode and explore your final work.

	As a discussion: can you tell and explain on which property the content of the report is based on? Take time to understand the report and to relate with the properties in used and their returning values.
	Notes:

End of lab exercise

Lab 4: Part 2 - Adding a Column to Existing Report

Purpose:	This lab allows you to practice creating a base table report.
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Tasks:	In this lab, you will: • Create a table report
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Step	Action
0	Login to portal with the provided username/password to the indicated class' ViPR SRM M&R portal.
1	Go to Edit Mode. Navigate to the following report node: All>>My Reports>> ViPR SRM Reporting class>>Module 03>> Lab 3 - Part 1 - Adv Search like report Take a copy and paste <u>under</u> the following report node: All>>My Reports>>ViPR SRM Reporting class>>Module 04 Rename the pasted report with the following: "Lab 4 - Part 2 - Inventory like report" Click Save.

2	Now, this report structure is a List type report, all way down to leaf. Let's change this to a standard table. Select the "Lab 4 - Part 2 - Inventory like report" report. Select "Report Configuration". From the Report Type list, select "standard table". Report Details tab should change. Select this tab. Define 2 columns of type Attribute: a) Column Name= Source name; Attribute=Node name b) Column Name=Device type count; Attribute=Child count Click Save.
3	Select the "[Per Source]" report. From the Report Type list, select "standard table". Report Details tab should change. Select this tab. Define 2 columns of type Attribute: a) Column Name= Device types; Attribute=Node name b) Column Name=Device count; Attribute=Child count Click Save.
4	Select the "[Per devtype]" report. From the Report Type list, select "standard table". Report Details tab should change. Select this tab. Define 2 columns of type Attribute: a) Column Name= Device list; Attribute=Node name b) Column Name=Component type count; Attribute=Child count Click Save.

5	See the pattern? Move on with remaining report nodes and follows this table in order to select column name correctly: <table><tr><td>Report node</td><td>Column order</td><td>Column type</td><td>Column Name</td><td>Attribute</td></tr><tr><td>[Per device]</td><td>1</td><td>Attribute</td><td>Component types list</td><td>Node name</td></tr><tr><td>[Per device]</td><td>2</td><td>Attribute</td><td>Component count</td><td>Child count</td></tr><tr><td>[Per parttype]</td><td>1</td><td>Attribute</td><td>Components list</td><td>Node name</td></tr><tr><td>[Per parttype]</td><td>2</td><td>Attribute</td><td>Metric count</td><td>Child count</td></tr><tr><td>[Per part]</td><td>1</td><td>Attribute</td><td>Metric list</td><td>Node name</td></tr><tr><td>[Per part]</td><td>2</td><td>Value</td><td>Last value</td><td>[n/a]</td></tr></table>	Report node	Column order	Column type	Column Name	Attribute	[Per device]	1	Attribute	Component types list	Node name	[Per device]	2	Attribute	Component count	Child count	[Per parttype]	1	Attribute	Components list	Node name	[Per parttype]	2	Attribute	Metric count	Child count	[Per part]	1	Attribute	Metric list	Node name	[Per part]	2	Value	Last value	[n/a]
Report node	Column order	Column type	Column Name	Attribute																																
[Per device]	1	Attribute	Component types list	Node name																																
[Per device]	2	Attribute	Component count	Child count																																
[Per parttype]	1	Attribute	Components list	Node name																																
[Per parttype]	2	Attribute	Metric count	Child count																																
[Per part]	1	Attribute	Metric list	Node name																																
[Per part]	2	Value	Last value	[n/a]																																
6	Finally, for the leaf report node “[per name]”, select report type to be “simple chart”. Click Save .																																			
7	Return to Browse Mode to look at the results. Which VMAX Array has the biggest number of Disks? _____																																			

8

Now let's add more interest in this report by adding some values from the device list point of view.

Select the "[Per devtype]" report. This table report will be populated by the device list.

Add the following columns:

Column Name	Type of column	Definition
Model	Property	Select 'model' as for the property
TotalDisk	Value	Filter on name=='TotalDisk'
TotalLun	Value	Filter on name==' TotalLun'
TotalHotSpare	Value	Filter on name==' TotalHotSpare'
TotalMemory	Value	Filter on name==' TotalMemory'

For each value column, change the sampling period from real-time to one hour. Edit Time Management settings and make use of "1 hour" Sampling Period.

Click **Save**.

9

Return to **Browse Mode** to look at the results.

First browse the VMAX-Collector source, look at the details about the totals, per array. That work fine.

Second, browse the BrocadeCollector; look at the details... why are those cells empty? Can you explain?

What's your conclusion?

	Notes:

End of lab exercise

Lab 4: Part 3 - Inventory Like Report – Flat Table

Purpose:	This lab is to practice another format of standard table report: flat table. This lab makes use of multiple expansion level on a single report node. This allows creating a flat table report. Be careful when using this kind of report as the number of entries grows very fast, because of multiple expansion expression. Number of rows can be evaluated by calculating the result of multiplication of the number of objects each property of the expansion generates. This reflects in the final number of elements in the table.
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Tasks:	In this lab, you will: • Create a flat table report. • Configure expansion on multiple properties.
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Step	Action
0	Login to portal with the provided username/password to the indicated class' ViPR SRM M&R portal.
1	Go to Edit Mode. Navigate to the following report node: All>>My Reports>> ViPR SRM Reporting class>>Module 04 Add a new report and give it the following name: "Lab 4 - Part 3 - SAN Switch port inventory" Define a report filter as follows: devtype=='FabricSwitch' & parttype=='Port' & vstatus=='active' Note: Doing so will limit the metric scope to port data of SAN Switches Click Save.

2

Under Report Configuration tab, select report type to be “standard table”.

Then under “Report Details: Table” define the following Property columns according to the following:

Column Name	Column Type	Property name
Source	Property	source
Data Group	Property	datagrp
Device Type	Property	devtype
Device Name	Property	device
Vendor	Property	vendor
Model	Property	model
Serial Number	Property	serialnb
Measurement Type	Property	parttype
Port name	Property	part
Port WWN	Property	portwwn
Port type	Property	iftype
Port Speed	Property	maxspeed
Metric list	Property	name
Device description	Property	devdesc
IP address	Property	ip
Port Status	Property	partstat

Continue with step 3 (below) for values columns definition. Optionally you can click **Save** after each column definition or at the end (of defining all columns). The rule is as long as you work on the same report node, you can wait to save when you’re done, just before either switch to Browse mode or when going to select another report node from the tree.

3

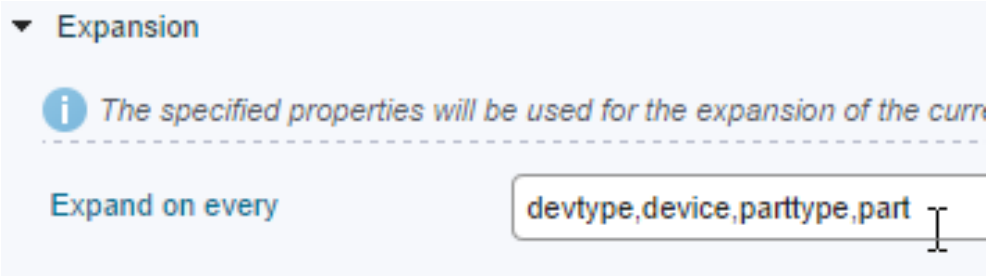
From the same table definition from previous step, define the following Value columns:

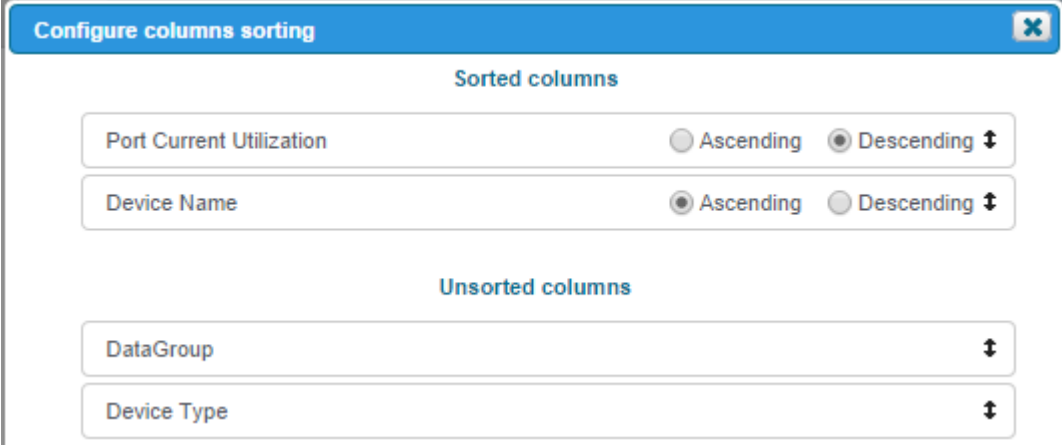
Column Name	Column Type	Filtered metric	Details
Port Status value	Value	name=='portOperStatus' name=='swPortOpStatus'	Time Management: 1-hour, “the last value only”, 2 periods Value settings: Use Rounding = 0 decimals, Thresholds: Normal=1, Critical=2 Value Formatter: Status
Port Current Utilization	Value	name=='Current Utilization' & part	Time Management: 1-hour, “the last value only”, 2 periods

You should have a total of 18 columns defined.

Once completed, click **Save**.

At this point **if** you switch to Browse mode, you’re report will be incomplete because you haven’t defined how the table will be populated... that’s what you’ll work on in the next step. If you did so, return back to Edit mode and continue with remaining steps.

4	Under “Lab 4 - Part 3 - SAN Switch port inventory” report, create a new child report. Name that node “[big expansion]”. Define the following expansion, using the all of the following properties: devtype, device,parttype,part. Click on “Switch to Input Field”, lists the properties separated by a comma, as follows:  Click Save <u>As an alternative in setting the expansion</u>, you can use the default mode of selecting the properties by using “Add a Property” button and the find and check all of the four properties from the list (simple expansion). Doing so, those should show up in the “Selected properties”, on top:  When you’re done with properties selection using List mode, click Ok. Then click Save.
5	From the [big expansion] report definition, change the report type from <u>list</u> to <u>simple chart</u>, under Report Configuration. Doing so will make the entry you select in the report to be presented as a graph instead of listing items.

6	Go back to top report (i.e. “Lab 4 - Part 3 – San Switch ...”) and sort the table columns items, as follows: 1- Port Current Utilization, Descending order 2- Device Name, Ascending order. From the “Report Details: Table” tab, click “Sort” button. For each of the above columns, move them from the Unsorted list to the Sorted list and select the ordering. 
7	Return to Browse Mode to look at the results.
8	• Notice how many entries (rows) you have in your report: _____ • Can you prove that number right? (Hint: return back to Lab 2) _____ • As you look at the report, which switch and port is the busiest? _____ • What is the current utilization value? _____ • As the initial report shows, you can notice some cells are empty. • Now, filter on the Device Name column for the device named “mgmt207106”, using the funnel icon on top of the column. Then do the same for Port name, using “*2/9*” expression. That should lead you to select 4 rows. Take note of the DataGroup value of the first rows: _____ • Now click to re-order the table by vendor. What is the DataGroup showing some vendor and model values? _____ • You should notice that collection is from 2 different data groups from the same source. One set has the vendor, model, and WWN of the port, but not the other. Look at the metric list. What do you notice?

	Notes:

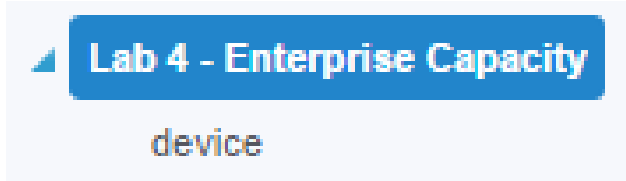
End of lab exercise

Lab 4: Part 4 - Enterprise Capacity Report

Purpose:	This lab discovers metrics attached to arrays (VMAX and VNX) by making use of an existing report.
-----------------	---

Tasks:	In this lab, you will: • Copy a report and move table columns • Make some modifications to reports
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Step	Action
0	Login to portal with the provided username/password to the indicated class' ViPR SRM M&R portal.
1	Go to Edit Mode. Navigate to the following report node: All>>My Reports>> ViPR SRM Reporting class>>Module 04 Add a new report and give it the following name: "Lab 4 – Part 4 – Enterprise Capacity" From Report Configuration tab, change the report type from list to standard table. Click Save.
2	Navigate the standard report library and highlight the following report: All>>Explore>>Storage>>More Reports>>Enterprise Capacity Take a copy and paste in under the report node you just created in previous step ("Lab 4 – Part 4 – Enterprise ...").

3	Highlight the 1st level of the copied report (“Enterprise Capacity”). Select “Report Details: Table”. Go at the bottom of the column list and click on “All” in order to select all of the columns. Hit “Copy” button. Return back to top of report, notice the Paste button. How many entries are copied into buffer? _____
4	Highlight the parent report “Lab 4 – Part 4 – Enterprise Capacity”. This is where we want our table report to be defined, not as a child of this report. Select “Report Details: Table” and click on Paste button. This will paste all columns definition contained in the paste buffer. Click Save.
5	Now, unfold and highlight the “device” report, just under “Enterprise Capacity”. Select Cut icon. Highlight the parent report (“Lab 4 – Part 4 – Enterprise ...”) and hit “Paste” report.
6	Unfold the ‘device’ report and highlight one at a time the child report (Topology Map and Device Summary). Hit Delete the Selected Report icon in order to get rid of those. All should left is the device report. Highlight the original (copied) “Enterprise Capacity” report and delete it. You should now have the following defined:  The screenshot shows a blue header bar with a triangle icon and the text 'Lab 4 - Enterprise Capacity'. Below it, the word 'device' is displayed in a smaller, lighter blue font.
7	Return back to Browse Mode. What happens? _____ No quite what was expected? What’s missing? _____

8	Return back to Edit Mode. Select the original “Enterprise Capacity” report from the standard library and take a copy of the filter expression. Place the filter expression right on “Lab 4 – Part 4 – Enterprise Capacity” report and add a statement that will exclude inactive metrics: <code>vstatus==‘active’</code>
9	Now have a look again at the report (Browse Mode). Look at the various column numbers... look again! Have you notice under “% Poll Used” and “%Pool Subscribe”? Some numbers simply not make sense. Let’s look how these numbers are defined. Return back to Edit Mode, select “Report Details: Table” tab of “Lab 4 – Part 4 – Enterprise Capacity” report. Unfold “% Pool Used”. Which metric is selected? _____ Can you then explain the nature of the number you had in such column? _____
10	From the previous discovery, and particularly if you take time to compare with original report layout, you will notice that the result originally called for a formula result. We have eliminated one result by the removal of underlying child report. In order to preserve our report, for now, we’ll have to eliminate those columns. Remove the following columns: • Unusable (GB) • Pool Used (GB) • % Pool Used • % Pool Subscribed
11	Now let’s discover a little bit the data organization of this report (return in Browse Mode). By looking at the first five value columns, what do you notice from the filter expression? _____ What does that mean? _____ In an earlier module, we had the list of “Metric directly attached to array”.

12	Automatically convert units. A nice feature that report does not make use of is the unit conversion of the cell value. Let make a first example of such modification in order to use this feature. Return back into Edit mode. Unfold “Total Raw (GB)” value column definition. Unfold “Value settings” section. For Scaling Mode, select “by unit”. The layout of the form will change a bit. On the left hand side, you have to specify the original unit of the value. Looking at the documentation, you understand the value is in Giga Bytes. Unit types should then stay but Unit should select Classic GB. For the right-hand side, keep Unit Type the same, but select “Classic Auto” for Unit drop down list. Click Save. Return back to Browse Mode. Next, you can also change the rounding value, to your taste. Also, you could get rid of the “(GB)” from the title of the column, as the unit converter adds itself the unit specification. The remaining columns configuration is left to you as an exercise.
	Notes:

End of lab exercise

Lab 4: Part 5 - Array Performance (Read/WriteReq)

Purpose:	This lab will allow you to experiment with various Time Management options of a value type column of a table report. Also covered is report structure so you can compare table reports in the same report page.
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Tasks:	In this lab, you will: • Create base table report. • Change Time Management options. • Structure report for better view and comparison on the reported numbers.
---------------	--

Step	Action
0	Login to portal with the provided username/password to the indicated class' ViPR SRM M&R portal.
1	Go to Edit Mode. Navigate to the following report node: All>>My Reports>> ViPR SRM Reporting class>>Module 04 Add a new report and give it the following name: "Lab 4 – Part 5 – Array performance analysis" For now, keep this report type as a list report. Add a filter expression, as follows: <code>datagrpf=='VMAX-Array'</code> Click Save.

2

Create a child report node named “Average”.

Set report type to be a standard table.

Create the following (property) column:

Column Name	Column Type	Property name
Array	Attribute	Node name
Array Model	Property	model
Firmware	Property	devdesc
Array Type	Property	arraytyp

3

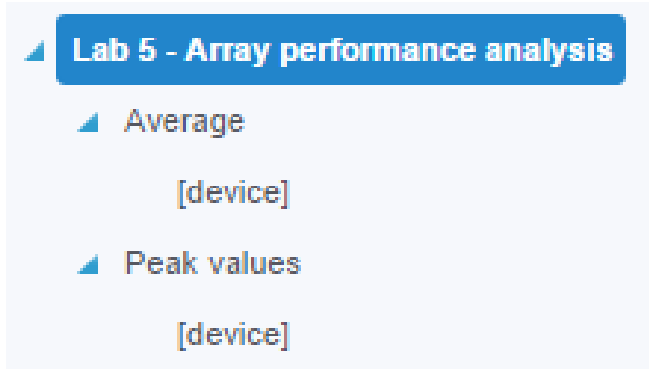
From the same table definition from previous step, define the following Value columns:

Column Name	Column Type	Filtered metric	Details
IORate - report	Value	name=='IORate'	Time Management: real-time, recover “all the values in the time range”
ReadRequests - report	Value	name=='ReadRequests'	Time Management: real-time, recover “all the values in the time range”
WriteRequests - report	Value	name=='WriteRequests'	Time Management: real-time, recover “all the values in the time range”
ReadThroughput - report	Value	name=='ReadThroughput'	Time Management: real-time, recover “all the values in the time range”
WriteThroughput - report	Value	name=='WriteThroughput'	Time Management: real-time, recover “all the values in the time range”

Click **Save**.

4	Add a new child report under “Average” report. Name this report “[device]”. Set expansion on ‘device’ property. Set report type to simple chart. Click Save.
5	Return in Browse Mode and see if values are populating you report. Numbers should show like the one in the ReportPack found here: All>>ViPR SRM Reporting class>>Module 04 - Base Report Types>> Lab 4 – Part 5 - Array performance analysis>>Average

6	Go to Edit Mode. Return back to table details of “Average” report. Take a copy and paste the five value definitions: IORate, Read+Write Requests, Read+Write Throughput. Revisit each of the 5 new columns and change 2 things: Column Name and Time Management parameters, as follows: <table border="1"> <thead> <tr> <th>Column Name</th><th>Details</th></tr> </thead> <tbody> <tr> <td>IORate – last month</td><td> Time Management: - Sampling Period: “1-hour” and “enforce the specified period” - Sampling Type: “average” - Column Time Range(s): “use a fixed time range”, “last”, “1 month” - Recover: “all the values in the rime range” - Temporal Aggregation: “same as sampling type” </td></tr> <tr> <td>ReadRequests – last month</td><td> Time Management: [Same as above] </td></tr> <tr> <td>WriteRequests – last month</td><td> Time Management: [Same as above] </td></tr> <tr> <td>ReadThroughput – last month</td><td> Time Management: [Same as above] </td></tr> <tr> <td>WriteThroughput – last month</td><td> Time Management: [Same as above] </td></tr> </tbody> </table> Click Save. In short, what you’re doing is to compare 2 different time range for 5 metrics and see how they vary over the 2 periods. Values presented are average of the period.	Column Name	Details	IORate – last month	Time Management: - Sampling Period: “1-hour” and “enforce the specified period” - Sampling Type: “average” - Column Time Range(s): “use a fixed time range”, “last”, “1 month” - Recover: “all the values in the rime range” - Temporal Aggregation: “same as sampling type”	ReadRequests – last month	Time Management: [Same as above]	WriteRequests – last month	Time Management: [Same as above]	ReadThroughput – last month	Time Management: [Same as above]	WriteThroughput – last month	Time Management: [Same as above]
Column Name	Details												
IORate – last month	Time Management: - Sampling Period: “1-hour” and “enforce the specified period” - Sampling Type: “average” - Column Time Range(s): “use a fixed time range”, “last”, “1 month” - Recover: “all the values in the rime range” - Temporal Aggregation: “same as sampling type”												
ReadRequests – last month	Time Management: [Same as above]												
WriteRequests – last month	Time Management: [Same as above]												
ReadThroughput – last month	Time Management: [Same as above]												
WriteThroughput – last month	Time Management: [Same as above]												
7	Return to Browse Mode in order to verify if numbers are showing up and if they align with the reference report. If everything goes, return in Edit Mode and continue with next step. Otherwise, review your work with the steps above.												

8	Now, highlight the “Average” report and take a copy of the report node. Paste on the same level (that is, highlight “Lab 4 – Part 5 – Array ...” report node and click Paste. Rename the copy version of the “Average” report to “Peak values”. Click Save. The resulting report structure should look like the following:  You might need to use “Child Ordering” at “Lab 4 – Part 5 – Array...” report node in order to force the correct order (even if that is optional). It’s a cosmetic matter.
9	Edit the table of “Peak values” report (Report Details: Table). Revisit all of the 10 value columns by changing the “Sampling Type” from “average” to “max”. Click Save.
10	Select “Lab 4 – Part 5 – Array ...” report node and change report type from “list” type to “mixed using defaults”.
11	Return in Browse Mode and admire your resulting report. Make sure the values are right: • Average – report: click on a value. Look at the time line: is it aligned with the default time range of the report (1 day)? _____ • Is the average value in the cell makes sense? _____ • Average – last month: click on a value. Look at the time line. Which period does it covers? _____ • Is the average value in the cell makes sense? _____

Lab 4: Part 6 - Table Report using Event Data

Purpose:	This lab will allow you to create reports using events data from various sources: Generic Events, VMWare, and Compliance. The main goal of this lab is to build report structures to conveniently show events from three different event source databases.
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Tasks:	In this lab, you will: • Build a report structure and set appropriate event filters. • Copy and paste some existing event reports and tailor them to reach our goal.
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Step	Action
0	Login to portal with the provided username/password to the indicated class' ViPR SRM M&R portal. General note: there are many filter expression manipulation in that lab. Please make sure to type in correctly OR to take appropriate copy selection. Filter expression ARE case-sensitive, always.
1	Go to Edit Mode. Navigate to the following report node: All>>My Reports>> ViPR SRM Reporting class>>Module 04 Add a new report and give it the following name: "Lab 4 – Part 6 – Events reports" For now, keep this report type as a list report. Click Save. This report will present 3 sections, one for each of 3 types of event databases: Generic Events, VMWare, and Compliance.

2	Take a copy of the following report node and paste as a child of “Lab 4 – Part 6 – Events ...” report: All>>Operations>>Alerts>>All Alerts
3	Expand all nodes under “All Alerts”. Clean up each of the Bold report title by removing each time the Unique Identifier: click on the pen icon next to the text field. You will receive a warning each time, acknowledge (click OK). Clear the content of the text box. Click Save after each modification. Select “Alert Details and Impact Analysis” report node... delete reports from that level (inclusively).
4	Select “Alert Details Expansion On Alert Name” report. Change the Display policy to “show this node in the reports but not in the tree”, this will prevent from the ability to further drill down the report on a row item. Now, cut and paste the report node filter expression and add it to the parent level using an ‘AND’ clause (All Alerts). The resulting filter for “All Alerts” report node would lead to the following: <i>!eventSource=='ImpactAnalysis-GenericEvent' & active=='1' & #EVENTS-GENERIC:ALL</i>
5	Change the name of “All Alerts” for “Generic Alerts (Events)”, that is more appropriate.
6	Test your report in Browse Mode and notice how many elements are showing. It must be 21 (elements found).
7	Return back to Edit Mode. We’ll now add the compliance events report. Locate and take a copy of the following report, as a child report of “Lab 4 – Part 6 – Events ...” report. All>>Storage Compliance>>Breach Report>><<TEMPLATE>>>>Breaches Rename that report to “Compliance - Active Breaches” Change Report Type from “interactive table” to “standard table”. Click Save.

	Ok, starting this point, the steps will stop mentioning you to click Save button when doing modification to report. It is now up to you to integrate this action.
8	As you may have noticed, filter is not set properly on our report (Compliance – Active Breaches). Let compose the filter based on the parents of the original report. From the original report, move 2 levels up, select “Breach Report”, or point to the following: All>>Storage Compliance>>Breach Report This is the main filter we need. Take a copy of the report expression and place it on our new report entry (Compliance – Active Breaches). Add the following filter element to the expression: <i>state=='1'</i> The final filter expression should look like this one on the “Compliance – Active Breaches” report: <i>#COMPLIANCE:ALL & breachName & state=='1'</i> Note: this “state” filter is from the “All Active Breaches” original node report.
9	Select child report (“id,breachName”) of our main report (“Compliance – Active Breaches”) and change report type from mixed report to standard table.
10	Expand “Breach details” under “id,breachName” and delete any further down reports (keep “Breach details”).
11	Delete “Device” report under “id,breachName” report.
12	In Browse Mode , look at the report and make sure “Compliance – Active Breaches” holds 63 event elements. When choosing an event, you’ll be brought to some details of the event.
13	Once the above is confirmed, return back to Edit Mode for the last (3 rd) event report entries about VMWare.

14	Locate and take a copy of the following report and paste as a child report of “Lab 4 – Part 6 – Events ...” report. All>>VMware vCenter>>Events & Tasks>>All Events by Category>>Total By Category>>Reboot & PoweredOn/Off - Rename that report to “VMWare - Reboot & PoweredOn/Off” - Change Report Type from “mixed reports” to “standard table”. - Under Report Details, remove all of the defined columns. - Revisit the report’s filter expression in order to limit the scope to VMware. The small required addition is from a piece of the main VMware report library: <i>source='VSPHERE-EVENTS%'</i> The final filter should look like the following: <i>(EventType='%RebootEvent' EventType='VmPowered%' EventType=='VmStartingEvent') & source='VSPHERE-EVENTS%' & eType=='Event'</i>
15	Delete the 2 underlying (link) reports: “Overtime” and “Detailed”.
16	Ok, be careful with the following step: Locate and take a copy of the table <u>columns definition</u> from the following report, back to the “VMWare - Reboot & PoweredOn/Off” report. All>>VMware vCenter>><<TEMPLATES>>><<EVENTS>>>>Detailed Note: as a student user you can’t copy the columns... the workaround is to take a copy of the whole report in a temporary location (under My Reports) and then proceed.
17	Locate and take a copy of the following report structure under “VMWare - Reboot & PoweredOn/Off” report: All>>VMware vCenter>><<TEMPLATES>>><<EVENTS>>>>eKey
18	Test this last report entry in Browse Mode. You should end up with 17 elements.
19	Now back to top report “Lab 4 – Part 6 – Events ...” - Change report type from list to standard table report. - Add a first Attribute column, selecting “node name” and named “Available reports”. - Add a second Attribute column, selecting “child count” and named “count”.
20	Return in Browse Mode and explore your final work.

Lab 4: Part 7 - VMAX IORate Multi-column

Purpose:	This lab will allow you to experiment with the multi-column feature of a table report.
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Tasks:	In this lab, you will: • Create a standard table report with a value. • Configure multi-column. • Define some threshold in order to display colored cell background that match.
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Step	Action
0	Login to portal with the provided username/password to the indicated class' ViPR SRM M&R portal.
1	Go to Edit Mode. Navigate to the following report node: All>>My Reports>> ViPR SRM Reporting class>>Module 04 Add a new report and give it the following name: "Lab 4 - Part 7 – VMAX IORate multi-column" Add a filter expression, as follows: <i>devtype=='Array' & source=='VMAX-Collector' & !part</i> Set report type as a standard table report.

2

a) Under Report Details: Table, define the following columns:

Column Name	Column Type	Property name
Array SN	Attribute	Node name
IORate	Value	Filter: name=='IORate' <u>Time Management:</u> Sampling Period: real-time Sampling Type: average *Column Time Range: “generate a column on the”, “previous”, “custom”, “12h”, for each “1 hour” (see below) Recover: “all the values in the time range” Temporal Aggregation: “same as sampling period”

*Here’s a screen capture of the Column Time Range settings we want:

b) Under IORate column, define the following thresholds:

Selector	Label	Threshold value	Color
Normal	Normal	0.0	Green
Minor	Minor	2500.0	Yellow
Major	Major	5000.0	Orange
Critical	Critical	8000.0	Red
Critical	Critical	Infinity	Red

c) Under Value Formatter, select “Value with background”

3	Create a new child node under “Lab 4 - Part 7 – VMAX ...” Name that report “[array]” Set expansion to use property “device” Set Report Type to be simple chart. Set the Default Duration to “last” and “1 day” Set Sampling Period to “1 hour” Set Sampling Type to “average” Optional: unfold Description and Properties section, write something between div tags (i.e. <div> [some text] </div>).
4	Return in Browse Mode and explore your final work.
	How many columns is the report showing? _____ What is the time coverage? From:_____ To: _____ From the first time slot, hit the information icon (white “i” in blue circle). What is it saying? _____ What happens when you drill down on an Array? _____
	Notes: _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____

End of lab exercise

Lab Exercise 5: Using Graph Report Types

Purpose:	This lab will allow you to practice using graph report types. This lab has three parts: • Part 1: Using standard graph report with VMAX array metric data. • Part 2: Using standard graph report with Cisco SAN switch metric data. • Part 3: Using standard graph report using dynamic rendering Remember: NEVER work directly on a report from the default report library. Always take a copy first.
Tasks:	In this lab, you will: • Familiarize yourself with graph report types. • Familiarize yourself with various options of a simple graph report. • Structure your report in order to set context suitable for graph report.

Lab 5: Part 1 - Array Performance (graph)

Purpose:	This lab is to practice creation and customization of a simple graph report for selected metrics directly attached to an array device.
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Tasks:	In this lab, you will: • Structure a report and set filter context. • Configure a graph report using 2 Y-Axis.
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Step	Action
0	Login to portal with the provided username/password to the indicated class' ViPR SRM M&R portal.
1	Go to Edit Mode. Navigate to the following report node: All>>My Reports>> ViPR SRM Reporting class>>Module 04 Add a new report and give it the following name: "Lab 5 – part 1 – Array performance (graph)" For now, keep this report type as a list report. Set the top filter as follows: <i>datagrpp=='VMAX-Array' & (name=='IORate' name=='TotalCacheUtilization' name=='HitPercent') & !parttype & vstatus=='active'</i> Can you elaborate/explain about this filter? _____ _____ _____

2	Create a new child node under “Lab 5 – part 1 – Array ...” Name that report “[array]” Set expansion to use property “device” Set Report Type to be simple chart. Set the Default Duration to “last” and “1 week” Set Sampling Period to “1 hour” Set Sampling Type to “average”
3	Click on “Report Details: Graph” in order to select options of that graph report. Under Metric Customization, click “Add Customization”. Match metric: select “filter wizard” option. Set filter to name==’IORate’. Configuration: select “on main axis”. Optionally you can define curve shape, width, marker, and color.
4	Under Metric Customization, click a second time on “Add Customization”. Match metric: select “filter wizard” option. Set filter in order to select <i>TotalCacheUtilization</i> and <i>HitPercent</i> metrics (yes you can!). Configuration: select “on secondary axis”. Optionally you can define curve shape, width, marker, and color.
5	Return in Browse Mode and admire your resulting report.
6	Using Display Menu, change the report rendering to “Dynamic Charts”. Can you precisely tell the timestamp of the first data point of IORate for array SN ending with 710? _____ (Optional: Change report rendering to be defined as Dynamic Charts)

7	Go to Edit Mode. Under Report Details: Graph of the “[array]” report, select the following Summary Statistics settings under “Settings for Standard Graphs”: - PinPoint - Trend
8	Return to Browse Mode. Look at the result for Array SN ending with 727. Why summary statistics are not showing? _____ Try hiding <i>HitPercent</i> and <i>TotalCacheUtilization</i> metrics from the graph. What do you conclude? _____ What are the following values for IORate? Max: _____ Min: _____ Average: _____ Is the trend stable, increasing, decreasing? _____ If you stretch the trend in time, when does IORate hit 7500 IOPS (approximately)? _____ How do you see that on the graph? _____ _____
	Notes: _____ _____ _____ _____ _____ _____ _____ _____

End of lab exercise

Lab 5: Part 2 - SAN Switch Performance (Cisco)

Purpose:	This lab allows you to define a simple inventory report on SAN switches and to graph performance metrics of ports.
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Tasks:	In this lab, you will: • Create report structure: table report + graph. • Set filter for in order to set the correct metric context. • Select some of the graph settings (double Y-Axis, limited metric scope).
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Step	Action
0	Login to portal with the provided username/password to the indicated class' ViPR SRM M&R portal.
1	Go to Edit Mode. Navigate to the following report node: All>>My Reports>> ViPR SRM Reporting class>>Module 04 Add a new report and give it the following name: "Lab 5 – part 2 – SAN Switch performance (Cisco)" <u>Filtering &Expansion:</u> Set the top filter as follows: <i>devtype=='FabricSwitch' & devdesc='%Cisco%' & vstatus=='active'</i> Can you relate/explain the above filter expression? _____ _____

2

Report Configuration:

Set report type to be a standard table report.

Report Details: Table:

Define the following table columns:

Column Name	Column Type	attribute
Switch name	Attribute	Node name
Port count	Attribute	Child count

3

Create a new child node under “Lab 5 – part 2 – San Switch ...”

Filtering & Expansion:

Name that report “[SAN switch]”

Set filter expression as follow:

parttype=='Port'

Set expansion to use property “device”

Set “Use the filter of this node for” to “expansion and selection”

Report Configuration:

Set Report Type to be standard table.

Report Details: Table:

Define the following table columns:

Column Name	Column Type	Property name
Port name	Attribute	Node name
Port type	Property	iftype
Port Speed	Property	maxspeed
Port Status	Property	partstat

And the following value type columns:

Column Name	Filtered metric	Details
Port Utilization (%)	name=='CurrentUtilization' & parttype=='Port'	Time Management: real-time, recover “all the values in the time range” Advanced Properties: Allow filtering on this value, expression: “\$v >= 0.00”
PortStatus	name=='portOperStatus' name=='swPortOpStatus'	Time Management: real-time, recover “the last value only”, time Threshold: 600 sec. Value settings: Thresholds Definition: Normal: 1.0 Critical: 2.0 Value Formatter: Status

4	Create a new child node under “[SAN switch]” <u>Filtering & Expansion:</u> Name that report “[port]” Set filter expression as follows: <i>name=='ifInOctets' name=='ifOutOctets' name=='CurrentUtilization' name=='portOperStatus'</i> Set expansion to use property “part”. Set “Use the filter of this node for” to “expansion and selection”
5	<u>Report Configuration:</u> Set Report Type to be simple chart. Set Report Rendering to “dynamic charts by default”.
6	<u>Report Details: Graph:</u> Under Metric Customization, click “Add Customization”. Match metric: select “filter wizard” option. Set filter to <i>name='if%Octets'</i> Configuration: select “on main axis”. Optionally you can define curve shape, width, marker, and color.
7	Under Metric Customization, click a second time on “Add Customization”. Match metric: select “filter wizard” option. Set filter to select either <i>CurrentUtilization</i> or <i>portOperStatus</i> metrics. Configuration: select “on secondary axis”. Optionally you can define curve shape, width, marker, and color.
8	Return to Browse Mode and explore your final work. Why are we setting a second metric filter at the graph level? _____ _____

	Notes:

End of lab exercise

Lab 5: Part 3 - Virtual Machines

Purpose:	This lab practices mixing table and graph reports with various views and lays the ground work for mixed reports. This lab is also meant to explore metric organization in VMware collection.
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Tasks:	In this lab, you will: • Create report structure. • Setup graph report.
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Step	Action
0	Login to portal with the provided username/password to the indicated class' ViPR SRM M&R portal.
1	Go to Edit Mode. Navigate to the following report node: All>>My Reports>> ViPR SRM Reporting class>>Module 04 Add a new report and give it the following name: "Lab 5 – part 3 – Virtual Machines" <u>Filtering &Expansion:</u> Set the top filter as follows: <i>devtype=='VirtualMachine' & #APG:ALL</i> Can you relate/explain the above filter expression? _____ _____

2	<u>Report Configuration:</u> Set report type to be a standard table report. As for the table columns definition, navigate to the following report, take a copy of all of the defined columns: All>>Report Library>>VMware vCenter>>Inventory>>Virtual Machines>>Virtual Machines Note: you might need to click the “Linked to” icon (white arrow in black circle) in order to be able to copy the “real” report node definition. Doing so, is also referred to “follows the link”. On destination, get rid of last 3columns: IOPs, Write IOPs, and Read IOPs
3	Create a new child node under “Lab 5 – part 3 – Virtual...” <u>Filtering &Expansion:</u> Name that report “[vm list]” Set expansion to use property “device” <u>Report Configuration:</u> Set Report Type to be list report.

4	Create a new child node under “[vm list]” <u>Filtering &Expansion:</u> Name that report “Performance CPU” Set filter as follows: <i>part=='System' & parttype=='Processor' & (name=='CurrentUtilization' name=='UsageMHz')</i> <u>Report Configuration:</u> Set Report Type to be simple chart Set Report Rendering to be “dynamic charts by default” <u>Report Details: Graph:</u> • Under Metric Customization, click “Add Customization”. • Match metric: select “filter wizard” option. Set filter to name=='UsageMHz’ • Configuration: select to display “on main axis”. Optionally you can define curve shape, width, marker, and color. • Under Metric Customization, click a second time on “Add Customization”. • Match metric: select “filter wizard” option. Set filter in order to select name=='CurrentUtilization’ • Configuration: select to display “on secondary axis”. Optionally you can define curve shape, width, marker, and color.						
5	Navigate to the following report node and take a copy, back under “[vm list]”: All>>VMware vCenter>><<TEMPLATES>>>><<VM>>>>Virtual Machines>>VM Device Summary>>Performance Memory <u>Report Configuration:</u> Set Report Type to be standard table <u>Report Details: Table:</u> Define the following table columns: <table><tr><th>Column Name</th><th>Column Type</th><th>Property name</th></tr><tr><td>Available reports</td><td>Attribute</td><td>Node name</td></tr></table>	Column Name	Column Type	Property name	Available reports	Attribute	Node name
Column Name	Column Type	Property name					
Available reports	Attribute	Node name					
6	Return back to Browse Mode. How many entries do you have from “Lab 5 – part 3 – Virtual Machine” report? _____						

Lab Exercise 6: Using Mixed Report Types

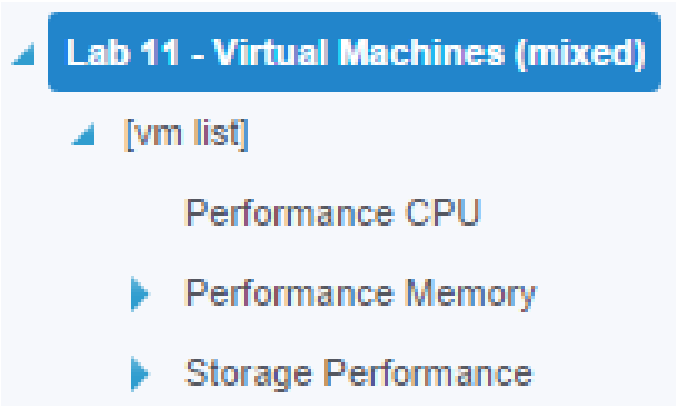
Purpose:	This lab will allow you to practice using mixed report types that are mostly associated with dashboards. This lab has four parts: • Part 1: Repurposing a previous lab part using Mix Report type • Part 2: Mixing SAN Switch and Array device in a Mix Report type • Part 3: Overlay reports using VNX metric data • Part 4: Overlay reports using VMware metric data .
Tasks:	In this lab, you will: • Familiarize yourself with the construction of a mixed report. • Practice using mixed reports.

Lab 6: Part 1 - Virtual Machines (mixed)

Purpose:	This lab details the previous lab 5 part 3 by using the mixed report feature.
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Tasks:	In this lab, you will: • Apply the mixed report concept to an already existing report.
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Step	Action
0	Login to portal with the provided username/password to the indicated class' ViPR SRM M&R portal.
1	Go to Edit Mode. Navigate to the following report node: All>>My Reports>> ViPR SRM Reporting class>>Module 04 Take a copy of "Lab 5 – part 3 – "Virtual Machines" under current Module 4 lab series. Rename that Lab 5 – part 3 for the following: "Lab 6 – part 1 – Virtual Machine (mixed)"
2	Select [vm list]"`report, under Report Configuration, change Report Type for "mixed reports".
3	Select "Performance Memory" report, under Report Configuration, change Report Type for "interactive table".

4	Navigate to the following report and take a copy and bring it back right under “[vm list]” report: All>>VMware vCenter>><<TEMPLATES>>><<VM>>>>Virtual Machines>>VM Device Summary>>Storage Performance The final report structure should look like the following: 
5	Reorganize the report presentation by making sure reports are presented in the following order: 1. Performance CPU 2. Performance Memory 3. Storage Performance Use Child Node Ordering from “Filtering & Expansion” in order to specify the ordering.
6	Return to Browse Mode and explore your final work. Make sure the following work correctly: - Selecting a VM report, “Performance CPU” is showing on the top. - Selecting a Report from “Performance Memory” update the chart report, just next right to the report list (interactive report) - Selecting any of the reports from Storage Performance, you have graphs reports of the metric context.

	Notes:

End of lab exercise

Lab 6: Part 2 - Mixed Reports: Array and SAN

Purpose:	This lab familiarizes you with layout features of a mixed report.
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Tasks:	In this lab, you will: • Use browse mode to edit the layout of a report. • Join together existing reports in a mixed mode.
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Step	Action
0	Login to portal with the provided username/password to the indicated class' ViPR SRM M&R portal.
1	Go to Edit Mode. Navigate to the following report node: All>>My Reports>> ViPR SRM Reporting class>>Module 04 Add a new report and give it the following name: "Lab 6 - Part 2 - Mixed reports: Array and SAN" Set report type to be a "mixed reports". Set Display Mode to "three reports per line"
2	Take a copy of the following three reports from previous labs and place them under the Lab 6 - Part 2 report: • Lab 5 - Part 1 - Array performance (graph) • Lab 5 - Part 2 - SAN Switch performance (Cisco) • Generic Alerts (Events) ← Found under Lab 4 – part 6 – Events reports

3	Edit Report type for report “Lab 5 - Part 1” and “Lab 5 - Part 2”, changing them to “mixed reports” Re-order the child report as they are listed in step 2 (Filtering & Expansion tab, Child Node Ordering section).
4	Return back to Browse Mode. Using the icon tools in the right-hand corner of one of the SAN Switch table report, make it span up to the 3 columns of the layout: click 2 times on the right pointing arrow. This will re-organize the layout. Do same to Events report.
5	In order to definitely accept the layout, move up to the top of the report page. Notice in the report title the text: “The layout of the report has changed”. Click on “save” in order to register the layout you just set. As soon as you click, the note disappears. How many reports do you have in the report area? _____
6	Return back to Edit Mode. Edit Report Type of “[SAN Switch]” report node found under “Lab 5 - Part 2” (the one under “Lab 6 - Part 2”), change it from <u>standard table</u> to <u>mixed reports</u>. Return back to Browse Mode. How many reports do you have in the report area? _____ What do you conclude about a mixed report of a mixed report? _____ _____ Look at the report under the ReportPack. Notice how it is laid out. Can you do the same?

	Notes:

End of lab exercise

Lab 6: Part 3 - Overlay - VNX

Purpose:	This lab is to practice Overlay report types.
-----------------	---

Tasks:	In this lab, you will: • Create a graph report. • Create a table report for events to list. • Define Overlay reports.
---------------	--

Step	Action
0	Login to portal with the provided username/password to the indicated class' ViPR SRM M&R portal.
1	Go to Edit Mode. Navigate to the following report node: All>>My Reports>> ViPR SRM Reporting class>>Module 04 Add a new report and give it the following name: "Lab 6 - Part 3 – Overlay - VNX" For now, set report type to be Mixed report.

2	Create a second report node under Lab 6 - Part 3. <u>Filtering & Expansion:</u> Name that report “IOPS – VNX 1582”. That is, this report will focus on a specific VNX system. Set the filter as follows: <pre>source=='VNXFile-Collector' & name='%Requests' & !partid & device=='VNX1582' & vstatus=='active'</pre> <u>Report Configuration:</u> Set Report Configuration to simple chart. Set Default duration to last 1 week Set Sampling Period to 1 hour <u>Report Details: Graph:</u> In Legend section, add a property the list: ‘moverid’ (use either the property selector of the input field, it is you choice to experiment).
3	Take a copy of a previous report from Lab 4 - Part 6: “Generic Alerts (Events)”. Paste that report right under Lab 6 - Part 3 report node.
4	Return to Browse Mode and look at your report. Graph report should be on top and table in second. If this is not the case, use Child Ordering feature under Filtering & Expansion tab.
5	Go to Edit Mode. Select “Lab 6 - Part 3 – Overlay VNX” report. Under “Report Configuration”, change Report Type to be Overlay.

6	Select “Report Details: Overlays” . Define (add) a first overlay. The configuration details of this first one is as follows: - Display Title: VNX Activity - Info - Selection Filter: <i>severityAsString=='INFORMATIONAL'</i> - Boundaries: from 50% to 60% - Tooltip Information: switch to input field and set the following list of properties, space separated (6): <i>severityAsString device eventname parttype part category</i> - Momentary Events: choose a green color; point size=3; Marker type=Triangle																				
7	Add 4 more Overlays, defined as follows: <table><tr><th>Display Title: “VNX Activity”+</th><th>Filter:</th><th>Boundaries</th><th>Momentary events settings:</th></tr><tr><td>Minor</td><td><i>severityAsString =='MINOR'</i></td><td>60% – 70%</td><td>Event color=yellow Point size=3 Marker=Triangle</td></tr><tr><td>Major</td><td><i>severityAsString =='MAJOR'</i></td><td>70% - 80%</td><td>Event color=orange Point size=3 Marker=Triangle</td></tr><tr><td>Critical</td><td><i>severityAsString =='CRITICAL'</i></td><td>80% - 90%</td><td>Event color=red Point size=3 Marker= down Triangle</td></tr><tr><td>Unknown</td><td><i>severityAsString =='UNKNOWN'</i></td><td>0% - 5%</td><td>Event color=magenta Point size=2 Marker=diamond</td></tr></table> Note: set the tooltips as in previous step for all of the overlays.	Display Title: “VNX Activity”+	Filter:	Boundaries	Momentary events settings:	Minor	<i>severityAsString =='MINOR'</i>	60% – 70%	Event color=yellow Point size=3 Marker=Triangle	Major	<i>severityAsString =='MAJOR'</i>	70% - 80%	Event color=orange Point size=3 Marker=Triangle	Critical	<i>severityAsString =='CRITICAL'</i>	80% - 90%	Event color=red Point size=3 Marker= down Triangle	Unknown	<i>severityAsString =='UNKNOWN'</i>	0% - 5%	Event color=magenta Point size=2 Marker=diamond
Display Title: “VNX Activity”+	Filter:	Boundaries	Momentary events settings:																		
Minor	<i>severityAsString =='MINOR'</i>	60% – 70%	Event color=yellow Point size=3 Marker=Triangle																		
Major	<i>severityAsString =='MAJOR'</i>	70% - 80%	Event color=orange Point size=3 Marker=Triangle																		
Critical	<i>severityAsString =='CRITICAL'</i>	80% - 90%	Event color=red Point size=3 Marker= down Triangle																		
Unknown	<i>severityAsString =='UNKNOWN'</i>	0% - 5%	Event color=magenta Point size=2 Marker=diamond																		

Lab 6: Part 4 - Overlay – VMware Hypervisors

Purpose:	This lab is to practice Overlay report types using VMware events.
-----------------	---

Tasks:	In this lab, you will: • Create a report structure. • Copy and paste overlay report from existing.
---------------	--

Step	Action
0	Login to portal with the provided username/password to the indicated class' ViPR SRM M&R portal.
1	Go to Edit Mode. Navigate to the following report node: All>>My Reports>> ViPR SRM Reporting class>>Module 04 <u>Filtering &Expansion:</u> Add a new report and give it the following name: "Lab 6 - Part 4 – Overlay – VMware Hosts" Set the filter as follows: <i>devtype=='Hypervisor'</i> <u>Report Configuration:</u> Set the report type to be list report.

2	Create a second report node under Lab 6 - Part 4. <u>Filtering & Expansion:</u> Name that report “[Hypevisor hosts]” Set expansion to use property “device” <u>Report Configuration:</u> Set Report Configuration to mixed report. Set Default duration to last 1 day. Set Sampling Period to 1 hour.
3	Take a copy of the overlay report from the VMware library, found as follows: All>>VMware vCenter>><<TEMPLATES>>><<ESX>>>Hosts>>ESX Device Summary>>Performance CPU & Memory>>CPU Paste this report under the “[Hypervisor host]” report node created in previous step.
4	Select CPU report and make sure Report Type is Overlay. Have a look at the defined overlays. What the filters have in common? _____ _____
5	Unfold the CPU report node. Select “CPU Usage %”. Look at the filter expression. What is this filter trying to select? _____ Look at the “Report Details: Graph” tab, more specifically to the metric customization section. Can you explain the metric customization parameters trying to do? _____

6	Select report “Events Impacting Processors”. Make sure it is a standard table report. Under “Report Details: Table” tab, add a new property column as follows: Column name: “Affected VM” Property: VM Note: if you prefer to explore the possible properties, click on the property selector button. Within the new window, select VMWARE tab. The property list is showing.
7	Return to Browse Mode and look at your report.
8	Do you have proposal on what to do for improving the initial report (Lab 6 - Part 4)?
	Notes:

End of lab exercise

Lab Exercise 7: Completing Reports

Purpose:	This lab is an initial work in progress. You acquired enough material and practice to start working on a more complete report. The end goal of this lab is to end up with a Chargeback report. But more concepts are required, especially with formulas, our next subject. All VMs of this dataset have been tagged with additional properties: customer, business units, owner, and application.
Tasks:	In this lab, you will: • Create an initial layout of vCenter report. • Make use of available tagging properties: customer and business units.

Lab 7: Part 1 - vCenter Inventory (part 1)

Step	Action															
0	Login to portal with the provided username/password to the indicated class' ViPR SRM M&R portal.															
1	Go to Edit Mode. Navigate to the following report node: All>>My Reports>> ViPR SRM Reporting class>>Module 04 Add a new report and give it the following name: “Lab 7 – vCenter Inventory (part 1)” <u>Filtering &Expansion:</u> Set the top filter as follows: <i>vstatus=='active' & devtype=='VirtualMachine' & customer & bunit</i> <u>Report Configuration:</u> Set report type to be an interactive table report.															
2	Create the following report structure under Lab 7 report: [customer] [bunit] [VM] [metric] For each report, set the expansion correctly and Report Type, as follows: <table><tr><th>Report name</th><th>Property to expand on:</th><th>Report Type</th></tr><tr><td>[customer]</td><td>customer</td><td>Standard table</td></tr><tr><td>[bunit]</td><td>bunit</td><td>Standard table</td></tr><tr><td>[VM]</td><td>device,deviceid</td><td>Standard table</td></tr><tr><td>[metric]</td><td>name</td><td>Simple chart</td></tr></table>	Report name	Property to expand on:	Report Type	[customer]	customer	Standard table	[bunit]	bunit	Standard table	[VM]	device,deviceid	Standard table	[metric]	name	Simple chart
Report name	Property to expand on:	Report Type														
[customer]	customer	Standard table														
[bunit]	bunit	Standard table														
[VM]	device,deviceid	Standard table														
[metric]	name	Simple chart														

Step	Action															
3	Define the following columns for Lab 7 report: <table><thead><tr><th>Column Name</th><th>Column Type</th><th>Property name</th></tr></thead><tbody><tr><td>Customer</td><td>Attribute</td><td>Node name</td></tr><tr><td>Business Unit count</td><td>Attribute</td><td>Child count</td></tr><tr><td>VM Count</td><td>Value</td><td>[default parameters]</td></tr><tr><td>Metric Count</td><td>Value</td><td>[default parameters]</td></tr></tbody></table>	Column Name	Column Type	Property name	Customer	Attribute	Node name	Business Unit count	Attribute	Child count	VM Count	Value	[default parameters]	Metric Count	Value	[default parameters]
Column Name	Column Type	Property name														
Customer	Attribute	Node name														
Business Unit count	Attribute	Child count														
VM Count	Value	[default parameters]														
Metric Count	Value	[default parameters]														
4	Define the following columns for [customer] report: <table><thead><tr><th>Column Name</th><th>Column Type</th><th>Property name</th></tr></thead><tbody><tr><td>Business Unit</td><td>Attribute</td><td>Node name</td></tr><tr><td>VM Count</td><td>Attribute</td><td>Child count</td></tr><tr><td>Metric Count</td><td>Value</td><td>[default parameters]</td></tr></tbody></table>	Column Name	Column Type	Property name	Business Unit	Attribute	Node name	VM Count	Attribute	Child count	Metric Count	Value	[default parameters]			
Column Name	Column Type	Property name														
Business Unit	Attribute	Node name														
VM Count	Attribute	Child count														
Metric Count	Value	[default parameters]														
5	Define the following columns for [bunit] report: <table><thead><tr><th>Column Name</th><th>Column Type</th><th>Property name</th></tr></thead><tbody><tr><td>VM Name</td><td>Attribute</td><td>Node name</td></tr><tr><td>Metric Count</td><td>Attribute</td><td>Child count</td></tr></tbody></table>	Column Name	Column Type	Property name	VM Name	Attribute	Node name	Metric Count	Attribute	Child count						
Column Name	Column Type	Property name														
VM Name	Attribute	Node name														
Metric Count	Attribute	Child count														

Step	Action																		
6	Define the following columns for [VM] report: <table><tr><th>Column Name</th><th>Column Type</th><th>Property name</th></tr><tr><td>Metric name</td><td>Attribute</td><td>Node name</td></tr><tr><td>Component type</td><td>Property</td><td>parttype</td></tr><tr><td>Component</td><td>Property</td><td>Part</td></tr><tr><td>Last value</td><td>Value</td><td>[default parameters]</td></tr><tr><td>Average value</td><td>Value</td><td>Recover “all the value in the time range”.</td></tr></table>	Column Name	Column Type	Property name	Metric name	Attribute	Node name	Component type	Property	parttype	Component	Property	Part	Last value	Value	[default parameters]	Average value	Value	Recover “all the value in the time range”.
Column Name	Column Type	Property name																	
Metric name	Attribute	Node name																	
Component type	Property	parttype																	
Component	Property	Part																	
Last value	Value	[default parameters]																	
Average value	Value	Recover “all the value in the time range”.																	
7	Return to Browse Mode and explore your final work. What is wrong with columns “VM count” and “Metric count” ? _____ _____ Note: in order to fix the above, we’ll need some formulas, our next topic. Stay tuned!																		
	Notes: _____ _____ _____ _____ _____ _____ _____ _____ _____ _____																		

End of lab exercise

Lab Exercise 8: Integration of Formulas in Reports

Purpose:	This lab will allow you to practice integration of formulas in your report. This lab has 11 parts: Part 1: Basic usage of formulas. Part 2: Computing CurrentUtilization from base data for Brocade SAN Switches. Part 3: Demonstrate the “Property Value” in formula. Part 4: How to add custom group in Chargeback report. Part 5: Baseline report case study and alternatives with formulas. Part 6: Revisiting vCenter inventory lab part. Part 7: Application of spatial aggregation in VNX context. Part 8: Timeslot alignment using formulas. Part 9: Discovering more formulas. Part 10: Application of ChildCount formula with SAN Switches. Part 11: Creating a chargeback report (based on a given model).
Tasks:	In this lab, you will: • Familiarize yourself with the formula concept. • Practice where to place and how to use formulas. • Create report structure where formula will apply. • Experiment and discover various formula usage.

Lab 8: Part 1 - VMAX IOPS

Purpose:	This lab is an introduction to formulas in a standard table report. This report is about adding two timeseries (Read + Write Requests) together in order to generate IOPS. We will then compare this value to the currently available IORate.
-----------------	---

Tasks:	In this lab, you will: • Create report structure. • Add some calculation through formulas. • Use result in a value column of a table report. • Use output KPI from formula in a graph and a table.
---------------	---

Step	Action
0	Login to portal with the provided username/password to the indicated class' ViPR SRM M&R portal.

1

Go to **Edit Mode**.

Navigate to the following report node:

All>>My Reports>> ViPR SRM Reporting class>>Module 05

Add a new report and give it the following name: “Lab 8 – part 1 – VMAX IOPS”

Filtering & Expansion:

Set the top filter as follows:

devtype=='Array' & source=='VMAX-Collector' & !part

Report Configuration:

Set report type to be a **standard table** report.

Report Details: Table:

Define the first column as follows:

Column Name	Column Type	attribute
Array SN	Attribute	Node name

Add the following value type columns:

Column Name	Filtered metric	Details
IORate	name=='IORate'	Time Management: real-time, recover “all the values in the time range”
ReadRequests	name=='ReadRequests'	Time Management: real-time, recover “all the values in the time range”
WriteRequests	name=='WriteRequests'	Time Management: real-time, recover “all the values in the time range”
IOPS	[everything]	[keep with defaults]
Error value between IORate and IOPS (%)	[everything]	[keep with defaults]

2	Create a new child node under “Lab 8 – part 1 – VMAX ...” Report name: [array list] <u>Filtering &Expansion:</u> Set expansion to use property “device” <u>Report Configuration:</u> Set Report Type to be simple chart.
3	Select Formula tab. Click Add a Formula button. From the formula library, refine the list of entries by typing “nop” into the search text box, below the list of Available Formulas. Browse and select “Nop4 (until)”, click Add this formula button. (If required, unfold the “4 Parameters to Enter” section) For the First Value, next to “Empty Parameter”, click the Edit icon. From the drop down list, select “Filter on this Node”. Using the wizard, set the following filter expression: <i>name=='ReadRequests'</i> Click Ok. That sets the First Value.
4	In the “4 Results Returned”, in the first textbox (the grayed out text “First Result”), replace default value for “ReadRequests” and check “show in graphs” parameters next to it.

5

Base on the steps above that configured the first input and output parameters, set two more values as follows:

Parameter to Enter:	Definition Type	Definition value:	Result Returned
Second Value	Filter on this Node	name=='WriteRequests'	WriteRequests
Third Value	Filter on this Node	name=='IORate'	IORate

Note: we won't use the Fourth Value, so we leave it to select "Empty Parameter".

Make sure to select "show in graphs" option for all 3 Results.

6

Click **Add a Formula** button.

Browse and select "Addition (math)", click **Add this formula**.

In the "Parameters to Enter" section, for the first value (metric1), next to "Empty Parameter", click the Edit icon.

From the drop down list, select "Formula Result".

From the second drop down list (the formula results available on the current node), select "ReadRequests".Click Ok.

In the "Parameters to Enter" section, for the second value (metric2), next to "Empty Parameter", click the Edit icon.

From the drop down list, select "Formula Result".

From the second drop down list (the formula results available on the current node), select "WriteRequests".Click Ok.

In the "Result Returned" section, set output value "IOPS" and checkbox "show in graphs".

7	Click Add a Formula button. Browse and select “DifferentialRatio (math)”, click Add this formula. In the “Parameters to Enter” section, for the first value (x), next to “Empty Parameter”, click the Edit icon. From the drop down list, select “Formula Result”. From the second drop down list (the formula results available on the current node), select “IORate”.Click Ok. In the “Parameters to Enter” section, for the second value (y), next to “Empty Parameter”, click the Edit icon. From the drop down list, select “Formula Result”. From the second drop down list (the formula results available on the current node), select “IOPS”. Click Ok. In the “Result Returned” section, set output value “errorValue” and checkbox “shown in graphs”. Note: this formula computes $1-y/x$. We need to compute the error difference between original IORate and the calculated IOPS. This would be $(IORate-IOPS)/IORate$. Simplifying the expression leads to $1-IOPS/Irate$, so Differential Ratio is what we need. We consider Irate to be the reference value.
8	We will now use the formula values in the table report we just set before. Go to the “Lab 8 – part 1 – VMAX ...” report node. <u>Report Details: Table:</u> Edit IOPS value column. In “Selected Value” drop down, select “IOPS” (under “use a formula result”). Under Time Management, recover “all the values in the time range”. Under “Summary settings”, Label a result “Global IOPS” and select “sum” from “Generate column” setting. Edit “Error value between...” column. In “Selected Value” drop down, select “errorValue” (under “use a formula result”). Under Time Management, recover “the last value only” and set Time Threshold to “3600” seconds. Under “Value settings”, set the Value Formatter to “Value”.

9	Return to Browse Mode and explore your final work. Note: the Error value (%) shown is not due to any Reporting tool. The difference comes from the sampling method of the source system. IORate, ReadRequests and WriteRequest are all native metrics attached to the array, and from the same source.
	Notes:

End of lab exercise

Lab 8: Part 2 - SAN Switch Performance (Brocade)

Purpose:	This lab is about computing currentUtilization value on each port list of a FabricSwitch. The use case is about Brocade switches that do not provide this native data from ports when collected. The value must be computed at browse time. This is what this lab demonstrates.
-----------------	---

Tasks:	In this lab, you will: • Build the report structure. • Apply formula concept to compute port utilization (BandwidthUtilization formula). • Use output KPI from formula in a graph and a table.
---------------	---

Step	Action
0	Login to portal with the provided username/password to the indicated class' ViPR SRM M&R portal.

1

Go to **Edit Mode**.

Navigate to the following report node:

All>>My Reports>> ViPR SRM Reporting class>>Module 05

Add a new report and give it the following name: “Lab 8 – part 2 – SAN Switch performance (Brocade)”

Filtering &Expansion:

Set the top filter as follows:

devtype=='FabricSwitch' & vendor=='Brocade' & vstatus=='active'

Report Configuration:

Set report type to be a standard table report.

Report Details: Table:

Define columns as follows:

Column Name	Column Type	Attribute/pro perty
Fabric Switch name	Attribute	Node name
Port count	Attribute	Child count
Port Types	Property	porttype

2	Create a new child node under “Lab 8 – part 2 – SAN Switch...” Report name: [SAN switch] <u>Filtering &Expansion:</u> Set filter as follows: <i>parttype=='Port'</i> Set expansion to use property “device” <u>Report Configuration:</u> Set Report Type to be interactive table. Unfold “Description and Properties” section, under Displayed Properties, add the following properties (and keep default description): device model vendor contact devdesc
---	---

3

Report Details: Table

Define columns as follows:

Column Name	Column Type	Attribute/property
Port name	Attribute	Node name
Port Type	Property	porttype
Port Speed (maxspeed)	Property	maxspeed filter: <i>name=='ifInOctets'</i>
Port Speed (brcspeed - KB/s)	Property	Brcspeed filter: <i>name=='ifInOctets'</i>
Port Status (2)	Property	partstat

And add the following value type columns:

Column Name	Filtered metric	Details
PortStatus	name=='swPortOpStatus'	Time Management: 1-hour, recover "the last values only" Value Settings: Use Rounding: 0 decimals Thresholds: Normal=1; Critical=2 Value Formatter=Value
Avg. Utilization (%)	[everything] (for now)	Time Management: real-time, recover "all the values in the time range" Value Settings: Value Formatter=Sparkline Advanced Properties: Allow filtering on this value: \$v>=0.0

4

Create a new child node under “[SAN Switch]”

Report name: “[port]”

Filtering & Expansion:

Set expansion to use property “part”

Report Configuration:

Set Report Type to be simple chart

Report Details: Graph:

Main Y-Axis Scaling Mode = by unit;

	From:	To:
Unit Type	[Rate] Byte	Bit
Unit	[Decimal] B/s	[Decimal] Auto

Note: We will get back to Metric Customization as we did not define a formula result at this point.

5

Continue editing the Report node: “[port]”

Select **Formula** tab.

Click **Add a Formula** button.

Browse and select “BandwidthUtilization (utilization)”, click **Add this formula**.

Configure formula as follows:

Parameters to Enter:

Name	Definition type:	Definition value:
ifInOctets	Filter	name=='ifInOctets'
ifOutOctets	Filter	name=='ifOutOctets'
ifSpeed	Property	brcspeed

Settings to be Set::

Name	Value:	Note:
duplex	FULLDUPLEX	
ifOctets scale	8	To convert Bytes/s into bits/s
ifSpeed scale	8000	To convert KiloBytes/s into bits/s
threshold	100	

Results Returned:

Name	Options:
bandwidth (Mb/s)	-
speed (Mb/s)	-
utilization (%)	Show in graph

6

Continue editing the Report node: “[port]”

Add a second formula:

Browse and select “Nop4 (util)”, click **Add this formula** button.

Parameters to Enter:

Name	Definition type:	Definition value:
First Value	Filter	name=='ifInOctets'
Second Value	Filter	name=='ifOutOctets'
Third Value	Property	brcspeed
Fourth Value	Empty Parameter	

Results Returned:

Name	Options:
ifInOctets	Show in graph
ifOutOctets	Show in graph
mxspeed	-

Note: Fourth Result is not in use here. Keep defaults.

7

Continue editing the Report node: “[port]”

Report Details: Graph:

Metric Customization:

Set to have ifInOctets and ifOutOctets metric on main axis

Set to have formula result “utilization (%)” on secondary axis

8	Report node: “[SAN Switch]” <u>Report Details: Table</u> Edit table value column “Avg. Utilization (%)”. Select “utilization (%)” formula result from Selected Value parameter, using the drop down menu.												
9	Return to Browse Mode and explore your final work. When selecting a switch, look at the list of ports. Notice the differences in Port Speed properties, describe: maxspeed: _____ brcspeed: _____ Are the values complementary? _____												
	As an extra exercise, set thresholds for Avg Utilization (%) in table report (fabric report). Following is a suggestion: <table border="1" data-bbox="467 888 1235 1230"> <thead> <tr> <th>Level</th> <th>Value:</th> <th>Color</th> </tr> </thead> <tbody> <tr> <td>Normal</td> <td>Negative Infinity</td> <td>Green</td> </tr> <tr> <td>Major</td> <td>70</td> <td>Orange</td> </tr> <tr> <td>Critical</td> <td>80</td> <td>Red</td> </tr> </tbody> </table>	Level	Value:	Color	Normal	Negative Infinity	Green	Major	70	Orange	Critical	80	Red
Level	Value:	Color											
Normal	Negative Infinity	Green											
Major	70	Orange											
Critical	80	Red											
	Notes: _____ _____ _____ _____ _____ _____ _____ _____ _____ _____												

End of lab exercise

Lab 8: Part 3 - SAN Switch Performance (Cisco)

Purpose:	The purpose of this lab is to demonstrate the use of "Property Value" conversion in formulas. You will handle two cases: 1) a property that contains a value and 2) a metric value. You will be showing them in a table report. Typical use case is that you might want to convert a property in a value (i.e. a timeseries), at browse time. This could be then be used for some table reporting.
-----------------	---

Tasks:	In this lab, you will: • Build the report structure. • Apply formula concept to convert property value into a usable value (in a table or again in a formula).
---------------	---

Step	Action
0	Login to portal with the provided username/password to the indicated class' ViPR SRM M&R portal.

1

Go to **Edit Mode**.

Navigate to the following report node:

All>>My Reports>> ViPR SRM Reporting class>>Module 05

Add a new report and give it the following name: “Lab 8 – part 3 – SAN Switch performance (Cisco)”

Filtering &Expansion:

Set the top filter as follows:

devtype=='FabricSwitch' & devdesc='%Cisco%' & (name=='ifInOctets' | name=='ifOutOctets' | name=='CurrentUtilization' | name=='portOperStatus') & vstatus=='active'

Report Configuration:

Set report type to be a standard table report.

Report Details: Table:

Define the first column as follows:

Column Name	Column Type	attribute
Device Name	Attribute	Node name
Port Count	Attribute	Child count
Port types	Property	porttype

2

Create a new child node under “Lab 8 – part 3 – SAN Switch...”

Report name: [SAN switch]

Filtering &Expansion:

Set filter as follows:

parttype=='Port'

Set expansion to use property “device”

Report Configuration:

Set Report Type to be interactive table.

3

Report Details: Table

Define columns as follows:

Column Name	Column Type	Attribute/property
Port name	Attribute	Node name
Port Type	Property	iftype
Type	Property	porttype
Label	Property	ifalias
Port Speed (maxspeed)	Property	maxspeed filter: <i>name=='IfInOctets'</i>
Port Speed (mxhspeed)	Property	mxhspeed filter: <i>name=='IfInOctets'</i>
Port Status (2)	Property	partstat

(continue onto next step)

4

And add the following value type columns:

Column Name	Filtered metric	Details
PortStatus	name=='portOperStatus' name=='swPortOpStatus'	Time Management: 1-hour, recover “the last values only” Value Settings: Use Rounding: 0 decimals Thresholds: Normal=1; Critical=2 Value Formatter=Status
Port Utilization (%)	name=='CurrentUtilization'	Time Management: 1-hour, recover “all the values in the time range” Advanced Properties: Allow filtering on this value: \$v>=0.0
Port Speed (maxspeed value)	<i>[everything]</i> (we will pick a formula result later...)	Time Management: 1-hour, recover “the last values only”, time threshold= 1 period
Port Speed (mxhspeed value)	<i>[everything]</i> (we will pick a formula result later...)	Time Management: 1-hour, recover “the last values only”, time threshold= 1 period

5

Create a new child node under “[SAN Switch]”

Report name: “[port]”

Filtering &Expansion:

Set expansion to use property “part”

Report Configuration:

Set Report Type to be simple chart.

6

At this point, we will convert two properties in values in order to use them in [SAN Switch] table report.

Select Report node: “[port]”

Select Formula tab.

Click **Add a Formula** button

Browse and select “Nop (util)”, click **Add this formula**. Configure formula as follows:

Parameters to Enter:

Name	Definition type:	Definition value:
metric	Property	maxspeed

Results Returned:

Name	Options:
mxspeed	-

7

Add a second formula.

Browse and select “Nop (util)”, click **Add this formula**. Configure formula as follows:

Parameters to Enter:

Name	Definition type:	Definition value:
metric	Property	mxhspeed

Results Returned:

Name	Options:
mxhspeed	-

8	Now, returning back to [SAN Switch] report node <u>Report Details: Table</u> Edit “Port Speed (maxspeed value)” column. In “Selected Value” drop down, select “mxspeed” formula result. Edit “Port Speed (mxhspeed)” column. In “Selected Value” drop down, select “mxhspeed” formula result.
9	Return to Browse Mode. Browse report for some switches. For columns Port Speed (maxspeed value) and/or Port Speed (mxhspeed value). Do you notice something wrong? _____
	We are facing an issue with selected metrics. In the metric context, it is possible that some metrics do not have the property maxspeed or mxhspeed. They are through the Nop formula... and do not generate a value! We will have to work around this by forcing a metric selection. By looking more closely, you will discover that iflnOctets always have both properties... what about forcing the selection through a filter? This is the trick.
10	Go to Edit Mode. Select “[port]” report and add a new child report. Name that new report “metric selector” Use filter: <i>name==’iflnOctets’</i>

11	While having “metric selector” report highlighted, select Formula tab. Add two new Nop formulas. Configure as indicated: Parameters to Enter: <table><tr><th>Name</th><th>Definition type:</th><th>Definition value:</th></tr><tr><td>metric</td><td>Property</td><td>maxspeed</td></tr><tr><td>metric</td><td>Property</td><td>mxhspeed</td></tr></table> Results Returned: <table><tr><th>Name</th><th>Options:</th></tr><tr><td>mxspeed_InOct</td><td>-</td></tr><tr><td>mxhspeed_InOct</td><td>-</td></tr></table>	Name	Definition type:	Definition value:	metric	Property	maxspeed	metric	Property	mxhspeed	Name	Options:	mxspeed_InOct	-	mxhspeed_InOct	-
Name	Definition type:	Definition value:														
metric	Property	maxspeed														
metric	Property	mxhspeed														
Name	Options:															
mxspeed_InOct	-															
mxhspeed_InOct	-															
12	Select “[port]” report. Select Formula tab. Edit the Nop formula that outputs mxspeed value. Under Parameter to Enter, in Definition, select value from child node formula: mxspeed_InOct. Edit the second Nop formula that outputs mxhspeed value. Under Parameter to Enter, in Definition, select value from child node formula: mxhspeed_InOct.															
13	Return to Browse Mode. Notice the difference.															
	Now, all that needs to be done is to formatting the values to appear with the units. Maxspeed is a property given in Bits per second. Mxhspeed is a property given in Kilo Bits per second. These are Rate values (hence the “per second”). We wanted them to be presented using the best multipliers (Mb, Gb) possible.															

14

Return to **Edit Mode**.

Select [SAN Switch] report node.

Report Details: Table

Edit “Port Speed (maxspeed value)” column. In Value Settings section, set scaling mode as follows:

	From:	To:
Unit Type	[Rate] Bit	Bit
Unit	[Decimal] b/s	[Decimal] Auto

Edit “Port Speed (mxhspeed value)” column. In Value Settings section, set scaling mode as follows:

	From:	To:
Unit Type	[Rate] Bit	Bit
Unit	[Decimal] Mb/s	[Decimal] Auto

15

Return to **Browse Mode** and explore your final work.

Notice the changes in the presentation of the numbers for both value columns. Compare with the property values. Notice the more formal presentation and less confusing.

Optionally, you can sort the column so you would have a value just next to the property column.

	Notes:

End of lab exercise

Lab 8: Part 4 - Add Custom Group to OOTB Chargeback Report

Purpose:	The purpose of this lab is to add a custom group to the OOTB Chargeback report. When managing groups tagging, the UI allows up to three custom groups. Once set, by default, those will not show in a Chargeback report.
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Tasks:	In this lab, you will: • Enable the hidden work for the custom1 group to appear in the Chargeback by Group report.
---------------	---

Step	Action
0	Login to the portal with the provided username/password to the indicated class' ViPR SRM M&R portal.
1	Go to Edit Mode. Navigate to the following report node: All>>My Reports>> ViPR SRM Reporting class>>Module 05 Add a new report and give it the following name: "Lab 8 – part 4 – Add Custom group to OOTB Chargeback report".

2	Locate the following report and take a copy back under Lab 8 – part 4 report: All>>Dashboards>>Storage>>Chargeback by Group>>Primary Used Chargeable Adjust the filter expression of Lab 8 – part 4 report according to location of the source report (Primary Used Chargeable) - (Note: you should have practiced this when working with lab 2 part 4). You should end up with something like the following: <pre>(devtype=='Host' devtype=='Hypervisor' devtype=='VirtualMachine' devtype=='PassiveHost') & (w4ncert=='1.0' w4ncert=='S1.0') & !vstatus=='inactive' & #APG:ALL</pre>
3	Take time to explore the way this report is built. Notice: • Primary Used Chargeable report node is the table report that presents the results. The table is populated by the underlying report node: Group Expansion. • Group Expansion report node is configured to makes use of complex expansion, grouping metrics based on nodegrp values (split by a pipe character). • Formulas found Group Expansion report node spatial sum service levels. • Group Expansion is defined as a table report and has some formulas set. All depends on child report nodes that are of the same name but are referring to two different locations. • One “device,ip” node refers to hosts (Hypervisors or Hosts), the second “device,ip” node refers to VMs (VMware context). • Under both “device,ip” report nodes, you can notice under formulas that you have an exposed results for each of the custom groups (i.e.: CustomXCapacity, where X=1,2, or 3). These formulas sum the LUNs capacity that are tagged with a custom group. You can go further down, trying to understand the computations – to be discussed at a later date.

4	Unfold Primary Used Chargeable report and select Group Expansion report node. On this report, we need to aggregate the computed KPIs for a given custom group. That is, the KPIs have been brought further down and up to this point in the report but not beyond. It is recommended to take a copy of an existing spatial sum formula for a service level and adapt it to our needs. As an example, take a copy of the BronzeCapacity formula and paste it on the same formula level.
5	From the copied formula: Edit “1 Parameters to Enter” section, click edit icon, under “Definition”. Select “Formula Result” then select Result “Custom1Capacity” (on a child node). Click Ok.
6	From the copied formula: Unfold the “Result Returned” section and change the output name to “Custom1Capacity”. We will use this one in the table (Primary Used Chargeable). Save your work.
7	The formula result is now available to the parent report: Primary Used Chargeable report. Select that report. Select “Report Details: Table” tab. At this point take a copy of the Bronze column definition. Paste the copied column. Unfold the copied column and change the name to “Custom 1”. Next to “Selected Value”, select a formula result named “Custom1Capacity”. The remaining parameters are already set and do not need to be changed. Save your work.

8	Return to Browse Mode and look at the results. Run the Primary Used Chargeable report. Note: the Primary Used Chargeable report could take some time to run so be patient. Once you have the result, what is the name of the last column of the report? _____ Can you explain why the values are showing that way? _____ _____
	Notes: _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____

End of lab exercise

Lab 8: Part 5 - Baseline Formula

Purpose:	This report is intended to let you experience the various options of baseline reports. Although there is a pre-defined baseline report, you may want more options.
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Tasks:	In this lab, you will: • Build a report structure allowing you to compare various baseline reports. • Use formulas to remodel baseline report.
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Step	Action
0	Login to portal with the provided username/password to the indicated class' ViPR SRM M&R portal.
1	Go to Edit Mode. Navigate to the following report node: All>>My Reports>> ViPR SRM Reporting class>>Module 05 Take a copy of "Lab 8 – part 3 - SAN Switch performance (Cisco)" report and place it under Module 05. Rename the report name with "Lab 8 - part 5 - Baseline formula".
2	Unfold the report structure down to "[port]" report node. Change report type to "mixed using defaults".

3	Create a first new report node under “[port]” and name it “Baseline Report of CurrentUtilization”. <u>Filtering &Expansion:</u> Set the filter on the node as follows: <i>name=='CurrentUtilization'</i> <u>Report Configuration:</u> Select Report Type: baseline Sampling Period: 1 hour
4	Create a second new report node under “[port]” and name it “CurrentUtilization over the two week period”. <u>Filtering &Expansion:</u> Set the filter on the node as follows: <i>name=='CurrentUtilization'</i> <u>Report Configuration:</u> Select Report Type: simple chart Default Duration: custom: last 14d , as follows: Default Duration last ▼ custom ▼ 14d Sampling Period: 1 hour <u>Report Details: Graph:</u> Summary Statistics: Boxed, Trend

5	Create a third new report node under “[port]” and name it: “temporal.CalendarBaseline formula” <u>Report Configuration:</u> Select Report Type: simple chart <u>Formula:</u> Click Add a formula. From the formula library, search and select “CalendarBaseLine (math.temporal)” formula. Parameter to Enter: filter “name==’CurrentUtilization’” Settings to be Set: period = 1d nbperiod = 14 variation-threshold = 0.0 Results Returned: CurrentUtilization (show in graphs) Baseline (show in graphs) Deviation (%) (show in graphs) deviationAvg
Note	For step 6, we will use the most flexible base line formula: BaseLine (math.temporal). This formula allows you to set the base line period and the number of periods back in time you want to cover. We will choose to cover last 14 days (2 weeks), group per period of 1 day (86400 seconds). We will use 1-hour aggregate values. That means the Formula Engine will average each hour of a day of last 14 days. We will do this for the average, minimum, and maximum values. Thus we have to use BaseLine formula 3 times for the same metric. Also bear in mind that at a minimum, we will have to work with aggregated values (1-hour, etc).
6	Create a fourth new report node under “[port]” and name it: “temporal.baseline formula”. <u>Report Configuration:</u> Select Report Type: simple chart Sampling Period: 1-hour Sampling Type: Average

7	Create a <u>first</u> child report node under “temporal.baseline formula”; name this node “Average baseline”. <u>Report Configuration:</u> Select Report Type: simple chart Sampling Period: 1-hour Sampling Type: Average <u>Formula:</u> Click Add a formula. From the formula library, search and select “BaseLine (math.temporal)” formula. Parameter to Enter: Select to filter on that node: “name==’CurrentUtilization’” Settings to be Set: period = 86400 nbperiod = 14 variation-threshold = 0.0 Results Returned: avgCurrentUtilization (show in graphs) avgBaseline (show in graphs) avgDeviation (%) avgDeviationAvg
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8	Create a <u>second</u> child report node under “temporal.baseline formula”; name this node “Max baseline”. <u>Report Configuration:</u> Select Report Type: simple chart Sampling Period: 1-hour Sampling Type: Max <u>Formula:</u> Click Add a formula. From the formula library, search and select “Aggregation (math)” formula. Parameter to Enter: Select to filter on that node: “name==’CurrentUtilization’” Settings to be Set: temporal-aggregation = MAX Results Returned: MaxValue Click again Add a formula. From the formula library, search and select “BaseLine (math.temporal)” formula. Parameter to Enter: Result on this node: “MaxValue” Settings to be Set: period = 86400 nbperiod = 14 variation-threshold = 0.0 Results Returned: maxCurrentUtilization (show in graphs) maxBaseline (show in graphs) maxDeviation (%) maxDeviationAvg
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9	Create a <u>third</u> child report node under “temporal.baseline formula”; name this node “Min baseline”. <u>Report Configuration:</u> Select Report Type: simple chart Sampling Period: 1-hour Sampling Type: Min <u>Formula:</u> Click Add a formula. From the formula library, search and select “Aggregation (math)” formula. Parameter to Enter: Select to filter on that node: “name==’CurrentUtilization’” Settings to be Set: temporal-aggregation = MIN Results Returned: MinValue Click again Add a formula. From the formula library, search and select “BaseLine (math.temporal)” formula. Parameter to Enter: Result on this node: “MinValue” Settings to be Set: period = 86400 nbperiod = 14 variation-threshold = 0.0 Results Returned: minCurrentUtilization (show in graphs) minBaseline (show in graphs) minDeviation (%) minDeviationAvg
---	--

10	Now, return back on the “temporal.baseline formula” report node, add 4 Nop formulas (or a Nop4 if you want) that will recover underlying child formula results (from last 3 steps) and will show values in a graph report. <table><tr><th>Parameter to Enter:</th><th>Definition Type</th><th>Definition value:</th><th>Result Returned</th></tr><tr><td>First Value</td><td>Result on a child node</td><td>minBaseline</td><td>minBaseline (show in graphs)</td></tr><tr><td>Second Value</td><td>Result on a child node</td><td>maxBaseline</td><td>maxBaseline (show in graphs)</td></tr><tr><td>Third Value</td><td>Result on a child node</td><td>avgBaseline</td><td>avgBaseline (show in graphs)</td></tr><tr><td>Fourth Value</td><td>Result on a child node</td><td>avgCurrentUtilization</td><td>avgCurrentUtilization (show in graphs)</td></tr></table>	Parameter to Enter:	Definition Type	Definition value:	Result Returned	First Value	Result on a child node	minBaseline	minBaseline (show in graphs)	Second Value	Result on a child node	maxBaseline	maxBaseline (show in graphs)	Third Value	Result on a child node	avgBaseline	avgBaseline (show in graphs)	Fourth Value	Result on a child node	avgCurrentUtilization	avgCurrentUtilization (show in graphs)
Parameter to Enter:	Definition Type	Definition value:	Result Returned																		
First Value	Result on a child node	minBaseline	minBaseline (show in graphs)																		
Second Value	Result on a child node	maxBaseline	maxBaseline (show in graphs)																		
Third Value	Result on a child node	avgBaseline	avgBaseline (show in graphs)																		
Fourth Value	Result on a child node	avgCurrentUtilization	avgCurrentUtilization (show in graphs)																		
Note	A second formula does the same work as “BaseLine (math.temporal)””; see the “CalendarBaseLine (math.temporal.)” formula. The only difference is that you have better flexibility is specifying the period value (the baseline period).																				
11	Return in Browse Mode and look at your resulting report.																				
Note	“CurrentUtilization over the two week period” report is a reference graph with a view over the last 14 days and using real-time values (full resolution). This allows you to further study the baseline reports. You can notice the general trend line and have then a generic idea in qualifying the baseline reports. “Baseline Report of CurrentUtilization” report is from the standard report library, no parameters are required and lack of flexibility does not allow you to customize it. Thus the shaded represent the area between minimum and maximum values over the analyzed period. “temporal.baseline formula” is the formula approach of baseline reporting. You have 4 lines you can distinguish from. Notice how the avgBaseline stays within the “funnel” of minimum and maximum. avgCurrentUtilization shows the current value over the presented period; this is why it could go outside of the “funnel” area. Remember that in any baseline use case, always use minimum aggregate level of 1-hour. Use of real-time do not apply, because of nature of real-time do not provide min and max values.																				

	Notes:

End of lab exercise

Lab 8: Part 6 - vCenter Inventory (part 2)

Purpose:	This lab details work from the previous module - lab 7 about the vCenter Inventory report. Now, with formulas, we can complete the work and report correct values.
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Tasks:	In this lab, you will: Finalize the vCenter Inventory report by presenting corrected values for some columns. Some count values were showing incorrect. Note: as a refresher, take time to navigate the source report (module 4, lab 7). Notice how the values are showing incorrect.
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Step	Action
0	Login to portal with the provided username/password to the indicated class' ViPR SRM M&R portal.
1	Go to Edit Mode. Navigate to the following report node: All>>My Reports>> ViPR SRM Reporting class>>Module 04 Take a copy of report "Lab 7 – vCenter Inventory (part 1)" Place the copy under Module 05. Rename that copy with "Lab 8 – part 6 - vCenter Inventory (part 2)"

2	We need to have the VM and Metric count value to show correctly on the top report (“Lab 8 – part 6 – vCenter”). As you should know, the formula concept goes from “leaf to the root”. So we’ll need to start our count from the leaf. This work starts from the “[VM]” report node. Locate and select the “[VM]” report. Under formula tab, click Add a Formula button. From the formula library, select “ChildCount (util)” formula. Only one parameter ned to be set: Result Returned. Name this output “VM_metricCount”.
3	Select parent report, “[bunit]”. <u>Report Details: Table</u> Add a value column to the table. Column Name: Metric count (formula) Selected Value: VM_metricCount <u>Formula:</u> Add two new formulas: one is counting the number of underlying elements (VM count) and the second sums the number of metrics from each VM (total for bunit). Click Add a Formula (1) From the formula library, select “ChildCount (util)” formula. Only one parameter ned to be set: Result Returned. Name this output “Bunit_VMCount”. Click Add a Formula (2) From the formula library, select “Sum (math.spatial)” formula. Parameter to Enter: Result on a child node: “VM_metricCount” Result Returned: Bunit_metricCount

4

Select parent report, “[customer]”.

Report Details: Table

Add one (1) new value columns to the table. We’ll display computed value from child node.

Column Name	Formula Result	Details
VM Count (formula)	Bunit_VMCount	Value Settings: Use Rounding: 0 decimals

From the same table, edit “Metric count” column to select formula result from child report. Select “Bunit_metricCount”. As follows:

Column Name	Formula Result	Details
Metric count	Bunit_metricCount	Value Settings: Use Rounding: 0 decimals

Formula:

Add two new spatial formulas: each will aggregate numbers from the child nodes.

Click **Add a Formula (1)**

From the formula library, select “Sum (math.spatial)” formula.

Parameter to Enter:

Result on a child node: “Bunit_metricCount”

Result Returned:

Customer_metricCount

Click **Add a Formula (2)**

From the formula library, select “Sum (math.spatial)” formula.

Parameter to Enter:

Result on a child node: “Bunit_VMCount”

Result Returned:

Customer_VMCount

5

We now have required formula sets and are able to complete the top report.

Select “Lab 8 – part 6 – vCenter Inventory (part 2)” report.

Report Details: Table

Update the following value columns of the table. We will display computed values from child node.

Column Name	Formula Result	Details
VM Count	Customer_VMCount	Value Settings: Use Rounding: 0 decimals
Metric count	Customer_metricCount	Value Settings: Use Rounding: 0 decimals

6

Return to **Browse Mode** and admire your resulting report.

Browse the reports and make sure the numbers add up for the number of VMs per Business Unit and per Customer. Also make verifications of the metric count.

Customer report shows VM Count from two sources: from formula (VM Count (formula)) and through an attribute.

What is the advantage of using the formula approach? _____

In which case does attribute approach can be used? _____

	Notes:

End of lab exercise

Lab 8: Part 7 - VNX IOPS

Purpose:	This lab is to let you practice on the VNX metric set and to introduce the Spatial formula computation. The goal is to have an overview report on the performance of the VNX arrays. Measurements that we will be interested in for this report are SPs Bandwidth utilization, and IOPs. You will have to aggregate SPs. Original value of Bandwidths are given in KB/s. We want values in MB/s.
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Tasks:	In this lab, you will: • Build a report structure using VNX dataset. • Apply Spatial formula in order to aggregate data from VNX objects.
---------------	--

Step	Action
0	Login to the portal with the provided username/password to the indicated class' ViPR SRM M&R portal.

1

Go to **Edit Mode**.

Navigate to the following report node:

All>>My Reports>> ViPR SRM Reporting class>>Module 05

Add a new report and give it the following name: “Lab 8 – part 7 – VNX IOPS”

Filtering & Expansion:

Set the top filter as follows:

source=='VNXBlock-Collector' & vstatus=='active'

Report Configuration:

Set report type to be a standard table report.

Report Details: Table

Define the first attribute column as follows:

Column Name	Column Type	attribute
Device Name	Attribute	Node name

2

Define the following value columns:

Column Name	Filtered metric	Details
Read Bandwidth (MB/s)	<i>[everything]</i> (we will pick a formula result later...)	Time Management: real-time, recover “all the values in the time range” Value Settings: Value Formatter=Sparkline
Write Bandwidth (MB/s)	[same as above]	[same as above]
Total Bandwidth (MB/s)	[same as above]	[same as above]
Read IOPS (IO/s)	[same as above]	[same as above]
Write IOPS (IO/s)	[same as above]	[same as above]
Total IOPS (IO/s)	[same as above]	[same as above]

Note: we will revisit this content later, when formula output will be available.

3

Create a new child node under “Lab 8 – part 7 – VNX IOPS”

Set Report Name: “[array]”

Filtering &Expansion:

Set expansion to use property “device”

Report Configuration:

Set Report Type to be mixed report

4	Create two (2) new child node under “[array]” A) Set Report Name: “Read / Write Bandwidth (MB/s)” <u>Filtering &Expansion:</u> Set filter as follows: <i>parttype==‘Controller’</i> <u>Report Configuration:</u> Set Report Type to be a simple chart Report Rendering: dynamic charts by default B) Set Report Name: “Read / Write IOPS (IO/s)” <u>Filtering &Expansion:</u> Set filter as follows: <i>parttype==‘Controller’</i> <u>Report Configuration:</u> Set Report Type to be a simple chart Report Rendering: dynamic charts by default
5	Create a child report under each of the two previous reports (Bandwidth and IOPS): Set Report Name: “[part]” <u>Filtering &Expansion:</u> Set expansion to use property “part” <u>Report Configuration:</u> Set Report Type to be a mixed report
6	Create a final sub child report, respectively under each branch report under “[part]” report node: A) Read / Write Bandwidth (MB/sec) B) Read / Write Throughput (IO/sec) <u>Report Configuration:</u> Set Report Type to be a simple chart Report Rendering: dynamic charts by default

7	The Read and Write values are in KB/sec, we first want to work them in MB/s. This is a choice of design. Under “Read / Write Bandwidth (MB/sec)”, add the following (3) formulas: 1) Division (math): a. Parameters to Enter: i. Numerator: filter on name==’ReadThroughput’ ii. Denominator: Constant = 1000.0 b. Result Returned: “Read Bandwidth (MB/s)” (show in graphs) 2) Division (math): a. Parameters to Enter: i. Numerator: filter on name==’WriteThroughput’ ii. Denominator: Constant = 1000.0 b. Result Returned: “Write Bandwidth (MB/s)” (show in graphs) 3) Addition (math): a. Parameters to Enter: i. Metric1: Result on this node: “Write Bandwidth (MB/s)” ii. Metric2: Result on this node: “Read Bandwidth (MB/s)” b. Result Returned: “Total Bandwidth (MB/s)” (show in graphs)
8	Under “Read / Write Throughput (IO/sec)”, add the following (3) formulas: 1) Nop (util): a. Parameters to Enter: i. metric: filter on name==’ReadCount’ b. Result Returned: “Read Throughput (IO/s)” (show in graphs) 2) Nop (util): a. Parameters to Enter: i. metric: filter on name==’WriteCount’ b. Result Returned: “Write Throughput (IO/s)” (show in graphs) 3) Addition (math): a. Parameters to Enter: i. Metric1: Result on this node: “Read Throughput (IO/s)” ii. Metric2: Result on this node: “Write Throughput (IO/s)” b. Result Returned: “Total Throughput (IO/s)” (show in graphs) Note: the use of Nop at this level is simply to make sure data is properly timeslot aligned. It is of a common practice since you can’t be sure data values are tagged with exact timestamp.

9

Back one step, you will have to use Nop on both “[part]” reports in order to forward the output calculation back to the object level. The parent report will aggregate using Spatial Sum formula.

Select “[part]” report under Bandwidth report.

Add a Nop4 (util) formula.

Parameter to Enter:	Definition Type	Definition value:	Result Returned
First Value	Result on a child node	[select appropriate child formula result]	Read Bandwidth (MB/s)
Second Value	Result on a child node	[select appropriate child formula result]	Write Bandwidth (MB/s)
Third Value	Result on a child node	[select appropriate child formula result]	Total Bandwidth (MB/s)

10

Select “[part]” report under Throughput report.

Add a Nop4(util) formula.

Parameter to Enter:	Definition Type	Definition value:	Result Returned
First Value	Result on a child node	[select appropriate child formula result]	Read Throughput (IO/s)
Second Value	Result on a child node	[select appropriate child formula result]	Write Throughput (IO/s)
Third Value	Result on a child node	[select appropriate child formula result]	Total Throughput (IO/s)

11	Now, each of the two parent reports (of Bandwidth or Throughput), we have to perform aggregation of data (Read/Write/Total). Select “Read / Write Bandwidth (MB/s)” report node. Add 3 Spatial Sum formulas. <table><tr><th>Formula number</th><th>Parameter to Enter</th><th>Settings</th><th>Result Returned</th></tr><tr><td>1</td><td>Result on a child node: Read Bandwidth (MB/s)</td><td>Partial=true</td><td>Read Bandwidth (MB/s) (show in graphs)</td></tr><tr><td>2</td><td>Result on a child node: Write Bandwidth (MB/s)</td><td>Partial=true</td><td>Write Bandwidth (MB/s) (show in graphs)</td></tr><tr><td>3</td><td>Result on a child node: Total Bandwidth (MB/s)</td><td>Partial=true</td><td>Total Bandwidth (MB/s) (show in graphs)</td></tr></table>	Formula number	Parameter to Enter	Settings	Result Returned	1	Result on a child node: Read Bandwidth (MB/s)	Partial=true	Read Bandwidth (MB/s) (show in graphs)	2	Result on a child node: Write Bandwidth (MB/s)	Partial=true	Write Bandwidth (MB/s) (show in graphs)	3	Result on a child node: Total Bandwidth (MB/s)	Partial=true	Total Bandwidth (MB/s) (show in graphs)
Formula number	Parameter to Enter	Settings	Result Returned														
1	Result on a child node: Read Bandwidth (MB/s)	Partial=true	Read Bandwidth (MB/s) (show in graphs)														
2	Result on a child node: Write Bandwidth (MB/s)	Partial=true	Write Bandwidth (MB/s) (show in graphs)														
3	Result on a child node: Total Bandwidth (MB/s)	Partial=true	Total Bandwidth (MB/s) (show in graphs)														
12	Select “Read / Write Throughput (IO/s)” report node. Add three Spatial Sum formulas. <table><tr><th>Formula number</th><th>Parameter to Enter</th><th>Settings</th><th>Result Returned</th></tr><tr><td>1</td><td>Result on a child node: Read Throughput (IO/s)</td><td>Partial=true</td><td>Read Throughput (IO/s) (show in graphs)</td></tr><tr><td>2</td><td>Result on a child node: Write Throughput (IO/s)</td><td>Partial=true</td><td>Write Throughput (IO/s) (show in graphs)</td></tr><tr><td>3</td><td>Result on a child node: Total Bandwidth (MB/s)</td><td>Partial=true</td><td>Total Throughput (IO/s) (show in graphs)</td></tr></table>	Formula number	Parameter to Enter	Settings	Result Returned	1	Result on a child node: Read Throughput (IO/s)	Partial=true	Read Throughput (IO/s) (show in graphs)	2	Result on a child node: Write Throughput (IO/s)	Partial=true	Write Throughput (IO/s) (show in graphs)	3	Result on a child node: Total Bandwidth (MB/s)	Partial=true	Total Throughput (IO/s) (show in graphs)
Formula number	Parameter to Enter	Settings	Result Returned														
1	Result on a child node: Read Throughput (IO/s)	Partial=true	Read Throughput (IO/s) (show in graphs)														
2	Result on a child node: Write Throughput (IO/s)	Partial=true	Write Throughput (IO/s) (show in graphs)														
3	Result on a child node: Total Bandwidth (MB/s)	Partial=true	Total Throughput (IO/s) (show in graphs)														

13

Now, in order for the values to show up in the final top table report, we need to forward one last time the data over the “[array]” report node.

For this we will require two Nop4 formulas because we have six values to forward.

A) Add a first Nop4 (util) formula.

Parameter to Enter:	Definition Type	Definition value:	Result Returned
First Value	Result on a child node	[select appropriate child formula result]	Read Bandwidth (MB/s) (show in graphs)
Second Value	Result on a child node	[select appropriate child formula result]	Write Bandwidth (MB/s) (show in graphs)
Third Value	Result on a child node	[select appropriate child formula result]	Total Bandwidth (MB/s) (show in graphs)

B) Perform same as in A) with Throughput metrics (Read, Write, and Total).

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Now you have all the output formulas required for the top table report, you can use them.

Back to top report “Lab 8 – part 7 – VNX IOPS”, under “Report Details: Table”, review the column value parameters: select the formula values as shown:

Column Name	Selected Value
Read Bandwidth (MB/s)	Read Bandwidth (MB/s)
Write Bandwidth (MB/s)	Write Bandwidth (MB/s)
Total Bandwidth (MB/s)	Total Bandwidth (MB/s)
Read IOPS (IO/s)	Read Throughput (IO/s)
Write IOPS (IO/s)	Write Throughput (IO/s)
Total IOPS (IO/s)	Total Throughput (IO/s)

Lab 8: Part 8 - Timeslots Re-alignment

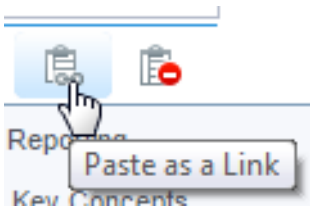
Purpose:	This lab is to practice recognizing the data timeslot misalignment and to propose a suitable workaround.
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Tasks:	In this lab, you will: • Create various reports showing the misalignment of timeslots and apply some techniques to solve the issue. • Apply formulas and experiment with wrong results.
---------------	--

Step	Action
0	Login to the portal with the provided username/password to the indicated class' ViPR SRM M&R portal.
1	Go to Edit Mode. Navigate to the following report node: All>>My Reports>> ViPR SRM Reporting class>>Module 05 Add a new report and give it the following name: "Lab 8 – part 8 – Timeslots re-alignment" <u>Report Configuration:</u> Set Report Type to be list report.

2	Create a new report under “Lab 8 – part 8 – Timeslot...” report. Name that report “VMAX Array - Raw Capacity Usage (v2)” <u>Filtering &Expansion:</u> Set the filter on the node as follows: <i>datagrps='VMAX-SAF' & !vstatus='inactive'</i> <u>Report Configuration:</u> Select Report Type: standard table Default Duration: last 1 week Sampling Period: 1 hour Sampling Type: average <u>Report Details: Table</u> <table><tr><th>Column Name</th><th>Type</th><th>Details</th></tr><tr><td>Name</td><td>Attribute</td><td>Node name</td></tr><tr><td>Capacity</td><td>Value</td><td><i>[everything]</i> (we will pick a formula result later...)</td></tr></table>	Column Name	Type	Details	Name	Attribute	Node name	Capacity	Value	<i>[everything]</i> (we will pick a formula result later...)
Column Name	Type	Details								
Name	Attribute	Node name								
Capacity	Value	<i>[everything]</i> (we will pick a formula result later...)								
3	Navigate to the following report node (standard library) and 1 by 1, take a copy and paste under “VMAX Array ... (v2)” report: All>><<Templates>>>><<Storage>>>>Enterprise Capacity Dashboard>>Raw Capacity Usage Reports to be copied and pasted: • Configured Usable • Hot Spare • RAID Overhead • Unconfigured • Unusable For each report above, revisit the Report Configuration tab and set Default Duration to “last 6 hours” and Sampling Period to “Real-time”. Note: by using “last 6 hours” report duration, you’ll better view the data points.									

4	Create a final report template named '<<TEMPLATE>>' right under "VMAX Array ... (v2)". <u>Filtering & Expansion:</u> Set Display Policy: "hide in browse mode but use it for formula results".
5	Add a child report under "<<TEMPLATE>>" report. Name that report "[device]". <u>Filtering & Expansion:</u> Set expansion to use property "device". <u>Report Configuration:</u> Report Type: simple chart Default Duration: last 6 hours Sampling Period: real-time <u>Report Details: Graphs:</u> Under Metric Customization, click Add Customization Select filter wizard and select <i>Everything</i> Select the <i>Diamond</i> marker. <u>Formula:</u> - Under formula tab, add a new formula "AggregationOfAggregation (math.temporal)". Configure as follows: Parameters to Enter: filter on Everything Setting to be Set: Aggregation Function: AVERAGE Aggregation Period: 1200 Result Returned: 20mnAggr (show in graph) - Add a second formula "Nop (util)", define as follows: Parameter to Enter: filter on Everything Result Returned: originalValue (show in graph)

6	After you click on Save on the previous report (i.e. “[device]”), take a copy of that report. Locate “Configured Usable” report and use “Paste as a Link” (select “R” as in Relative).  While you are on the “Configured Usable” report node: • Change Report Type to use “per children charts”; • Change Report Rendering: dynamic charts by default; • Select Formula tab and add a formula: “Sum (math.Spatial)”: Parameters to Enter: Result on a child node: “20mnAggr” Result Returned: sum Locate and delete the underlying “Arrays” report (no longer required). Perform the same set of actions as above (i.e.: copy, paste, add formula) over the remaining reports: “Hot Spare”, “RAID Overhead”, “Unconfigured”, and “Unusable”.
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7	Now you have set formulas for each node, edit the parent table report in order to use that “sum” value. Locate and select “VMAX Array ... (v2)” report. <u>Report Details: Table</u> Edit the value column (Capacity). Under “Selected Value” select “sum” formula result. Under Time Management, recover the last value only. Use Time Threshold of 3600 seconds. Under Value Settings: use Scaling Mode to convert from GB to TB automatically: <table><tr><th></th><th>From:</th><th>To:</th></tr><tr><td>Unit Type</td><td>[Volume] Byte</td><td>Byte</td></tr><tr><td>Unit</td><td>[Classic] BG</td><td>[Classic] Auto</td></tr></table> Under Summary settings: Label: “Total Raw” Generate column: “sum” of all visible rows.		From:	To:	Unit Type	[Volume] Byte	Byte	Unit	[Classic] BG	[Classic] Auto					
	From:	To:													
Unit Type	[Volume] Byte	Byte													
Unit	[Classic] BG	[Classic] Auto													
8	Return in Browse Mode and browse the reports. Look at the total capacity, values should be like the following: <table><tr><td>Name</td><td>Capacity</td></tr><tr><td>Configured Usable</td><td>347.09 TB</td></tr><tr><td>Hot Spares</td><td>58.17 TB</td></tr><tr><td>RAID Overhead</td><td>317.24 TB</td></tr><tr><td>Unconfigured</td><td>116.45 TB</td></tr><tr><td>Unusable</td><td>13.96 GB</td></tr><tr><td>Total Raw</td><td>838.97 TB</td></tr></table> Select “Configured Usable” report and view the re-alignment while performing the AggregationOfAggregation, compare with the original value. Now remember each value is passed to the Sum.Spatial formula. With all values aligned, the output value is right.	Name	Capacity	Configured Usable	347.09 TB	Hot Spares	58.17 TB	RAID Overhead	317.24 TB	Unconfigured	116.45 TB	Unusable	13.96 GB	Total Raw	838.97 TB
Name	Capacity														
Configured Usable	347.09 TB														
Hot Spares	58.17 TB														
RAID Overhead	317.24 TB														
Unconfigured	116.45 TB														
Unusable	13.96 GB														
Total Raw	838.97 TB														
	Part 2 – Now let’s view the values in a graph, and see the misalignment. For this dome, we will make use of RawCapacity metric that returns the total capacity seen by an entire array.														

9	Go to Edit Mode. Create a new report node under “Lab 8 – part 8 – Timeslot re-alignment”. Name that report: “VMAX Array - Raw Capacity (v1)” <u>Filtering & Expansion:</u> Set the filter on the node as follows: <pre>devtype=='Array' & source=='VMAX-Collector' & vstatus=='active' & !parttype & name=='RawCapacity'</pre> Change Report Rendering: dynamic charts by default <u>Report Configuration:</u> Set Report Type to “Mixed using defaults”
10	Create a first child report under “VMAX Arrau ... (v1)”. Name that report “Raw Capacity - all Arrays (as they are)”. <u>Report Configuration:</u> Set Report Type to be simple chart Change Report Rendering: dynamic charts by default Default Duration: last 6 hours Sampling Period: real-time <u>Report Details: Graph:</u> Under Metric Customization: click Add Customization Select filter wizard and select <i>Everything</i> Select the <i>Diamond</i> marker. In Legend section: Edit Properties and add “device” property, that will help identify who’s who when looking at the graph report.
11	Take a complete copy of the report you have just created and place it on the same level, under “VMAX Arrau ... (v1)”. Name that report “Raw Capacity - all Arrays (real-time aligned)”. <u>Report Configuration:</u> Set Report Type to be “children-based chart” Change Report Rendering: dynamic charts by default Default Duration: last 6 hours Sampling Period: real-time

Lab 8: Part 9 – Discovering Formulas

Purpose:	The purpose of this lab is to discover the usage of some formulas and their applications. This report will be based on Lab 1 of this module and extends the possibilities of formulas. This lab is progressive and separated into three parts.
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Tasks:	In this lab, you will: • Work from a copy of lab 1 (module 5). • Integrate new formulas. • Experiment with the use of some advanced formulas and statistical methods.
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Part 9 – a: Set the Basic: Irate per Array

Step	Action
0	Login to portal with the provided username/password to the indicated class' ViPR SRM M&R portal.
1	Go to Edit Mode. Navigate to the following report node: All>>My Reports>> ViPR SRM Reporting class>>Module 05 Add a new report and give it the following name: "Lab 8 – part 9 – discovering formulas" Note: this report node is just a placeholder where we'll list various reports (1 per lab part).

2	Navigate to Lab 8 – part 1 of module 5 (“Lab 8 – part 1 – VMAX IOPS”). Take a copy and paste right under Lab 8 – part 9. Rename that report to “a – Set the basic: Irate per Array” <u>Report Details: Table</u> Omit all columns except for Array SN and IORate (2 columns). Make two more copies of IORate columns (total 3 IORate columns). Rename 1st column “IORate Avg”, 2nd “IORate Peak”, and 3rd “IORate Min”
3	Edit “IORate Peak”. Under Time Management, use the following: Sampling Period= real-time Sampling Type= average Recover =” all the values in the time range” Temporal Aggregation = “max”
4	Edit “IORate Min”. Under Time Management, use the following: Sampling Period= real-time Sampling Type= average Recover =” all the values in the time range” Temporal Aggregation = “min”
5	As the report specifies, when the user selects an array, all metrics should show in a separate graph report. Edit Report Type of “[array list]” report node. Change to “per children charts”. Add a new report under “[array list]” report node. Name this new report: “[metric]” <u>Filtering & Expansion:</u> Set expansion to use “name” property. <u>Report Configuration:</u> Simple chart

6	Return in Browse Mode. Make sure the values in the columns for a given Array makes sense: average value over the period, peak value over the period, and minimum value over the period.
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End of lab section

Part 9 – b: Add Trend, Deviation, and Standard Deviation

Step	Action
0	Login to portal with the provided username/password to the indicated class' ViPR SRM M&R portal.
1	Go in Edit Mode Navigate to the following report node: All>>My Reports>> ViPR SRM Reporting class>>Module 05 Navigate down to Lab 8 – part 9 report level. Take a complete copy of “a – Set the basic: IORate per Array” report right under Lab 8 – part 9. Rename that copied report with “b – Add trend, deviation, stddev”
2	Navigate and select leaf report (“[metric]”). <u>Remove</u> the expansion (ie “name”) In order to be consistent with the practice, rename that report node to “metric” (ie removing the brackets, meaning this node is an expansion, which is no longer the case).

Step	Action
3	From the “metric” report node: Select Formula tab, click Add a Formula. Browse the formula library and select “LinearForecast (forecasting)” formula. Set the parameters as follow: Parameter to Enter: Filter on name==’IORate’ Settings to be Set: - Before = 10 (days) - After = 7 (days) - Leave min and max values empty - Aggregation = AVG Results Returned: [leave all 7 output names as they are] - Check “Show in graphs” for “Base Value” and “Regression” only This formula computes the linear regression of IORate metric based on data points from last 10 days up to now, using Average values (if “Display” selects an aggregation level). The formula will compute the expected value on the 7th days in the future. Date and Time to threshold are irrelevant for our current use case (they represent the date/time data point when the value will reach the threshold value). Deviation is the slope of the metric in value per second. Base Value is a copy of the original input timeseries. Regression is the timeseries of the forecast. Only last two values are suitable for a graph report (because they are timeseries).

Step	Action
4	Next to the previous formula, Add a Formula. Browse the formula library and select “StandardDeviation (math)” formula. Set the parameters as follow: Parameter to Enter: Filter on name==‘IORate’ Settings to be Set: Method = SAMPLE Result Returned: IORate_std_dev This formula will compute the standard deviation of the metric IORate. StdDev is a statistic allowing to you to determine how large the values of the sample spans around the mean value. When the values are tightly bunched together around the mean, the standard deviation is small. On the reverse, when the values are spare around the mean, the standard deviation value is larger. In our current use case, that would tell us if the array is used to serve steady or spare IO rates. For further details on standard deviation use and interpretation, please refers to valuable statistical reference. As an example: http://www.robertniles.com/stats/stddev.shtml

Step	Action																
5	Select parent report (“[array list]”), we’ll need to migrate the results back to top table report. From Formula tab, add a new Nop4 formula. Configure as follow: <table><tr><th>Parameter to Enter:</th><th>Definition Type</th><th>Definition value:</th><th>Result Returned</th></tr><tr><td>First Value</td><td>Result on a child node</td><td>IORate_std_dev</td><td>IORate_std_dev (show in graphs)</td></tr><tr><td>Second Value</td><td>Result on a child node</td><td>Deviation</td><td>Deviation (show in graphs)</td></tr><tr><td>Third Value</td><td>Result on a child node</td><td>Expected value</td><td>Expected value (show in graphs)</td></tr></table> Before moving to another node, change report definition (“[array list]”): <u>Report Configuration:</u> Set Report Type to “mixed reports” Report Rendering: dynamic charts by default Default Duration: last 1 week Sampling Period: 1 hour	Parameter to Enter:	Definition Type	Definition value:	Result Returned	First Value	Result on a child node	IORate_std_dev	IORate_std_dev (show in graphs)	Second Value	Result on a child node	Deviation	Deviation (show in graphs)	Third Value	Result on a child node	Expected value	Expected value (show in graphs)
Parameter to Enter:	Definition Type	Definition value:	Result Returned														
First Value	Result on a child node	IORate_std_dev	IORate_std_dev (show in graphs)														
Second Value	Result on a child node	Deviation	Deviation (show in graphs)														
Third Value	Result on a child node	Expected value	Expected value (show in graphs)														

Step	Action												
6	Now, you’re ready to report the values back into the top table report. Select “b – Add trend, ...” report. <u>Report Details: Table:</u> Add 2 new value columns to the table report, configure as follow: <table><tr><th>Column Name</th><th>Metric</th><th>Details</th></tr><tr><td>7-days expected value</td><td>Expected value</td><td>Time Management: Recover the last value only</td></tr><tr><td>Trend rate (/day)</td><td>Deviation</td><td>Use time settings from: “column 7-days expected value” Value Settings: Scaling Mode: multiply by 86400*</td></tr><tr><td>IORate StdDev</td><td>IORate_std_dev</td><td>Time Management: Sampling Period: 1-hour; Sampling Type: average; Recover “the last value only” Value Settings: Value Formatter = Value</td></tr></table> * Deviation output value is in value/second. We need value/day. 86400 is the number of seconds in a day.	Column Name	Metric	Details	7-days expected value	Expected value	Time Management: Recover the last value only	Trend rate (/day)	Deviation	Use time settings from: “column 7-days expected value” Value Settings: Scaling Mode: multiply by 86400*	IORate StdDev	IORate_std_dev	Time Management: Sampling Period: 1-hour; Sampling Type: average; Recover “the last value only” Value Settings: Value Formatter = Value
Column Name	Metric	Details											
7-days expected value	Expected value	Time Management: Recover the last value only											
Trend rate (/day)	Deviation	Use time settings from: “column 7-days expected value” Value Settings: Scaling Mode: multiply by 86400*											
IORate StdDev	IORate_std_dev	Time Management: Sampling Period: 1-hour; Sampling Type: average; Recover “the last value only” Value Settings: Value Formatter = Value											
7	Return in Browse Mode. Look at the new columns added to the report. Do the values make sense? Click on an array entry in order to view the regression (trend) line on a graph. Using Display menu, set time selection in a way to view data from July 18th to July 30th (midnight if ok). Can you justify the regression value up to the 7th day after last poll data? _____												
Extra	Reading the Standard Deviation and the Average of Array 727, how would you qualify it’s IORate performance? _____ How would you compare with array 710? _____												

End of lab section

Part 9 – c: When did that occur?

Step	Action
	In part 3, we will be interested in getting more information about max and mean peaks: when did they last occur? Plus, we want to know for how long the IORate was over 5000 IOPS.
0	Login to portal with the provided username/password to the indicated class' ViPR SRM M&R portal.
1	Go to Edit Mode. All>>My Reports>> ViPR SRM Reporting class>>Module 05 Navigate down to Lab 8 – part 9 report level. Take a complete copy of “b – Add trend, ...” report right under Lab 8 – part 9. Rename that copied report with “c – when did that occur”
2	Navigate and select leaf report (“[metric]”). Select Formula tab, click Add a Formula. In order to work from a good reference value to many formulas, we will pass the IORate metric through a Nop first. Browse the formula library and select “Nop (util)” formula. Set the parameters as follows: Parameter to Enter: Filter on name=='IORate' Results Returned: IORate_value

Step	Action
3	Add another new formula. Browse the formula library and select “GraphicPercentile (sla)” formula. Set the parameters as follows: Parameter to Enter: Result on this node: IORate_value Settings to be Set: Percentile (%) = 95 Reverse sort = false Percentile type = PercentileX Results Returned: Sorted Metric Values (show in graphs) 95thIORate (show in graphs)
4	Move up to one node toward the parent report, “[array list]”. Select Formula tab, click Add a Formula. Browse the formula library and select “FindMinMaxTimestamp(util)” formula. Set the parameters as follows: Parameter to Enter: Result on a child node: IORate_value Setting to be Set: StartFrom = end Results Returned: respectively: MinIORate value, MinIORate date, MaxIORate value, MaxIORate date This formula finds Min and Max values from given input metric timeseries and extracts the value and the date for each. This is what we want to show in our report.

Step	Action
5	Click Add a Formula. Browse the formula library and select “ConditionalTimeValueCount (util)” formula. Set the parameters as follows: Parameter to Enter: Result on a child node: IORate_value Setting to be Set: Comparison Type = ‘>’ (textual, with the single quotes) Base Value = 5000 Scale Factor = 300 * Results Returned: DurationOver5000IOPS This formula will scan the timeseries values of the input metric in order to count the number of occurrences where the value matches the given criteria, say, higher than 5000. Hint: If you want the value to be inclusive, use mouse to highlight the “greater or equal” sign, copy and paste in the textbox, surrounded of single quotes. * Each timeslot worth a 300 seconds interval. This factor will multiply the counted value by 300, because we’re looking for a total time range, in seconds.
6	Click Add a Formula. Browse the formula library and select “Percentile (math.temporal)” formula (double check you chose the right one!). Set the parameters as follows: Parameter to Enter: Result on a child node: IORate_value Setting to be Set: Percentile = 95 Extended = false Results Returned: 95thIORate There are many Percentile formulas available. Although it could be confusing, each one serves a specific use case. Our case here is to compute the 95th percentile value (just the number) in order to print in a table report.

Step	Action									
7	Click Add a Formula. Browse the formula library and select “Division (math)” formula (double check you chose the right indicated one!). Set the parameters as follows: Parameter to Enter: Numerator: Result on this node: DurationOver5000IOPS Denominator: Constant: 604800.0 * Setting to be Set: scale = 100 Results Returned: Over5000IOPS percent This formula is optional; it will allow you to relate the durationOver5000IOPS with a 1 week period. In other terms, how long the duration is compared to 1 week, assuming this is the default period of the report. * this number is the number of seconds in a week (7*24*3600).									
8	Now select the parent table report where we will fit the outputs of the formulas. <table><tr><th>Column Name</th><th>Metric</th><th>Details</th></tr><tr><td>Min IORate date</td><td>MinIORate date</td><td> Use time settings from: this column Time Management: Recover “all the values ...”; Temporal Aggregation: min Value Settings: Value Formatter: Date and Time </td></tr><tr><td>Max IORate date</td><td>MaxIORate date</td><td> Use time settings from: this column Time Management: Recover “all the values ...”; Temporal Aggregation= max Value Settings: Value Formatter= Date and Time </td></tr></table>	Column Name	Metric	Details	Min IORate date	MinIORate date	Use time settings from: this column Time Management: Recover “all the values ...”; Temporal Aggregation: min Value Settings: Value Formatter: Date and Time	Max IORate date	MaxIORate date	Use time settings from: this column Time Management: Recover “all the values ...”; Temporal Aggregation= max Value Settings: Value Formatter= Date and Time
Column Name	Metric	Details								
Min IORate date	MinIORate date	Use time settings from: this column Time Management: Recover “all the values ...”; Temporal Aggregation: min Value Settings: Value Formatter: Date and Time								
Max IORate date	MaxIORate date	Use time settings from: this column Time Management: Recover “all the values ...”; Temporal Aggregation= max Value Settings: Value Formatter= Date and Time								

Step	Action									
9	Also add the following columns: <table><tr><th>Column Name</th><th>Metric</th><th>Details</th></tr><tr><td>Min IORate value (from formula)</td><td>MinIORate value</td><td>Use time settings from: column MinIORate date</td></tr><tr><td>Max IORate value (from formula)</td><td>MaxIORate value</td><td>Use time settings from: column MaxIORate date</td></tr></table>	Column Name	Metric	Details	Min IORate value (from formula)	MinIORate value	Use time settings from: column MinIORate date	Max IORate value (from formula)	MaxIORate value	Use time settings from: column MaxIORate date
Column Name	Metric	Details								
Min IORate value (from formula)	MinIORate value	Use time settings from: column MinIORate date								
Max IORate value (from formula)	MaxIORate value	Use time settings from: column MaxIORate date								
10	Add the following columns: <table><tr><th>Column Name</th><th>Metric</th><th>Details</th></tr><tr><td>Total duration over 5000 IOPS</td><td>DurationOver5000IOPS</td><td>Use time settings from: this column Time Management: Sampling Period = real-time; Recover “all the value...” ; Temporal Aggregation=sum Value settings: Value Formatter= Duration</td></tr><tr><td>% of time over 5000 IOPS</td><td>Over5000IOPS percent</td><td>Use time settings from: column Total duration over 5000 IOPS Value settings: Value Formatter= Value</td></tr></table>	Column Name	Metric	Details	Total duration over 5000 IOPS	DurationOver5000IOPS	Use time settings from: this column Time Management: Sampling Period = real-time; Recover “all the value...” ; Temporal Aggregation=sum Value settings: Value Formatter= Duration	% of time over 5000 IOPS	Over5000IOPS percent	Use time settings from: column Total duration over 5000 IOPS Value settings: Value Formatter= Value
Column Name	Metric	Details								
Total duration over 5000 IOPS	DurationOver5000IOPS	Use time settings from: this column Time Management: Sampling Period = real-time; Recover “all the value...” ; Temporal Aggregation=sum Value settings: Value Formatter= Duration								
% of time over 5000 IOPS	Over5000IOPS percent	Use time settings from: column Total duration over 5000 IOPS Value settings: Value Formatter= Value								

Step	Action
11	Return to Browse Mode. Look at the table report and validate the Min and Max date with a graph report. Using the graph report, validate (approximately) the total duration over 5000 IOPS. Do you agree with the proportion (% of time over 5000 IOPS)? What is 95th percentile means? _____ _____ Note: you might want to apply percentile to performance analysis as Response Time. There are informative articles on the internet about using percentile and average values. Take some time to look at the following report, under the ViPR SRM Advanced Reporting ReportPack: Extras >> "VMAX –Response Time analysis". This report exposes average with 25th, 50th, 75th and 90th percentile. Combined with good literature, you could learn to better use those statistical results and draw conclusions about the behavior and health of your storage system.
	Notes: _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____

End of lab exercise

Lab 8: Part 10 - SAN Switch Ports Inventory Status

Purpose:	This lab is a continuation of discovering formula usage. So far, you have been using ChildCount formulas to count a number of objects. That required you to set an expansion report node for counting objects. Now we will see how to do that differently.
-----------------	--

Tasks:	In this lab, you will: • Build SAN switch report on port type count without having to expand and count ports.
---------------	--

Step	Action
0	Login to portal with the provided username/password to the indicated class' ViPR SRM M&R portal.

1

Go to **Edit Mode**.

Navigate to the following report node:

All>>My Reports>> ViPR SRM Reporting class>>Module 05

Add a new report and give it the following name: “Lab 8 – part 10 – SAN Switch Ports Inventory status”

Filtering & Expansion:

Set the top filter as follows:

*parttype=='Port' & (!(part='mgmt%' | part='sup-fc%')) & partstat &
devtype=='FabricSwitch'*

Report Configuration:

Select Report Type: standard table

Default Duration: last 1 week

Sampling Period: 1 hour

Sampling Type: average

Report Details: Table

Define the first attribute column as follows:

Column Name	Column Type	attribute
Device Name	Attribute	Node name
Model	Property	model
Switch IP	Property	ip
Port Statuses	Property	partstat

2

Add five (5) new value columns to the table:

Column Name	Metric	Details
Total Ports	<i>[everything]</i> (we will pick a formula result later...)	Time Management: real-time, recover “the last value only” Value Settings: Use Rounding = 0 decimals Summary settings: Label = Overall port count Generate column = sum
Occupied Ports	[same as above]	Time Management: real-time, recover “the last value only” Value Settings: Use Rounding = 0 decimals Summary settings: Label = Overall busy Generate column = sum
Free Ports	[same as above]	Time Management: real-time, recover “the last value only” Value Settings: Use Rounding = 0 decimals
% of Free Ports	[same as above]	[same as above]
Not Online Ports	[same as above]	[same as above]

3	Create a new child node under “Lab 8 – part 10 – SAN Switch Ports ...” Set Report Name: “[device]” <u>Filtering &Expansion:</u> Set expansion to use property “device” <u>Report Configuration:</u> Select Report Type: standard table Default Duration: last 1 day Sampling Period: 1 hour Sampling Type: average <u>Report Details: Table</u> Define the table columns as follows: <table><tr><th>Column Name</th><th>Column Type</th><th>attribute</th></tr><tr><td>Port Name</td><td>Attribute</td><td>Node name</td></tr><tr><td>Port Status</td><td>Property</td><td>partstat</td></tr></table>	Column Name	Column Type	attribute	Port Name	Attribute	Node name	Port Status	Property	partstat
Column Name	Column Type	attribute								
Port Name	Attribute	Node name								
Port Status	Property	partstat								
4	Select Formula tab, click Add a Formula. Browse the formula library and select “DistinctValueCountFormula (util)” formula. Set the parameters as follows: Setting to be Set: Filter: parttype=='Port' ExpandOn: device,part Level-Up: 0 Results Returned: FCPortCount This formula counts the number of distinct values resulting from the filter and from the expansion expression.									

5	Click Add a Formula. Browse the formula library and select “DistinctValueCountFormula (util)” formula. Set the parameters as follows: Setting to be Set: Filter: parttype=='Port' & (partstat=='online' partstat=='Online' partstat=='up' partstat=='Enabled') ExpandOn: device,part Level-Up: 0 Results Returned: OnlineFCPortCount
6	Click Add a Formula. Browse the formula library and select “DistinctValueCountFormula (util)” formula. Set the parameters as follows: Setting to be Set: Filter: parttype=='Port' & !(partstat=='online' partstat=='Online' partstat=='up' partstat=='Enabled') ExpandOn: device,part Level-Up: 0 Results Returned: SeelfWeBalance Be careful with the filter expression, this one is to catch the complement of the previous formula. This is the count for ports that would be in another state other than alive.

7	Click again Add a Formula. Browse the formula library and select “Substraction (math)” formula. Set the parameters as follows: Parameter to Enter: Base metric = Result on this node: FCPortCount Substract metric = Result on this node: OnlineFCPortCount Results Returned: FreeFCPortCount
8	Click Add a Formula. Browse the formula library and select “Division (math)” formula. Set the parameters as follows: Parameter to Enter: numerator = Result on this node: FreeFCPortCount denominator = Result on this node: FCPortCount Setting to be Set: scale = 100 Results Returned: Free FC Port (%)
9	Create a new child node under “[device]” Set Report Name: “[interface list]” <u>Filtering &Expansion:</u> Set the top filter as follows: <i>name='if%Octets'</i> Use the filter of this node for: expansion and selection Set expansion to use property “part” <u>Report Configuration:</u> Select Report Type: simple chart Note: this report is for simple verification when you have numbers you would like to verify in the report. More particularly, ports that are “unknown” or “offline” are not counted by the original report from the report library.

Lab 8: Part 11 - Challenge Lab: Chargeback

Purpose:	This lab encompasses all of the reporting features you have used so far. It presents a vCenter chargeback model and a real application of using formulas and table graphs.
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Tasks:	In this lab, you will: • Create the report structure of the vCenter chargeback model. • Transform customer wish into real report application.
---------------	---

Part 11 - a: Challenge Lab - Chargeback vCenter

Step	Action
	The use case is described by a customer, a service provider that would like to generate a chargeback report for its small cloud service. He would like to be able to have high level view of revenues and a breakdown per customer and their business units. The basis of this chargeback model relies on VM size: CPU, Memory, and disk space used. The main chargeback rules are: • vCPU is charged 25\$/vCPU/month • Memory is charged 10\$/GB/month • Disk usage is 0.50\$/GB/month (95th percentile)
0	Login to portal with the provided username/password to the indicated class' ViPR SRM M&R portal.

1	Go to Edit Mode. Navigate to the following report node: All>>My Reports>> ViPR SRM Reporting class>>Module 05 Add a new report and give it the following name: “Lab 8 – part 11 – Chargeback vCenter” <u>Filtering & Expansion:</u> Set the filter on the node as follows: <i>!vstatus=='inactive' & devtype=='VirtualMachine' & customer & bunit</i>																								
2	Create a new report under “Lab 8 – part 11 – Chargeback...” report. Name that report “Chargeback VDC - details” <u>Report Configuration:</u> Select Report Type: standard table Default Duration: last 1 day Sampling Period: 1 hour Sampling Type: average <u>Report Details: Table</u> <table><tr><th>Column Name</th><th>Type</th><th>Details</th></tr><tr><td>Name</td><td>Attribute</td><td>Node name</td></tr><tr><td>Customer</td><td>Property</td><td>customer</td></tr><tr><td>Business Unit</td><td>Property</td><td>bunit</td></tr><tr><td>IP</td><td>Property</td><td>ip</td></tr><tr><td>Guest OS</td><td>Property</td><td>devdesc</td></tr><tr><td>State, Status</td><td>Property</td><td>state status</td></tr><tr><td>nb vCPU</td><td>Property</td><td>nbcpu</td></tr></table>	Column Name	Type	Details	Name	Attribute	Node name	Customer	Property	customer	Business Unit	Property	bunit	IP	Property	ip	Guest OS	Property	devdesc	State, Status	Property	state status	nb vCPU	Property	nbcpu
Column Name	Type	Details																							
Name	Attribute	Node name																							
Customer	Property	customer																							
Business Unit	Property	bunit																							
IP	Property	ip																							
Guest OS	Property	devdesc																							
State, Status	Property	state status																							
nb vCPU	Property	nbcpu																							

3

Add six (6) new value columns to the table:

Column Name	Metric	Details
Cost of vCPU (\$)	<i>[everything]</i> (we will pick a formula result later...)	Time Management: 1 hour; recover “the last value only” Value Settings: Use Rounding = 0 decimals; Value Formatter: Value Summary settings: Label = Total: Generate column = sum
Memory Size	part=='System' & parttype=='Memory' & name=='TotalMemory'	Time Management: real-time; recover “the last value only”; Time Threshold = 900 sec Value Settings: Use Rounding = 0 decimals Scaling Mode: (volume) Byte/(classic)MB to Byte/(classic)Auto; Value Formatter: Value
Memory Cost (\$)	<i>[everything]</i> (we will pick a formula result later...)	Time Management: 1 hour; recover “the last value only” Value Settings: Use Rounding = 2 decimals Value Formatter: Value Summary settings: Label = Total: Generate column = sum

[continues on next page]

3(c)

[Continued]

Column Name	Metric	Details
Disk Used space (95th)	[everything] (we will pick a formula result later...)	Time Management: real-time; recover “the last value only”; Time Threshold = 900 sec
Disk Used space Cost (\$)	[everything] (we will pick a formula result later...)	Time Management: 1 hour; recover “the last value only” Value Settings: Use Rounding = 2 decimals; Value Formatter: Value Summary settings: Label = Total: Generate column = sum
VM Total Cost (\$)	[everything] (we will pick a formula result later...)	[same as above]

4	Create a new child node under “Chargeback VDC - details” Set Report Name: “[device]” <u>Filtering &Expansion:</u> Click “Switch to List” button in the expansion section. In the textbox, enter the following expression (no space): <i>device,deviceid<type=hide></i> <u>Report Configuration:</u> Displayed Properties: add the following properties: <table><tr><th>Property Name</th><th>Format</th><th>Title</th></tr><tr><td>memberof</td><td>Custom</td><td>Data Center</td></tr><tr><td>domain</td><td>Custom</td><td>Cluster</td></tr><tr><td>hypervsr</td><td>Custom</td><td>Hosted by</td></tr><tr><td>devdesc</td><td>Custom</td><td>Guest O.S</td></tr><tr><td>hostname</td><td>Custom</td><td>Guest Hostname</td></tr><tr><td>device</td><td>default</td><td>Device name</td></tr><tr><td>ip</td><td>default</td><td>Device IP address</td></tr><tr><td>toolvrs</td><td>Custom</td><td>Tools version</td></tr><tr><td>toolstat</td><td>Custom</td><td>Tools status</td></tr><tr><td>deviceid</td><td>default</td><td>deviceid</td></tr></table>	Property Name	Format	Title	memberof	Custom	Data Center	domain	Custom	Cluster	hypervsr	Custom	Hosted by	devdesc	Custom	Guest O.S	hostname	Custom	Guest Hostname	device	default	Device name	ip	default	Device IP address	toolvrs	Custom	Tools version	toolstat	Custom	Tools status	deviceid	default	deviceid
Property Name	Format	Title																																
memberof	Custom	Data Center																																
domain	Custom	Cluster																																
hypervsr	Custom	Hosted by																																
devdesc	Custom	Guest O.S																																
hostname	Custom	Guest Hostname																																
device	default	Device name																																
ip	default	Device IP address																																
toolvrs	Custom	Tools version																																
toolstat	Custom	Tools status																																
deviceid	default	deviceid																																
5	Locate and take a copy of the following report from the standard VMware library All>>VMware vCenter>><<TEMPLATES>>>><<VM>>>>Virtual Machines>>VM Device Summary>>Storage Capacity>>File Systems Place that report under “[device]” Select the “File Systems” report. Under Filtering & Expansion tab, set Display Policy to “hide in browse mode but use it for formula results”.																																	

6	Select “[device]” report; Select Formula tab, click Add a Formula. Browse the formula library and select “Multiplication (math)” formula. Set the parameters as follows: Parameter to Enter: First operand = Filter: "name=='TotalMemory' & part=='System' & parttype=='Memory'" second operand = Constant: "0.009765625" * Results Returned: Memory Cost This sets the calculation of the Memory cost: 10\$ per GB. * $0.009765625 = 10/1024 = 10\\$/(\text{MB to GB factor})$
7	Click again Add a Formula Browse the formula library and select “Multiplication (math)” formula. Set the parameters as follows: Parameter to Enter: First operand = Property: "nbcpu" second operand = Constant: "25.0" Results Returned: CPUCost This sets the calculation of \$25 per vCpu.
8	Click again Add a Formula Browse the formula library and select “Subtraction (math)” formula. Set the parameters as follows: Parameter to Enter: Base metric = Result on a child node: "ProvisionedSize" Subtract metric = Result on a child node: "AvailableSpace" Results Returned: UsedSpace Those child formula results are from “File Systems” report. We want to bill on UsedSpace.

9	Click again Add a Formula Browse the formula library and select “Percentile (math.temporal)” formula. Set the parameters as follows: Parameter to Enter: metric = Result on this node: "UsedSpace" Settings to be set: Percentile = 95 Extended = true Results Returned: UsedSpace95th This is a new step in our goal, we want to bill based on the 95th Percentile value of UsedSpace.
10	Click again Add a Formula Browse the formula library and select “Multiplication (math)” formula. Set the parameters as follows: Parameter to Enter: First operand = Result on this node: "UsedSpace95th" second operand = Constant: "0.5" Results Returned: UsedSpaceCost This set the cost value base on disk space usage, 0.50\$/GB. * 0.5\$/GB, the initial metrics (ProvisionedSize and AvailableSpace) are in GB.

11	Click Add a Formula. Browse the formula library and select “Sum (math.spatial)” formula. Set the parameters as follows: Parameter to Enter: metric = combined parameters: Result on this node: "CPUCost" Result on this node: "Memory Cost" Result on this node: "UsedSpaceCost" Constant: "0.0" Settings to be set: aggregation = DEFAULT partial = false Results Returned: VMTotalCost												
12	At this point, you have all of the formula results to now use in table report. Select “Chargeback VDC - details”. Revisit the table column definition, as follows (details removed for clarity purposes): <table border="1" data-bbox="321 1081 1235 1524"> <thead> <tr> <th>Column Name</th><th>Metric</th></tr> </thead> <tbody> <tr> <td>Cost of vCPU (\$)</td><td>Selected Value: CPUCost</td></tr> <tr> <td>Memory Cost (\$)</td><td>Selected Value: Memory Cost</td></tr> <tr> <td>Disk Used space (95th)</td><td>Selected Value: UsedSpace95th</td></tr> <tr> <td>Disk Used space Cost (\$)</td><td>Selected Value: UsedSpaceCost</td></tr> <tr> <td>VM Total Cost (\$)</td><td>Selected Value: VMTotalCost</td></tr> </tbody> </table> Click “Sort” button in order to sort results by VM Total Cost (\$). Pick the “VM Total Cost (\$)” from the Unsorted columns list and bring it over the Sorted columns section. Click radio button Descending.	Column Name	Metric	Cost of vCPU (\$)	Selected Value: CPUCost	Memory Cost (\$)	Selected Value: Memory Cost	Disk Used space (95th)	Selected Value: UsedSpace95th	Disk Used space Cost (\$)	Selected Value: UsedSpaceCost	VM Total Cost (\$)	Selected Value: VMTotalCost
Column Name	Metric												
Cost of vCPU (\$)	Selected Value: CPUCost												
Memory Cost (\$)	Selected Value: Memory Cost												
Disk Used space (95th)	Selected Value: UsedSpace95th												
Disk Used space Cost (\$)	Selected Value: UsedSpaceCost												
VM Total Cost (\$)	Selected Value: VMTotalCost												

13	Select Formula tab, click Add a Formula. Browse the formula library and select “Sum (math.spatial)” formula. Set the parameters as follows: Parameter to Enter: Metric: Result on a child node: "VMTotalCost" Settings to be set: aggregation = DEFAULT partial = false Results Returned: Cost per BU
14	Click again Add a Formula. Browse the formula library and select “ChildCount (util)” formula. Set the parameters as follows: Results Returned: BU VM count
15	Return to Browse Mode. Look at the content and make sure the value columns are properly populated. Some value could be missing for some VMs - that is normal. It is possible that the VM still exists but maybe powered off. The minimum charges are applied (CPU, Memory). This is accepted for the chargeback report design.

End of lab section

Part 11 - b: Challenge Lab - Chargeback vCenter

Step	Action												
	The second part of this lab is to set the report structure per customer and business unit. This part will re-use work from part 1.												
1	Go to Edit Mode. Navigate and select the chargeback top report node: “Lab 8 – part 11 – Chargeback vCenter” Add a new report node, name that report “Chargeback VDC – Drill-down” <u>Report Configuration:</u> Select Report Type: interactive table Default Duration: last 1 day Sampling Period: 1 hour Sampling Type: average <u>Report Details: Table</u> <table><tr><th>Column Name</th><th>Type</th><th>Details</th></tr><tr><td>Customer</td><td>Attribute</td><td>Node name</td></tr><tr><td>VM Count</td><td>Value</td><td>[everything] (we will pick a formula result later...)</td></tr><tr><td>Customer unit total cost (\$)</td><td>Value</td><td>[everything] (we will pick a formula result later...)</td></tr></table>	Column Name	Type	Details	Customer	Attribute	Node name	VM Count	Value	[everything] (we will pick a formula result later...)	Customer unit total cost (\$)	Value	[everything] (we will pick a formula result later...)
Column Name	Type	Details											
Customer	Attribute	Node name											
VM Count	Value	[everything] (we will pick a formula result later...)											
Customer unit total cost (\$)	Value	[everything] (we will pick a formula result later...)											

Step	Action												
2	Go to Edit Mode. Navigate and select the chargeback top report node: “Chargeback VDC – Drill-down” Add a new report node, name that report “[per Customer]” <u>Filtering & Expansion:</u> Set expansion to use property “customer” property. <u>Report Configuration:</u> Select Report Type: standard table Default Duration: last 1 day Sampling Period: 1 hour Sampling Type: average <u>Report Details: Table</u> <table><tr><th>Column Name</th><th>Type</th><th>Details</th></tr><tr><td>Business unit</td><td>Attribute</td><td>Node name</td></tr><tr><td>VM Count</td><td>Value</td><td><i>[everything]</i> (we will pick a formula result later...)</td></tr><tr><td>Customer unit total cost (\$)</td><td>Value</td><td><i>[everything]</i> (we will pick a formula result later...)</td></tr></table>	Column Name	Type	Details	Business unit	Attribute	Node name	VM Count	Value	<i>[everything]</i> (we will pick a formula result later...)	Customer unit total cost (\$)	Value	<i>[everything]</i> (we will pick a formula result later...)
Column Name	Type	Details											
Business unit	Attribute	Node name											
VM Count	Value	<i>[everything]</i> (we will pick a formula result later...)											
Customer unit total cost (\$)	Value	<i>[everything]</i> (we will pick a formula result later...)											
3	Navigate and select the chargeback top report node: “[per Customer]” Add a new report node, name that report “[per Business Unit]” <u>Filtering & Expansion:</u> Set expansion to use property “bunit” property. <u>Report Configuration:</u> Select Report Type: mixed reports Default Duration: last 1 day Sampling Period: real-time Sampling Type: average												

Step	Action												
4	In finalizing the report structure, take a copy of the report from lab part a as a leaf report, under [per Business Unit]. Locate “Chargeback VDC - details” report. Click copy button. Locate the following report: Lab 8 – part 11 - Challenge lab - Chargeback vCenter>>Chargeback VDC - Drill-down>>[per Customer]>>[per Business Unit] Click paste as a link button and select “R” icon (for Relative).												
5	Select [per Business Unit] report node. Select Formula tab, click Add a Formula. Browse the formula library and select “Nop4 (util)” formula. Set the parameters as follows: <table><tr><th>Parameter to Enter:</th><th>Definition Type</th><th>Definition value:</th><th>Result Returned</th></tr><tr><td>First Value</td><td>Result on a child node</td><td>BU VM count</td><td>BU VM count</td></tr><tr><td>Second Value</td><td>Result on a child node</td><td>Cost per BU</td><td>Cost per BU</td></tr></table>	Parameter to Enter:	Definition Type	Definition value:	Result Returned	First Value	Result on a child node	BU VM count	BU VM count	Second Value	Result on a child node	Cost per BU	Cost per BU
Parameter to Enter:	Definition Type	Definition value:	Result Returned										
First Value	Result on a child node	BU VM count	BU VM count										
Second Value	Result on a child node	Cost per BU	Cost per BU										

Step	Action									
6	Return back to parent report, “[per Customer]”, revisit table columns: <u>Report Details: Table:</u> <table><tr><th>Column Name</th><th>Metric</th><th>Details</th></tr><tr><td>VM Count</td><td>BU VM count</td><td>Time Management: Recover the last value only Value Settings: Use Rounding = 0 decimals; Value Formatter = Value</td></tr><tr><td>Business unit total cost (\$)</td><td>Cost per BU</td><td>Time Management: Sampling Period = 1 hour; Recover the last value only Value Settings: Value Formatter = Value Summary settings: Label = Total Generate column = sum</td></tr></table>	Column Name	Metric	Details	VM Count	BU VM count	Time Management: Recover the last value only Value Settings: Use Rounding = 0 decimals; Value Formatter = Value	Business unit total cost (\$)	Cost per BU	Time Management: Sampling Period = 1 hour; Recover the last value only Value Settings: Value Formatter = Value Summary settings: Label = Total Generate column = sum
Column Name	Metric	Details								
VM Count	BU VM count	Time Management: Recover the last value only Value Settings: Use Rounding = 0 decimals; Value Formatter = Value								
Business unit total cost (\$)	Cost per BU	Time Management: Sampling Period = 1 hour; Recover the last value only Value Settings: Value Formatter = Value Summary settings: Label = Total Generate column = sum								
7	Select Formula tab, click Add a Formula. Browse the formula library and select “Sum (math.spatial)” formula. Set the parameters as follows: Parameter to Enter: metric = Result on a child node: "BU VM count" Settings to be set: aggregation = DEFAULT partial = false Results Returned: CustomerVMCount									

Step	Action									
8	Click Add a Formula. Browse the formula library and select “Sum (math.spatial)” formula. Set the parameters as follows: Parameter to Enter: metric = Result on a child node: "Cost per BU" Settings to be set: aggregation = DEFAULT partial = false Results Returned: CustomerVMCost									
9	Return back to parent report, “Chargeback VDC – Drill-down”, revisit table columns: <u>Report Details: Table:</u> <table><tr><th>Column Name</th><th>Metric</th><th>Details</th></tr><tr><td>VM Count</td><td>CustomerVMCount</td><td> Time Management: Recover the last value only Value Settings: Use Rounding = 0 decimals; Value Formatter = Value Summary settings: Label = Total VM Generate column = sum </td></tr><tr><td>Customer unit total cost (\$)</td><td>CustomerVMCost</td><td> Time Management: Sampling Period = 1 hour; Recover the last value only Value Settings: Value Formatter = Value Summary settings: Label = Total Generate column = sum </td></tr></table>	Column Name	Metric	Details	VM Count	CustomerVMCount	Time Management: Recover the last value only Value Settings: Use Rounding = 0 decimals; Value Formatter = Value Summary settings: Label = Total VM Generate column = sum	Customer unit total cost (\$)	CustomerVMCost	Time Management: Sampling Period = 1 hour; Recover the last value only Value Settings: Value Formatter = Value Summary settings: Label = Total Generate column = sum
Column Name	Metric	Details								
VM Count	CustomerVMCount	Time Management: Recover the last value only Value Settings: Use Rounding = 0 decimals; Value Formatter = Value Summary settings: Label = Total VM Generate column = sum								
Customer unit total cost (\$)	CustomerVMCost	Time Management: Sampling Period = 1 hour; Recover the last value only Value Settings: Value Formatter = Value Summary settings: Label = Total Generate column = sum								

Lab Exercise 9: Practicing Aggregated Report Types

Purpose:	This lab will allows you to practice Aggregated report types. This lab has four parts: Part 1: Practice with stacked charts Part 2: Practice with stacked bars Part 3: Practice with status report Part 4: Practice with gauge report
Tasks:	In this lab, you will: • Set the base report structure required for an aggregated report type. • Experiment various aggregated report types.

Lab 9: Part 1 - Stacked Chart

Purpose:	The purpose of this lab is to practice and experiment with the Stacked Chart report type.
-----------------	---

Tasks:	In this lab, you will: • Set the base report structure for Stacked Chart report type. • Use Stacked Chart and compare with simple chart.
---------------	--

Step	Action
0	Login to portal with the provided username/password to the indicated class' ViPR SRM M&R portal.
1	Go in Edit Mode Navigate to the following report node: All>>My Reports>> ViPR SRM Reporting class>>Module 06 Add a new report and give it the following name: "Lab 9 – part 1 – Stacked Chart"
2	Add a child report under Lab 9 – part 1 and name it "VNX-Block Use LUNs Perf" <u>Filtering & Expansion:</u> Set the filter on the node as follows: <pre>source=='VNXBlock-Collector' & !vstatus=='inactive' & parttype=='LUN' & !dgraid=='Hot Spare'</pre>
3	Add a child report under "VNX-Block Use LUNs Perf" and name it "[serialnb,part]" <u>Filtering & Expansion:</u> Set expansion to use properties "serialnb" and "part" <u>Report Configuration:</u> Select Report Type: mixed reports

4	Add a child report under “[serialnb,part]” and name it “Bandwidth (MB/s) - Separate” <u>Report Configuration:</u> Select Report Type: simple chart
5	Select Formula tab, click Add a Formula. Browse the formula library and select “Nop (util)” formula. Set the parameters as follows: Parameter to Enter: First operand = Filter: "name=='ReadThroughput'" Results Returned: Read Bandwidth (MB/s) (show in graphs)
6	Click Add a Formula. Browse the formula library and select “Nop (util)” formula. Set the parameters as follows: Parameter to Enter: First operand = Filter: "name== WriteThroughput" Results Returned: Write Bandwidth (MB/s) (show in graphs)
7	Click Add a Formula. Browse the formula library and select “Addition (math)” formula. Set the parameters as follows: Parameter to Enter: Metric 1 = Filter: "name=='WriteThroughput'" Metric 2 = Filter: "name=='ReadThroughput'" Results Returned: Total Bandwidth (MB/s) (show in graphs)
8	Add a child report under “[serialnb,part]” and name it “Bandwidth (MB/s) - Stacked” <u>Report Configuration:</u> Select Report Type: stacked chart Report Rendering: dynamic charts by default

[illegible]

End of lab exercise

Lab 9: Part 2 - Stacked Bar

Purpose:	The purpose of this lab is to practice the Stacked Bar report type.
-----------------	---

Tasks:	In this lab, you will: • Set the base report structure for Stacked Bar report type.
---------------	--

Step	Action
0	Login to the portal with the provided username/password to the indicated class' ViPR SRM M&R portal.
1	Go to Edit Mode. Navigate to the following report node: All>>My Reports>> ViPR SRM Reporting class>>Module 06 Add a new report and give it the following name: "Lab 9 – part 2 – Stacked Bar"

2	Add a child report under Lab 9 – part 2 and name it “Bar chart and thresholds - Storage Performance” <u>Filtering & Expansion:</u> Set the filter on the node as follows: <i>source=='VMWareCollector' & #APG-DB:ALL & !vstatus=='inactive' & devtype=='Hypervisor' & parttype=='Disk' & (name=='ReadThroughput' name=='WriteThroughput') & !part</i> Can you explain that filter expression? _____ _____ <u>Report Configuration:</u> Select Report Type: interactive table <u>Report Details: Table</u> <table><tr><th>Column Name</th><th>Type</th><th>Details</th></tr><tr><td>Device</td><td>Attribute</td><td>Node name</td></tr><tr><td>Cluster member</td><td>Property</td><td>memberof</td></tr></table> Display options: Paging Limit = 8	Column Name	Type	Details	Device	Attribute	Node name	Cluster member	Property	memberof
Column Name	Type	Details								
Device	Attribute	Node name								
Cluster member	Property	memberof								
3	Add a child report under “Bar chart and thresholds - Storage Performance” and name it “[memberof,device]” <u>Filtering & Expansion:</u> Set expansion to use properties “memberof” and “device”. Use “Switch to Input Field” button and write down the following expansion expression: <i>memberof<type=hide>,device *</i> <u>Report Configuration:</u> Select Report Type: mixed reports * This <type=hide> parameter is considered a “complex expansion” and is simply hiding the result of memberof property when listing the report nodes in the tree. This is purely a cosmetic, optional parameter.									

4	Navigate to the following report: All>>VMware vCenter>><<TEMPLATES>>><<ESX>>>Hosts>>ESX Device Summary>>Storage Performance>>Global Disk Throughput Take a copy of “Global Disk Throughput” and bring it under “[memberof,device]” in your report structure.																												
5	(Optional) Define the following thresholds to show up on the stack report (as horizontal lines): <table data-bbox="388 606 1274 1041"> <tr> <th>Threshold Type</th><th>Name</th><th>Value</th><th>Color</th></tr> <tr> <td>Custom</td><td>Low</td><td>0.0 MB</td><td>Cyan</td></tr> <tr> <td>Normal</td><td>Normal</td><td>0.075 MB</td><td>Green</td></tr> <tr> <td>Custom</td><td>Medium</td><td>0.15 MB</td><td>Violet</td></tr> <tr> <td>Minor</td><td>Minor</td><td>0.2 MB</td><td>Light Orange</td></tr> <tr> <td>Major</td><td>Major</td><td>0.25 MB</td><td>Dark Orange</td></tr> <tr> <td>Critical</td><td>Critical</td><td>0.4 MB</td><td>Red</td></tr> </table> Note: The values are given base on the context, not for real application.	Threshold Type	Name	Value	Color	Custom	Low	0.0 MB	Cyan	Normal	Normal	0.075 MB	Green	Custom	Medium	0.15 MB	Violet	Minor	Minor	0.2 MB	Light Orange	Major	Major	0.25 MB	Dark Orange	Critical	Critical	0.4 MB	Red
Threshold Type	Name	Value	Color																										
Custom	Low	0.0 MB	Cyan																										
Normal	Normal	0.075 MB	Green																										
Custom	Medium	0.15 MB	Violet																										
Minor	Minor	0.2 MB	Light Orange																										
Major	Major	0.25 MB	Dark Orange																										
Critical	Critical	0.4 MB	Red																										
6	Return in Browse Mode and look at your resulting report.																												
	Notes:																												

End of lab exercise

Lab 9: Part 3 - Status Report

Purpose:	This report allows you to practice Status Report types.
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Tasks:	In this lab, you will: • Set the base report structure for Status Report type.
---------------	---

Step	Action
0	Login to the portal with the provided username/password to the indicated class' ViPR SRM M&R portal.
1	Go to Edit Mode. Navigate to the following report node: All>>My Reports>> ViPR SRM Reporting class>>Module 06 Add a new report and give it the following name: "Lab 9 – part 3 – Status report"

2

Add a child report under Lab 9 – part 3 and name it “Brocade SAN Switch status”

Filtering & Expansion:

Set the filter on the node as follows:

datagrp='BROCADE%' & !vstatus=='inactive'

Report Configuration:

Select Report Type: status

Report Details: Status:

Marker Type: Medium Circle

Show Value: Show value

Order: Child order

Top ‘N’ mode: show all items

Thresholds Definition:

Threshold Type	Name	Value	Color
Custom	Critical	0.0	Red
Custom	Major	50.0	Orange
Custom	Normal	100	Green

Tooltip Information:

Property name	type	description
devdesc	Default	Device Description
model	Default	Device model
ip	Default	Device ip address
firmware	Default	firmware
maxport	Custom	FC Port count

3

Add a child report under “Brocade SAN Switch status” and name it “[device]”

Filtering & Expansion:

Set expansion to use property “device”

4	Select Formula tab, click Add a Formula. Browse the formula library and select “Nop (util)” formula. Set the parameters as follows: Parameter to Enter: First operand = Filter: "name=='OperStatus'" Results Returned: OperStatus Select “Default result” radio button. This becomes the default KPI (metric) returned to parent node and consumed by Status report.																																	
5	(optional) As report enhancement, on that [device] report node, you can display properties on the top, as follows: Report Configuration: Under Description and Properties section, add properties to “Displayed Properties”: <table><tr><th>Property name</th><th>type</th><th>description</th></tr><tr><td>device</td><td>Default</td><td>Device name</td></tr><tr><td>devdesc</td><td>Default</td><td>Device Description</td></tr><tr><td>model</td><td>Default</td><td>Device model</td></tr><tr><td>ip</td><td>Default</td><td>Device ip address</td></tr><tr><td>firmware</td><td>Default</td><td>Firmware</td></tr><tr><td>maxport</td><td>Custom</td><td>FC Port count</td></tr><tr><td>devstat</td><td>Custom</td><td>Device status</td></tr><tr><td>devicesn</td><td>Custom</td><td>Soft serial number</td></tr><tr><td>bootdate</td><td>Custom</td><td>Last boot date</td></tr><tr><td>domainid</td><td>Custom</td><td>Domain ID</td></tr></table>	Property name	type	description	device	Default	Device name	devdesc	Default	Device Description	model	Default	Device model	ip	Default	Device ip address	firmware	Default	Firmware	maxport	Custom	FC Port count	devstat	Custom	Device status	devicesn	Custom	Soft serial number	bootdate	Custom	Last boot date	domainid	Custom	Domain ID
Property name	type	description																																
device	Default	Device name																																
devdesc	Default	Device Description																																
model	Default	Device model																																
ip	Default	Device ip address																																
firmware	Default	Firmware																																
maxport	Custom	FC Port count																																
devstat	Custom	Device status																																
devicesn	Custom	Soft serial number																																
bootdate	Custom	Last boot date																																
domainid	Custom	Domain ID																																
6	Return to Browse Mode and look at your resulting report.																																	

	Notes:

End of lab exercise

Lab 9: Part 4 - Gauge Chart

Purpose:	The purpose of this lab is to practice and experiment with Gauge chart report types.
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Tasks:	In this lab, you will: • Set the base report structure for a Gauge chart report type.
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Step	Action
0	Login to the portal with the provided username/password to the indicated class' ViPR SRM M&R portal.
1	Go to Edit Mode. Navigate to the following report node: All>>My Reports>> ViPR SRM Reporting class>>Module 06 Add a new report and give it the following name: "Lab 9 – part 4 – Gauge chart"
2	Add a child report under Lab 9 – part 4 and name it "Switch analysis (Brocade)"

3

Add a child report under “Switch analysis (Brocade)” and name it “Interfaces Utilization”

Filtering & Expansion:

Set the filter on the node as follows:

name=='CurrentUtilization' & devtype=='FabricSwitch' & parttype=='Port'

Report Configuration:

Select Report Type: interactive table

Report Details: Table:

Column Name	Type	Details
Device	Property	device
Interface name	Property	part
Interface Type	Property	iftype
Port Speed	Property	maxspeed
Current Utilization (%)	Value	Filter to Apply: name=='CurrentUtilization' Time Management: Sampling Period = real-time Recover: “all the values in the time range” Temporal Aggregation: average Value Settings: Value Formatter: Sparkline

Click Sort button, select “Current Utilization (%)” column to move out from “Unsorted columns” to “Sorted columns”, choose Descending as the sort parameter.

Lab Exercise 10: Using TopN Reports

Purpose:	The purpose of this lab is to practice and experiment various possibilities in using TopN report type. This lab has four parts: • Part 1: Practice with Bar chart • Part 2: Practice with Pie chart • Part 3: Practice with Single horizontal bar • Part 4: Practice with Timeratio bars
Tasks:	In this lab, you will: • Set the report structure for a TopN report. • Experiment with different use cases for TopN report: ○ Bar chart ○ Pie chart ○ Single horizontal bar ○ Timeratio bars

Lab 10: Part 1 - Bar Chart Report Type

Purpose:	The purpose of this lab is to practice various possibilities in using Bar Chart report type. This lab has six parts. Each part demonstrates a Bar chart usage.
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Tasks:	In this lab, you will: • Set the report structure for single and group mode of bar charts. • Experiment different use cases for bar chart report.
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Part 1 –a: Bar Chart: FabricSwitch Inventory - per Vendor only

Step	Action
	Part 1a and 1b are for an inventory use case about the count of SAN Switches. Two possible reports are explored: plain count per vendor and the second with a breakdown (stacked version) per model.
0	Login to portal with the provided username/password to the indicated class' ViPR SRM M&R portal.
1	Go to Edit Mode. Navigate to the following report node: All>>My Reports>> ViPR SRM Reporting class>>Module 06 Add a new report and give it the following name: "Lab 10 – part 1 – Bar Chart"

Step	Action
2	Add a new report under Lab 10 – part 1 and give it the following name: “a - FabricSwitch inventory - per Vendor only” <u>Filtering & Expansion:</u> Set the filter on the node as follows: <code>devtype=='FabricSwitch' & vstatus=='active'</code> <u>Report Configuration:</u> Set Report Type to horizontal bars <u>Report Details: TopN Graph:</u> Under Settings for TopN Graphs: Section order: descending Section grouping mode: stacked Number of sections: 5
3	Add a child report under “a - FabricSwitch inventory - per Vendor only” and name it “[vendor]” <u>Filtering & Expansion:</u> Set expansion to use property “vendor”
4	Select Formula tab, click Add a Formula. Browse the formula library and select “DistinctValueCountFormula (util)” formula. Set the parameters as follows: Settings to be set: Filter: * (that is, the star character) ExpandOn: device Level-Up: 0 Results Returned: Count (default result)
5	Return to Browse Mode. Notice how the device count is gathered. Do you see a list of device of a certain vendor? _____ What happens when you click a vendor bar? _____ Why? _____ Make a suggestion for improving the leaf report and avoid the issue: _____ _____

End of lab section

Part 1 – b: Bar Chart: FabricSwitch Inventory - Vendor and Model Grouped + Stacked Categories

Step	Action
0	Login to the portal with the provided username/password to the indicated class' ViPR SRM M&R portal.
1	Go to Edit Mode. Navigate to the following report node: All>>My Reports>> ViPR SRM Reporting class>>Module 06 >> Lab 10 – part 1 - Bar Chart Take a copy of “a - FabricSwitch inventory - per Vendor only” report. Paste under Lab 10 – part 1. Rename with: “b - FabricSwitch inventory - Vendor and Model grouped + stacked categories”
2	Select “[vendor]” report. Rename for “[vendor,model]”. Set expansion to use properties “vendor” and “model”. Using your mouse, pick and drag “vendor” label up until a background yellow area with name “New Group” shows up. Release “vendor” label on this area. You should now see Group 1 and Group 2. Vendor is member of Group 1 and model is member of Group 2.
3	Add a child report under “[vendor,model]” and name it “[device]” <u>Filtering & Expansion:</u> Set expansion to use property “device”
3	Return in Browse Mode and look at your resulting report.

Step	Action
	What is the difference between the 2 reports (part 1a vs part 1b)? _____ _____ Move your mouse pointer on a colored area, what do you see? _____ _____ How many fabrics are from Cisco Vendor? _____ How many Brocade 6510 are there in our inventory? _____ Now, what happens when you click a section of a horizontal bar? _____ _____ Note: you can enrich tooltips by returning back into report, under Report Details tab, under Tooltip Information section. Unfortunately, you cannot add new values to the tooltip box, only properties. Try using “porttype” property.

End of lab section

Part 1 – c: Bar Chart: Distribution by Guest OS

Step	Action
	The following parts 1c and 1d are for inventory of VMs by guest Operation Systems.
0	Login to the portal with the provided username/password to the indicated class' ViPR SRM M&R portal.
1	Go to Edit Mode. Navigate to the following report node: All>>My Reports>> ViPR SRM Reporting class>>Module 06 >> Lab 10 – part 1 - Bar Chart Add a new report and give it the following name: “c - Distribution by Guest OS” <u>Filtering & Expansion:</u> Set the filter on the node as follows: <i>source=='VMWareCollector' & vstatus=='active' & devtype=='VirtualMachine'</i> <u>Report Configuration:</u> Set Report Type: horizontal bars
2	Add a new report under “c - Distribution by Guest OS” and give it the following name “[devdesc]” <u>Filtering & Expansion:</u> Set expansion to use property “devdesc” Set Display Policy to “show this node in the reports but not in the tree”
3	Select Formula tab, click Add a Formula. Browse the formula library and select “DistinctValueCountFormula (util)” formula. Set the parameters as follows: Settings to be set: Filter: * (that is, the start character) ExpandOn: deviceid Level-Up: 0 Results Returned: VmCount (default result)

Step	Action
4	Return to Browse Mode . What happens when trying to drill down a bar of the report? _____

End of lab section

Part 1 – d: Bar Chart: Revisited - Distribution by Guest OS

Step	Action
0	Login to portal with the provided username/password to the indicated class' ViPR SRM M&R portal.
1	Go to Edit Mode. Navigate to the following report node: All>>My Reports>> ViPR SRM Reporting class>>Module 06 >> Lab 10 – part 1 - Bar Chart Add a new report and give it the following name: “d – Revisited – Distribution by Guest OS” <u>Filtering & Expansion:</u> Set the filter on the node as follows: <i>source=='VMWareCollector' & vstatus=='active' & devtype=='VirtualMachine'</i> <u>Report Configuration:</u> Set Report Type: horizontal bars Report Details:TopN Graph: Under Legend, remove ‘units’ from the list of “Properties in Legend”.
2	Under “d – Revisited – Distribution by Guest OS” report, create four new reports and name them as follows: • <<device TEMPLATE>> • Linux • Microsoft Windows • Others
3	Select “Linux” report. <u>Filtering & Expansion:</u> Set the filter on the node as follows: <i>devdesc='%Linux%'</i> <u>Report Configuration:</u> Set Report Type: horizontal bars

Step	Action
4	Select Formula tab, click Add a Formula. Browse the formula library and select “DistinctValueCountFormula (util)” formula. Set the parameters as follows: Settings to be set: Filter: devdesc='%Linux%' ExpandOn: devdesc,deviceid Level-Up: 0 Results Returned: VmCount (default result)
5	Select “Microsoft Windows” report. <u>Filtering & Expansion:</u> Set the filter on the node as follows: <i>devdesc='%Windows%'</i> <u>Report Configuration:</u> Set Report Type: horizontal bars
6	Select Formula tab, click Add a Formula. Browse the formula library and select “DistinctValueCountFormula (util)” formula. Set the parameters as follows: Settings to be set: Filter: devdesc='%Windows%' ExpandOn: devdesc,deviceid Level-Up: 0 Results Returned: VmCount (default result)
7	Select “Others” report. <u>Filtering & Expansion:</u> Set the filter on the node as follows: <i>!(devdesc='%Linux%' devdesc='%Windows%')</i> <u>Report Configuration:</u> Set Report Type: horizontal bars

Step	Action																								
8	Select Formula tab, click Add a Formula. Browse the formula library and select “DistinctValueCountFormula (util)” formula. Set the parameters as follows: Settings to be set: Filter: !(devdesc='%Windows%' devdesc='%Linux%') ExpandOn: devdesc,deviceid Level-Up: 0 Results Returned: VmCount (default result)																								
9	Select “<<device TEMPLATE>>” report. <u>Filtering & Expansion:</u> Set Display Policy: “always hide the node”																								
10	Under “<<device TEMPLATE>>”, create a new report, name it “[devdesc]” <u>Filtering & Expansion:</u> Set expansion to use property “devdesc” <u>Report Configuration:</u> Select Report Type: standard table <u>Report Details: Table</u> Define the table columns as follows: <table><tr><th>Column Name</th><th>Column Type</th><th>attribute</th></tr><tr><td>Device Name</td><td>Property</td><td>device</td></tr><tr><td>Hostname</td><td>Property</td><td>hostname</td></tr><tr><td>OS</td><td>Property</td><td>devdesc</td></tr><tr><td>vdc</td><td>Property</td><td>vdc</td></tr><tr><td>Device ID</td><td>Property</td><td>deviceid</td></tr><tr><td>Nb of CPU</td><td>Property</td><td>nbcpu</td></tr><tr><td>Member of</td><td>Property</td><td>memberof</td></tr></table>	Column Name	Column Type	attribute	Device Name	Property	device	Hostname	Property	hostname	OS	Property	devdesc	vdc	Property	vdc	Device ID	Property	deviceid	Nb of CPU	Property	nbcpu	Member of	Property	memberof
Column Name	Column Type	attribute																							
Device Name	Property	device																							
Hostname	Property	hostname																							
OS	Property	devdesc																							
vdc	Property	vdc																							
Device ID	Property	deviceid																							
Nb of CPU	Property	nbcpu																							
Member of	Property	memberof																							

Step	Action
11	Select Formula tab, click Add a Formula. Browse the formula library and select “DistinctValueCountFormula (util)” formula. Set the parameters as follows: Setting to be Set: Filter: * (that is, a start character) ExpandOn: deviceid Level-Up: 0 Results Returned: VmCount (default result)
12	Under “[devdesc]” report, create a new report, name it “[deviceid]” <u>Filtering & Expansion</u>: Set expansion to use property “deviceid” Display Policy: “show this node in the reports but not in the tree”
13	Now, link the template to real report nodes. Take a copy of the “[devdesc]” report. For each of the Linux, Microsoft Windows, and Others report, place a relative link copy (“R” icon)
14	Return to Browse Mode. Make sure the VMCount works for any level of the report and use tooltips to determine the count value. Can you explain how this report is built? _____ _____ Can we do like we did with switch report: by vendor and model, i.e. in a single stacked horizontal bar? _____ _____ Why? _____

End of lab section

Part 1 – e: Bar Chart: VDC VM Customer and Business Unit Distribution

Step	Action
	This part “e” report is reusing customer and business unit break down in order to experiment the various modes of horizontal chart report type.
0	Login to portal with the provided username/password to the indicated class’ ViPR SRM M&R portal.
1	Go to Edit Mode. Navigate to the following report node: All>>My Reports>> ViPR SRM Reporting class>>Module 06 >> Lab 10 – part 1 - Bar Chart Add a new report and give it the following name: “e - VDC VM Customer and Business Unit distribution” <u>Filtering & Expansion:</u> Set the filter on the node as follows: <i>devtype=='VirtualMachine' & vstatus=='active'</i> <u>Report Configuration:</u> Select Report Type: horizontal bar chart <u>Report Details: TopN Graph:</u> Settings for TopN Graphs: Section grouping mode: summary
2	Add a new report under “e - VDC VM Customer and Business Unit distribution” report and give it the following name “[customer,bunit]” <u>Filtering & Expansion:</u> Set expansion expression (use Switch to Input Field): (customer),(bunit). This way of typing will place the properties in Group 1 and Group 2 respectively. Set Display Policy to “show this node in the reports but not in the tree”

Step	Action
3	Select Formula tab, click Add a Formula. Browse the formula library and select “DistinctValueCountFormula (util)” formula. Set the parameters as follows: Setting to be Set: Filter: * (that is, a start character) ExpandOn: deviceid Level-Up: 0 Results Returned: VmCount (default result)
4	Return to Browse Mode. Describe the resulting report: _____ _____ What the usage of this report format? _____ _____
5	Go to Edit Mode. Select report “e - VDC VM Customer and Business Unit distribution” <u>Report Details: TopN Graph:</u> Settings for TopN Graphs: Section grouping mode: stacked
6	Return to Browse Mode. Has the presentation changed? _____ _____ What happens when hovering the mouse over a section of a bar? _____ _____

End of lab section

Part 1 – f: Bar Chart: Check Polling Consistency

Step	Action
0	Login to portal with the provided username/password to the indicated class' ViPR SRM M&R portal.
1	Go to Edit Mode. Navigate to the following report node: All>>My Reports>> ViPR SRM Reporting class>>Module 06 >> Lab 10 – part 1 - Bar Chart Add a new report and give it the following name: “f - Check polling consistency” <u>Filtering & Expansion:</u> Set the filter on the node as follows: <i>devtype=='Array' & !parttype & vstatus=='active' & name=='IORate'</i> <u>Report Configuration:</u> Set Report Type to bar chart Default Duration: last 6 hours Sampling Period: 1 hour Sampling Type: count <u>Report Details: Graph:</u> In Legend section, add “device” property to the list in “Properties in Legend”
2	Return to Browse Mode. Do you see any missing polls from this view? _____ Note: bars from many arrays are one over the other... use legend labels to hide one at a time and investigate. If you enlarge the period to 1 week, do you see some missed polled? _____ If so, which array? _____
3	Go to Edit Mode. Select report “f - Check poling consistency” Change the report type to stacked bars.

Step	Action
4	Return to Browse Mode. What does each stack represent? _____
5	Go to Edit Mode. Select report “f - Check poling consistency” Change filter: remove “name is IORate” for “name is RawCapacity”
6	Return to Browse Mode. What do you notice for on the polling cycle? _____ Do you notice missing polls? _____
	Notes: _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____

End of lab section
End of lab exercise

Lab 10: Part 2 – Pie Charts

Purpose:	The purpose of this lab is to practice and experiment Pie Chart report type. This part has two sections.
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Tasks:	In this lab, you will: • Set the base report structure for Pie Chart report type
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Part 2 – a: FabricSwitch inventory - Vendor and Model grouped + stacked categories

Step	Action
0	Login to the portal with the provided username/password to the indicated class' ViPR SRM M&R portal.
1	Go to Edit Mode. Navigate to the following report node: All>>My Reports>> ViPR SRM Reporting class>>Module 06 Add a new report and give it the following name: "Lab 10 – part 2 – Pie Chart"
2	Take a copy of previous Lab 10 – part 1b ("b - FabricSwitch inventory - Vendor and Model grouped + stacked categories"). Paste report under Lab 10 – part 2. Rename report to: "a - FabricSwitch inventory - Vendor and Model grouped + stacked categories" <u>Report Configuration:</u> Set Report Type to "pie chart".

Step	Action
3	Return to Browse Mode . Is the total the same as with the bar chart of lab 10 part 1 b? _____

End of lab section

Part 2 – b: Storage Pool Distribution by Target Protection

Step	Action									
0	Login to the portal with the provided username/password to the indicated class' ViPR SRM M&R portal.									
1	Go to Edit Mode. Navigate to the following report node: All>>My Reports>> ViPR SRM Reporting class>>Module 06>>“ Lab 10 – part 2 – Pie Chart Add a new report and give it the following name: “b - Storage Pool Distribution by Target Protection” <u>Filtering & Expansion:</u> Set the filter on the node as follows: <i>devtype=='Array' & raidtype</i> <u>Report Configuration:</u> Set Report Type: interactive table <u>Report Details: Table:</u> Define the table columns as follows: <table><tr><th>Column Name</th><th>Column Type</th><th>attribute</th></tr><tr><td>Array Name</td><td>Attribute</td><td>Node name</td></tr><tr><td>Model</td><td>Property</td><td>model</td></tr></table>	Column Name	Column Type	attribute	Array Name	Attribute	Node name	Model	Property	model
Column Name	Column Type	attribute								
Array Name	Attribute	Node name								
Model	Property	model								
2	Add a new report under “b - Storage Pool Distribution by Target Protection” and give it the following name “[device]” <u>Filtering & Expansion:</u> Set expansion to use property “device” <u>Report Configuration:</u> Set Report Type to “pie chart”									

Lab 10: Part 3 –Single Horizontal Bar

Purpose:	The purpose of this lab is to practice various possibilities while using a Single Horizontal bar report type. This lab part has two sections.
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Tasks:	In this lab, you will: • Set the report structure for Single Horizontal bar report. • Experiment different use cases for Single Horizontal bar report.
---------------	---

Part 3 – a: Datastore Capacity Distribution

Step	Action
0	Login to the portal with the provided username/password to the indicated class' ViPR SRM M&R portal.
1	Go to Edit Mode. Navigate to the following report node: All>>My Reports>> ViPR SRM Reporting class>>Module 06 Add a new report and give it the following name: "Lab 10 – part 3 – Single Horizontal bar"

Step	Action
2	Add a new report under “Lab 10 – part 3 – [...]” and give it the following name: “a - Datastore Capacity Distribution” <u>Filtering & Expansion:</u> Set the filter on the node as follows: <i>devtype=='Datastore'</i> <u>Report Configuration:</u> Set Report Type to single horizontal bars Set Sampling Period to 1 hour Sampling Type to average <u>Report Details: TopN Graph:</u> Under Settings for TopN Graphs: Section order: descending Section grouping mode: summary Number of sections: 10 Scaling Mode: by unit Unit type: (Volume) Bytes, Unit=(Classic) GB TO: Unit type: Byte, Unit=(Classic) Auto
3	Add a child report under “a - Datastore Capacity Distribution” and name it “[datastore]” <u>Filtering & Expansion:</u> Set expansion to use property “device” Set Display Policy to “show this node in the reports but not in the tree”
4	Select Formula tab, click Add a Formula. Browse the formula library and select “Nop (util)” formula. Set the parameters as follows: Parameter to Enter: Filter: "name=='Capacity'" Results Returned: Capacity (show in graphs, default result)
5	Return to Browse Mode and look at your resulting report.

Step	Action
Extra	Experiment by yourself: Return to Edit Mode, under “a - Datastore Capacity Distribution” report node, under Report Details: TopN Graph tab, in Settings section, change “Number of sections” to, let’s say, 100. See the rainbow in browse mode.

End of lab section

Part 3 – b: FabricSwitch Inventory - Vendor and Model

Step	Action
0	Login to the portal with the provided username/password to the indicated class' ViPR SRM M&R portal.
1	Go to Edit Mode. Take a copy of the following report: All>>ViPR SRM Reporting class>>Module 06 - More Report Types>>Lab 10 – part 1 - Bar Chart>>a - FabricSwitch inventory - per Vendor only Navigate to the following report node: All>>My Reports>> ViPR SRM Reporting class>>Module 06 >> Lab 10 – part 3 – Single Horizontal bar Paste the copied report. Rename that report to “b - FabricSwitch inventory - Vendor and Model” <u>Report Configuration:</u> Set Report Type to mixed reports
2	Select “[vendor]” report. <u>Report Configuration:</u> Set Report Type to “single horizontal bar”
3	Add a child report under “[vendor]” and name it “[model]” <u>Filtering & Expansion:</u> Set expansion to use property “model”
4	Select Formula tab, click Add a Formula. Browse the formula library and select “DistinctValueCountFormula (util)” formula. Set the parameters as follows: Settings to be set: - Filter: * (that is, the start character) - ExpandOn: device - Level-Up: 0 - Results Returned: Count (default result)

Step	Action
5	Return to Browse Mode and look at your resulting report. How different from bar chart is the report? _____
	Notes:

End of lab section
End of lab exercise

Lab 10: Part 4 – Timeratio Bar Reports

Purpose:	The purpose of this lab is to practice various possibilities in using TimeRatio bars report type. This lab part has two sections.
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Tasks:	In this lab, you will: • Set the report structure for TimeRatio bars report. • Experiment with different use cases for TimeRatio bars report.
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Part 4 – a: ESX Hosts CPU Utilization

Step	Action
0	Login to the portal with the provided username/password to the indicated class' ViPR SRM M&R portal.
1	Go to Edit Mode. Navigate to the following report node: All>>My Reports>> ViPR SRM Reporting class>>Module 06 Add a new report and give it the following name: "Lab 10 – part 4 – Timeratio bars"

Step	Action																																
2	Add a new report under Lab 10 – part 4 and give it the following name: “a - ESX hosts CPU utilization” <u>Filtering & Expansion:</u> Set the filter on the node as follows: <i>devtype=='Hypervisor' & name=='CurrentUtilization' & parttype=='Processor' & part=='System'</i> <u>Report Configuration:</u> Set Report Type to time ratio bars Default Duration: last 1 week Set Sampling Period to 1 hour Sampling Type to average <u>Report Details: Graph:</u> Define the following thresholds that will define the categories in time ratio bars report: <table><thead><tr><th>Threshold Type</th><th>Name</th><th>Value</th><th>Color *</th></tr></thead><tbody><tr><td>Custom</td><td>Low</td><td>-Infinity</td><td>Cyan</td></tr><tr><td>Normal</td><td>Normal</td><td>30.0</td><td>Green</td></tr><tr><td>Informational</td><td>Informational</td><td>45.0</td><td>Blue</td></tr><tr><td>Minor</td><td>Minor</td><td>55.0</td><td>Light Orange</td></tr><tr><td>Major</td><td>Major</td><td>70.0</td><td>Dark Orange</td></tr><tr><td>Custom</td><td>Heavy</td><td>90.0</td><td>Pink</td></tr><tr><td>Critical</td><td>Critical</td><td>Infinity</td><td>Red</td></tr></tbody></table> * You can choose color you want... just indicative in here.	Threshold Type	Name	Value	Color *	Custom	Low	-Infinity	Cyan	Normal	Normal	30.0	Green	Informational	Informational	45.0	Blue	Minor	Minor	55.0	Light Orange	Major	Major	70.0	Dark Orange	Custom	Heavy	90.0	Pink	Critical	Critical	Infinity	Red
Threshold Type	Name	Value	Color *																														
Custom	Low	-Infinity	Cyan																														
Normal	Normal	30.0	Green																														
Informational	Informational	45.0	Blue																														
Minor	Minor	55.0	Light Orange																														
Major	Major	70.0	Dark Orange																														
Custom	Heavy	90.0	Pink																														
Critical	Critical	Infinity	Red																														
3	Add a child report under “a - ESX hosts CPU utilization” and name it “[host]” <u>Filtering & Expansion:</u> Set expansion to use property “device”																																

End of lab section

Part 4 – b: IORate Analysis in Time

Step	Action
0	Login to the portal with the provided username/password to the indicated class' ViPR SRM M&R portal.
1	Go to Edit Mode. Navigate to the following report node: All>>My Reports>> ViPR SRM Reporting class>>Module 05 >> Lab 8 – part 9 [...]>> c – when did that occur Take a copy of that report. Paste it under the following: All>>My Reports>> ViPR SRM Reporting class>>Module 06>> Lab 10 – part 4 – Timeratio bars Rename that report to: “b - IORate analysis in time” <u>Report Configuration:</u> Set Report Type to “interactive table” Default Duration: last 1 week Set Sampling Period to 1 hour Sampling Type to average
2	Select “[array list]” report. <u>Report Configuration:</u> Set Report Type to “mixed reports”

Step	Action																								
3	Add a child report under “[array list]” and name it “Analysis of IORate” <u>Filtering & Expansion:</u> Set the filter as follows: <i>name=='IORate'</i> <u>Report Configuration:</u> Select Report Type: time ratio bars Default Duration: last 1 week Sampling Period: 1 hour Sampling Type: average <u>Report Details: Graph:</u> Define the following thresholds that will define the categories in time ratio bars report: <table><thead><tr><th>Threshold Type</th><th>Name</th><th>Value</th><th>Color</th></tr></thead><tbody><tr><td>Custom</td><td>Low usage</td><td>-Infinity</td><td>Cyan</td></tr><tr><td>Normal</td><td>Normal</td><td>500</td><td>Green</td></tr><tr><td>Minor</td><td>Minor</td><td>1000</td><td>Light Orange</td></tr><tr><td>Major</td><td>Major</td><td>2500</td><td>Dark Orange</td></tr><tr><td>Critical</td><td>Critical</td><td>5000</td><td>Red</td></tr></tbody></table>	Threshold Type	Name	Value	Color	Custom	Low usage	-Infinity	Cyan	Normal	Normal	500	Green	Minor	Minor	1000	Light Orange	Major	Major	2500	Dark Orange	Critical	Critical	5000	Red
Threshold Type	Name	Value	Color																						
Custom	Low usage	-Infinity	Cyan																						
Normal	Normal	500	Green																						
Minor	Minor	1000	Light Orange																						
Major	Major	2500	Dark Orange																						
Critical	Critical	5000	Red																						
4	Return to Browse Mode and look at your resulting report.																								

Lab Exercise 11: Advanced Report Types

Purpose:	The purpose of this lab is to practice various possibilities in using some advanced report types. This lab has three parts: • Part 1: Practice with Heatmap • Part 2: Practice with Treemap • Part 3: Practice with Geomap
Tasks:	In this lab, you will: • Set the report structure for some advanced report types. • Experiment different use cases for advanced report types.

Lab 11: Part 1 - HeatMap

Purpose:	The purpose of this lab is to practice a Heat Map report type.
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Tasks:	In this lab, you will: • Set the report structure for Heat Map report type.
---------------	--

Step	Action
0	Login to the portal with the provided username/password to the indicated class' ViPR SRM M&R portal.
1	Go to Edit Mode. Navigate to the following report node: All>>My Reports>> ViPR SRM Reporting class>>Module 06 Add a new report and give it the following name: "Lab 11 – part 1 – HeatMap"

2

Add a new report under Lab 11 – part 1 and give it the following name: “HeatMap - Cisco ports usage”

Filtering & Expansion:

Set the filter on the node as follows:

devtype=='FabricSwitch' & vstatus=='active' & devdesc='%Cisco%'

Report Configuration:

Set Report Type to **heat map**

Sampling Period: **1 hour**

Report Details: TopN Graph:

Order: **Alphanumeric**

Show grid: (checked)

Define the following thresholds that will define the categories in time ratio bars report:

Threshold Type	Name	Value	Color *
Normal	Normal	0.0	Green
Informational	Informational	0.5	Blue
Minor	Minor	0.75	Light Orange
Major	Major	1.0	Dark Orange
Critical	Critical	5.0	Red

* You can choose color you want... just indicative in here.

Tooltip Information: Additional Properties:

Property name	type	description
appli	Custom	Application
customer	Custom	Customer
bunit	Default	Business Unit
model	Default	Device model
ip	Default	Device IP address
location	Default	Device location

3	Add a child report under “HeatMap - Cisco ports usage” and name it “[device,part]” <u>Filtering & Expansion:</u> Set the filter on the node as follows: <i>iftype=='fibreChannel' & (!(part='sup-fc%' part='mgmt%'))</i> Use the filter of this node for: “expansion and selection” Set expansion to use properties “device” and “part”. “Device” property should be assigned to Group 1 and “part” to Group 2. <u>Report Configuration:</u> Report Type: simple chart
4	Select Formula tab, click Add a Formula. Browse the formula library and select “Nop (util)” formula. Set the parameters as follows: Parameter to Enter: Metric: Filter: "name=='CurrentUtilization'" Results Returned: CurrentUtilization (show in graph, default result)
5	Return in Browse Mode and look at your resulting report. What a white cell represents? _____ Hover the mouse over a colored cell. What’s the number showing up? _____ _____ How would you have a forecasted value of future 90th day? _____ _____

	Notes:

End of lab exercise

Lab 11: Part 2 –TreeMap

Purpose:	The purpose of this lab is to practice using a TreeMap report type. This lab part has four sections.
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Tasks:	In this lab, you will: • Set the report structure for TreeMap chart. • Experiment with different use cases for TreeMap report.
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Part 2 – a: TreeMap: Single Level Tree Map

Step	Action
0	Login to the portal with the provided username/password to the indicated class' ViPR SRM M&R portal.
1	Go to Edit Mode. Navigate to the following report node: All>>My Reports>> ViPR SRM Reporting class>>Module 06 Add a new report and give it the following name: "Lab 11 – part 2 – TreeMap"

Step	Action																
2	Add a new report under Lab 11 – part 2 and give it the following name: “a - Single level Tree map” <u>Filtering & Expansion:</u> Set the filter on the node as follows: <i>devtype=='VirtualMachine' & vstatus=='active'</i> <u>Report Configuration:</u> Set Report Type to treemap <u>Report Details: Treemap:</u> Number of Levels: 1 Size: Column Name: vCPU Size Selection: use a property column Property: nbcpu Filter to Apply: * (that is, the stat character = Everything) Color: Column Name: CPU Utilization Selected Value: use the filter below Filter to Apply: <i>parttype=='Processor' & part=='System' & name=='CurrentUtilization'</i> Time Management: Sampling: inherit from report Recover: all the values in the time range Temporal Aggregation: Average Value Settings: Thresholds Definition: <table><tr><th>Threshold Type</th><th>Name</th><th>Value</th><th>Color *</th></tr><tr><td>Normal</td><td>Normal</td><td>0.0</td><td>Green</td></tr><tr><td>Major</td><td>Major</td><td>15</td><td>Orange</td></tr><tr><td>Critical</td><td>Critical</td><td>30</td><td>Red</td></tr></table>	Threshold Type	Name	Value	Color *	Normal	Normal	0.0	Green	Major	Major	15	Orange	Critical	Critical	30	Red
Threshold Type	Name	Value	Color *														
Normal	Normal	0.0	Green														
Major	Major	15	Orange														
Critical	Critical	30	Red														

Step	Action									
2	Tooltip Information: Define the table columns as follows: <table><tr><th>Column Name</th><th>Column Type</th><th>attribute</th></tr><tr><td>Device description</td><td>Property</td><td>devdesc</td></tr><tr><td>Status</td><td>Property</td><td>state</td></tr></table>	Column Name	Column Type	attribute	Device description	Property	devdesc	Status	Property	state
Column Name	Column Type	attribute								
Device description	Property	devdesc								
Status	Property	state								
3	Add a child report under “a - Single level Tree map” and name it “[VM list]” <u>Filtering & Expansion:</u> Set expansion expression as follows (use “Switch to Input Field” button): <i>device,deviceid<type=hide></i>									
4	Return to Browse Mode .									

End of lab section

Part 2 – b: TreeMap: Double Level Tree Map

Step	Action
0	At this point, you could either work from the previous part 2a and modify or start as new. The above steps describes as a new lab. If you choose to re-purpose, you'll need to insert a report between "a – Single level Tree map" and "[VM list]".

Step	Action
1	Go to Edit Mode. Navigate to the following report node: All>>My Reports>> ViPR SRM Reporting class>>Module 06>> Lab 11 – part 2 - TreeMap Add a new report under Lab 10 and give it the following name: “b - Double level Tree map” <u>Filtering & Expansion:</u> Set the filter on the node as follows: <i>devtype=='VirtualMachine' & vstatus=='active'</i> <u>Report Configuration:</u> Set Report Type to treemap <u>Report Details: Treemap:</u> Number of Levels: 2 Size: Column Name: vCPU Size Selection: use a property column Property: nbcpu Filter to Apply: * (that is, the stat character = Everything) Color: Column Name: CPU Utilization Selected Value: use the filter below Filter to Apply: <i>parttype=='Processor' & part=='System' & name=='CurrentUtilization'</i> Time Management: Sampling: inherit from report Recover: all the values in the time range Temporal Aggregation: Average Value Settings: Thresholds Definition: <i>See definitions from part 1, step 2</i> Tooltip Information: <i>See definitions from part 1, step 2</i>
2	Add a child report under “b - Double level Tree map” and name it “[status]” <u>Filtering & Expansion:</u> Set expansion to use property “state”

Step	Action
3	Add a child report under “[status]” and name it “[VM list]” <u>Filtering & Expansion:</u> Set expansion expression as follows (use “Switch to Input Field” button): <i>device,deviceid<type=hide></i>
4	Return to Browse Mode .

End of lab section

Part 2 – c: Chargeback VDC - Tree Map

Step	Action
	This report is demonstrates the transformation of an already existing report into a more visual report. The final outcome of this treemap report tells you how much money a customer/business unit generates. The color is the footprint of such a VM, based on vCPU and Memory (in GB) allowed. The two metrics are multiplied together in order to give a magnitude to the footprint of resource taken.
1	Go to Edit Mode. Navigate to the following report node: All>>My Reports>> ViPR SRM Reporting class>>Module 05>> Lab 8 – part 11 - Challenge lab - Chargeback vCenter Take a copy of “Chargeback VDC – Drill down”. Past the report on the following report node: All>>My Reports>> ViPR SRM Reporting class>>Module 06>> Lab 11 – part 2 - TreeMap This report node has no filter set (i.e.: everything). Take a copy of the filter found on <u>Lab 8 - part 11</u> report node and place it on the recent copy of “Chargeback VDC – Drill down” report. Rename “Chargeback VDC – Drill-down” report to “c - Chargeback VDC – Treemap”

Step	Action
2	Unfold all levels of “c - Chargeback VDC – Treemap” report, down to the last linked report node, delete the link. Return back to: All>>My Reports>> ViPR SRM Reporting class>>Module 05>> Lab 8 – part 11 - Challenge lab - Chargeback vCenter>> Chargeback VDC - details Take a copy of the “[device]” report found under “Chargeback VDC - details”. Paste that report just under “[per Business Unit]” report: [...]>>Lab 11 – part 2 - TreeMap>>c - Chargeback VDC - Treemap>>[per Customer]>>[per Business Unit] Now, take a copy of the formulas on the original “Chargeback VDC –details” report, back onto [per Business Unit] report (in formula tab). Get rid of the Nop4 formula on [per Business Unit]. Return back to Browse Mode in order to confirm the content of the report is its actual form. Numbers in table should be the same as the original view per customer (count # of VM, \$ should match).
3	Go to Edit Mode. Now, there is one new formula that needs to be added. Unfold the Chargeback report structure and select [device] report. Under formula tab, add a “Multiplication (math)” formula. Set the parameters as follows: Parameters to Enter: First operand: Property: "nbcpu" Second operand: Filter: "name=='TotalMemory' & part=='System' & parttype=='Memory'" Settings to be Set: Scale: 0.0097656 (or 10/1024) Result Returned: CPUmemoryFootprint

Step	Action																																
4	Select top report, “c - Chargeback VDC – Treemap” report. Let’s now configure that Treemap: <u>Report Configuration:</u> Set Report Type to treemap <u>Report Details: Treemap:</u> Number of Levels: 3 Size: Column Name: VM Total Cost (\$) Size Selection: use a value column Selected Value: VMTotalCost Color: Column Name: Footprint value Selected Value: CPUMemoryFootprint Use time settings from: this column Time Management: Sampling: average Recover: the last value only Time Threshold: 3600 Value Settings: Thresholds Definition: <table><tr><th>Threshold Type</th><th>Name</th><th>Value</th><th>Color</th></tr><tr><td>Custom</td><td>tiny</td><td>0</td><td>Ice blue</td></tr><tr><td>Custom</td><td>minimal</td><td>2</td><td>Light blue</td></tr><tr><td>Custom</td><td>low</td><td>4</td><td>Light green</td></tr><tr><td>Normal</td><td>Normal</td><td>8</td><td>Green</td></tr><tr><td>Custom</td><td>Medium</td><td>32</td><td>Orange</td></tr><tr><td>Custom</td><td>Large</td><td>96</td><td>Dark Orange</td></tr><tr><td>Custom</td><td>Huge</td><td>128</td><td>Red</td></tr></table>	Threshold Type	Name	Value	Color	Custom	tiny	0	Ice blue	Custom	minimal	2	Light blue	Custom	low	4	Light green	Normal	Normal	8	Green	Custom	Medium	32	Orange	Custom	Large	96	Dark Orange	Custom	Huge	128	Red
Threshold Type	Name	Value	Color																														
Custom	tiny	0	Ice blue																														
Custom	minimal	2	Light blue																														
Custom	low	4	Light green																														
Normal	Normal	8	Green																														
Custom	Medium	32	Orange																														
Custom	Large	96	Dark Orange																														
Custom	Huge	128	Red																														

Step	Action																					
5	Tooltip Information: Define the table columns as follows: <table><tr><th>Column Name</th><th>Column Type</th><th>attribute</th></tr><tr><td>Customer</td><td>Property</td><td>customer</td></tr><tr><td>Business Unit</td><td>Property</td><td>bunit</td></tr><tr><td>Nb CPU</td><td>Property</td><td>nbcpu</td></tr></table> Plus the 2 following value columns: <table><tr><th>Column Name</th><th>Metric</th><th>Details</th></tr><tr><td>Memory (GB)</td><td>name=='TotalMemory' & part=='System' & parttype=='Memory'</td><td>Time Management: real-time; recover “the last values only” Value Settings: Use Rounding: 2 decimals Scaling Mode: divide by 1024</td></tr><tr><td>Used Space (GB – 95th percentile)</td><td>Selected value: UsedSpace95th</td><td>Time Management: 1-hour, recover “the last value only”</td></tr></table>	Column Name	Column Type	attribute	Customer	Property	customer	Business Unit	Property	bunit	Nb CPU	Property	nbcpu	Column Name	Metric	Details	Memory (GB)	name=='TotalMemory' & part=='System' & parttype=='Memory'	Time Management: real-time; recover “the last values only” Value Settings: Use Rounding: 2 decimals Scaling Mode: divide by 1024	Used Space (GB – 95 th percentile)	Selected value: UsedSpace95th	Time Management: 1-hour, recover “the last value only”
Column Name	Column Type	attribute																				
Customer	Property	customer																				
Business Unit	Property	bunit																				
Nb CPU	Property	nbcpu																				
Column Name	Metric	Details																				
Memory (GB)	name=='TotalMemory' & part=='System' & parttype=='Memory'	Time Management: real-time; recover “the last values only” Value Settings: Use Rounding: 2 decimals Scaling Mode: divide by 1024																				
Used Space (GB – 95 th percentile)	Selected value: UsedSpace95th	Time Management: 1-hour, recover “the last value only”																				
6	Return to Browse Mode and look at your resulting report.																					

End of lab section

Part 2 – d: Extra - VNX Array - Disk Empty Slots

Step	Action
0	This final work with TreeMap is a derivation of the type of report. We will try to use TreeMap to show disk empty slots of a VNX array. The VNX data collection provides a CurrentUtilization metric with information about the status of a disk slot in the array. We will make use of that information in order to map the array. Be aware this report makes use of some advanced property manipulation (regex and replacement) using complex expansion.
1	Go to Edit Mode. Navigate to the following report node: All>>My Reports>> ViPR SRM Reporting class>>Module 06>>Lab 11 – part 2 - TreeMap Add a new report under Lab 11 – part 2 and give it the following name: “d - Extra - VNX Array - disk empty slots” <u>Filtering & Expansion:</u> Set the filter on the node as follows: <pre>devtype=='Array' & parttype=='Disk' & model='VNX%' & (name=='Availability' name=='Capacity')</pre> <u>Report Configuration:</u> Set Report Type to list Sampling Period: 1 hour

Step	Action
2	Add a child report under “d - Extra - VNX Array - disk empty slots” and name it “[per array]” <u>Filtering & Expansion:</u> Set expansion to use property “device” <u>Report Configuration:</u> Report Type: treemap Sampling Period: 1 hour <u>Report Details:</u> Set Report Type: Treemap Note: We will get back to the configuration once the required formula values are set.
3	Add a child report under “[per array]” and name it “[per bus]” <u>Filtering & Expansion:</u> Set expansion expression as follows (switch to input field): <i>part<type=regex;value-match=^\\s*Bus\\s*(.+)\\s*Enclosure\\s*(.+)\\s*Disk\\s*(.+);value-replace=Bus \$1></i> This complex expansion makes use of “part” property value that is decomposed in bus, enclosure, and disk numbers. At each level, we recover the appropriate value of entity (bus, enclosure, or disk). The expression is always the same, except for the final <i>value-replace</i> expression. So you can cut and paste expression from report node to report node and adjust according to the context of the report.
4	Add a child report under “[per bus]” and name it “[per enclosure]” <u>Filtering & Expansion:</u> Set expansion expression as follows (switch to input field): <i>part<type=regex;value-match=^\\s*Bus\\s*(.+)\\s*Enclosure\\s*(.+)\\s*Disk\\s*(.+);value-replace=Enclosure \$2></i>

Step	Action
5	Add a child report under “[per enclosure]” and name it “[per disk]” <u>Filtering & Expansion:</u> Set expansion expression as follows (switch to input field): <i>part<type=regex;value-match=^\\s*Bus\\s*(.+)\\s*Enclosure\\s*(.+)\\s*Disk\\s*(.+)\\s*;value-replace=\$3></i> <u>Report Configuration:</u> Report Type: simple chart
6	Select Formula tab, click Add a Formula. Browse the formula library and select “Nop (util)” formula. Set the parameters as follows: Parameter to Enter: Metric: Constant: "1.0" Results Returned: Constant5
7	Select Formula tab, click Add a Formula. Browse the formula library and select “SimpleConditionalValue (util)” formula. Set the parameters as follows: Parameter to Enter: Indicator: Filter: "name=='Availability'" Settings to be Set: Operator: '=' (that is: single quote, equal sign, and single quote) Value: 2 Result Returned: DiskEmpty

Step	Action																																	
8	Now back to Treemap definition, on “[per array]” report: <u>Report Details: Treemap:</u> Number of Levels: 3 Size: Column Name: Constant Size Selection: use a value column Selected Value: Constant5 Use time settings from: this column Color: Column Name: Empty Slot? Selected Value: DiskEmpty Use time settings from: this column Time Management: Sampling: inherit from report Recover: the last value only Time Threshold: 3600 Value Settings: Thresholds Definition: <table><thead><tr><th>Threshold Type</th><th>Name</th><th>Value</th><th>Color</th></tr></thead><tbody><tr><td>Custom</td><td>Busy Slot</td><td>0</td><td>Green</td></tr><tr><td>Custom</td><td>Empty Slot</td><td>1</td><td>Red</td></tr></tbody></table> Tooltip Information: Define the table columns as follows: <table><thead><tr><th>Column Name</th><th>Column Type</th><th>attribute</th></tr></thead><tbody><tr><td>Disk Manufacturer</td><td>Property</td><td>partdesc</td></tr><tr><td>Disk Size</td><td>Property</td><td>disksize</td></tr><tr><td>Disk RPM</td><td>Property</td><td>diskrpm</td></tr><tr><td>Disk type</td><td>Property</td><td>disktype</td></tr><tr><td>Disk model</td><td>Property</td><td>partmdl</td></tr><tr><td>Disk Serial Number</td><td>Property</td><td>partsn</td></tr></tbody></table>	Threshold Type	Name	Value	Color	Custom	Busy Slot	0	Green	Custom	Empty Slot	1	Red	Column Name	Column Type	attribute	Disk Manufacturer	Property	partdesc	Disk Size	Property	disksize	Disk RPM	Property	diskrpm	Disk type	Property	disktype	Disk model	Property	partmdl	Disk Serial Number	Property	partsn
Threshold Type	Name	Value	Color																															
Custom	Busy Slot	0	Green																															
Custom	Empty Slot	1	Red																															
Column Name	Column Type	attribute																																
Disk Manufacturer	Property	partdesc																																
Disk Size	Property	disksize																																
Disk RPM	Property	diskrpm																																
Disk type	Property	disktype																																
Disk model	Property	partmdl																																
Disk Serial Number	Property	partsn																																

Lab 11: Part 3 - GeoMap Report

Purpose:	The purpose of this lab is to practice Geomap report types.
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Tasks:	In this lab, you will: • Set the report structure for a Geomap report. • Experiment with use cases for a Goma report.
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Step	Action
0	Login to the portal with the provided username/password to the indicated class' ViPR SRM M&R portal.
1	Go to Edit Mode. Navigate to the following report node: All>>My Reports>> ViPR SRM Reporting class>>Module 06 Add a new report and give it the following name: "Lab 11- part 3 - GeoMap"

2

Add a new report under Lab 11- part 3 and give it the following name: “Geomap - Array location, size and count”

Filtering & Expansion:

Set the filter on the node as follows:

devtype=='Array'

Report Configuration:

Set Report Type to **standard table**

(we will start our work with standard table and then move to Geomap).

Report Details: Table:

Define the first column as follows:

Column Name	Column Type	attribute
Location	Attribute	Node name
Customer	Property	customer

Add the following value type columns:

Column Name	Filtered metric	Details
Total Raw Capacity	[everything] (we’ll pick a formula result later...)	Time Management: Sampling Period: 1 hour ; Sampling Type: average; Recover “the last values only”; Time Threshold: 2 periods Value Settings: Scaling Mode: by unit (see below)
Device count	[same as above]	Time Management: [same as above] Value Settings: Thresholds (see below)
Total Disk	[same as above]	Time Management: [same as above]

3	Total Raw Capacity , by unit Scaling Mode definition: <table><tr><th></th><th>From:</th><th>To:</th></tr><tr><td>Unit Type</td><td>[Volume] Byte</td><td>Byte</td></tr><tr><td>Unit</td><td>[Classic] GB</td><td>[Classic] Auto</td></tr></table> Device count Thresholds definitions: <table><tr><th>Threshold Type</th><th>Name</th><th>Value</th><th>Color *</th></tr><tr><td>Normal</td><td>Normal</td><td>1</td><td>Green</td></tr><tr><td>Major</td><td>Major</td><td>3</td><td>Orange</td></tr><tr><td>Critical</td><td>Critical</td><td>4</td><td>Red</td></tr></table>		From:	To:	Unit Type	[Volume] Byte	Byte	Unit	[Classic] GB	[Classic] Auto	Threshold Type	Name	Value	Color *	Normal	Normal	1	Green	Major	Major	3	Orange	Critical	Critical	4	Red
	From:	To:																								
Unit Type	[Volume] Byte	Byte																								
Unit	[Classic] GB	[Classic] Auto																								
Threshold Type	Name	Value	Color *																							
Normal	Normal	1	Green																							
Major	Major	3	Orange																							
Critical	Critical	4	Red																							
4	Add a child report under “Geomap - Array location, size and count” and name it “[location]” <u>Filtering & Expansion:</u> Set expansion to use property “location”																									
5	Add a child report under “[location]” and name it “[device]” <u>Filtering & Expansion:</u> Set expansion to use property “device”																									
6	Select Formula tab, click Add a Formula. Browse the formula library and select “Nop (util)” formula. Set the parameters as follows: Parameter to Enter: Metric: Filter: "name=='RawCapacity' & !(parttype)" Results Returned: RawCap																									
7	Click Add a Formula. Browse the formula library and select “Nop (util)” formula. Set the parameters as follows: Parameter to Enter: Metric: Filter: "name=='TotalDisk' & !(parttype)" Results Returned: TotalDisk																									

8	Move up one report node, to “[location]” level. Select Formula tab, click Add a Formula. Browse the formula library and select “Sum (math.spatial)” formula. Set the parameters as follows: Parameter to Enter: Metric: Result on a child node: "RawCap" Results Returned: TotalRawCapacity								
9	Click Add a Formula. Browse the formula library and select “Sum (math.spatial)” formula. Set the parameters as follows: Parameter to Enter: Metric: Result on a child node: "TotalDisk" Results Returned: TotalDisk								
10	Click Add a Formula. Browse the formula library and select “ChildCount (util)” formula. Set the parameters as follows: Results Returned: Number of Arrays								
11	Let’s now put that result back into the table report. Move up one report node, to “Geomap - Array location, size, and count” level. <u>Report Details: Table</u> Revisit the table column definition, as follows (details removed for clarity purposes): <table border="1"> <thead> <tr> <th>Column Name</th><th>Metric</th></tr> </thead> <tbody> <tr> <td>Total Raw Capacity</td><td>Selected Value: TotalRawCapacity</td></tr> <tr> <td>Device count</td><td>Selected Value: Number of Arrays</td></tr> <tr> <td>Total Disk</td><td>Selected Value: TotalDisk</td></tr> </tbody> </table>	Column Name	Metric	Total Raw Capacity	Selected Value: TotalRawCapacity	Device count	Selected Value: Number of Arrays	Total Disk	Selected Value: TotalDisk
Column Name	Metric								
Total Raw Capacity	Selected Value: TotalRawCapacity								
Device count	Selected Value: Number of Arrays								
Total Disk	Selected Value: TotalDisk								
12	Return to Browse Mode. Make sure the table report populates and the numbers are correct.								

Lab Exercise 12: ReportPack Creation

Purpose:	The purpose of this lab is to practice ReportPack creation.
Tasks:	In this lab, you will: • Create template report. • Create a ReportPack. • Export ReportPack.

Lab 12: Part 1 - ReportPack Creation

Step	Action
0	In order to be able to perform some important steps of this lab, you will have to use an administrator login. Please refer to your Instructor in order to obtain your privileged username/password (adminXY).
1	In Browse Mode , select the main report entry, containing all your labs, under My Report. It should be: All>>My Reports>>ViPR SRM Reporting class
2	Go to Edit Mode . From Exports menu, select Report Template. This should save an xml file with the name of the report plus "Template" (ViPR SRM Reporting class Template.xml)
3	Logout from the portal as student user. Login again, as administrator user, credentials provided by your Instructor.
4	Click Administration menu, on top. Locate menu item "List / Import ReportPacks" under "ReportPacks" section of the Administration panel.
5	Click " New ReportPack " button.
6	Enter a name for the ReportPack you are about to create. Beware that you are not alone working on this server. Make sure the name you give to this new ReportPack is unique. Append with your student name in front of it. You can optionally fill in Version and a Description. When completed, click " Save "

Step	Action
7	Locate and click on your newly created ReportPack. The page should bring you back to the ReportPack editing page with additional buttons.
8	Click on “New Template” button. Fill in information about the template you are about to create: Template Name. Optionally, Version and a Description. Next to Tree Template, click “Choose File” button.
9	From the file selection box, locate and select the template file you exported from step 2 above. There is a good chance that the file is located in a Download directory. When completed, click Save.
10	Click “Hook to Another Node” button in order to define where this template should show up in the report tree. For now, select “inside the node ‘[your report pack name]’, under the root node”. When completed, click “Save” button.
11	Return back to User Mode, hit the top button “User Interface”
12	Locate your ReportPack on the navigation tree. Make sure the template you join is there.
13	Logout from the administrator user. Login back again as student. Do you see your ReportPack? _____ Note: if you don’t see the Report Pack, the cause might be the wrong role assignation. This will require help from you instructor to allow your student role to see newly created ReportPacks. With a production system, it is up to the SRM site administrator to set these permissions.

