

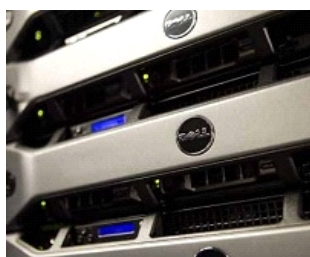


The power to do more



Dell Performance Analysis Collection Kit

For Fylkesmannen i Oslo og Akershus

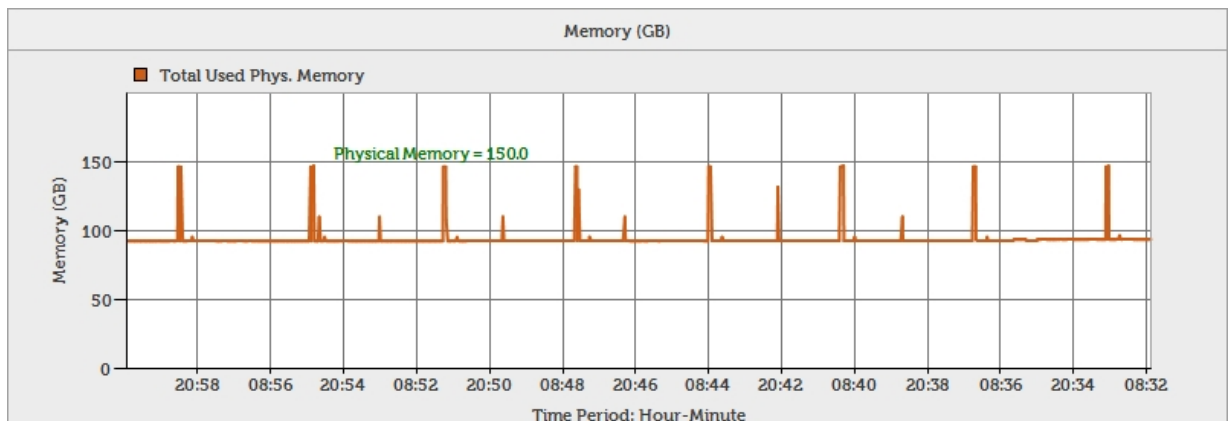
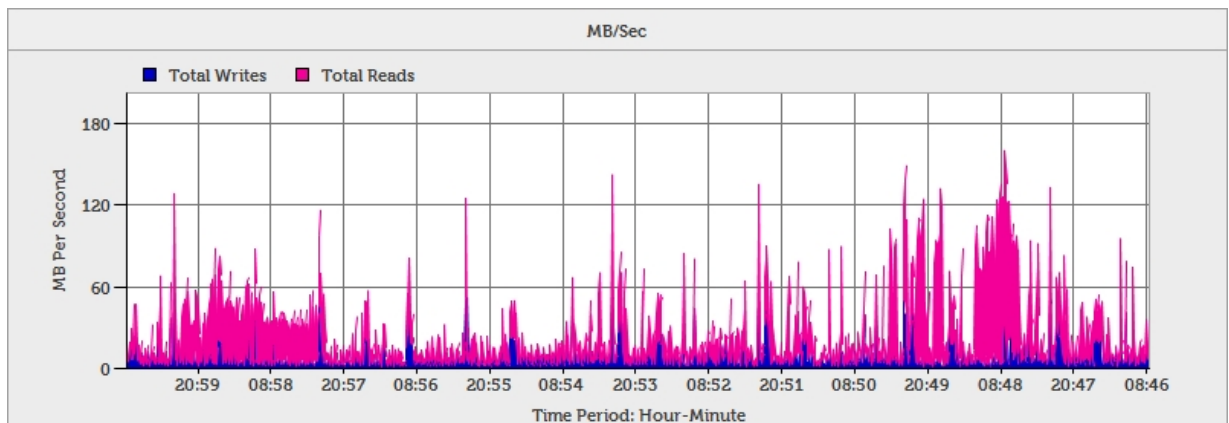
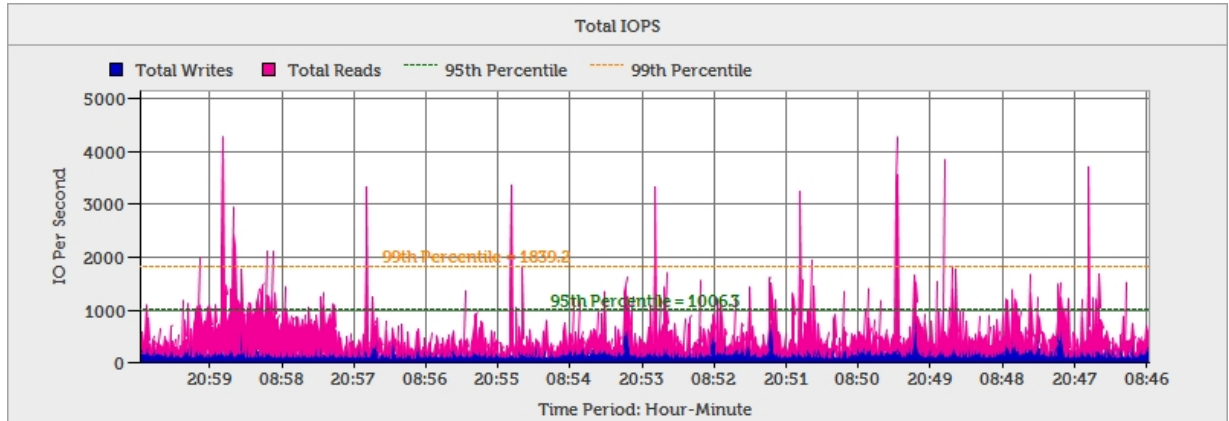


The overview of this document is to understand the storage need of Fylkesmannen i Oslo og Akershus with regard to the number of servers, server work load and server capacity. The data depicted in this report will be used to make recommendations on what type of configuration will be required to support the workload and capacity of the servers that are being considered for the solution.

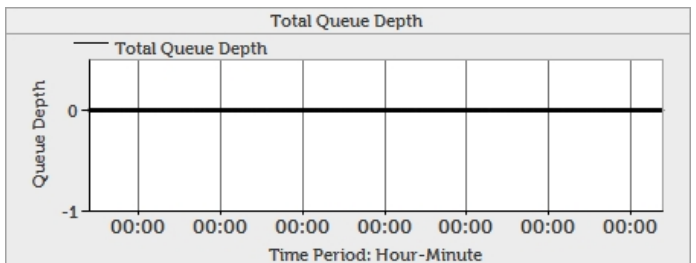
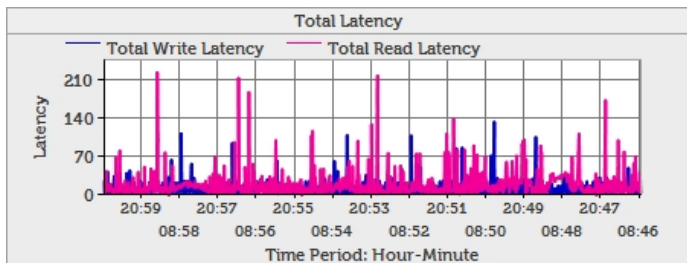
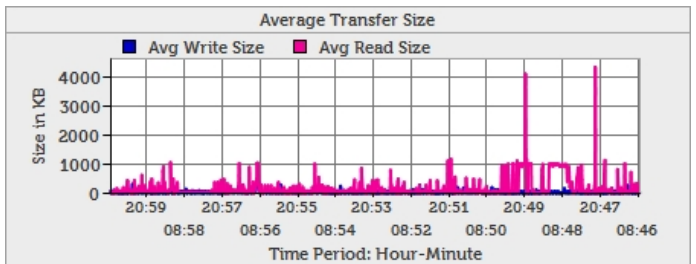
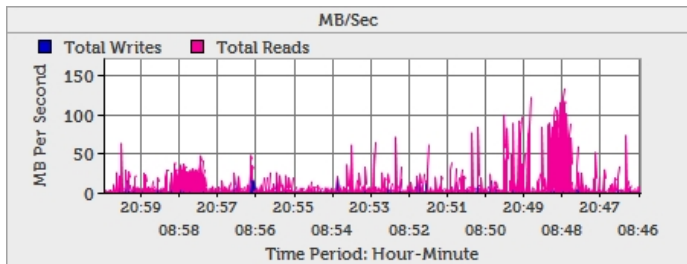
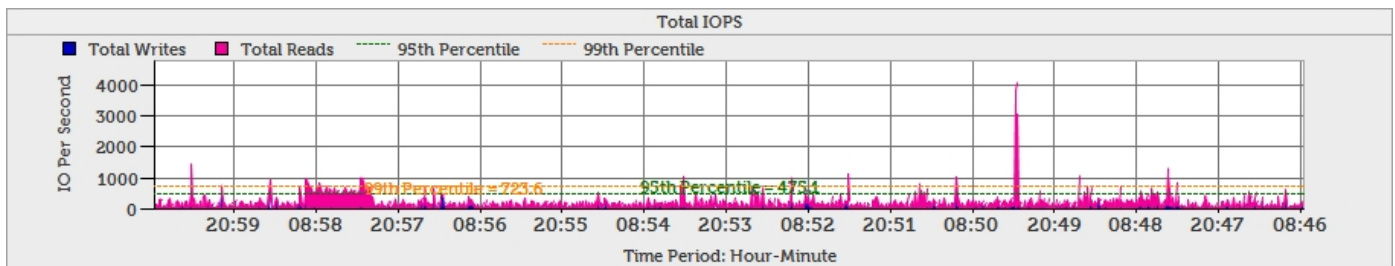


Dell will be able to identify the Peak IO's, 95% and 99% capacity marks over several days to ensure that the solution addresses the key pain points within your environment.

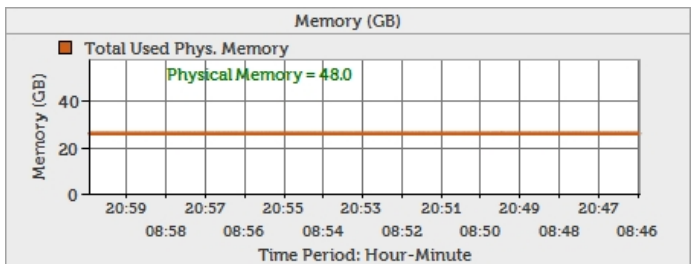
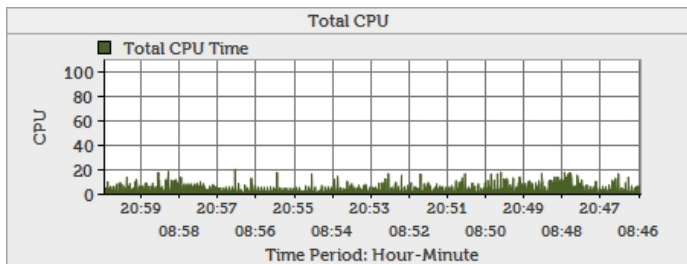
Aggregate Output	
Time Recorded	6 Day(s) 23 Hour(s) 58 Minute(s), 9/14/2012 - 9/21/2012
Servers Recorded	5
Output Summary:	
Throughput	160.4
IOPS	1006.3 at 95%, 1839.2 at 99% and 4280.1 at peak
Read/Write Ratio	82% and 18%
Total Capacity:	14250.2 GBs
Free Capacity	6220.3 GBs Free
Used Capacity	8029.9 GBs Used
Total Cores	42
Total Processors	9



Individual Server Report:fmoaesx03.fmo.no			
Host Operating System:		VMware ESX 4.1.0 build-348481	
Time Recorded		6 Day(s) 23 Hour(s) 58 Minute(s), 9/14/2012 - 9/21/2012	
Collector Version:		1.4.0.272643	
Output Summary:		Output Summary:	
Throughput	130.4	Average IO size	Read:57.3 KB / Write:34.4 KB
IOPS	475.1 at 95%, 723.6 at 99% and 4080.4 at peak	Latency	223.0 ms Reads and 132.6 ms Writes
Read/Write Ratio	90% / 10%	Peak Queue Depth	0.0
Total Capacity:	66.5 GBs	Peak/Min CPU	21% / 1%
Free Capacity	45.8 GBs Free	Peak/Min Memory	21.6 GB / 21.6 GB
Used Capacity	20.7 GBs Used	Peak/Min Memory In Use	26.4 GB / 26.4 GB
		Host Memory Reservation	46.9 GB
Sockets:	Cores:	Description:	
2	12	3,10 GHz	



Information Related to the Server



Summary:

Server Name	95% IOPS	99% IOPS	Peak IOPS	Total MB/s	Local Capacity	Local Capacity Used	Shared Storage
fmoaesx03.fmoa.no	475.1	723.6	4080.4	130.4	66.5 GBs	20.7 GBs	11.0 TBs

Local Device Data:

Device Name	Capacity	Capacity Free	MB/s at Peak	95% IOPS	99% IOPS	Peak IOPS	Read/Write Ratio	Avg IO Size	Read Latency	Write Latency	Peak Queue Depth
fmoaesx03_local	66.5 GBs	45.8 GBs	3.7	24.3	32.3	199.5	19%/81%	6.7 KB/27.6 KB	19.0 ms	19.7 ms	0.0

Shared Device Data:

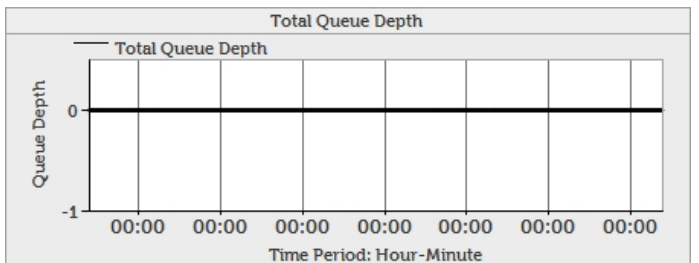
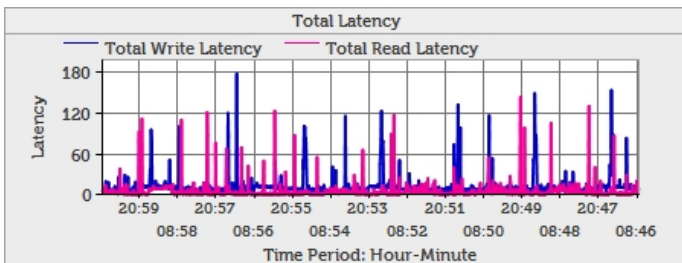
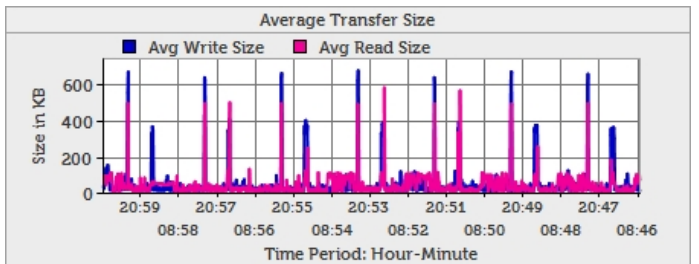
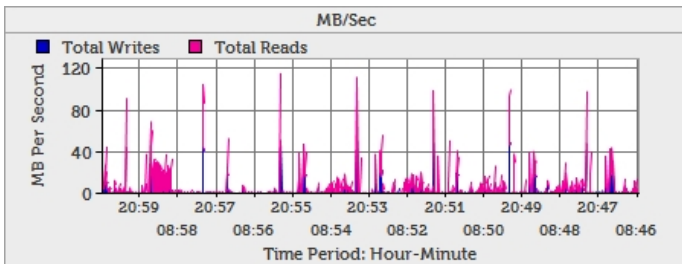
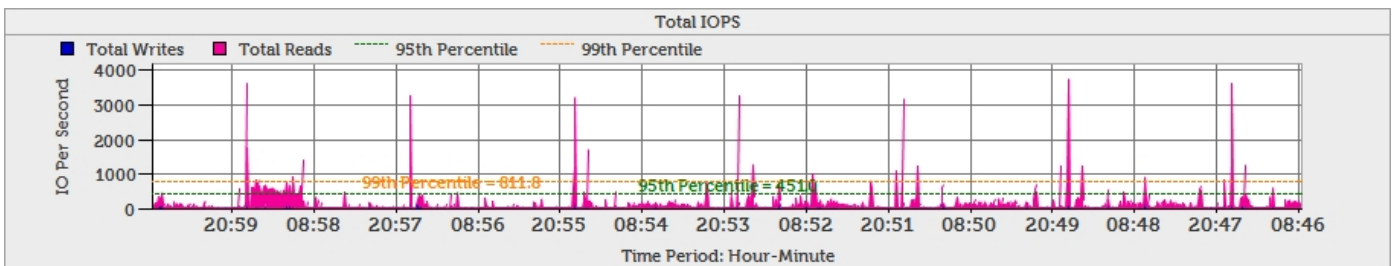
Device Name	Capacity	Capacity Free	MB/s at Peak	95% IOPS	99% IOPS	Peak IOPS	Read/Write Ratio	Avg IO Size	Read Latency	Write Latency	Peak Queue Depth
Fibre Channel Disk (naa.60060160d9e01a00f612b47aa8cddc11)	50.0 GBs	0.0 GBs	0.0	0.0	0.0	0.0	0%/100%	0.0 KB/0.0 KB	0.0 ms	0.0 ms	0.0
Fibre Channel Disk (naa.60060160d9e01a00c2ff0a5922cbbdb11)	319.2 GBs	0.0 GBs	0.0	0.0	0.0	0.0	0%/100%	0.0 KB/0.0 KB	0.0 ms	0.0 ms	0.0
Fibre Channel Disk (naa.60060160d9e01a00f2778907c0d4dc11)	200.0 GBs	0.0 GBs	0.0	0.0	0.0	0.0	0%/100%	0.0 KB/0.0 KB	0.0 ms	0.0 ms	0.0
1	1023.8 GBs	279.4 GBs	89.7	65.2	90.2	315.5	92%/8%	597.4 KB/14.0 KB	178.0 ms	637.3 ms	0.0
(1)	1073.3 GBs	166.5 GBs	83.7	68.3	81.7	83.0	100%/0%	994.3 KB/0.0 KB	42.5 ms	0.0 ms	0.0
iSCSI-ekstra	1374.8 GBs	809.4 GBs	32.7	181.0	262.0	634.0	85%/15%	37.9 KB/65.6 KB	217.0 ms	104.0 ms	0.0
LUN	1023.8 GBs	409.7 GBs	121.3	95.6	258.2	4026.0	92%/8%	147.2 KB/65.1 KB	446.9 ms	215.3 ms	0.0
Bruker_h_omr	804.8 GBs	0.2 GBs	67.5	436.2	490.7	656.7	100%/0%	52.6 KB/7.1 KB	73.4 ms	140.0 ms	0.0
2 15K	336.0 GBs	126.7 GBs	93.0	52.0	99.7	264.8	40%/60%	105.1 KB/19.3 KB	223.0 ms	389.0 ms	0.0
3 15K	399.8 GBs	101.3 GBs	87.7	19.2	82.8	408.1	55%/45%	100.3 KB/18.8 KB	214.0 ms	321.0 ms	0.0
iSCSI-templates-iso	1999.8 GBs	1713.5 GBs	0.6	6.0	6.0	6.0	100%/0%	103.0 KB/0.0 KB	6.0 ms	0.0 ms	0.0
iSCSI-TDS-backup	2024.8 GBs	1742.9 GBs	0.3	5.0	5.0	5.0	100%/0%	62.2 KB/0.0 KB	6.0 ms	0.0 ms	0.0
4	386.0 GBs	89.3 GBs	53.2	55.5	365.8	689.0	92%/8%	56.4 KB/29.0 KB	187.0 ms	165.8 ms	0.0
og ISO	199.8 GBs	105.5 GBs	99.2	49.7	93.2	106.5	100%/0%	660.2 KB/0.0 KB	27.8 ms	0.0 ms	0.0
VeeamBackup_FMOAVEEAM01	49.9 GBs	33.7 GBs	0.0	0.0	0.0	0.0	0%/100%	0.0 KB/0.0 KB	0.0 ms	0.0 ms	0.0



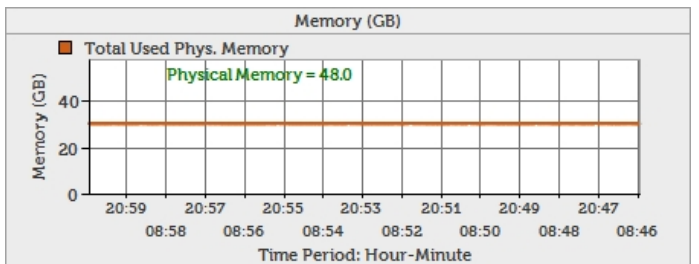
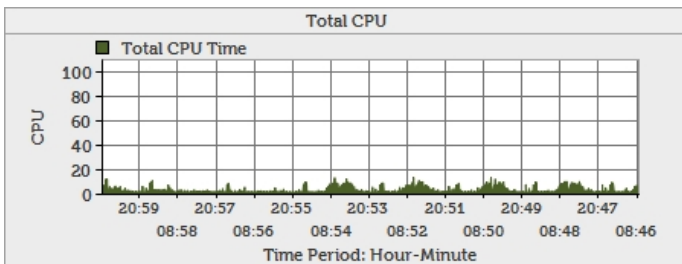
Individual Server Report:fmoaesx01.fmo.no

Host Operating System:	VMware ESX 4.1.0 build-348481
Time Recorded	6 Day(s) 23 Hour(s) 58 Minute(s), 9/14/2012 - 9/21/2012
Collector Version:	1.4.0.272643

Output Summary:		Output Summary:	
Throughput	106.2	Average IO size	Read:47.8 KB / Write:72.6 KB
IOPS	451.0 at 95%, 811.8 at 99% and 3609.8 at peak	Latency	144.0 ms Reads and 178.4 ms Writes
Read/Write Ratio	91% / 9%	Peak Queue Depth	0.0
Total Capacity:	66.5 GBs	Peak/Min CPU	14% / 2%
Free Capacity	45.8 GBs Free	Peak/Min Memory	17.4 GB / 17.3 GB
Used Capacity	20.7 GBs Used	Peak/Min Memory In Use	30.7 GB / 30.6 GB
		Host Memory Reservation	46.9 GB
Sockets:	Cores:	Description:	
2	12	3,10 GHz	



Information Related to the Server



Summary:

Server Name	95% IOPS	99% IOPS	Peak IOPS	Total MB/s	Local Capacity	Local Capacity Used	Shared Storage
fmoaesx01.fmoa.no	451.0	811.8	3609.8	106.2	66.5 GBs	20.7 GBs	11.0 TBs

Local Device Data:

Device Name	Capacity	Capacity Free	MB/s at Peak	95% IOPS	99% IOPS	Peak IOPS	Read/Write Ratio	Avg IO Size	Read Latency	Write Latency	Peak Queue Depth
fmoaesx01_local	66.5 GBs	45.8 GBs	2.3	20.7	29.2	335.8	27%/73%	7.4 KB/36.8 KB	8.0 ms	23.7 ms	0.0

Shared Device Data:

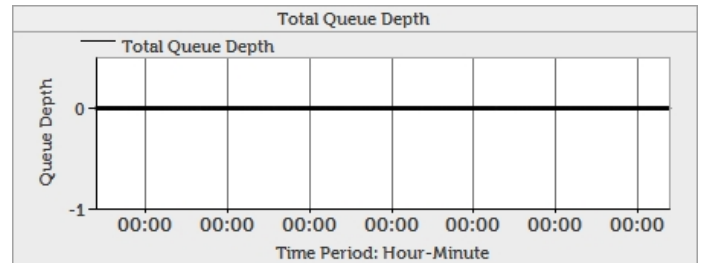
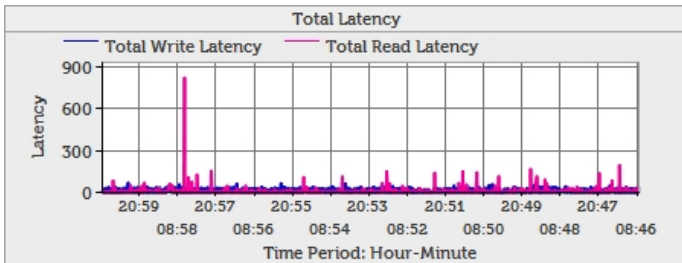
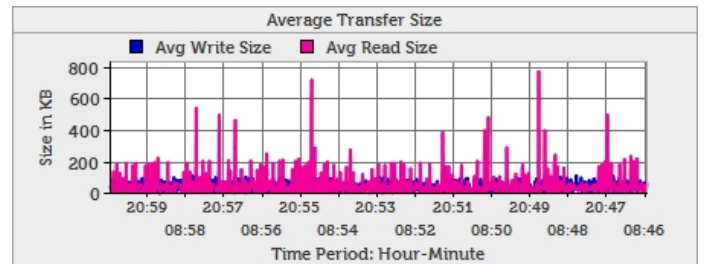
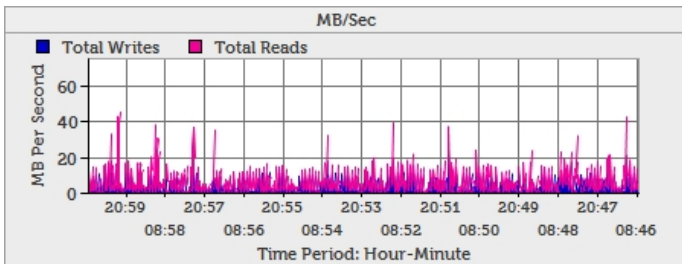
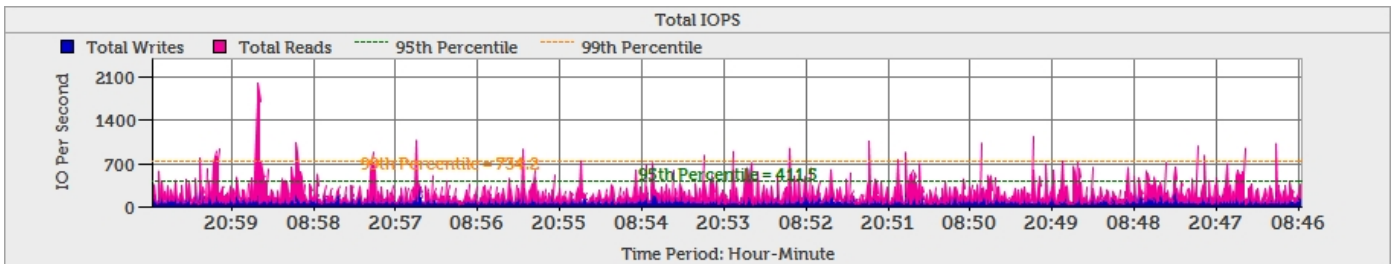
Device Name	Capacity	Capacity Free	MB/s at Peak	95% IOPS	99% IOPS	Peak IOPS	Read/Write Ratio	Avg IO Size	Read Latency	Write Latency	Peak Queue Depth
Fibre Channel Disk (naa.60060160d9e01a00f612b47aa8cddc11)	50.0 GBs	0.0 GBs	0.0	0.0	0.0	0.0	0%/100%	0.0 KB/0.0 KB	0.0 ms	0.0 ms	0.0
Fibre Channel Disk (naa.60060160d9e01a00c2ff0a5922cbbdb11)	319.2 GBs	0.0 GBs	0.0	0.0	0.0	0.0	0%/100%	0.0 KB/0.0 KB	0.0 ms	0.0 ms	0.0
Fibre Channel Disk (naa.60060160d9e01a00f2778907c0d4dc11)	200.0 GBs	0.0 GBs	0.0	0.0	0.0	0.0	0%/100%	0.0 KB/0.0 KB	0.0 ms	0.0 ms	0.0
1	1023.8 GBs	279.4 GBs	38.9	45.8	227.5	474.7	72%/28%	41.8 KB/153.0 KB	207.0 ms	336.8 ms	0.0
3 15K	399.8 GBs	101.3 GBs	64.3	116.4	476.9	3553.2	95%/5%	85.2 KB/32.9 KB	79.3 ms	205.5 ms	0.0
4	386.0 GBs	89.3 GBs	0.0	0.0	0.0	0.0	0%/100%	0.0 KB/0.0 KB	0.0 ms	0.0 ms	0.0
og ISO	199.8 GBs	105.5 GBs	0.0	0.0	0.0	0.0	0%/100%	0.0 KB/0.0 KB	0.0 ms	0.0 ms	0.0
(1)	1073.3 GBs	166.5 GBs	32.8	475.5	553.3	657.0	99%/1%	51.0 KB/7.7 KB	129.0 ms	98.7 ms	0.0
Bruker_h_omr	804.8 GBs	0.2 GBs	0.0	0.0	0.0	0.0	0%/100%	0.0 KB/0.0 KB	0.0 ms	0.0 ms	0.0
iSCSI-templates-iso	1999.8 GBs	1713.5 GBs	0.0	0.0	0.0	0.0	0%/100%	0.0 KB/0.0 KB	0.0 ms	0.0 ms	0.0
iSCSI-ekstra	1374.8 GBs	809.4 GBs	10.4	145.2	166.7	166.7	0%/100%	0.0 KB/63.8 KB	0.0 ms	6.0 ms	0.0
iSCSI-TDS-backup	2024.8 GBs	1742.9 GBs	0.0	0.0	0.0	0.0	0%/100%	0.0 KB/0.0 KB	0.0 ms	0.0 ms	0.0
2 15K	336.0 GBs	126.7 GBs	0.0	0.0	0.0	0.0	0%/100%	0.0 KB/0.0 KB	0.0 ms	0.0 ms	0.0
LUN	1023.8 GBs	409.7 GBs	50.7	11.2	378.5	1568.3	87%/13%	17.7 KB/100.1 KB	180.0 ms	204.9 ms	0.0
VeeamBackup_FMOAVEEAM01	49.9 GBs	33.7 GBs	0.0	0.0	0.0	0.0	0%/100%	0.0 KB/0.0 KB	0.0 ms	0.0 ms	0.0



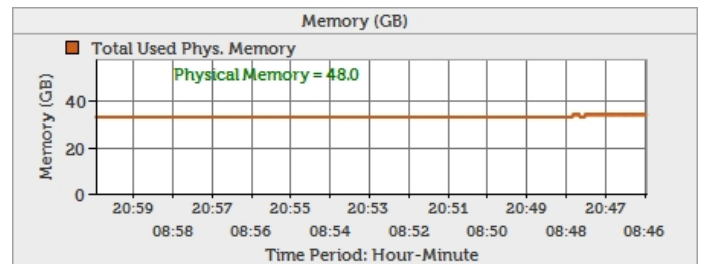
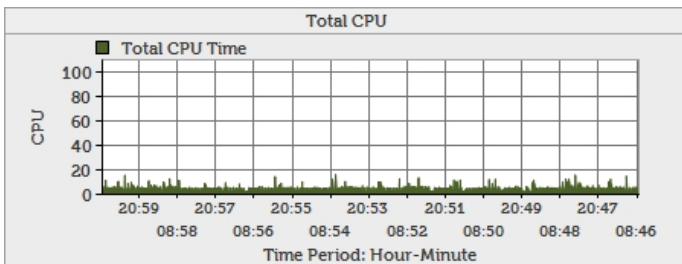
Individual Server Report:fmoaesx02.fmo.no

Host Operating System:	VMware ESX 4.1.0 build-348481
Time Recorded	6 Day(s) 23 Hour(s) 58 Minute(s), 9/14/2012 - 9/21/2012
Collector Version:	1.4.0.272643

Output Summary:		Output Summary:	
Throughput	48.0	Average IO size	Read:27.2 KB / Write:34.0 KB
IOPS	411.5 at 95%, 730.2 at 99% and 2001.9 at peak	Latency	822.6 ms Reads and 70.0 ms Writes
Read/Write Ratio	78% / 22%	Peak Queue Depth	0.0
Total Capacity:	66.5 GBs	Peak/Min CPU	16% / 1%
Free Capacity	45.8 GBs Free	Peak/Min Memory	14.6 GB / 13.6 GB
Used Capacity	20.7 GBs Used	Peak/Min Memory In Use	34.4 GB / 33.4 GB
		Host Memory Reservation	46.9 GB
Sockets:	Cores:	Description:	
2	12	3,10 GHz	



Information Related to the Server



Summary:

Server Name	95% IOPS	99% IOPS	Peak IOPS	Total MB/s	Local Capacity	Local Capacity Used	Shared Storage
fmoaesx02.fmoa.no	411.5	730.2	2001.9	48.0	66.5 GBs	20.7 GBs	11.0 TBs

Local Device Data:

Device Name	Capacity	Capacity Free	MB/s at Peak	95% IOPS	99% IOPS	Peak IOPS	Read/Write Ratio	Avg IO Size	Read Latency	Write Latency	Peak Queue Depth
fmoaesx02_local	66.5 GBs	45.8 GBs	1.9	30.0	38.7	98.7	19%/81%	5.2 KB/30.8 KB	19.0 ms	15.4 ms	0.0

Shared Device Data:

Device Name	Capacity	Capacity Free	MB/s at Peak	95% IOPS	99% IOPS	Peak IOPS	Read/Write Ratio	Avg IO Size	Read Latency	Write Latency	Peak Queue Depth
Fibre Channel Disk (naa.60060160d9e01a00f612b47aa8cddc11)	50.0 GBs	0.0 GBs	0.0	0.0	0.0	0.0	0%/100%	0.0 KB/0.0 KB	0.0 ms	0.0 ms	0.0
Fibre Channel Disk (naa.60060160d9e01a00c2ff0a5922cbdb11)	319.2 GBs	0.0 GBs	0.0	0.0	0.0	0.0	0%/100%	0.0 KB/0.0 KB	0.0 ms	0.0 ms	0.0
Fibre Channel Disk (naa.60060160d9e01a00f2778907c0d4dc11)	200.0 GBs	0.0 GBs	0.0	0.0	0.0	0.0	0%/100%	0.0 KB/0.0 KB	0.0 ms	0.0 ms	0.0
3 15K	399.8 GBs	101.3 GBs	4.1	6.5	36.0	260.0	27%/73%	63.9 KB/50.2 KB	214.0 ms	376.7 ms	0.0
1	1023.8 GBs	279.4 GBs	41.6	176.0	358.8	803.0	66%/34%	31.4 KB/70.1 KB	168.0 ms	133.7 ms	0.0
LUN	1023.8 GBs	409.7 GBs	38.9	34.5	221.8	658.7	71%/29%	14.6 KB/9.0 KB	117.0 ms	694.2 ms	0.0
2 15K	336.0 GBs	126.7 GBs	26.9	114.3	294.5	505.7	89%/11%	41.7 KB/14.6 KB	125.0 ms	151.5 ms	0.0
og ISO	199.8 GBs	105.5 GBs	14.6	56.1	277.5	604.0	85%/15%	14.0 KB/15.6 KB	12.2 ms	91.6 ms	0.0
iSCSI-ekstra	1374.8 GBs	809.4 GBs	24.2	58.8	252.6	733.8	80%/20%	22.8 KB/20.7 KB	1056.0 ms	101.8 ms	0.0
4	386.0 GBs	89.3 GBs	22.4	5.0	107.4	1779.4	90%/10%	6.5 KB/10.8 KB	29.0 ms	118.7 ms	0.0
iSCSI-TDS-backup	2024.8 GBs	1742.9 GBs	0.0	0.0	0.0	0.0	0%/100%	0.0 KB/0.0 KB	0.0 ms	0.0 ms	0.0
Bruker_h_omr	804.8 GBs	0.2 GBs	0.0	0.0	0.0	0.0	0%/100%	0.0 KB/0.0 KB	0.0 ms	0.0 ms	0.0
(1)	1073.3 GBs	166.5 GBs	0.0	0.0	0.0	0.0	0%/100%	0.0 KB/0.0 KB	0.0 ms	0.0 ms	0.0
iSCSI-templates-iso	1999.8 GBs	1713.5 GBs	0.0	0.0	0.0	0.0	0%/100%	0.0 KB/0.0 KB	0.0 ms	0.0 ms	0.0

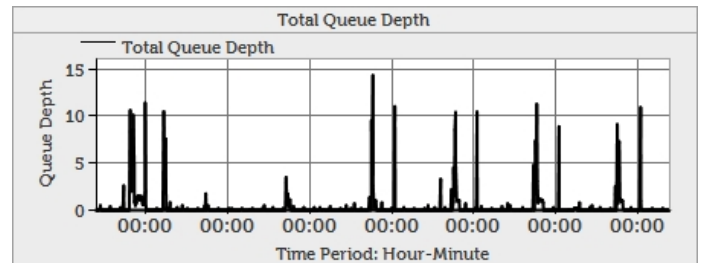
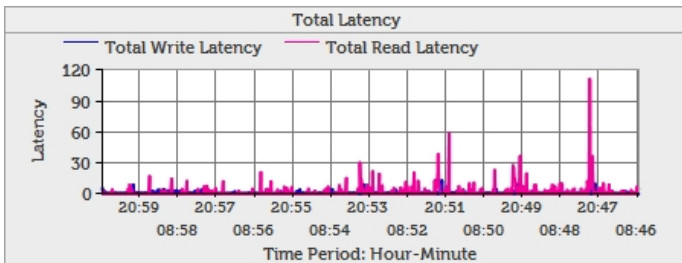
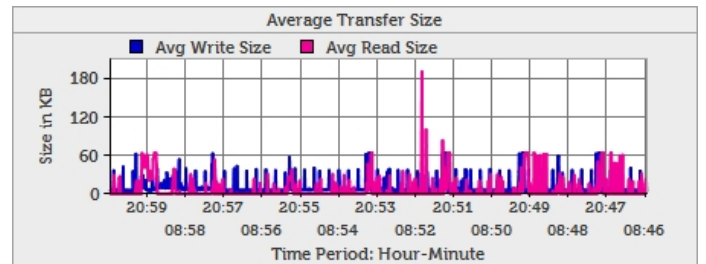
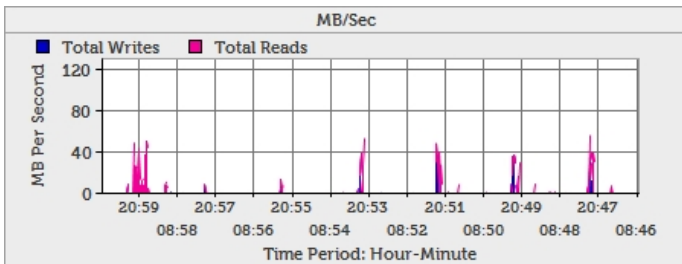
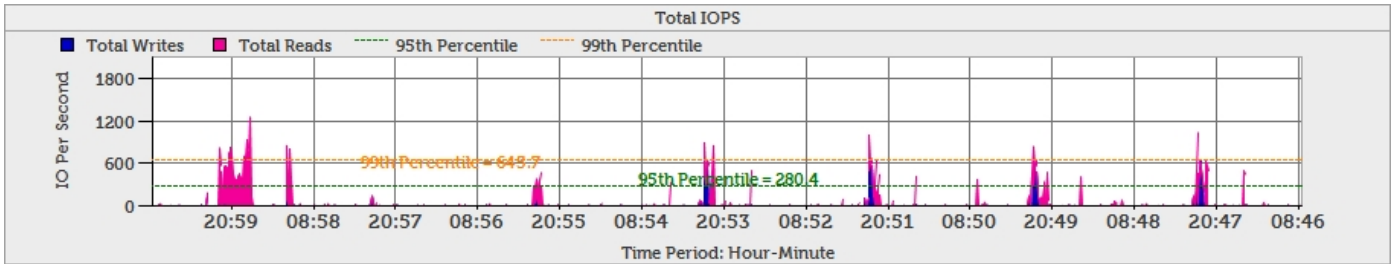


Individual Server Report:10.241.1.12

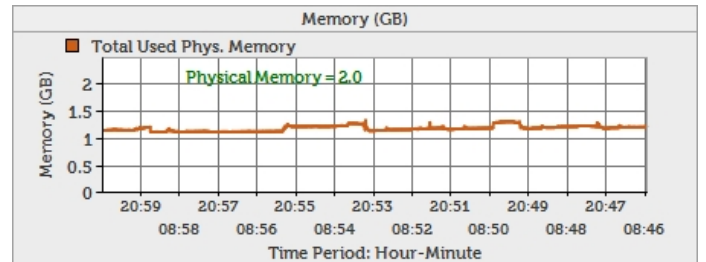
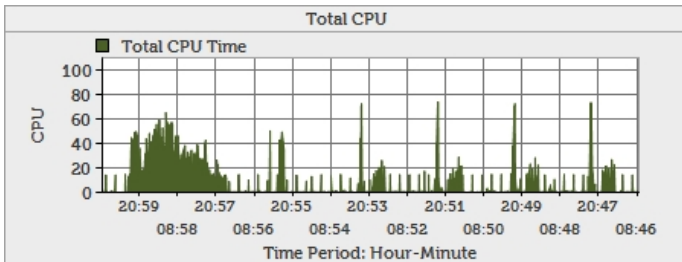
Operating System:	Microsoft(R) Windows(R) Server 2003, Standard Edition Service Pack 2
Time Recorded	6 Day(s) 23 Hour(s) 58 Minute(s), 9/14/2012 - 9/21/2012
Collector Version:	1.4.0.272643

Output Summary:		Output Summary:	
Throughput	77.0	Average IO size	Read:28.2 KB / Write:21.5 KB
IOPS	280.4 at 95%, 645.7 at 99% and 1253.7 at peak	Latency	111.5 ms Reads and 13.0 ms Writes
Read/Write Ratio	80% / 20%	Peak Queue Depth	14.3
Total Capacity:	2649.2 GBs	Peak/Min CPU	74% / 0%
Free Capacity	389.4 GBs Free	Peak/Min Memory	0.9 GB / 0.7 GB
Used Capacity	2259.9 GBs Used	Peak/Min Memory In Use	1.3 GB / 1.1 GB

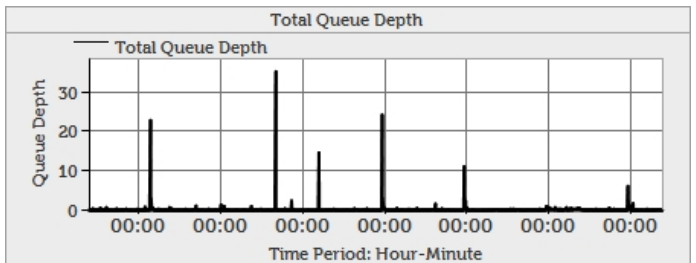
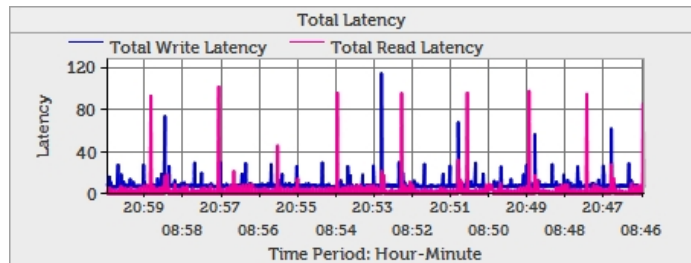
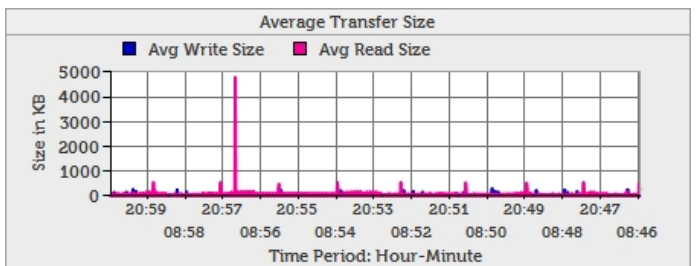
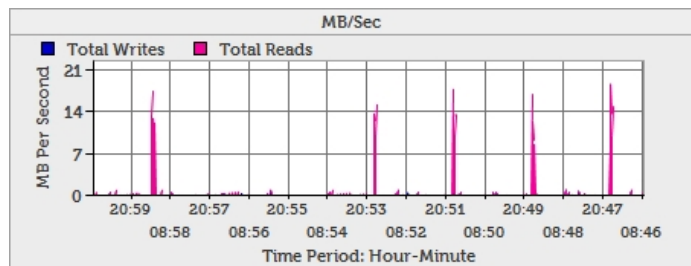
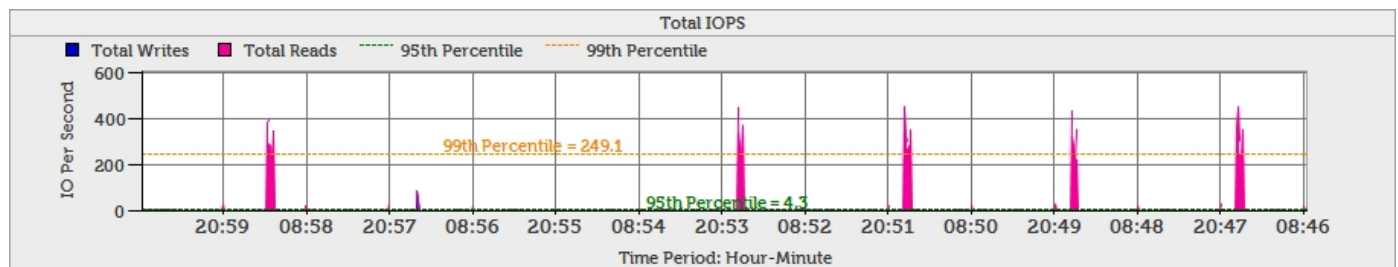
Sockets:	Cores:	Description:
2	2	Intel(R) Xeon(TM) CPU 3.20GHz



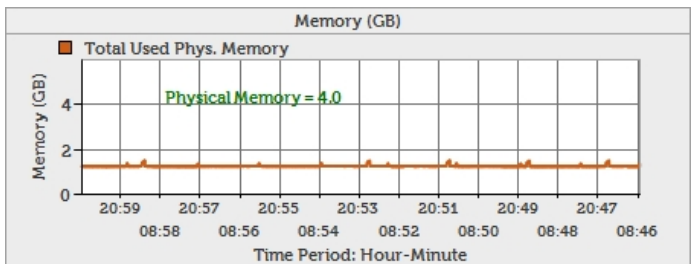
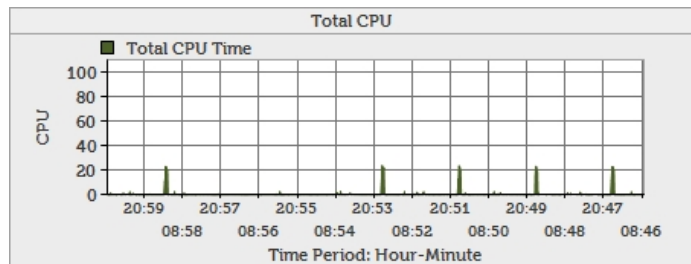
Information Related to the Server



Individual Server Report:FMOADC08			
Operating System:	Windows Server 2008 R2 Standard		
Time Recorded	6 Day(s) 23 Hour(s) 58 Minute(s), 9/14/2012 - 9/21/2012		
Collector Version:	1.4.0.272643		
Output Summary:		Output Summary:	
Throughput	18.7	Average IO size	Read:71.1 KB / Write:22.4 KB
IOPS	4.3 at 95%, 249.1 at 99% and 452.2 at peak	Latency	101.6 ms Reads and 114.0 ms Writes
Read/Write Ratio	95% / 5%	Peak Queue Depth	35.2
Total Capacity:	136.1 GBs	Peak/Min CPU	24% / 0%
Free Capacity	115.4 GBs Free	Peak/Min Memory	2.7 GB / 2.5 GB
Used Capacity	20.8 GBs Used	Peak/Min Memory In Use	1.5 GB / 1.3 GB
Sockets:	Cores:	Description:	
1	4	Intel(R) Xeon(R) CPU X3323 @ 2.50GHz	



Information Related to the Server



Servers Recorded						
Server Name(s)	Local Capacity	Free Capacity	Used Capacity	IOPS	MB/Sec	Read/Write Ratio
fmoaesx03.fmoa.no	66.5 GBs	45.8 GBs	20.7 GBs	475.1	130.4	90% / 10%
fmoaesx01.fmoa.no	66.5 GBs	45.8 GBs	20.7 GBs	451.0	106.2	91% / 9%
fmoaesx02.fmoa.no	66.5 GBs	45.8 GBs	20.7 GBs	411.5	48.0	78% / 22%
10.241.1.12	2649.2 GBs	389.4 GBs	2259.9 GBs	280.4	77.0	80% / 20%
FMOADC08	136.1 GBs	115.4 GBs	20.8 GBs	4.3	18.7	95% / 5%
Shared Storage Devices						
Device Name	Shared Capacity	Free Capacity	Used Capacity	Performance data reflected above		
17 - VeeamBackup_FMOAVEEAM01	49.9 GBs	33.7 GBs	16.2 GBs			
17 - LUN	1023.8 GBs	409.7 GBs	614.1 GBs			
17 - og ISO	199.8 GBs	105.5 GBs	94.3 GBs			
17 - 4	386.0 GBs	89.3 GBs	296.7 GBs			
17 - 3 15K	399.8 GBs	101.3 GBs	298.4 GBs			
17 - 2 15K	336.0 GBs	126.7 GBs	209.3 GBs			
17 - 1	1023.8 GBs	279.4 GBs	744.3 GBs			
17 - iSCSI-templates-iso	1999.8 GBs	1713.5 GBs	286.2 GBs			
17 - iSCSI-TDS-backup	2024.8 GBs	1742.9 GBs	281.9 GBs			
17 - iSCSI-ekstra	1374.8 GBs	809.4 GBs	565.3 GBs			
17 - (1)	1073.3 GBs	166.5 GBs	906.7 GBs			
17 - Fibre Channel Disk (naa.60060160d9e01a00f612b47aa8cddc11)	50.0 GBs	0.0 GBs	50.0 GBs			
17 - Fibre Channel Disk (naa.60060160d9e01a00f2778907c0d4dc11)	200.0 GBs	0.0 GBs	200.0 GBs			
17 - Fibre Channel Disk (naa.60060160d9e01a00c2ff0a5922cbdb11)	319.2 GBs	0.0 GBs	319.2 GBs			
17 - Bruker_h_omr	804.8 GBs	0.2 GBs	804.6 GBs			
Total Capacity	13.9 TBs	6.1 TBs	7.8 TBs	**		82% / 18%

These totals are calculated on the summary page. Dell calculates these based on a methodology that takes into account the time at which the highs and lows of system occur as well as many other factors. *** Servers and Hosts report IOPS, MB/s, Internal Capacity, and Read/Write Ratios as unique to the server. Shared capacity IOPS are included in the Total IOPS column next to the servers name. Shared capacity is the only value that a server or host would duplicate. Therefore, shared capacity is reported separately so that those capacities are only counted one time and represent the true capacity of the cluster. This report assumes the IO workloads observed by the DellPACK.exe application are typical and exemplary of workloads that will take place in the future. Should future workloads significantly vary from the observed activity in this report, the suggested IO sizing recommendations implicit in this report may be invalid.



Disk Data:						
Server Name(s)	Device Name	Local Capacity	Free Capacity	Used Capacity	95% IOPS:	Read/Write Ratio
10.241.1.12	C:	33.9 GBs	20.9 GBs	13.0 GBs	7.7	79%/21%
	E:	1955.6 GBs	43.1 GBs	1912.5 GBs	454.5	47%/53%
	Q:	309.7 GBs	246.8 GBs	62.9 GBs	349.9	99%/1%
	R:	350.0 GBs	78.6 GBs	271.4 GBs	810.4	100%/0%
FMOADC08	C:	136.1 GBs	115.4 GBs	20.8 GBs	4.3	95%/5%

This report shows performance summations of multiple disks and machines. These summaries are very useful in understanding the total storage requirements of a set of disks and machines. However, the summary assumes that there is some correlation between the activity observed on the disks and the times of the observation. If there is no correlation between the activity of the observed disks and the times of the observation, then the actual storage requirement may exceed what is suggested in this report.



Definition

Transfer size is the average size of an IO.

Latency is the time take to complete an IO. It is a key factor in performance.

Queue depth is the number of outstanding read or write operations waiting to access the disk. A high queue depth can be an indicator of an under sized system.

