Challenges of Capacity Management in Large Mixed Organizations

ASG-PERFMAN

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Topics

- What is ASG-PERFMAN and Who Uses It?
- Capacity planning challenges – past and present
- What is Capacity Management
- A new use case for capacity planning in a large virtualized environment
  - Distributed environment
  - Mainframe environment
- How ASG PERFMAN 2020 can help

According to ITIL

Capacity Management is a process used to manage information technology (IT). Its primary goal is to ensure that IT capacity meets current and future business requirements in a cost-effective manner. One common interpretation of Capacity Management is described in the ITIL framework. ITIL version 3 views capacity management as comprising three sub-processes: business capacity management, service capacity management, and component capacity management (known as resource capacity management in ITIL version 2).

…

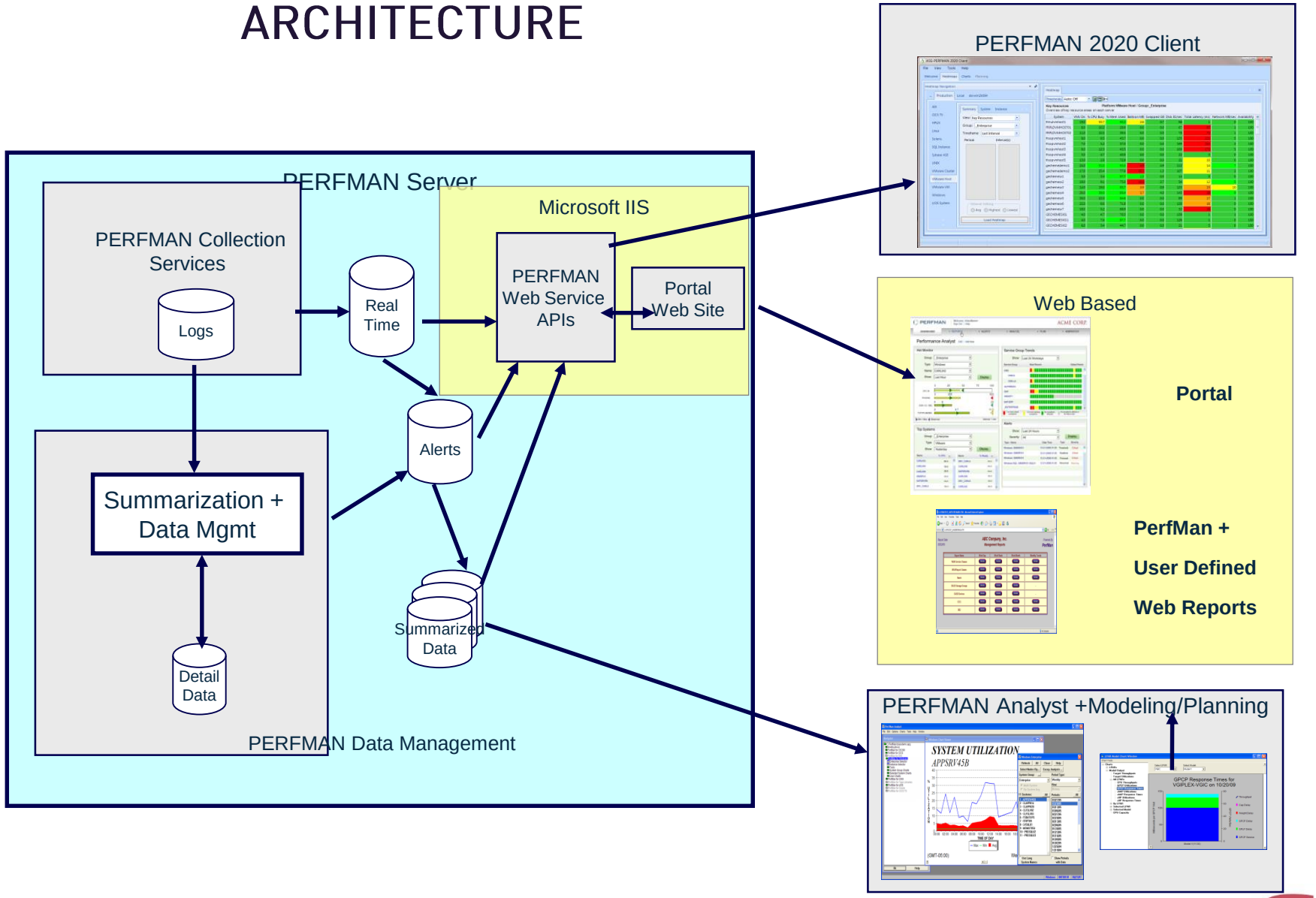
Capacity management is concerned with:

1. **Monitoring** the performance and throughput or load on a server, server farm, or property
2. **Performance analysis** of measurement data, including analysis of the impact of new releases on capacity
3. **Performance tuning** of activities to ensure the most efficient use of existing infrastructure
4. **Understanding the demands** on the Service and future plans for workload growth (or shrinkage)
5. **Influences on demand** for computing resources
6. **Capacity planning** – developing a plan for the Service

What is ASG-PERFMAN and Who Uses It?

ASG-PERFMAN in the real world

ARCHITECTURE



ARCHITECTURE: PERFMAN SERVER

- Hosts about 95% of the solution
    - A license file bound to this hardware determines capability.
- Installed and managed by your designated “PerfMan Admin” person.
- Hosts all related data.
    - Detail data is accumulated and summarizations are performed.
- Hosts the web sites and web services associated with PerfMan
- There are several administrative interfaces on this system
- Additional PerfMan Analysts can be installed from this system.

DATA COLLECTION: DATA SOURCES

Platform	Data Source	Collector
z/OS (+BUA Option)	SMF: 70–75, 78, DCOLLECT (30, 42)	z/OS-based Programs
DB2	SMF: 100-102	z/OS-based Programs
CICS TS	SMF: 110 or TMON for CICS	z/OS-based Programs
Tape Libraries	SMF: 94, BVIR, STK	z/OS-based Programs
Windows	MS Performance Library	**Agentless** (RPC)
AIX, HP-UX, Solaris, Linux	sar, iostat, vmstat, nmon, etc.	SSH (shell script)
VMware	VMware Infrastructure (VI)	**Agentless** (API)
Citrix XenServer	Round Robin Databases (RRD)	**Agentless** (API)
Oracle	V$ Tables & Views	**Agentless**
Sybase ASE	Mon tables	**Agentless** (API)

Capacity Planning Today

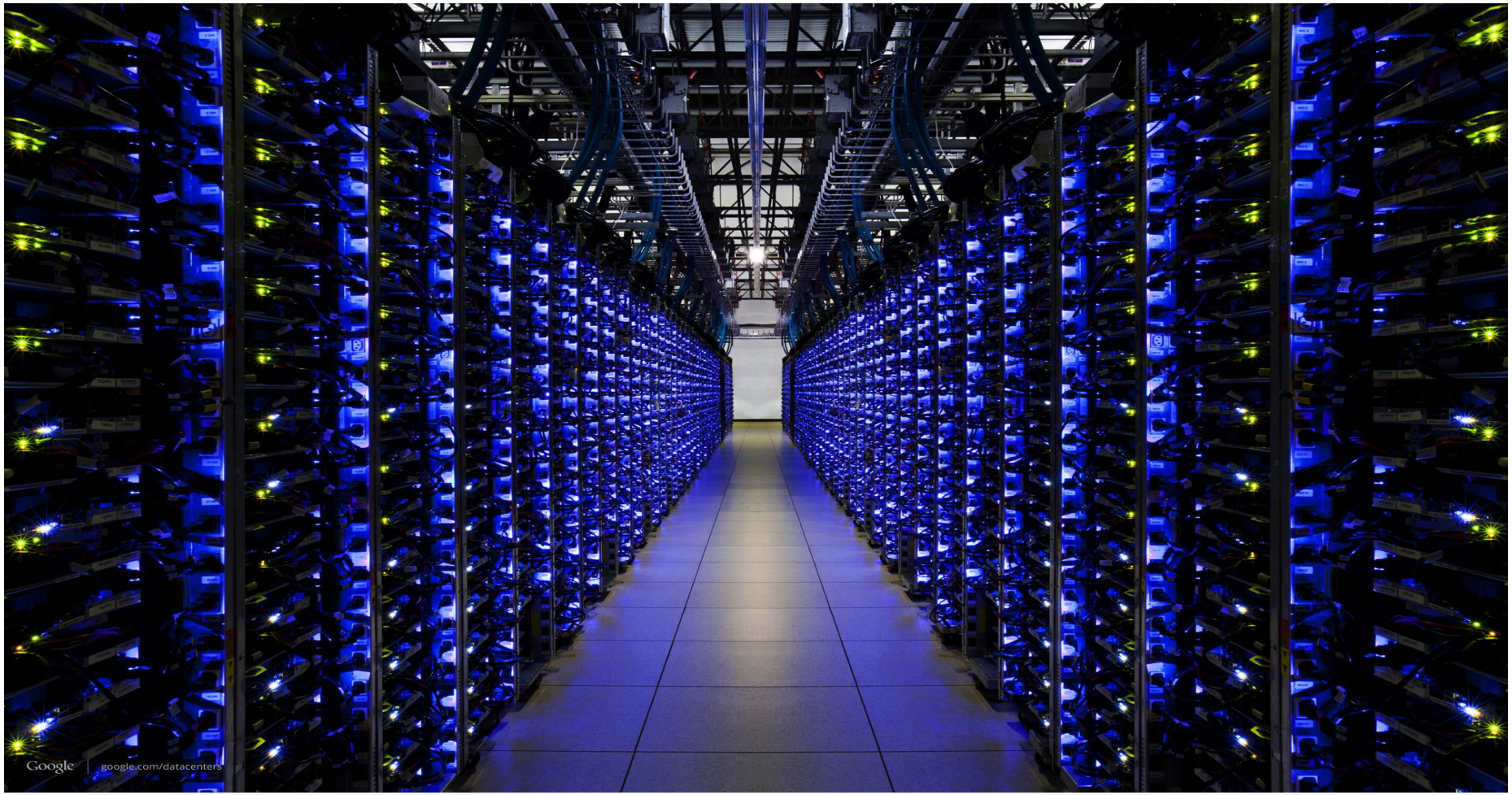
- Justification of capital expenditures
- Modeling of I/O Performance
- Modeling of configuration changes
- Publishing reports for different audiences
- Understanding the cause of the peak 4 hour rolling average (managing to you capacity cap)
- Disk space trends
- Needing to plan capacity across an entire infrastructure

What is ASG-PERFMAN and How Can it Help?

ASG-PERFMAN provides superior analysis, trending, forecasting and modeling that allows companies to set realistic expectations, prevent unnecessary hardware purchases, maximize expensive resources, and communicate accurate and actionable information.

ASG-PERFMAN gathers detailed data, which is summarized, analyzed, and presented in an easy-to-understand format for analysis, trending, forecasting, and modeling.

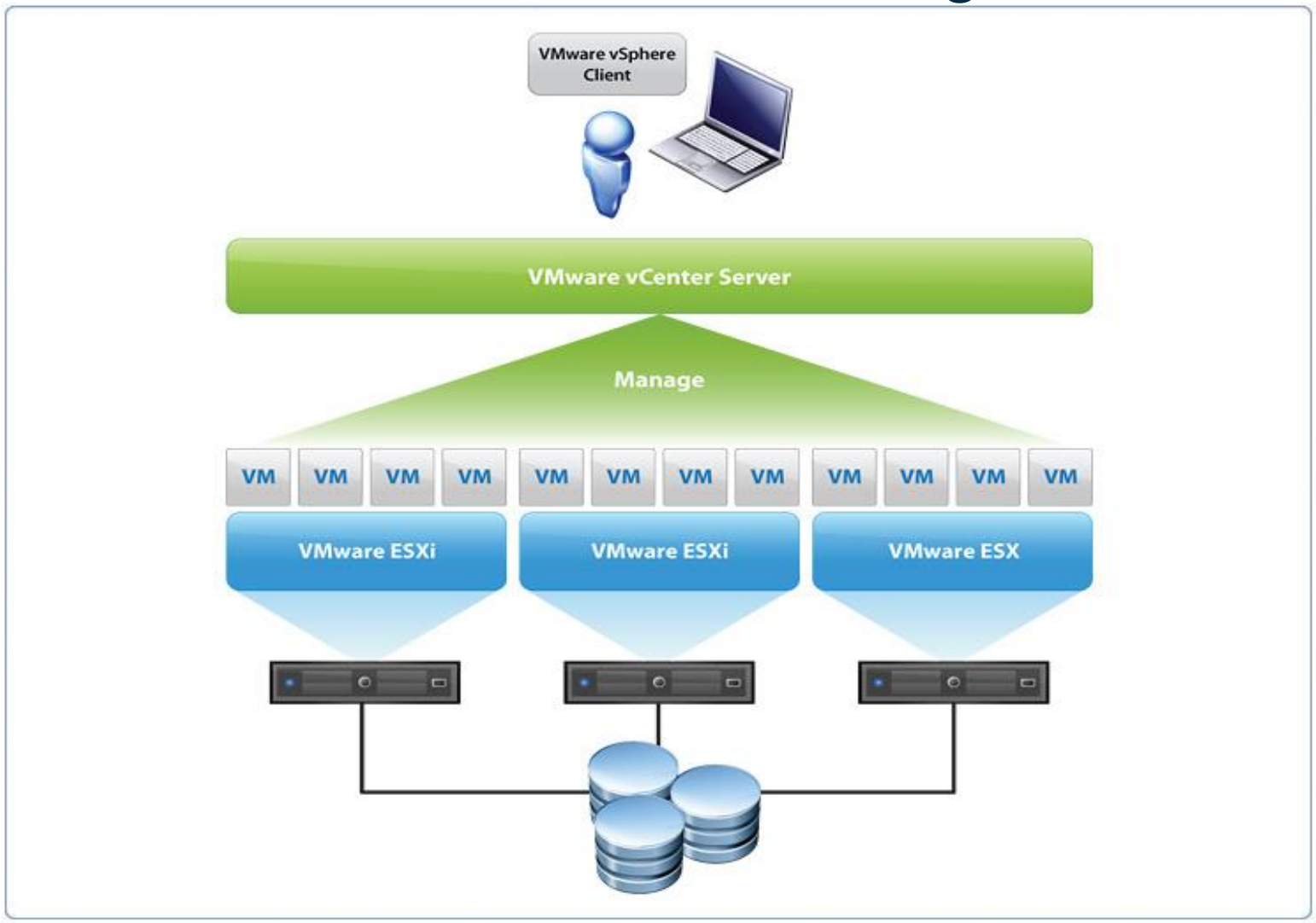
Capacity planning in a large virtualized environment



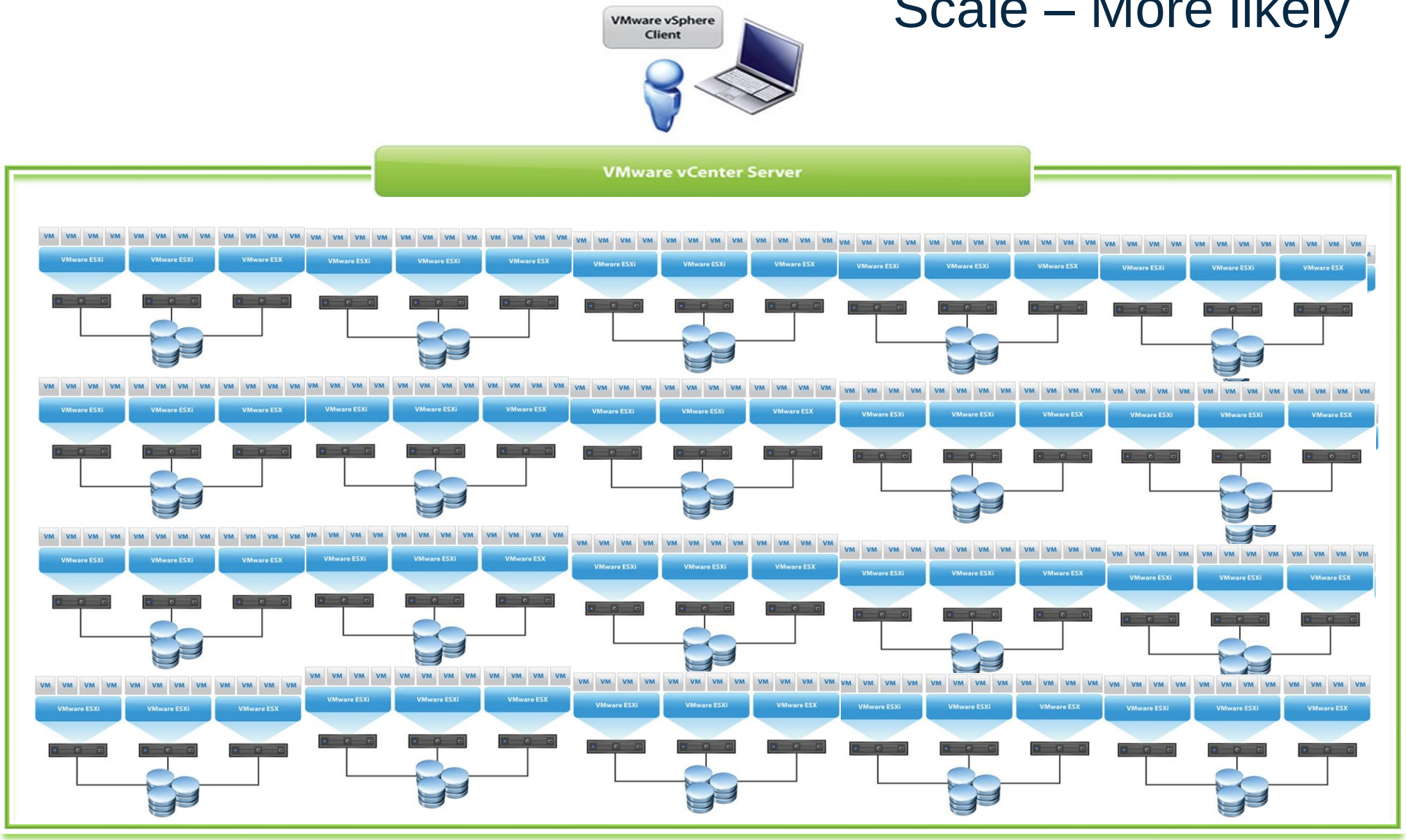
Challenges

- Scale
- Capacity On Demand technologies
- Clustering
- Self tuning environments
- Power management
- Constantly evolving technology
- … and many more

Scale – The marketing view

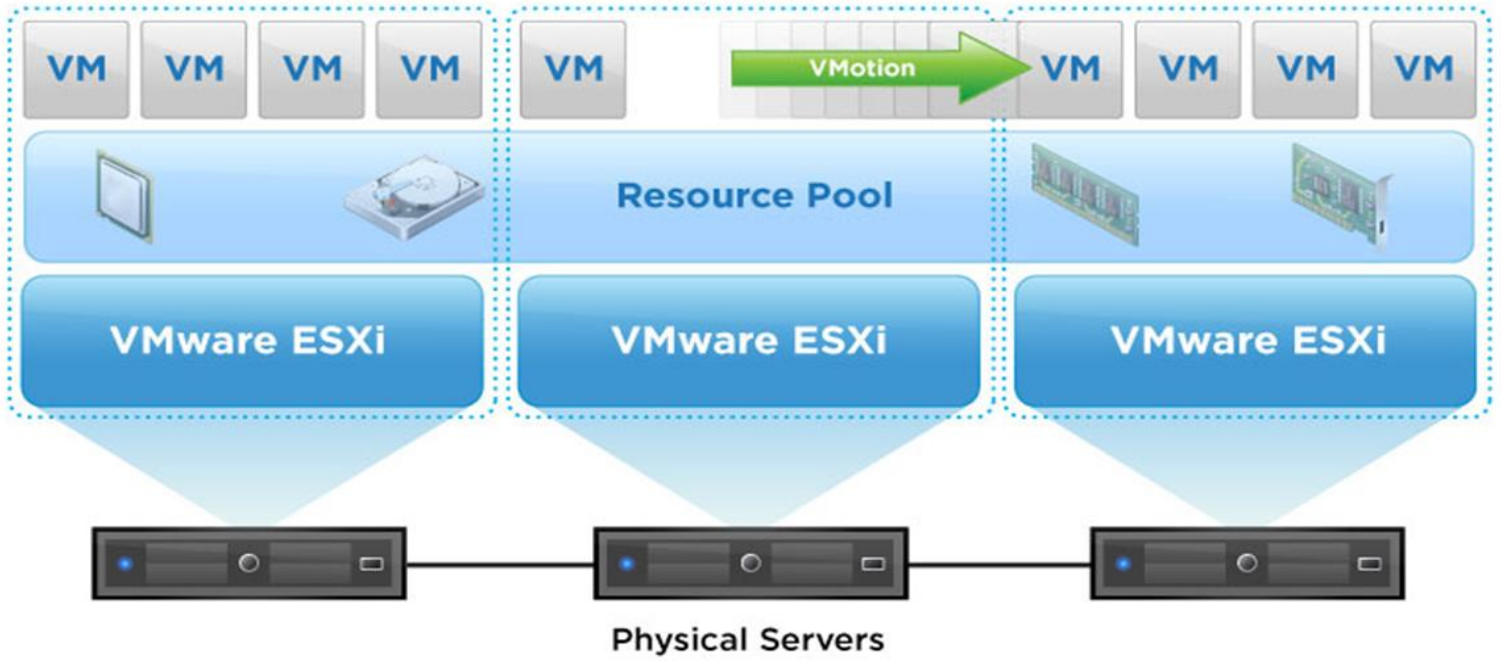


Scale – More likely



Scale – The reality

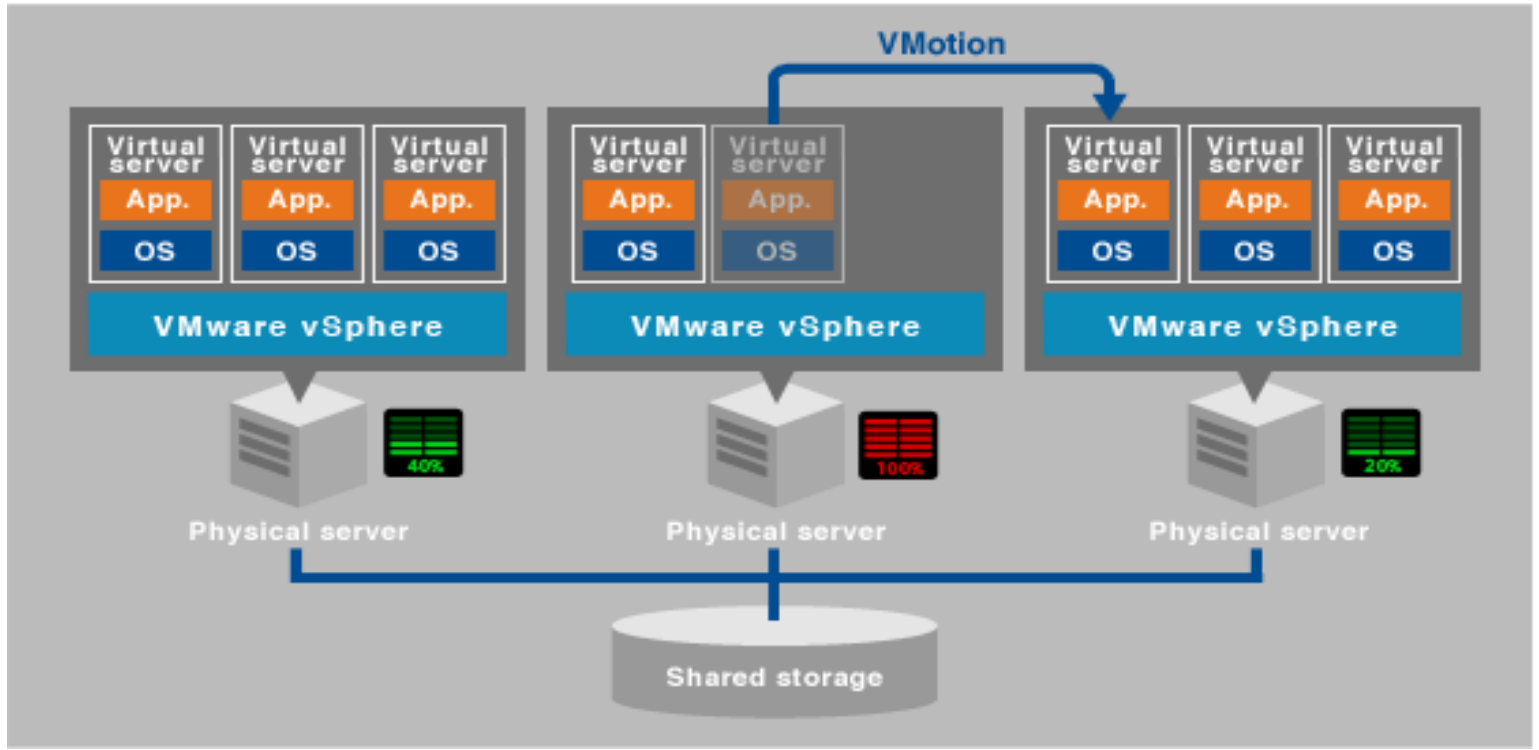
Clusters and Resource Pools



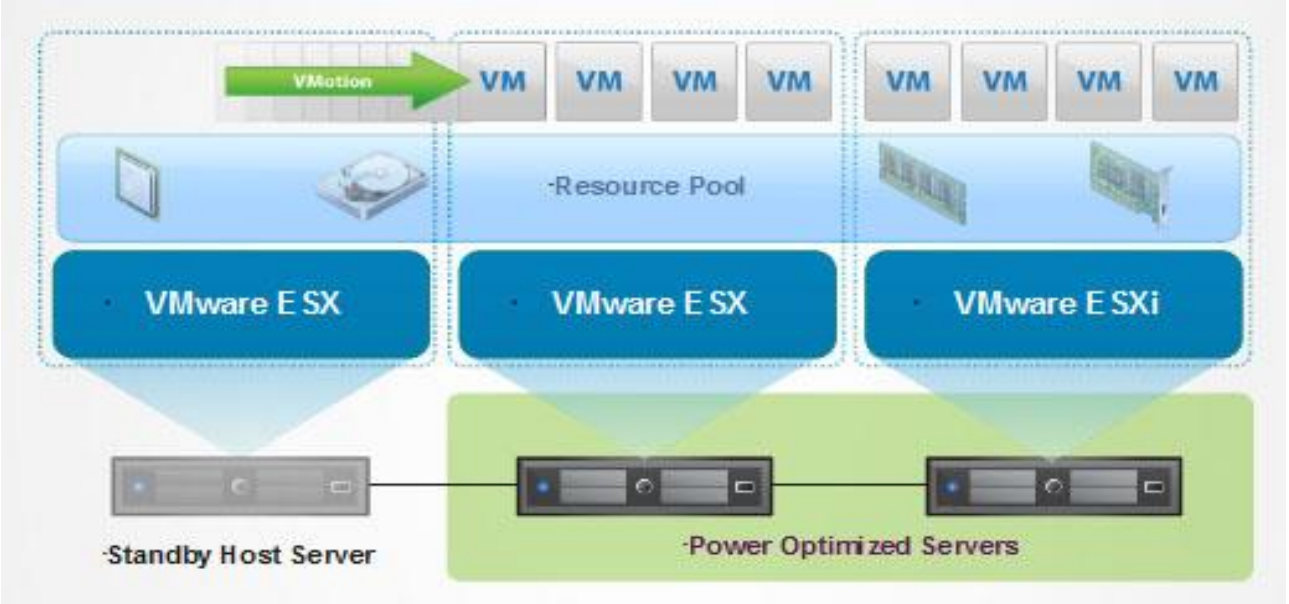
Self Tuning environment

VMware Distributed Resource Scheduler (DRS)

Automatic resource allocation based on CPU and memory load status



Power Management

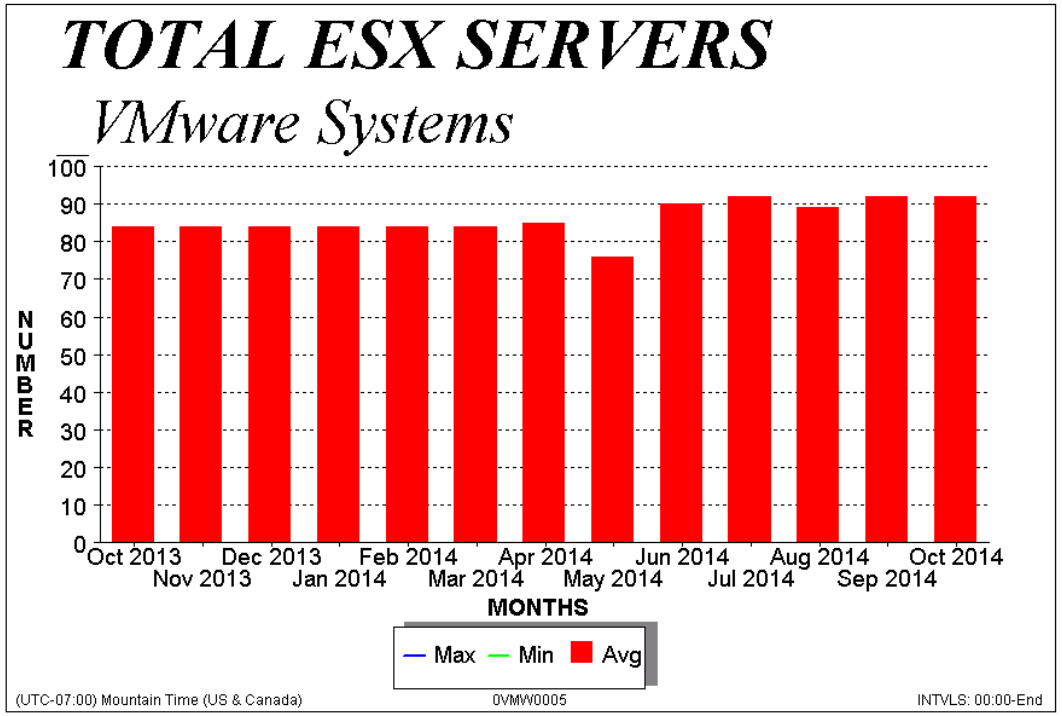


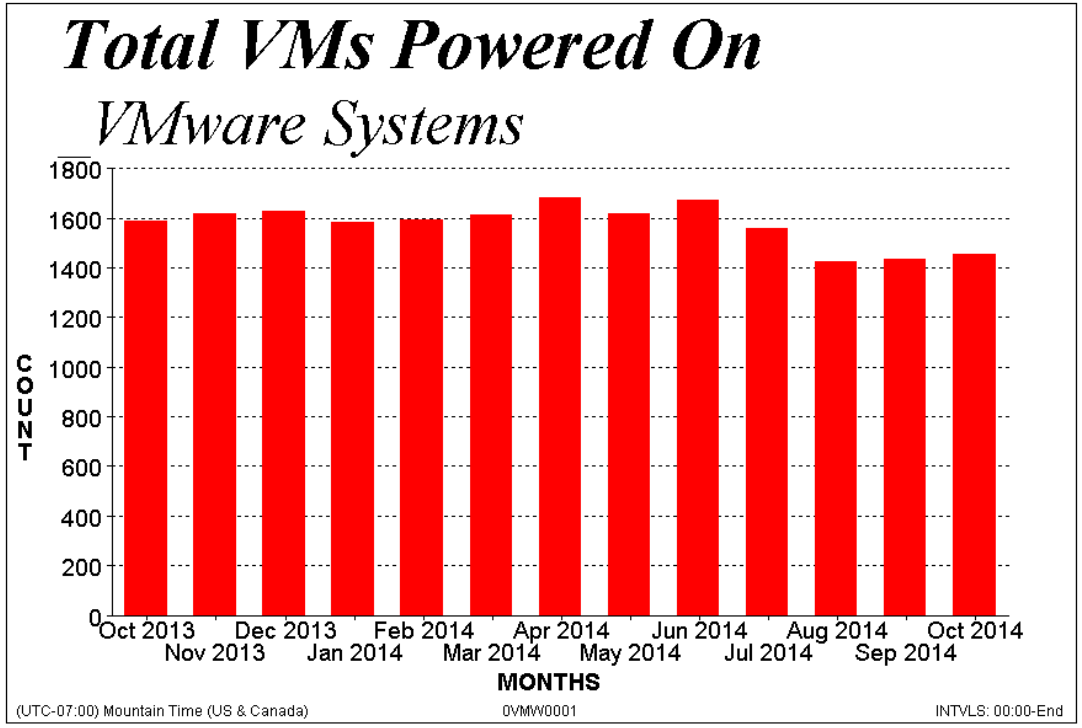
Constantly Evolving Technology

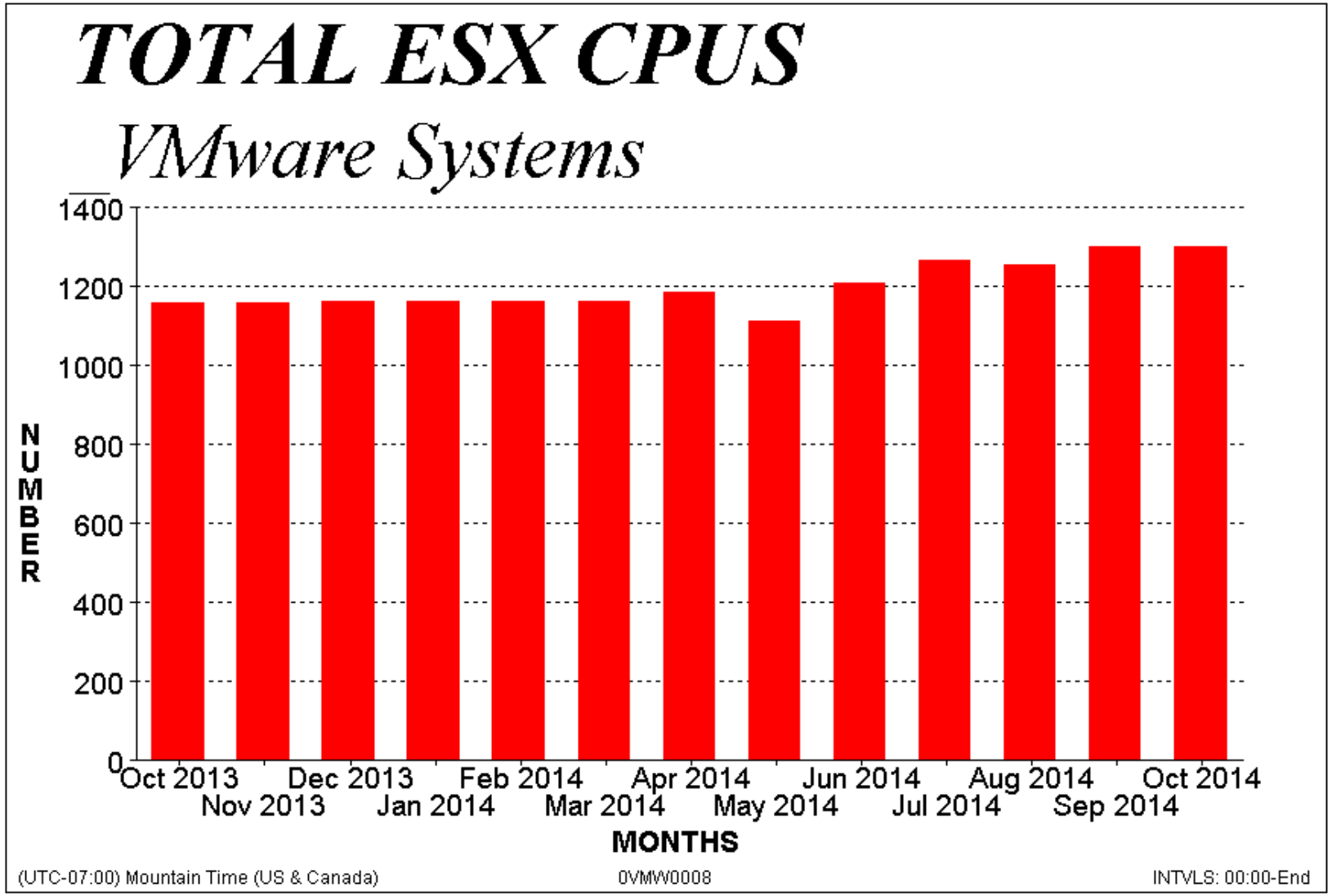
- Memory sharing
- Memory compression
- CPU Scheduler improvements
- Support for wide VMs (more vCPUs)
- Non-Uniform Memory Access (NUMA) support

In Search of a new approach

- Was I “over thinking it”?
- What can I see from ASG-PERFMAN


TOTAL ESX SERVERS
VMware Systems
NUMBER
100
90
80
70
60
50
40
30
20
10
0
Oct 2013
Nov 2013
Dec 2013
Jan 2014
Feb 2014
Mar 2014
Apr 2014
May 2014
Jun 2014
Jul 2014
Aug 2014
Sep 2014
Oct 2014
MONTHS
Max
Min
Avg
(UTC-07:00) Mountain Time (US & Canada)
0VMW0005
INTVLS: 00:00-End


Total VMs Powered On
VMware Systems
COUNT
1800
1600
1400
1200
1000
800
600
400
200
0
Oct 2013
Nov 2013
Dec 2013
Jan 2014
Feb 2014
Mar 2014
Apr 2014
May 2014
Jun 2014
Jul 2014
Aug 2014
Sep 2014
Oct 2014
MONTHS
(UTC-07:00) Mountain Time (US & Canada)
0VMW0001
INTVLS: 00:00-End


TOTAL ESX CPUS
VMware Systems
1400
1200
1000
800
600
400
200
0
NUMBER
Oct 2013
Nov 2013
Dec 2013
Jan 2014
Feb 2014
Mar 2014
Apr 2014
May 2014
Jun 2014
Jul 2014
Aug 2014
Sep 2014
Oct 2014
MONTHS
(UTC-07:00) Mountain Time (US & Canada)
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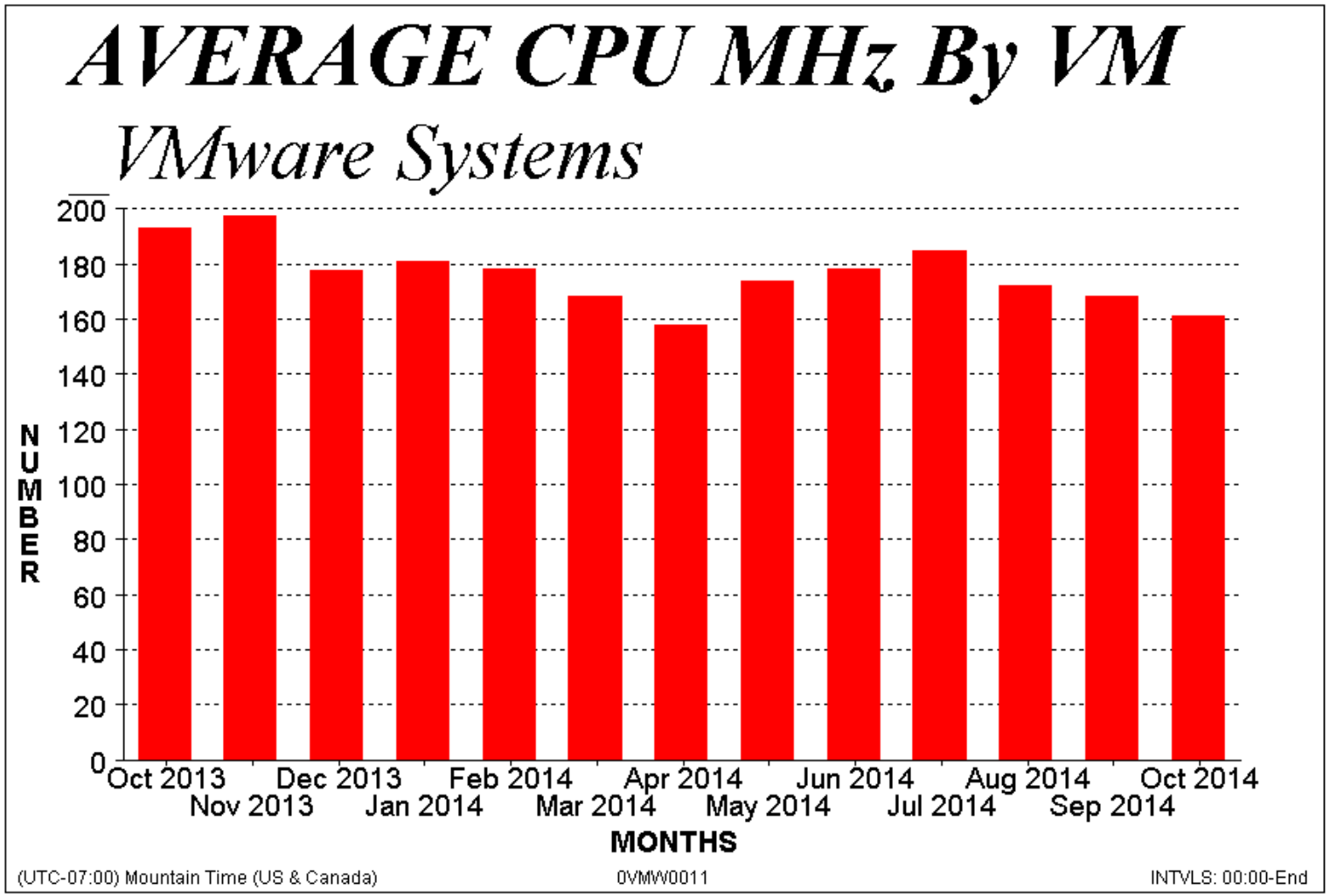
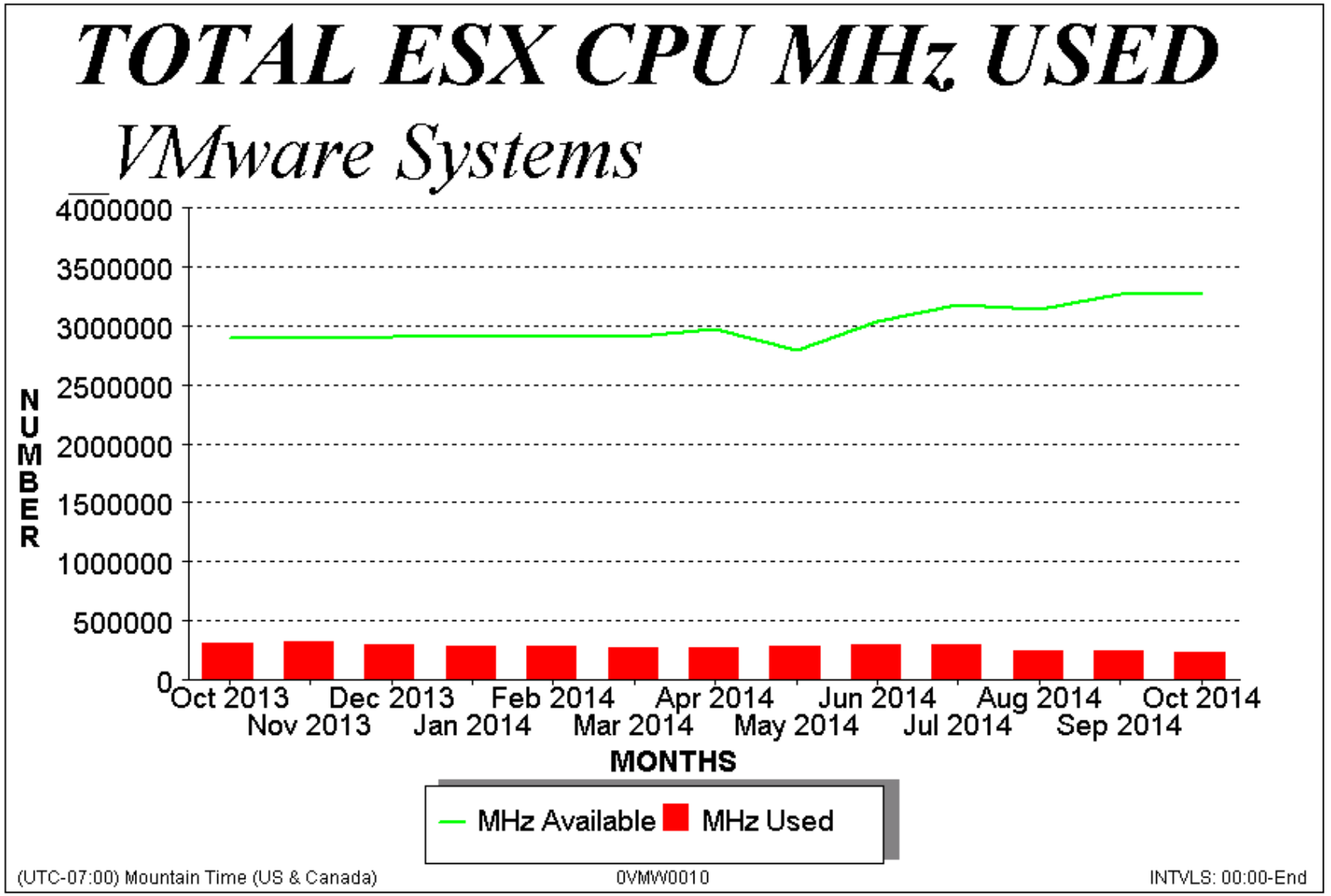
INTVLS: 00:00-End


AVERAGE CPU MHz By VM
VMware Systems
NUMBER
200
180
160
140
120
100
80
60
40
20
0
Oct 2013
Nov 2013
Dec 2013
Jan 2014
Feb 2014
Mar 2014
Apr 2014
May 2014
Jun 2014
Jul 2014
Aug 2014
Sep 2014
Oct 2014
MONTHS
(UTC-07:00) Mountain Time (US & Canada)
0VMW0011
INTVLS: 00:00-End


TOTAL ESX CPU MHz USED
VMware Systems
4000000
3500000
3000000
2500000
2000000
1500000
1000000
500000
0
NUMBER
Oct 2013
Nov 2013
Dec 2013
Jan 2014
Feb 2014
Mar 2014
Apr 2014
May 2014
Jun 2014
Jul 2014
Aug 2014
Sep 2014
Oct 2014
MONTHS
MHz Available
MHz Used
(UTC-07:00) Mountain Time (US & Canada)
0VMW0010
INTVLS: 00:00-End

Capacity planning in a zSeries Mainframe environment

- MIPS Reduction!!
- DASD and Tape I/O
- Multiple LPARS
- CPU Utilization
- Rolling 4 Hour Average
- Modeling scenarios

DATA COLLECTION: IBM z/SERIES

FTP

ASG-PERFMAN for z/OS

- No data accumulation on z/OS platform
- Direct transfer of mainframe data via FTP
- No SAS or third-party product installed on the mainframe

ASG-PERFMAN FOR Z/OS

- PROCESSES MULTIPLE SMFIDS IN A SINGLE PASS
  - Handle all record types
- HIGHLY EFFICIENT ASM PROGRAMS 100X FASTER THAN SAS
- MINIMAL DASD SPACE CONSUMPTION – PRODUCT FOOTPRINT ONLY
- CPU PERFORMANCE TABLE FOR RATINGS & NORMALIZATION
  - Customer overrides allowed

- Automatic handling of dynamic capacity/configuration changes
- Proper handling of uncaptured time
- Proper handling of zIIP/zAAP/IFL specialty processors
- Automatic support for goal mode configuration information
- Turnkey operation – no “parm file” required

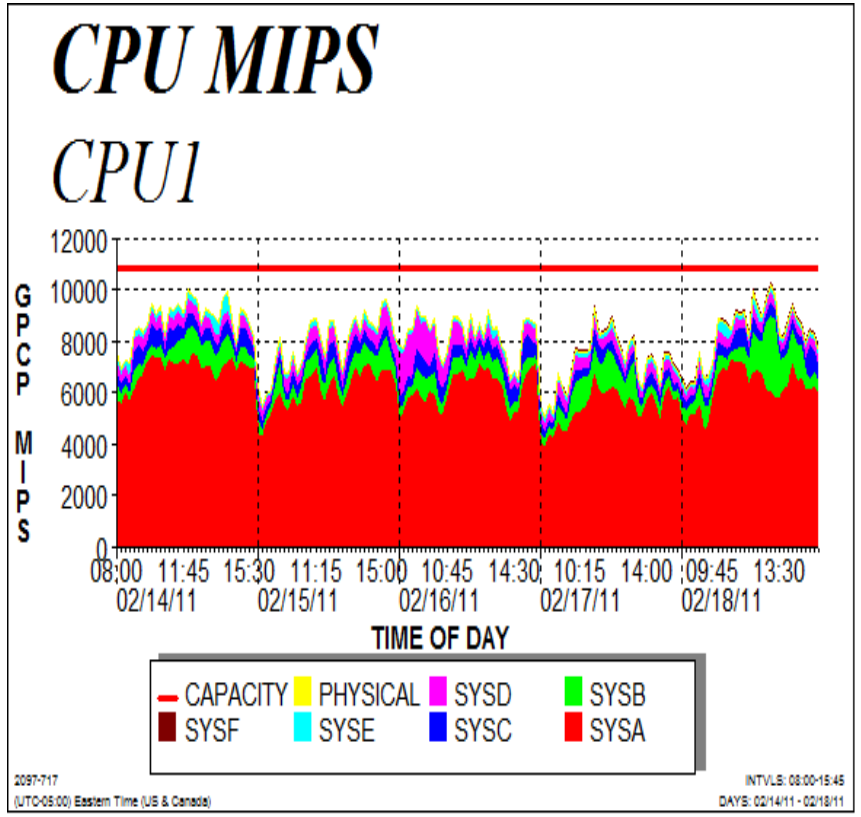
ARCHITECTURE

Strategies for Reducing MIPS Consumption

- Determining where high MIPS consumption is occurring
  - Time-frame perspective
  - Workload perspective
- Forecasting areas of growing MIPS consumption.
- Determining the benefits of using less expensive (and often faster) specialty engines, zAAPs and zIIPs.
- Analyzing the effectiveness of defined capacity for z/OS LPARs.
- Determining the optimum settings for various LPAR controls like weights, capping and the number and type of logical processors.
- Analyzing delays in accessing CPU resources that may manifest themselves as high MIPS consumption.
- Assessing how LPARs may be moved among mainframes to balance MIPS consumption.

Determining where high MIPS consumption is occurring

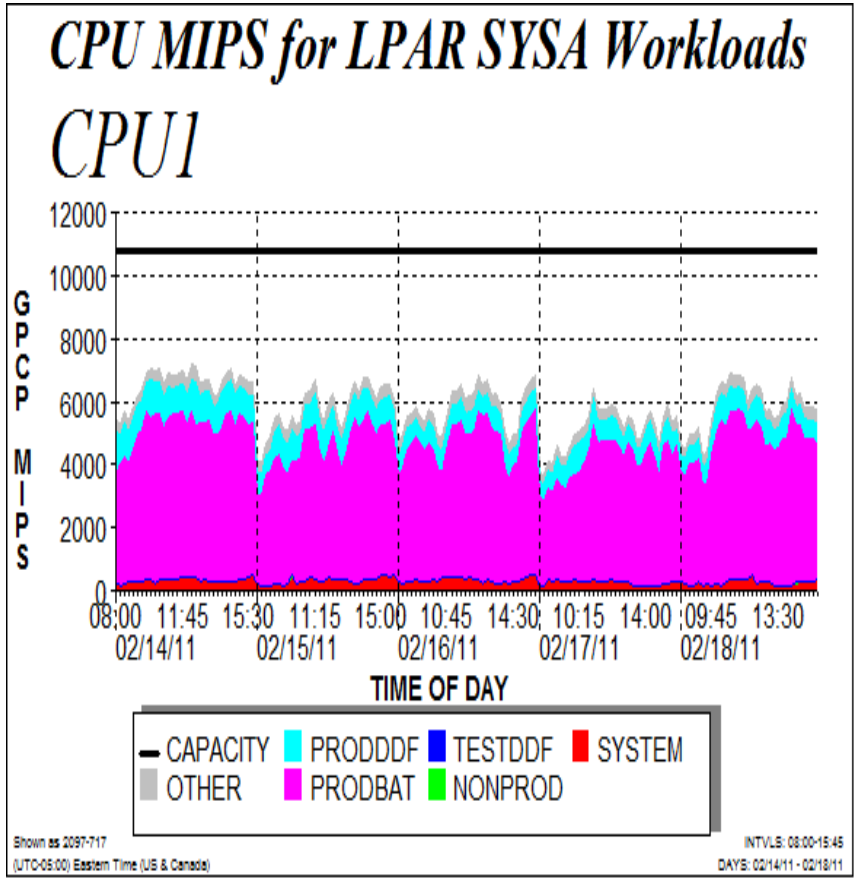
Time-Frame Perspective



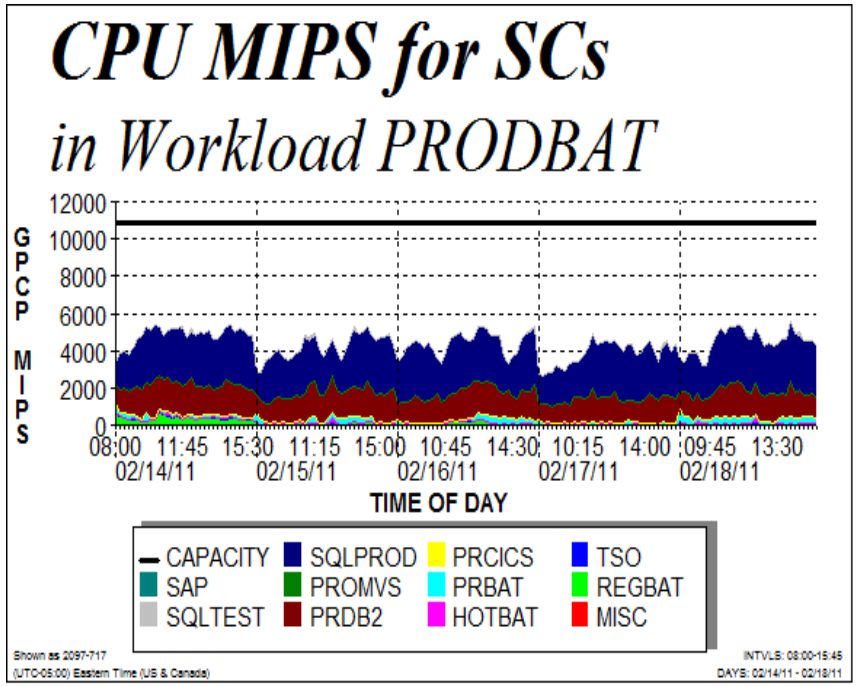
- Observations:
  - MIPS consumption is fairly constant across prime shift
  - LPAR SYSA is the big consumer
  - What are the workloads in SYSA?

Determining where high MIPS consumption is occurring

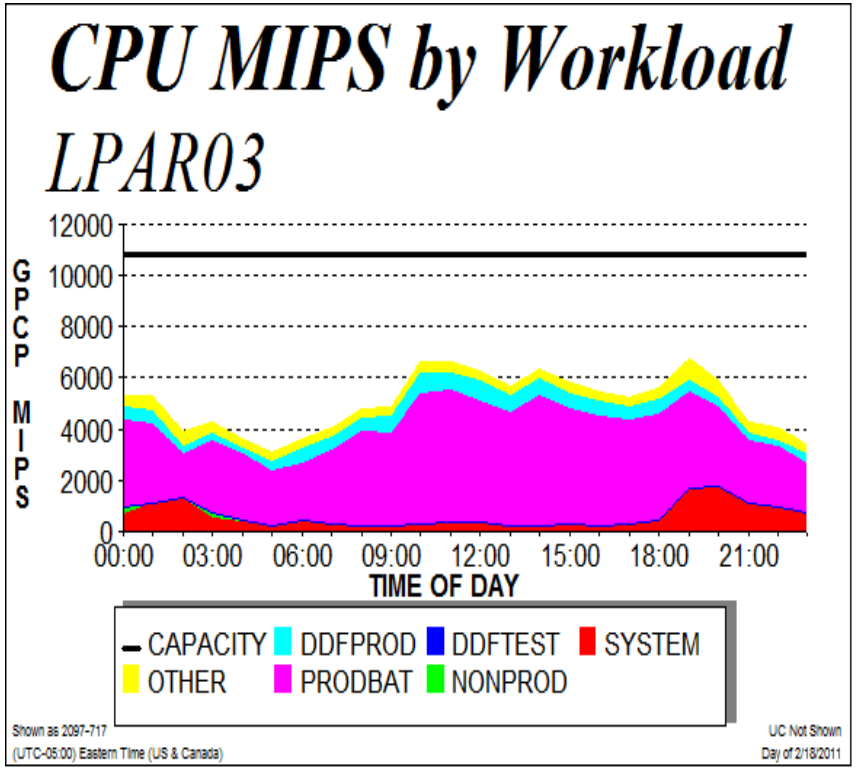
Workload Perspective



- Observations:
  - PRODBAT is the big consumer during prime-shift
  - Now drill down into its Service Classes
    - PRDB2 and SQLPROD are the big hitters

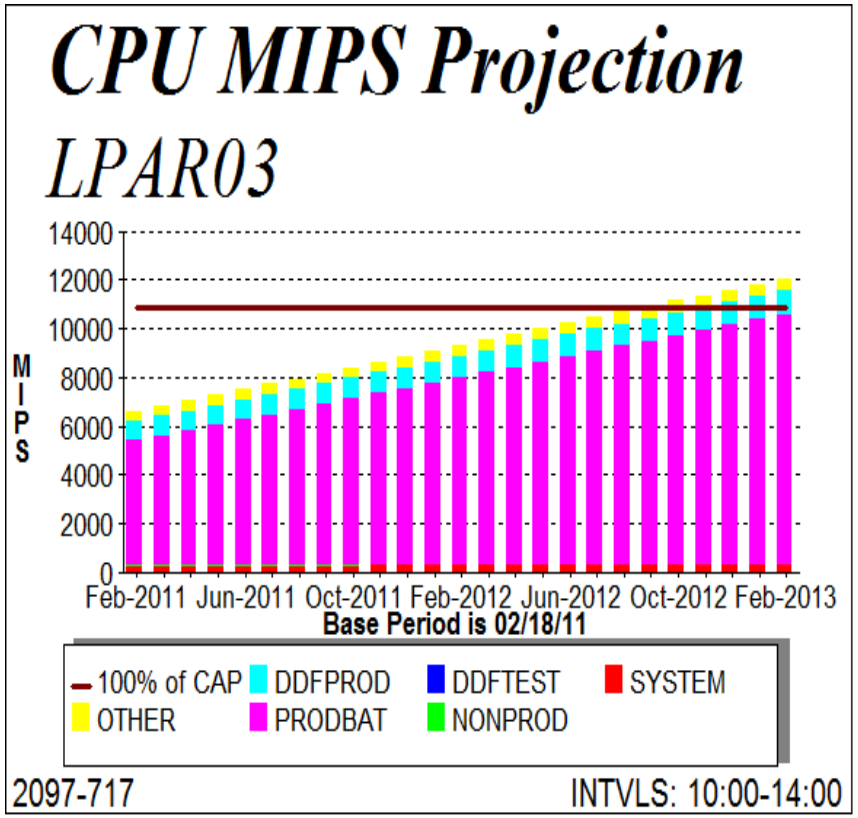


Forecasting growth of MIPS Consumption

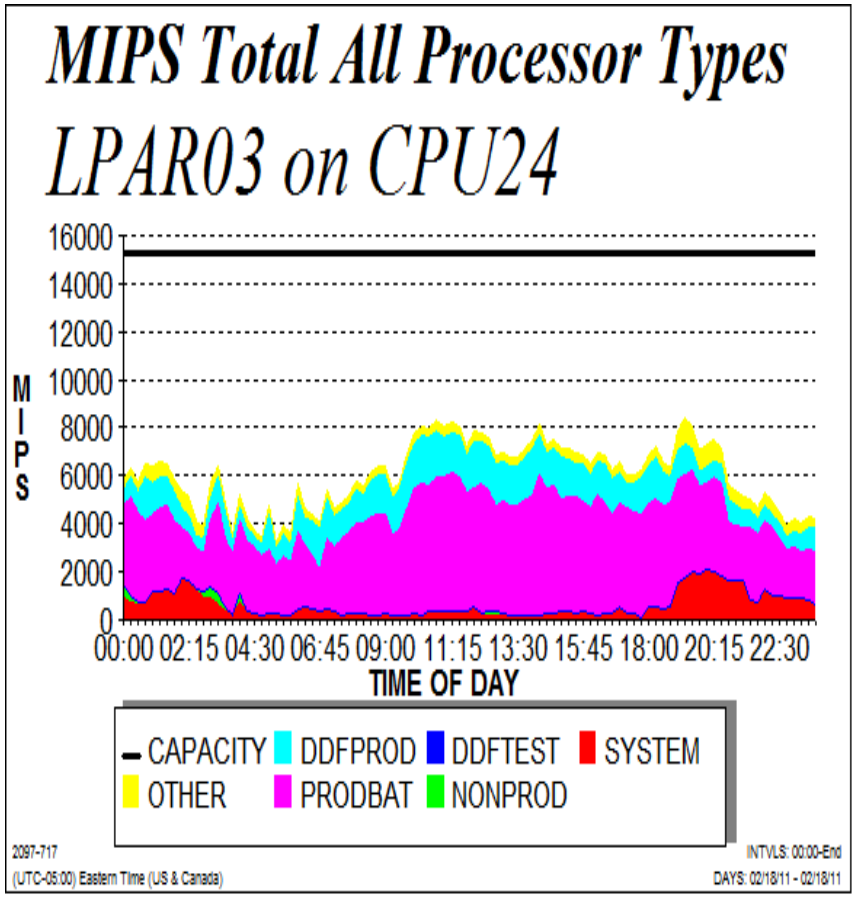


How will PRODBAT grow in the next two years months?

Use ASG-PERFMAN for z/OS Capacity Planning to project based on history data

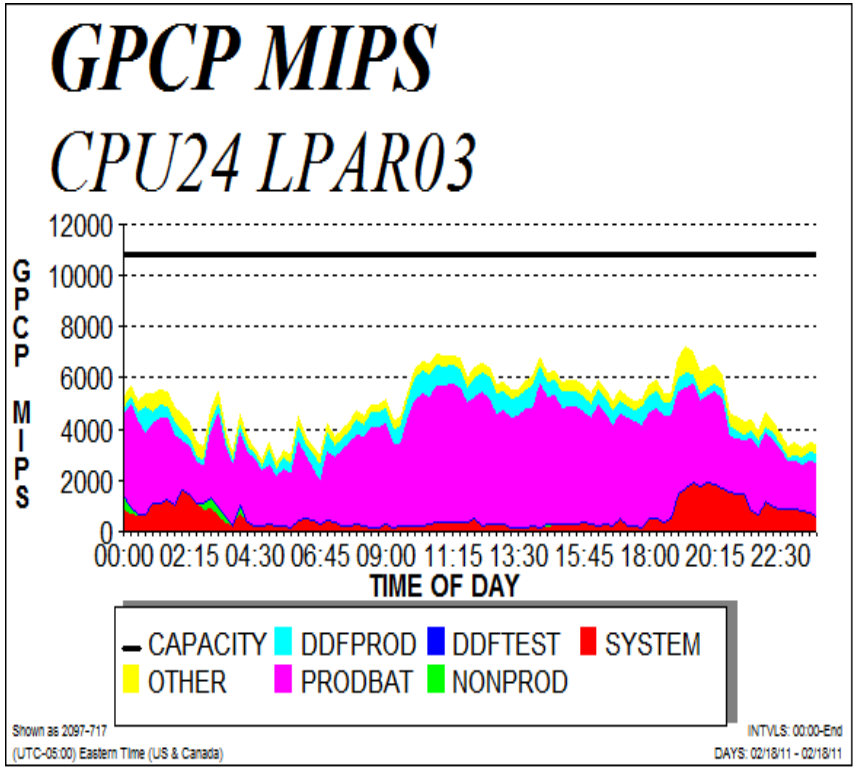


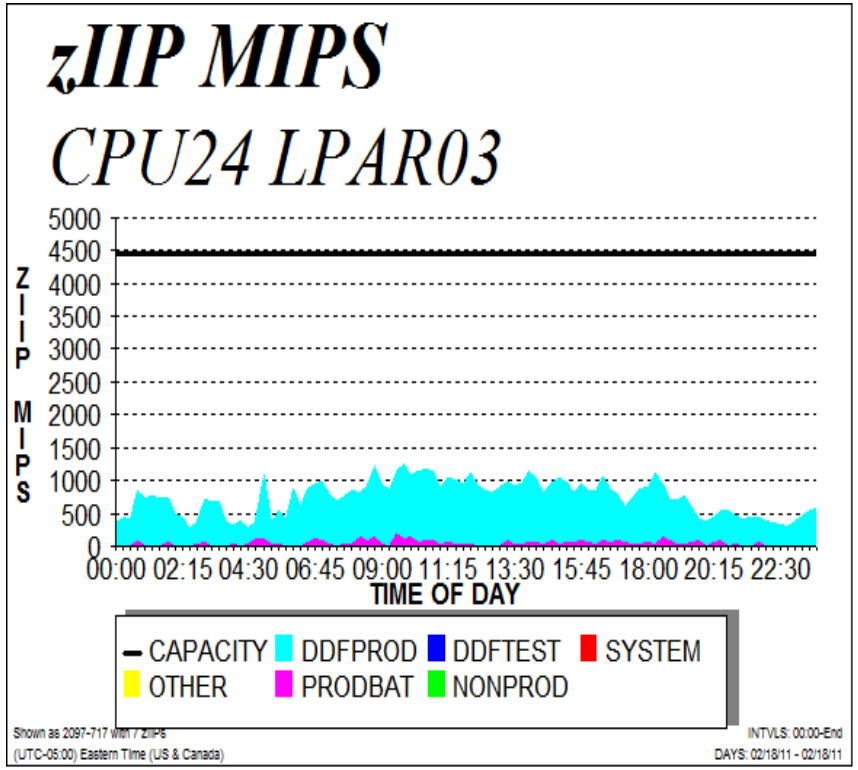
Determining the benefits of using zAAPs and zIIPs



- All MIPS consumed by LPAR03 on CPU24
- Some are consumed on GPCPs
- Some are consumed on zIIPs
- zIIPs are cheaper!
- Is CPU24 taking advantage of zIIPs?

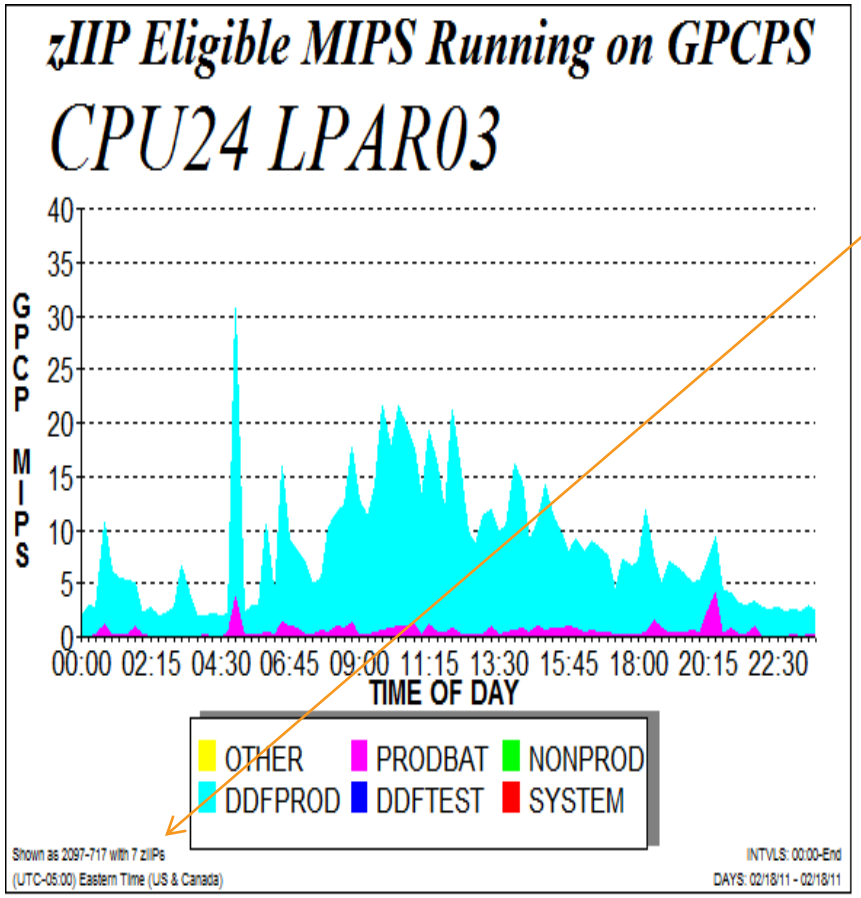
Determining the benefits of using zAAPs and zIIPs





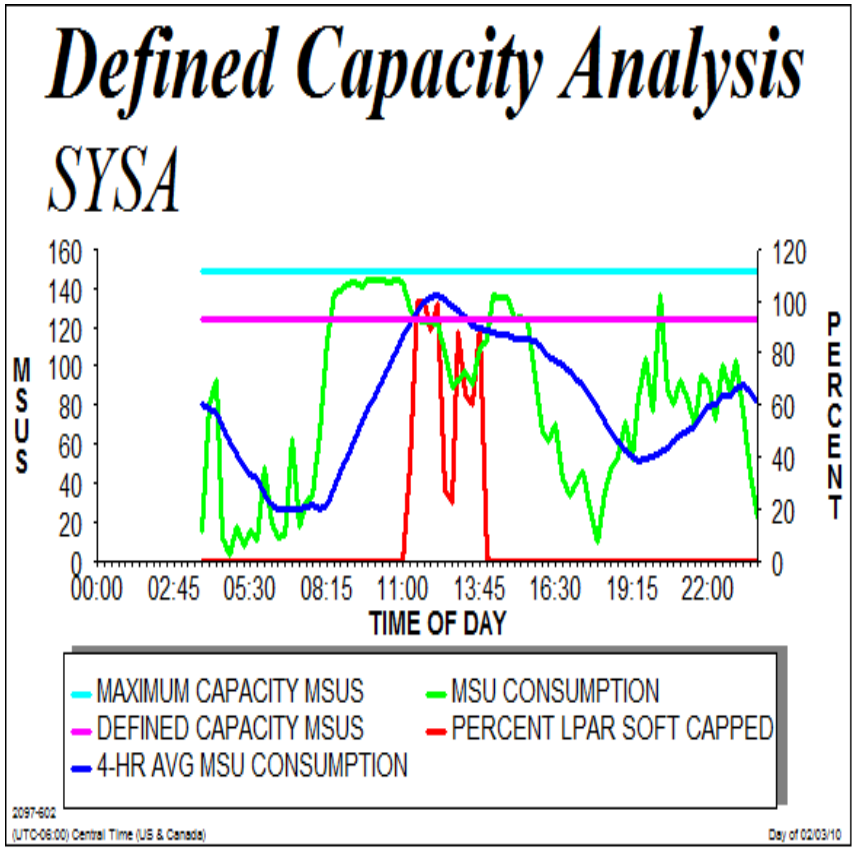
A good portion of the DDFPROD workload is running on the cheaper zIIPs. Is there more work that can run on zIIPs?

Is there more work that can run on zIIPs?



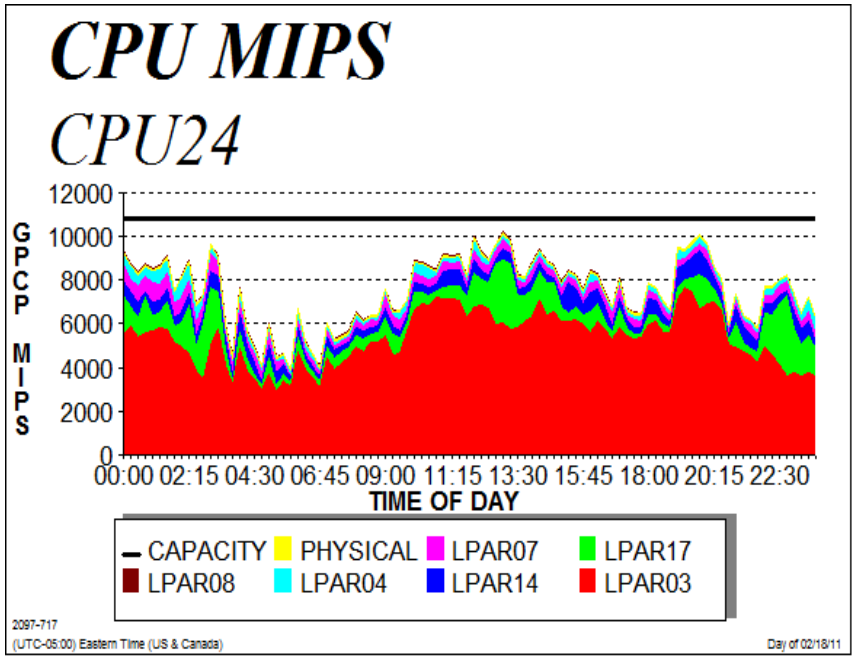
- Yes, but…
- CPU24 already has 7 zIIPs
- They are only about 20-25% utilized (see last slide)
- This chart is a reflection of the z/OS “Needs Help” dispatcher.
- Sometimes knowing when you don’t have to buy more is useful!

Analyzing the effectiveness of defined capacity for LPARs



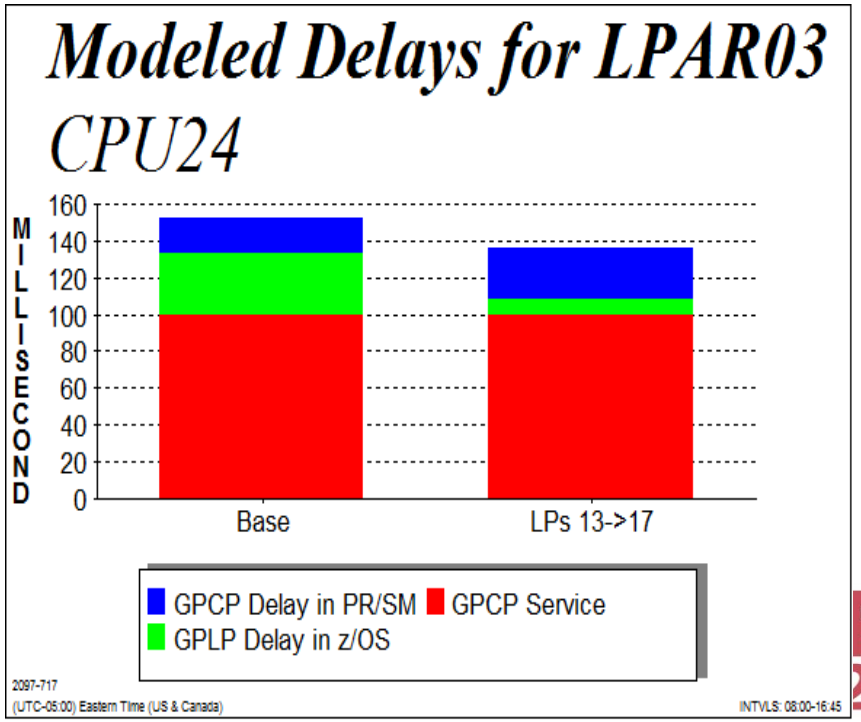
- Analysis
  - MSU CONSUMPTION (green) often exceeds DEFINED CAPACITY (magenta)
  - 4-HR AVG MSU CONSUMPTION (blue) mitigates
  - When 4-HR AVG MSU CONSUMPTION (blue) exceeds DEFINED CAPACITY (magenta)
    - LPAR is soft capped (red)
    - Until 4-HR AVG MSU CONSUMPTION (blue) back under DEFINED CAPACITY (magenta)

Determining the optimum settings for LPAR controls

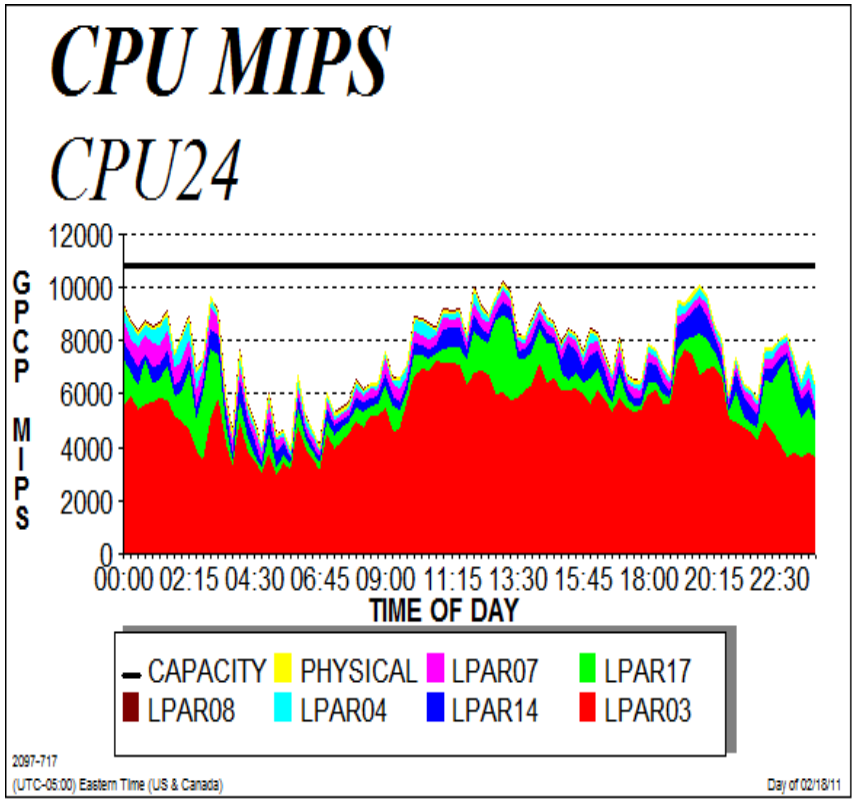


- Could LPAR03 use more logical processors (LPs) at 13:00?
- Use PerfMan for z/OS LPAR Model.

- Increase the number of LPs for LPAR03 from 13 to 17.
- Overall delay decreases
  - LP delay decreases a lot
  - CP delay increases a little



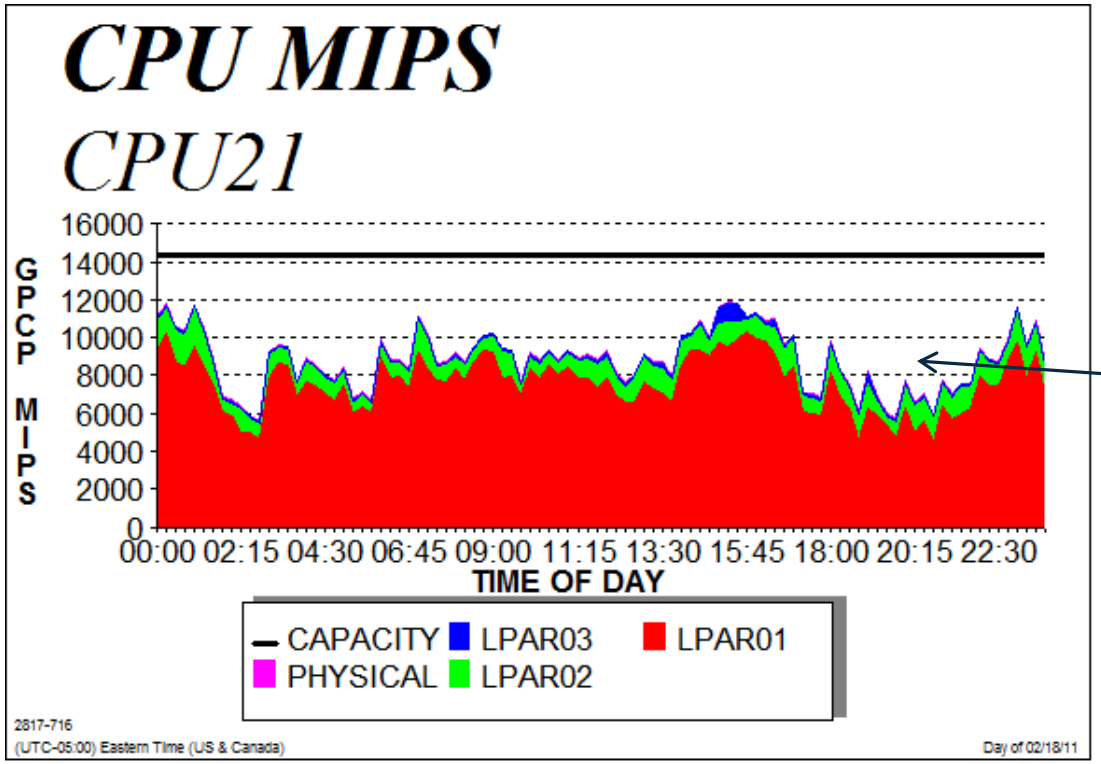
Analyzing delays in accessing CPU resources

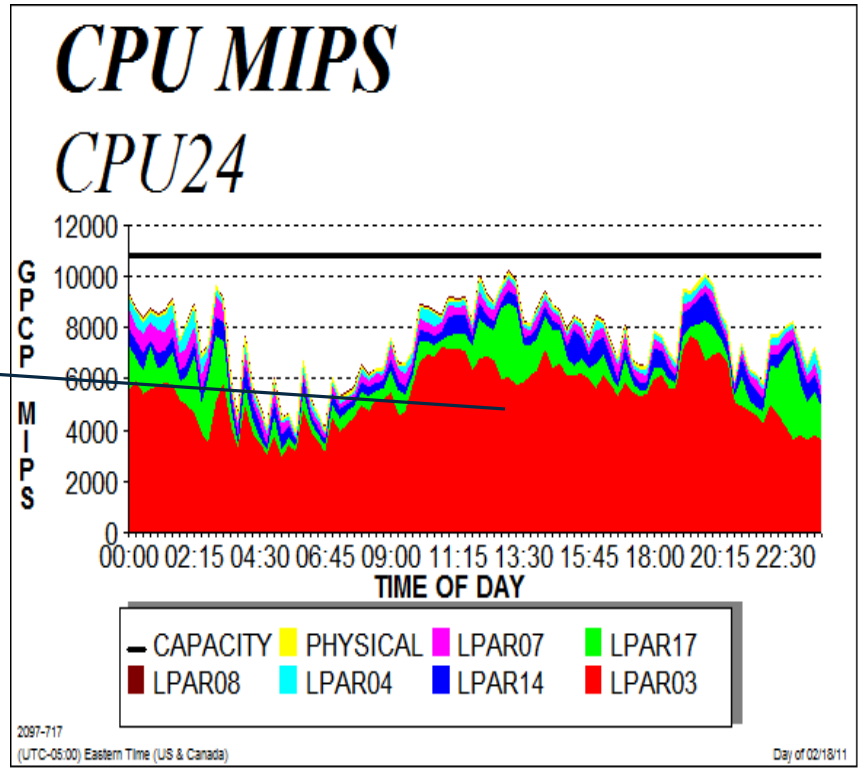


- How much delay, and what type of delay, is LPAR HD03 experiencing at 13:00?
- Use PerfMan for z/OS LPAR Model.
- To get 100 ms of GPCP service, HD03 is delayed:
  - 33.20 ms by contention for logical processors inside z/OS
  - 19.18 ms by contention for GPCP processors inside PR/SM
  - This is over a 50% delay that may be perceived as a MIPS shortage.

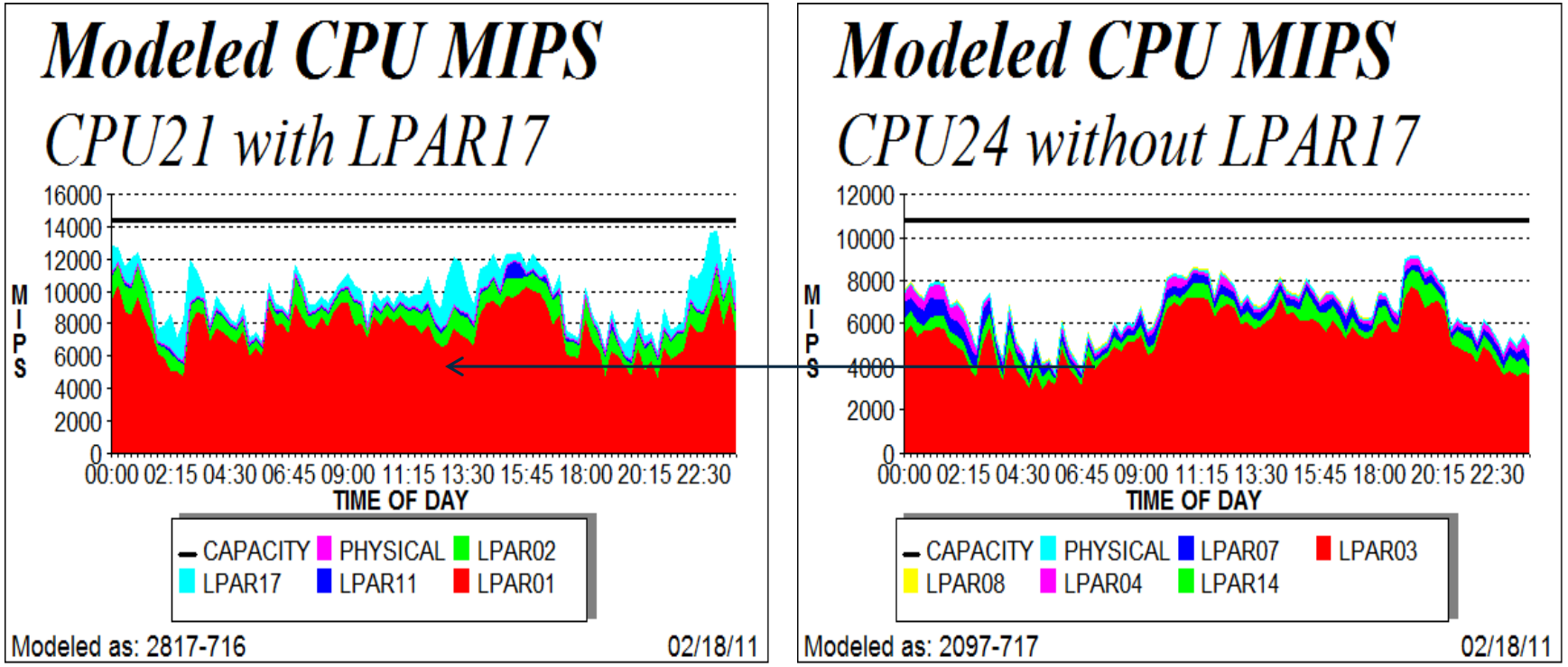
Re-aligning LPARs to balance MIPS Consumption

Can we move LPAR17 from CPU24 to CPU21?



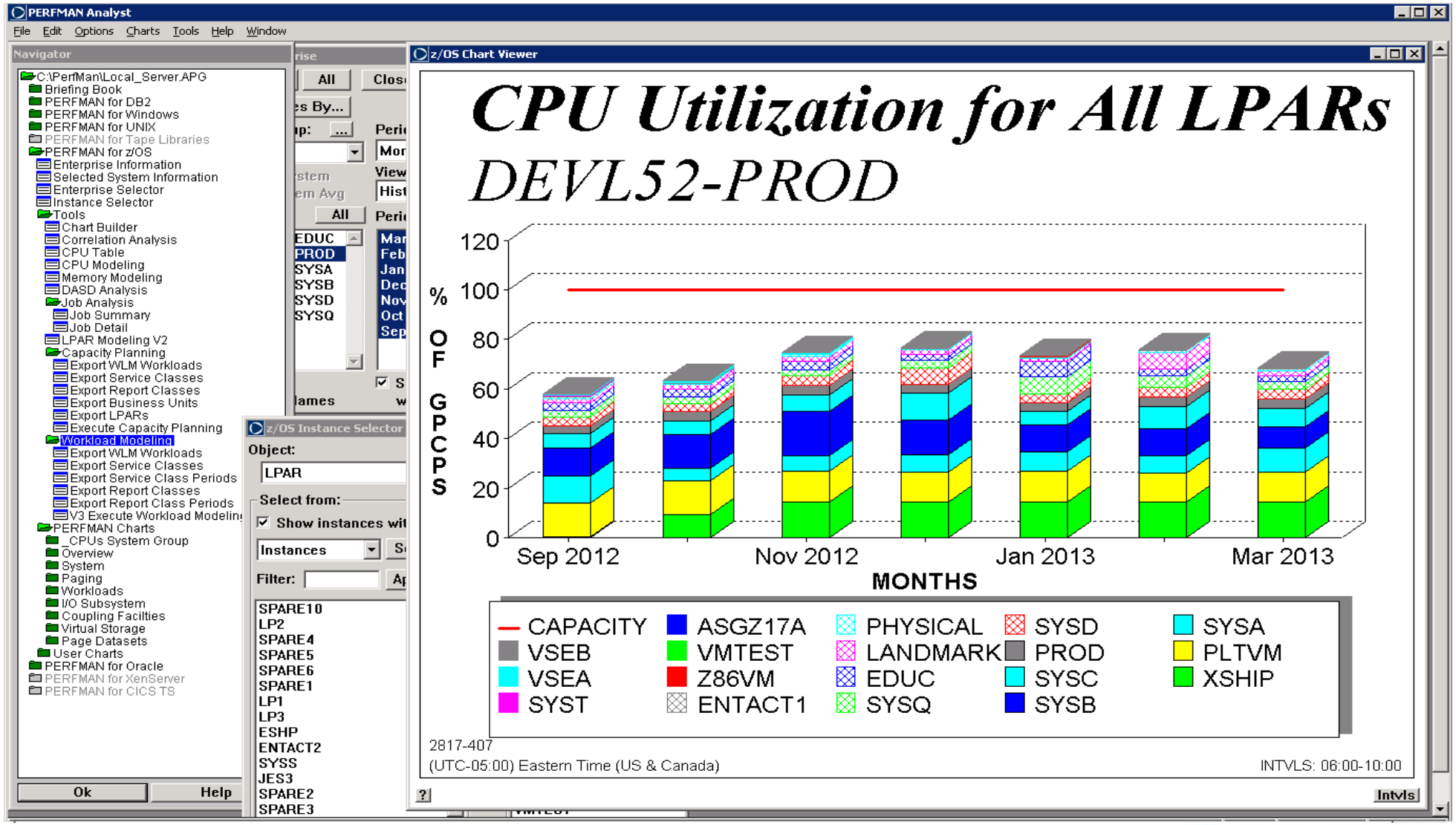


Shift LPAR17 from CPU24 to CPU21 using PerfMan for z/OS CPU Modeling

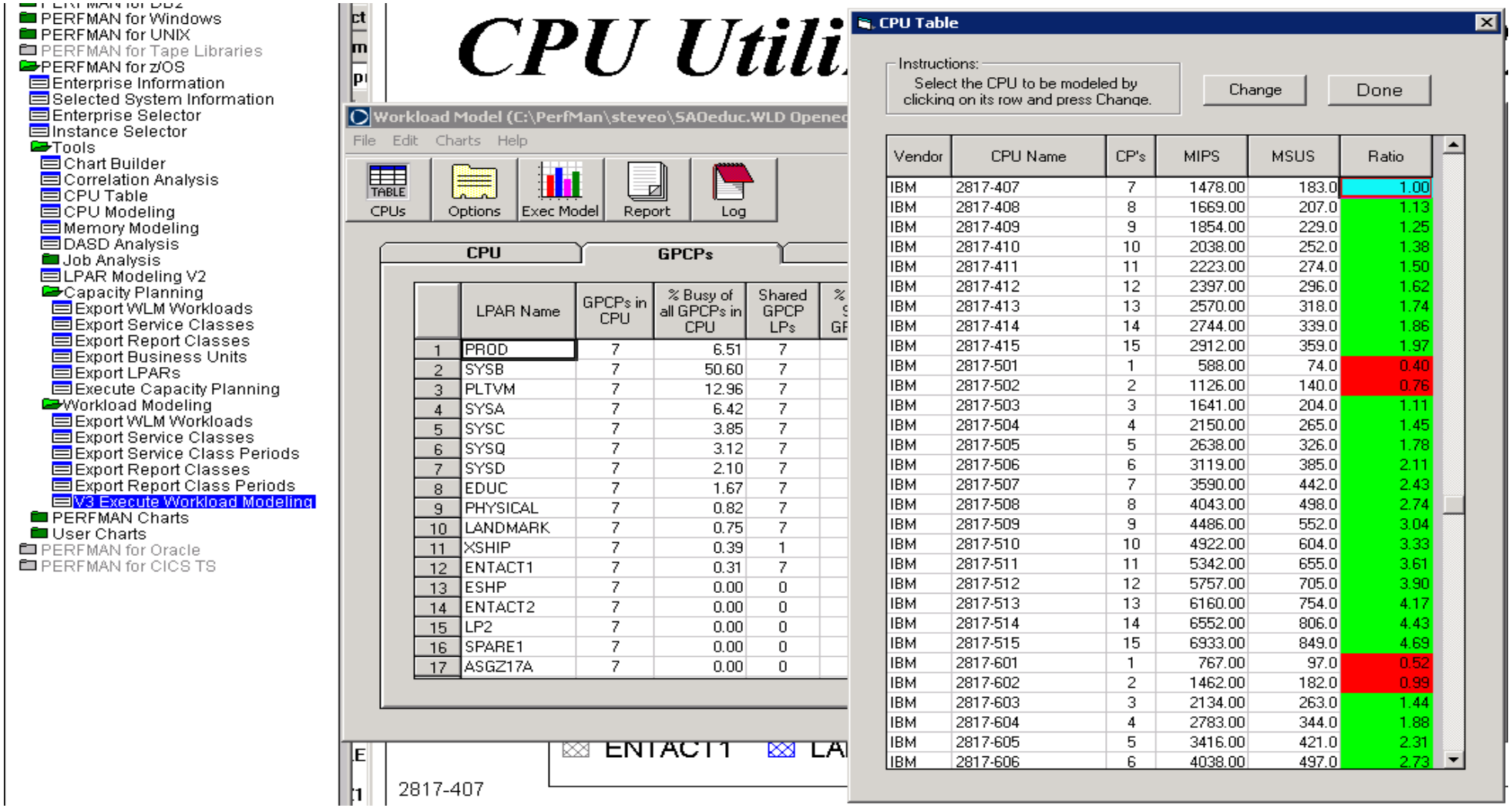


CPU21 gets close to 100% near midnight, but that is better than CPU24 getting close to 100% during prime shift (see last slide).

ASG-PERFMAN ANALYST CLIENT

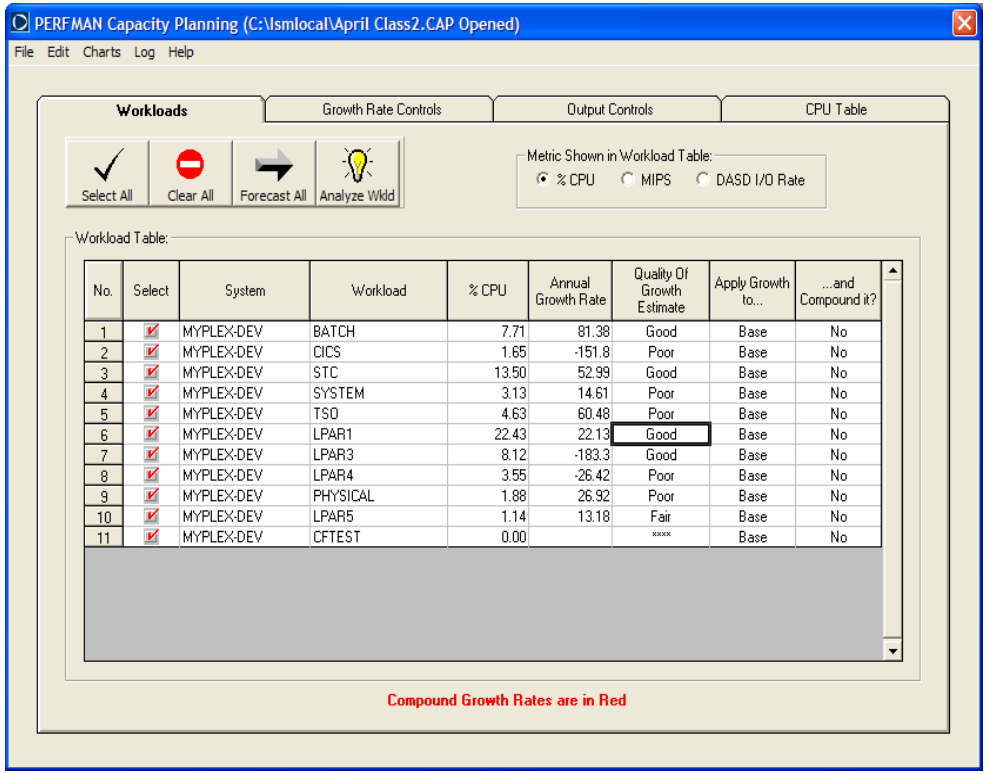


ANALYST – "WHAT IF" MODELING & PLANNING TOOLS

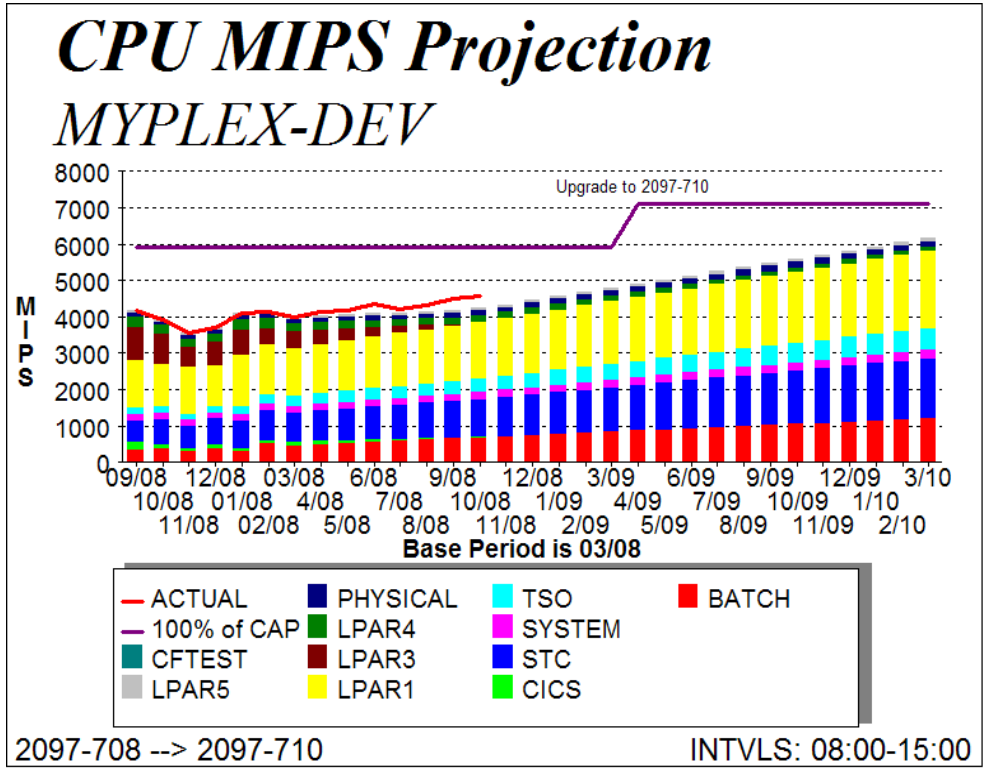


ASG-PERFMAN FOR Z/OS CAPACITY PLANNING

- MULTIPLE SYSTEMS (LPARS)
- PROJECTS CPU & DASD I/O RESOURCE USAGE
- ALLOWS CPU UPGRADES
- TRACKS ACTUAL VALUES AGAINST FORECAST

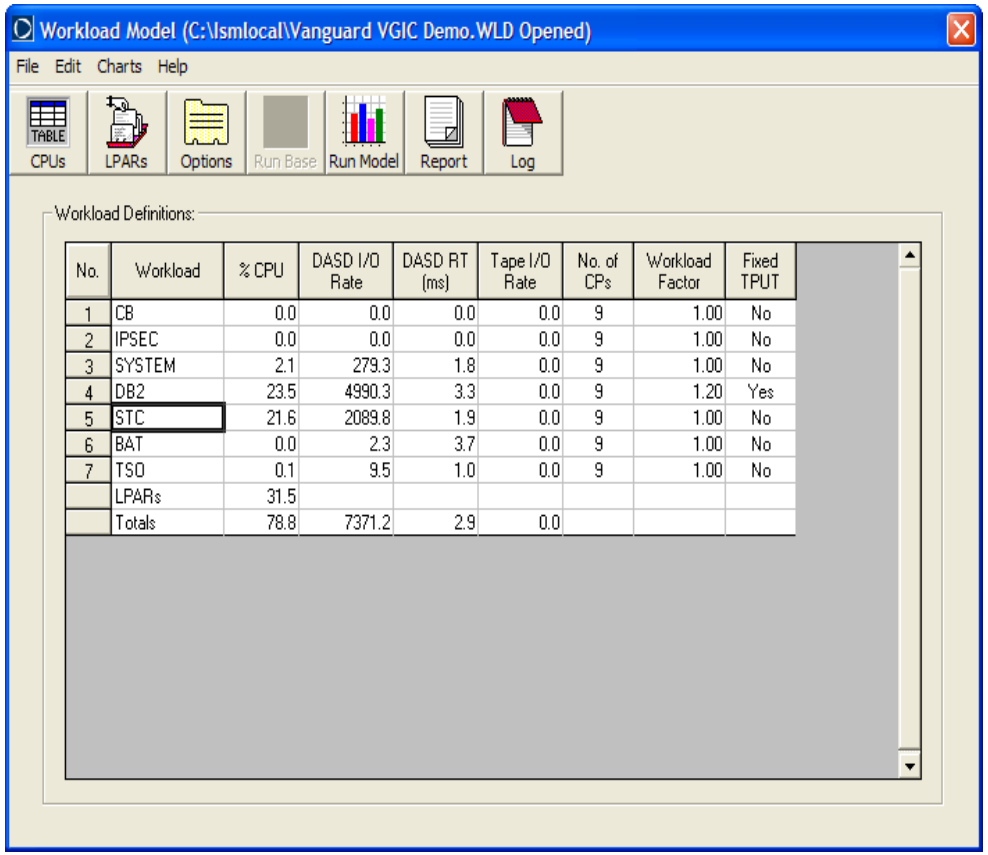


No.	Select	System	Workload	% CPU	Annual Growth Rate	Quality Of Growth Estimate	Apply Growth to...	...and Compound it?
1	☑	MYPLEX-DEV	BATCH	7.71	81.38	Good	Base	No
2	☑	MYPLEX-DEV	CICS	1.65	-151.8	Poor	Base	No
3	☑	MYPLEX-DEV	STC	13.50	52.99	Good	Base	No
4	☑	MYPLEX-DEV	SYSTEM	3.13	14.61	Poor	Base	No
5	☑	MYPLEX-DEV	TSO	4.63	60.48	Poor	Base	No
6	☑	MYPLEX-DEV	LPAR1	22.43	22.13	Good	Base	No
7	☑	MYPLEX-DEV	LPAR3	8.12	-183.3	Good	Base	No
8	☑	MYPLEX-DEV	LPAR4	3.55	-26.42	Poor	Base	No
9	☑	MYPLEX-DEV	PHYSICAL	1.88	26.92	Poor	Base	No
10	☑	MYPLEX-DEV	LPAR5	1.14	13.18	Fair	Base	No
11	☑	MYPLEX-DEV	CFTEST	0.00		****	Base	No

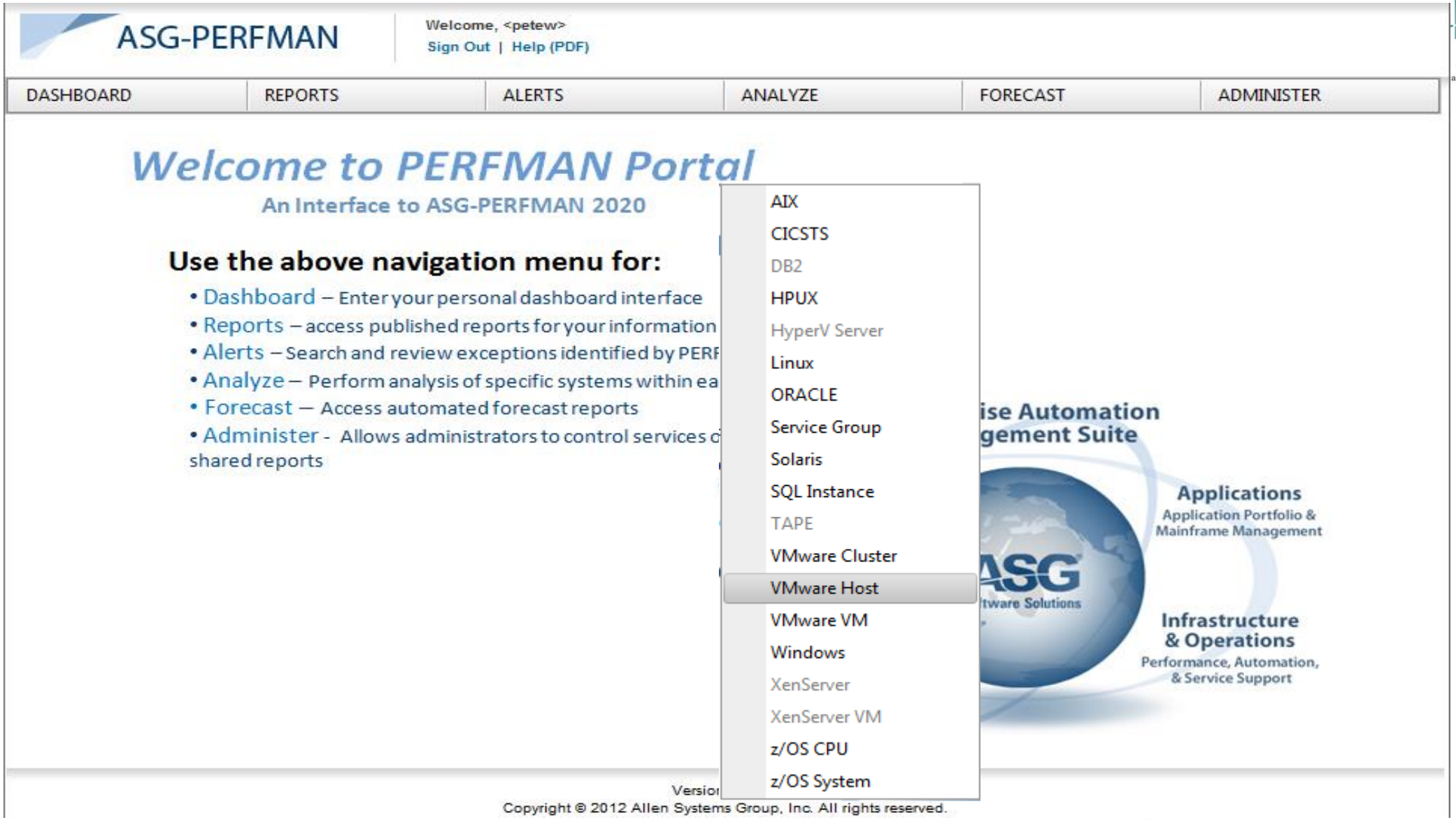


ASG-PERFMAN FOR Z/OS WORKLOAD MODELING

- BUILDS MODEL OF CEC (I.E. ALL LPARS)
- WORKLOADS FROM PRIMARY LPAR REPRESENTED EXPLICITLY
- USES ANALYTIC MODELING TECHNIQUES
- ALLOWS CHANGES TO:
  - CPU
  - Workload intensities
  - DASD I/O rates and response times
  - Other LPARs
- ESTIMATES IMPACT ON:
  - Throughputs
  - CPU utilizations
  - Response Times



No.	Workload	% CPU	DASD I/O Rate	DASD RT (ms)	Tape I/O Rate	No. of CPs	Workload Factor	Fixed TPUT
1	CB	0.0	0.0	0.0	0.0	9	1.00	No
2	IPSEC	0.0	0.0	0.0	0.0	9	1.00	No
3	SYSTEM	2.1	279.3	1.8	0.0	9	1.00	No
4	DB2	23.5	4990.3	3.3	0.0	9	1.20	Yes
5	STC	21.6	2089.8	1.9	0.0	9	1.00	No
6	BAT	0.0	2.3	3.7	0.0	9	1.00	No
7	TSO	0.1	9.5	1.0	0.0	9	1.00	No
	LPARs	31.5						
	Totals	78.8	7371.2	2.9	0.0			


ASG-PERFMAN
Welcome, <petew>
Sign Out | Help (PDF)
DASHBOARD
REPORTS
ALERTS
ANALYZE
FORECAST
ADMINISTER
Welcome to PERFMAN Portal
An Interface to ASG-PERFMAN 2020
Use the above navigation menu for:
• Dashboard – Enter your personal dashboard interface
• Reports – access published reports for your information
• Alerts – Search and review exceptions identified by PERF
• Analyze – Perform analysis of specific systems within ea
• Forecast – Access automated forecast reports
• Administer - Allows administrators to control services c
shared reports
AIX
CICSTS
DB2
HPUX
HyperV Server
Linux
ORACLE
Service Group
Solaris
SQL Instance
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VMware Host
VMware VM
Windows
XenServer
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Infrastructure
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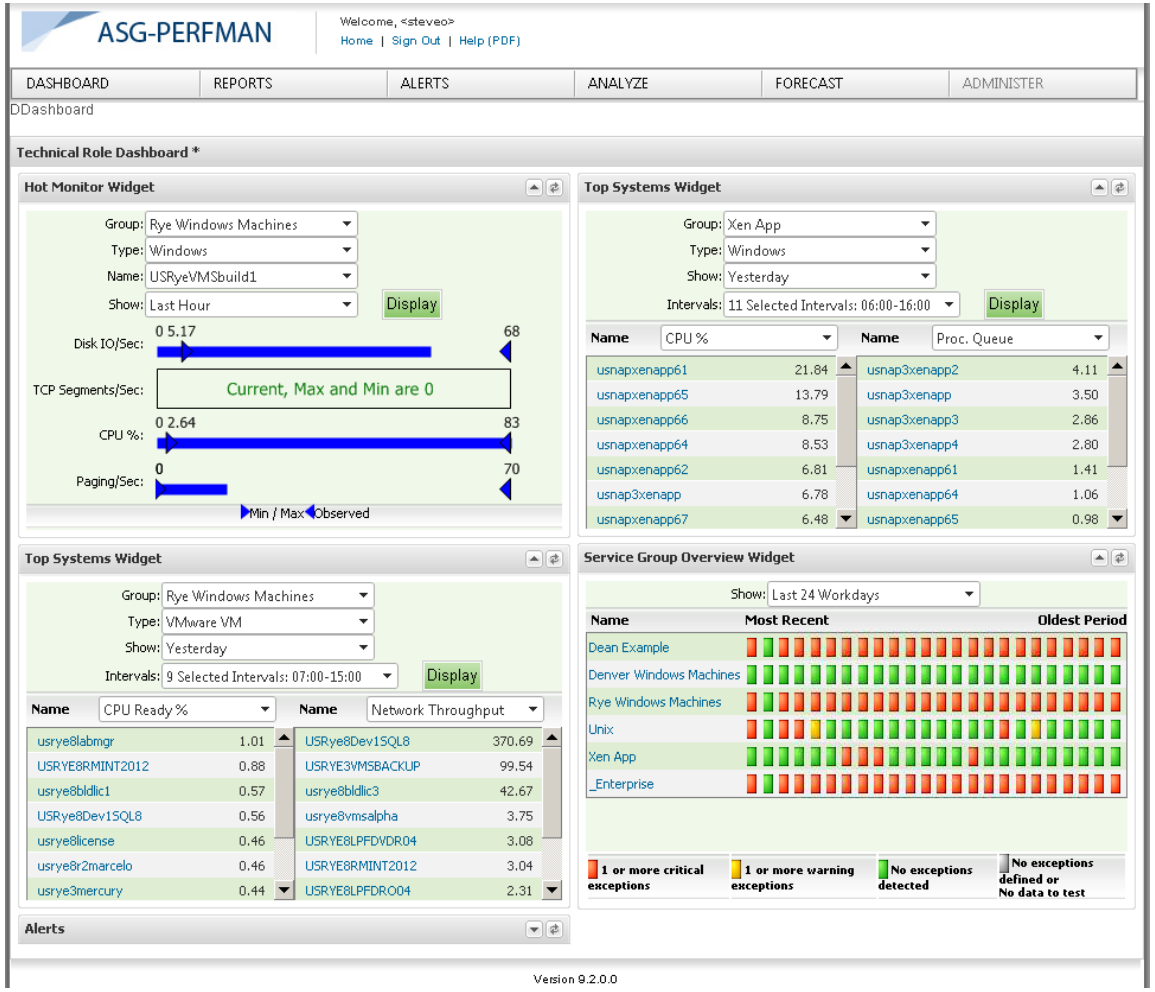
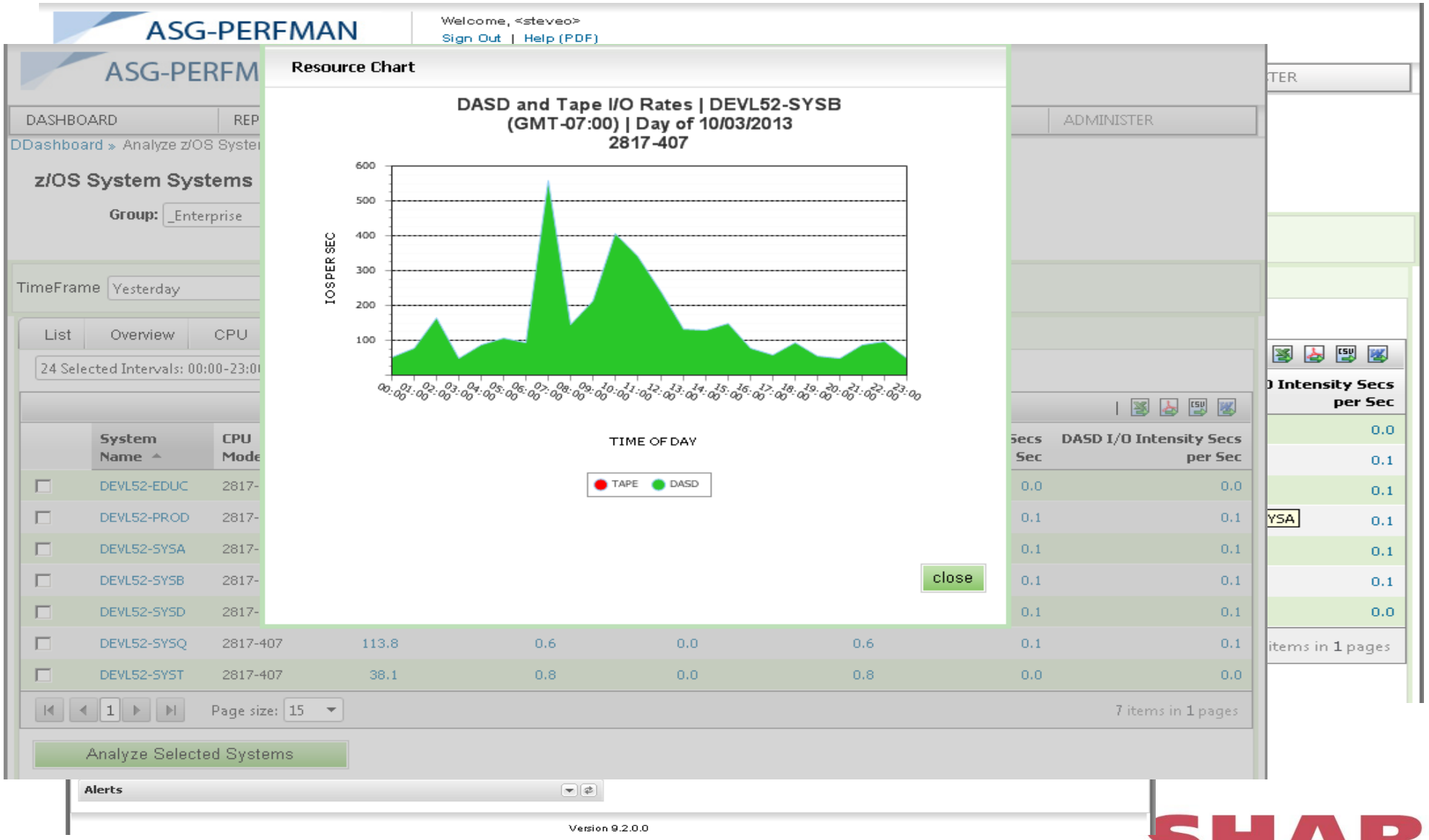
ASG-PERFMAN PORTAL



- FULLY-INTEGRATED, CUSTOMIZABLE WEB-BASED INTERFACE
- ACCESS SUMMARIZED DATA (DAILY, WEEKLY, MONTHLY) FOR ANALYSIS
- IDENTIFY SERVICE EXCEPTIONS FOR GROUPS OR INDIVIDUAL SYSTEMS
- ACCESS SHARED AND AUTOMATIC REPORTS

Web-based Portal User Interface



CPU Delay Analysis

Planning Interval: INTVLS: 00:00-End
Time Zone: (GMT-07:00) Mountain Time (US & Canada)

Threshold Criteria (Samples)

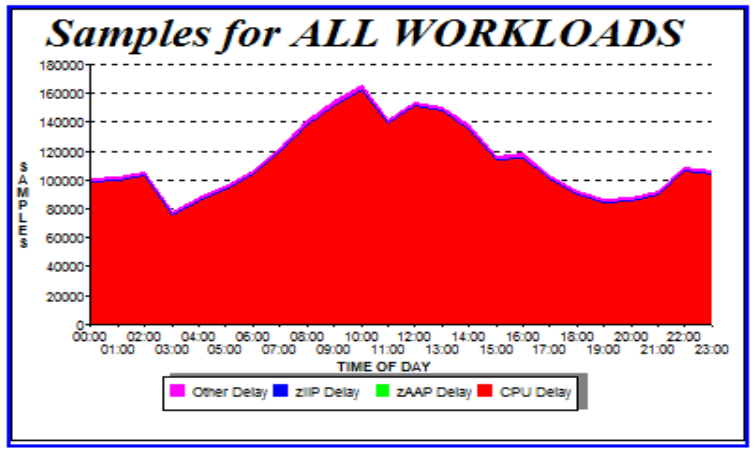
Good	Value <= 10000.0
Warning	10000.0 > Value < 15000.0
Problem	Value >= 15000.0

ANALYSIS

Observations:

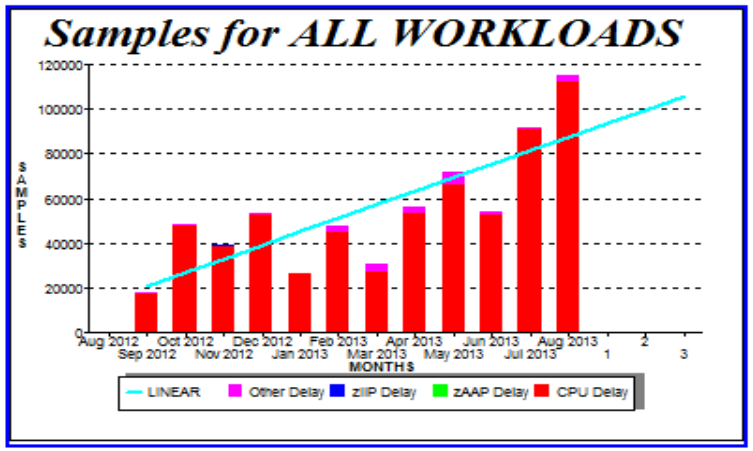
The average CPU delay for DEVL52-SYSB is 112375.41 samples. Based on an average growth rate of 21.97% per period, in 3 months the predicted average CPU percent utilization is expected to be 101822.21 samples with fair confidence.

CURRENT PERIOD

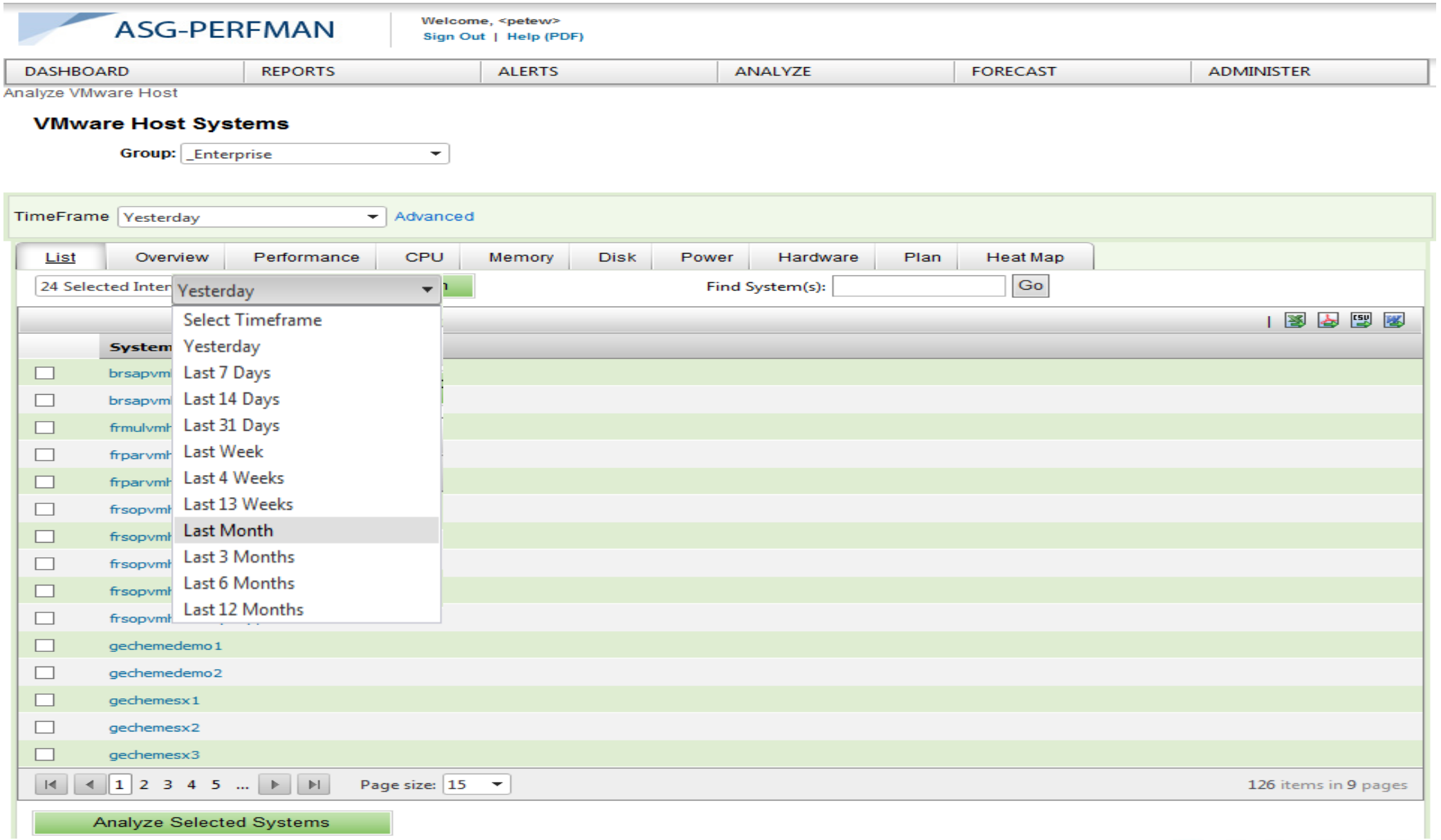


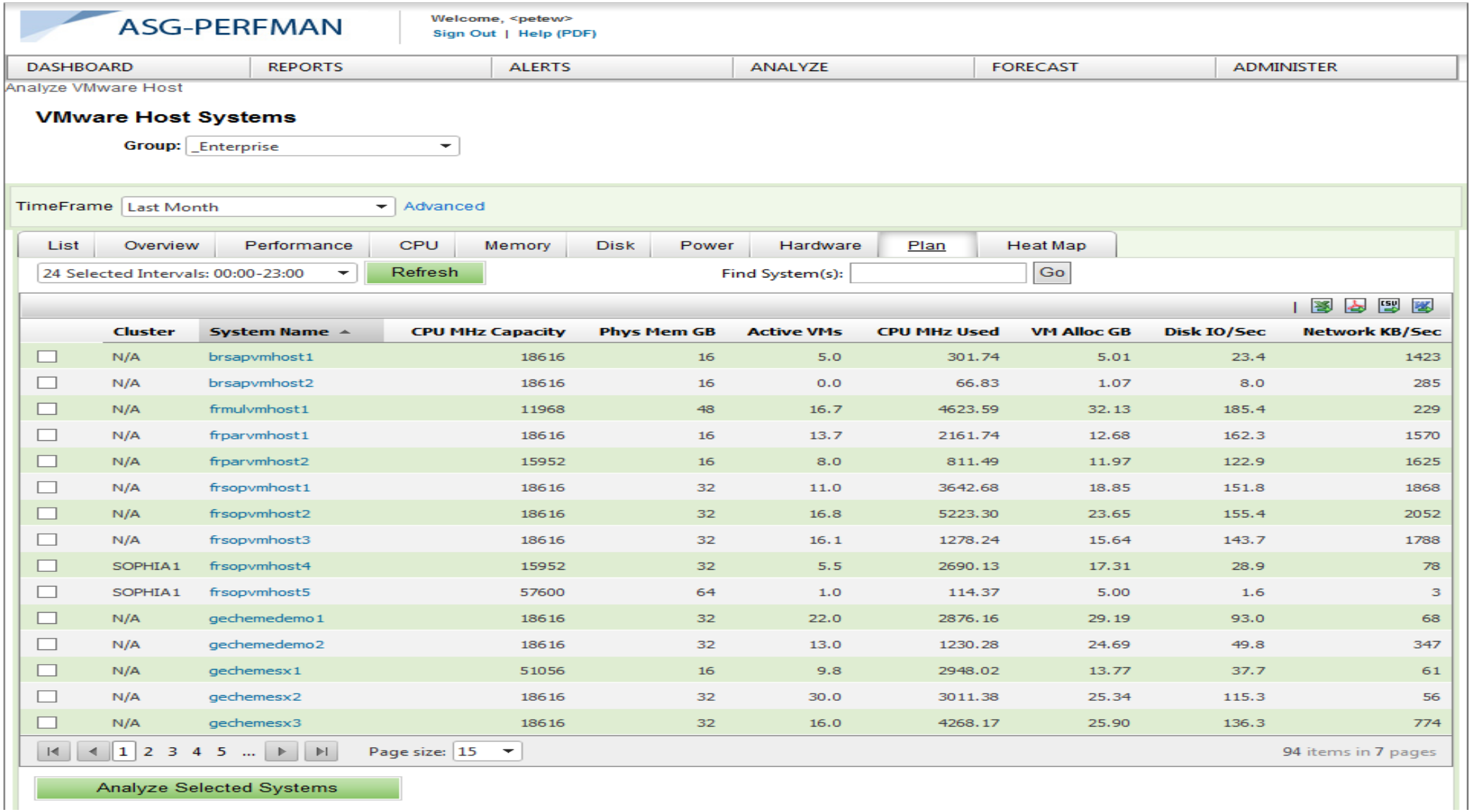
Hour	GPCP	zAAP	zIIP	Other	Total
0	98933.422	0.000	39.231	2269.808	101242.464
1	99470.617	0.000	40.500	2252.578	101763.695
2	103458.492	0.000	41.692	2259.511	105759.698
3	75890.188	0.000	27.111	2155.373	78072.670
4	85966.148	0.000	24.741	2191.291	88182.182
5	92725.406	0.000	30.815	2195.990	94952.209
6	103805.961	0.000	36.444	2368.438	106210.844

HISTORY



Period	GPCP	zAAP	zIIP	Other	Total
Aug 2012	nodata	nodata	nodata	nodata	nodata
Sep 2012	17518.461	0.000	3.090	80.029	17601.580
Oct 2012	47605.527	0.000	1.900	992.525	48599.951
Nov 2012	38776.895	0.000	43.870	135.087	38955.853
Dec 2012	52894.898	0.000	1.459	102.408	52998.767
Jan 2013	26413.482	0.000	2.513	119.661	26535.657
Feb 2013	44610.340	0.000	4.237	2946.236	47560.814


ASG-PERFMAN
Welcome, <petew>
Sign Out | Help (PDF)
DASHBOARD
REPORTS
ALERTS
ANALYZE
FORECAST
ADMINISTER
Analyze VMware Host
VMware Host Systems
Group: _Enterprise
TimeFrame Yesterday
Advanced
List
Overview
Performance
CPU
Memory
Disk
Power
Hardware
Plan
Heat Map
24 Selected Inter
Yesterday
Find System(s):
Go
Select Timeframe
Yesterday
Last 7 Days
Last 14 Days
Last 31 Days
Last Week
Last 4 Weeks
Last 13 Weeks
Last Month
Last 3 Months
Last 6 Months
Last 12 Months
System
brsapvmi
brsapvmi
frmulvmh
frparvmh
frparvmh
frsopvmh
frsopvmh
frsopvmh
frsopvmh
frsopvmh
gechemedemo1
gechemedemo2
gechemesx1
gechemesx2
gechemesx3
1 2 3 4 5 ...
Page size: 15
126 items in 9 pages
Analyze Selected Systems


ASG-PERFMAN
Welcome, <petew>
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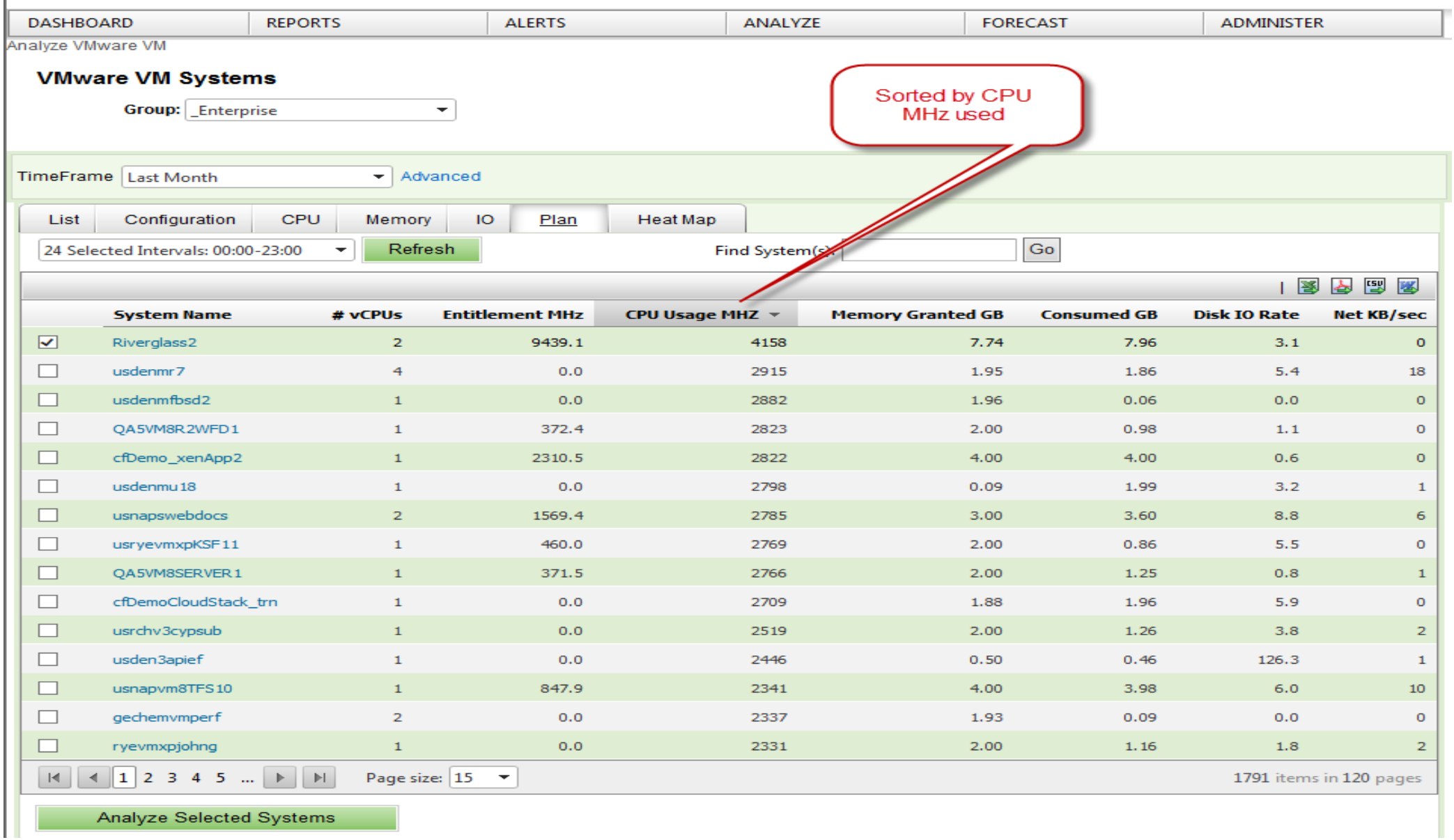
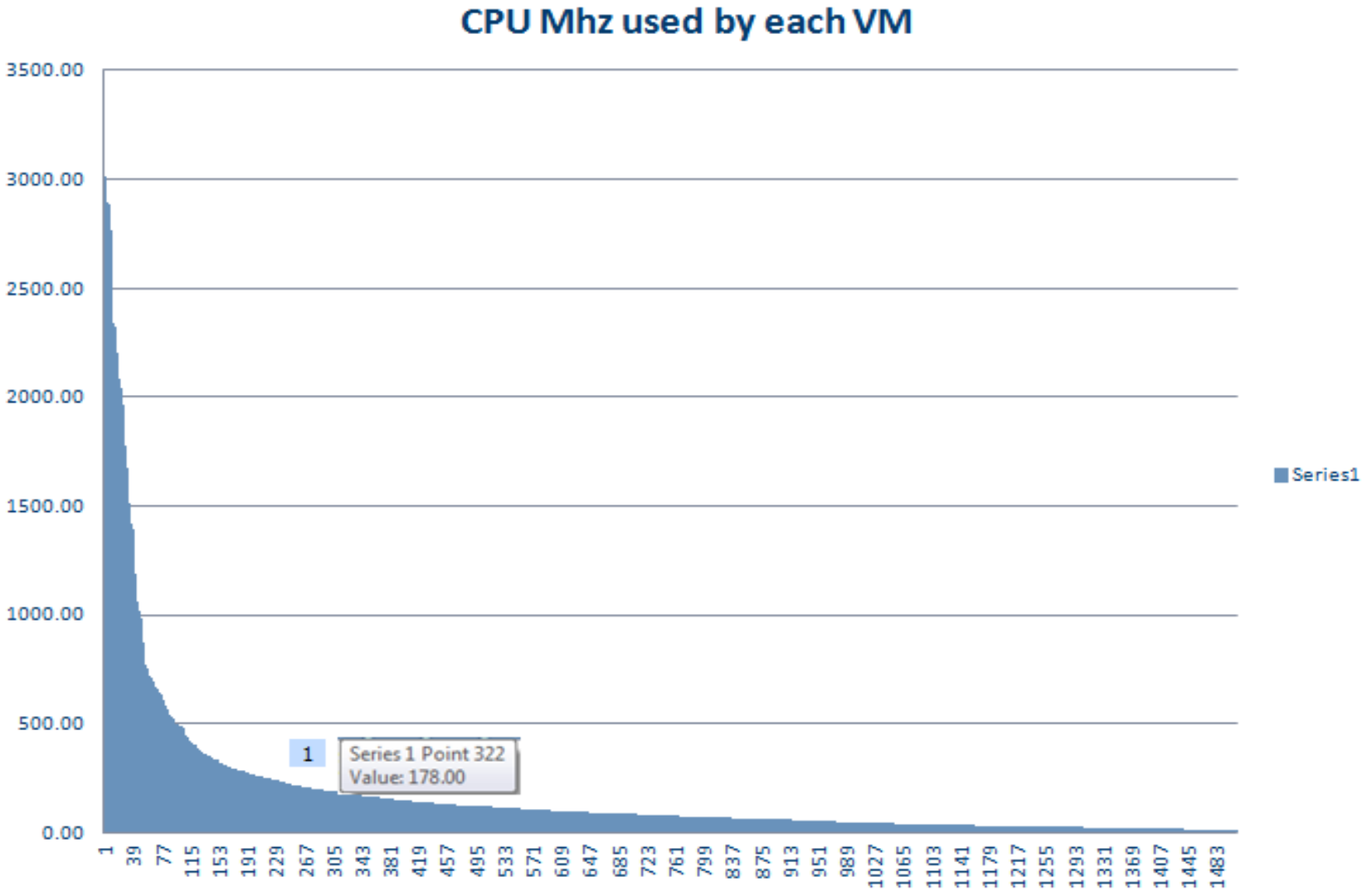
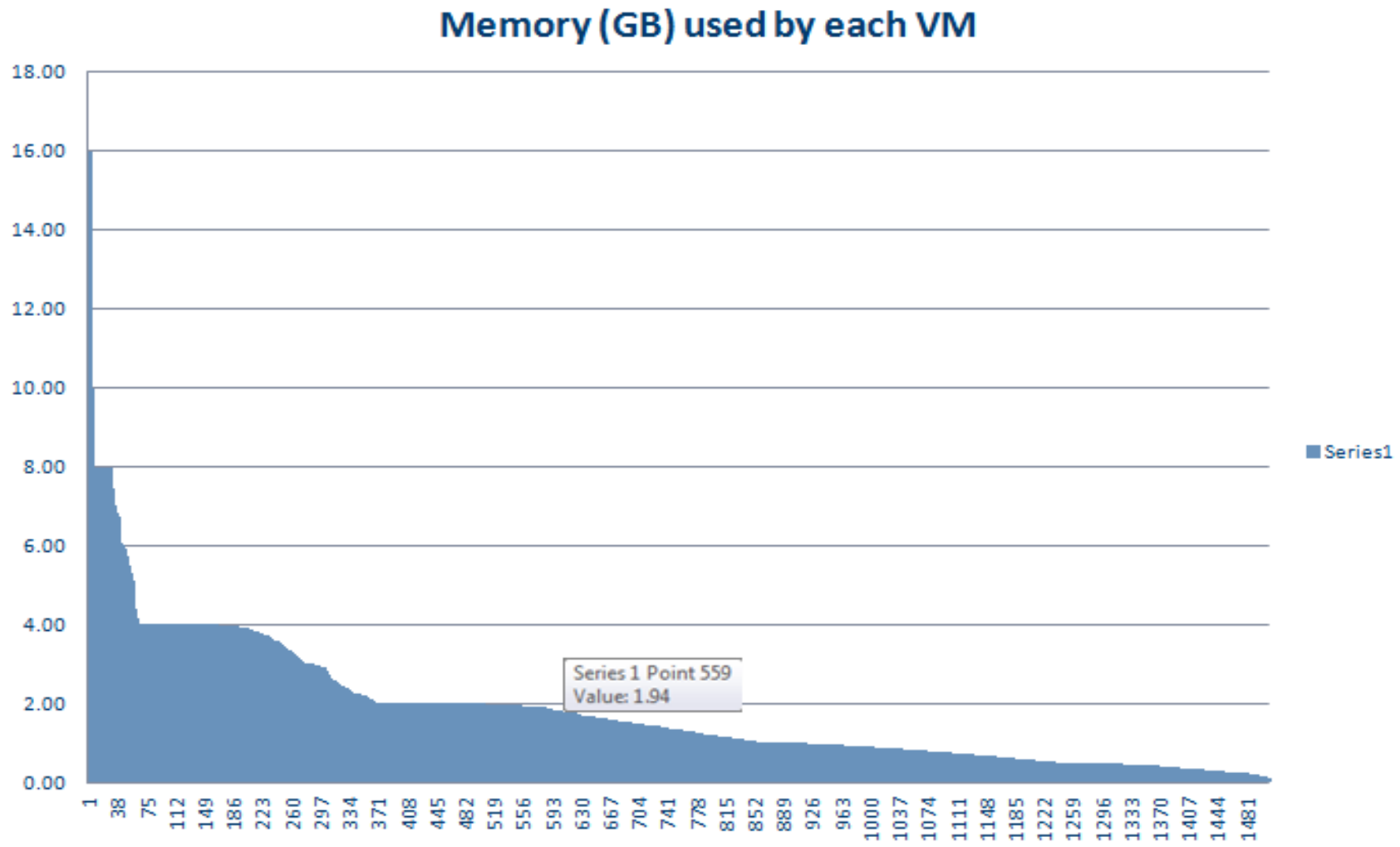
DASHBOARD
REPORTS
ALERTS
ANALYZE
FORECAST
ADMINISTER
Analyze VMware Host
VMware Host Systems
Group: _Enterprise
TimeFrame Last Month
Advanced
List
Overview
Performance
CPU
Memory
Disk
Power
Hardware
Plan
Heat Map
24 Selected Intervals: 00:00-23:00
Refresh
Find System(s):
Go
Cluster
System Name
CPU MHz Capacity
Phys Mem GB
Active VMs
CPU MHz Used
VM Alloc GB
Disk IO/Sec
Network KB/Sec
N/A brsapvmhost1 18616 16 5.0 301.74 5.01 23.4 1423
N/A brsapvmhost2 18616 16 0.0 66.83 1.07 8.0 285
N/A frmulvmhost1 11968 48 16.7 4623.59 32.13 185.4 229
N/A frparvmhost1 18616 16 13.7 2161.74 12.68 162.3 1570
N/A frparvmhost2 15952 16 8.0 811.49 11.97 122.9 1625
N/A frsopvmhost1 18616 32 11.0 3642.68 18.85 151.8 1868
N/A frsopvmhost2 18616 32 16.8 5223.30 23.65 155.4 2052
N/A frsopvmhost3 18616 32 16.1 1278.24 15.64 143.7 1788
SOPHIA1 frsopvmhost4 15952 32 5.5 2690.13 17.31 28.9 78
SOPHIA1 frsopvmhost5 57600 64 1.0 114.37 5.00 1.6 3
N/A gechemedemo1 18616 32 22.0 2876.16 29.19 93.0 68
N/A gechemedemo2 18616 32 13.0 1230.28 24.69 49.8 347
N/A gechemesx1 51056 16 9.8 2948.02 13.77 37.7 61
N/A gechemesx2 18616 32 30.0 3011.38 25.34 115.3 56
N/A gechemesx3 18616 32 16.0 4268.17 25.90 136.3 774
1 2 3 4 5 ...
Page size: 15
94 items in 7 pages
Analyze Selected Systems


DASHBOARD
REPORTS
ALERTS
ANALYZE
FORECAST
ADMINISTER
Analyze VMware VM
VMware VM Systems
Group: _Enterprise
Sorted by CPU MHz used
TimeFrame Last Month
Advanced
List
Configuration
CPU
Memory
IO
Plan
Heat Map
24 Selected Intervals: 00:00-23:00
Refresh
Find System(s)
Go
System Name
vCPUs
Entitlement MHz
CPU Usage MHZ
Memory Granted GB
Consumed GB
Disk IO Rate
Net KB/sec
Riverglass2 2 9439.1 4158 7.74 7.96 3.1 0
usdenmr7 4 0.0 2915 1.95 1.86 5.4 18
usdenmfbsd2 1 0.0 2882 1.96 0.06 0.0 0
QA5VM8R2WFD1 1 372.4 2823 2.00 0.98 1.1 0
cfDemo_xenApp2 1 2310.5 2822 4.00 4.00 0.6 0
usdenmu18 1 0.0 2798 0.09 1.99 3.2 1
usnapswebdocs 2 1569.4 2785 3.00 3.60 8.8 6
usryevmxpKSF11 1 460.0 2769 2.00 0.86 5.5 0
QA5VM8SERVER1 1 371.5 2766 2.00 1.25 0.8 1
cfDemoCloudStack_trn 1 0.0 2709 1.88 1.96 5.9 0
usrchv3cypsub 1 0.0 2519 2.00 1.26 3.8 2
usden3apief 1 0.0 2446 0.50 0.46 126.3 1
usnapvm8TFS10 1 847.9 2341 4.00 3.98 6.0 10
gechemvmperf 2 0.0 2337 1.93 0.09 0.0 0
ryevmxpjohng 1 0.0 2331 2.00 1.16 1.8 2
1 2 3 4 5 ...
Page size: 15
1791 items in 120 pages
Analyze Selected Systems

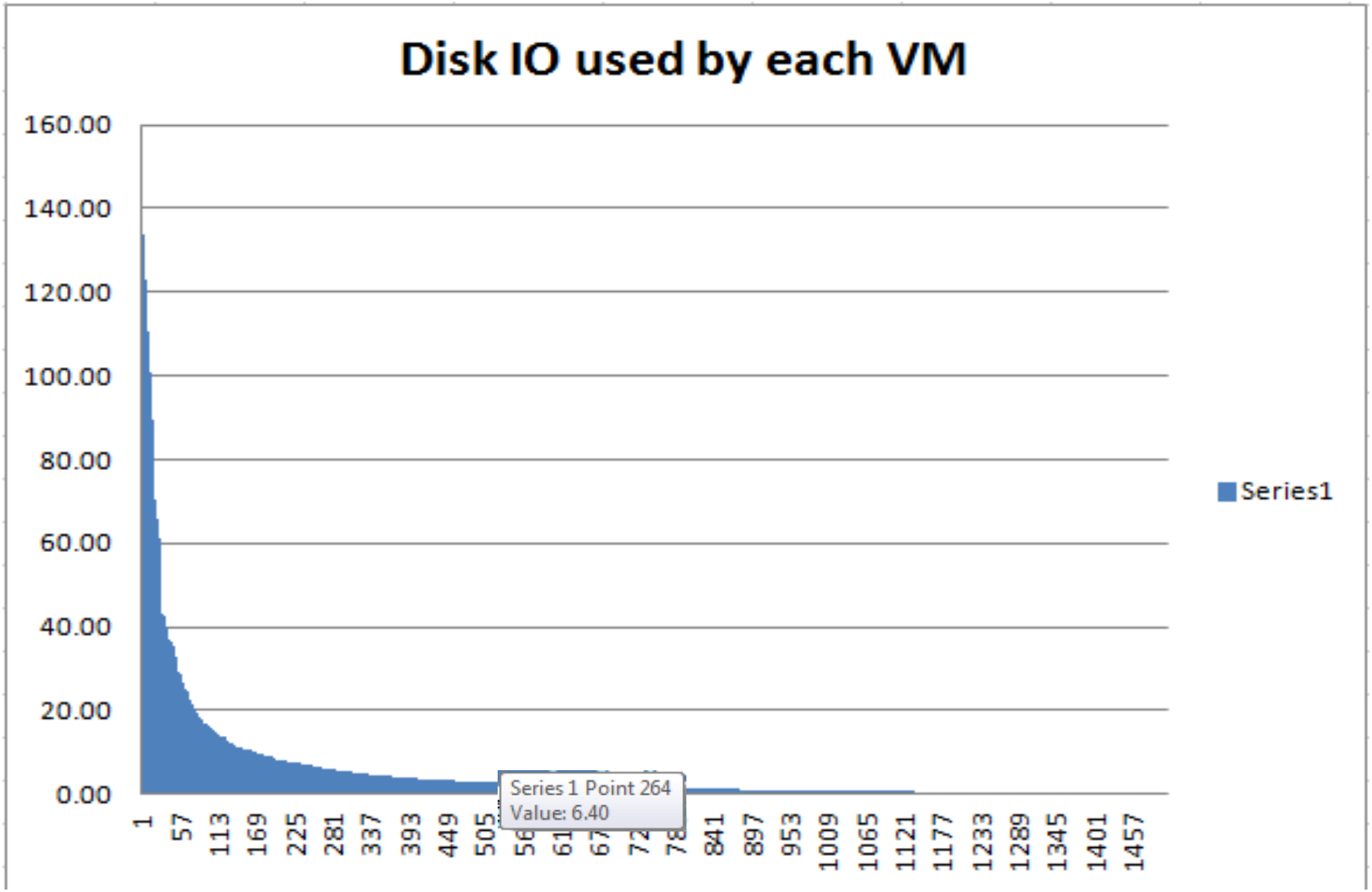
Average VM CPU is 81st percentile



Average Mem is 63rd percentile



Average IO is 82nd percentile



CPU Capacity Limit	80%
Memory Commit	100%
Disk IO Limit	1200
Net KB Limit	10000

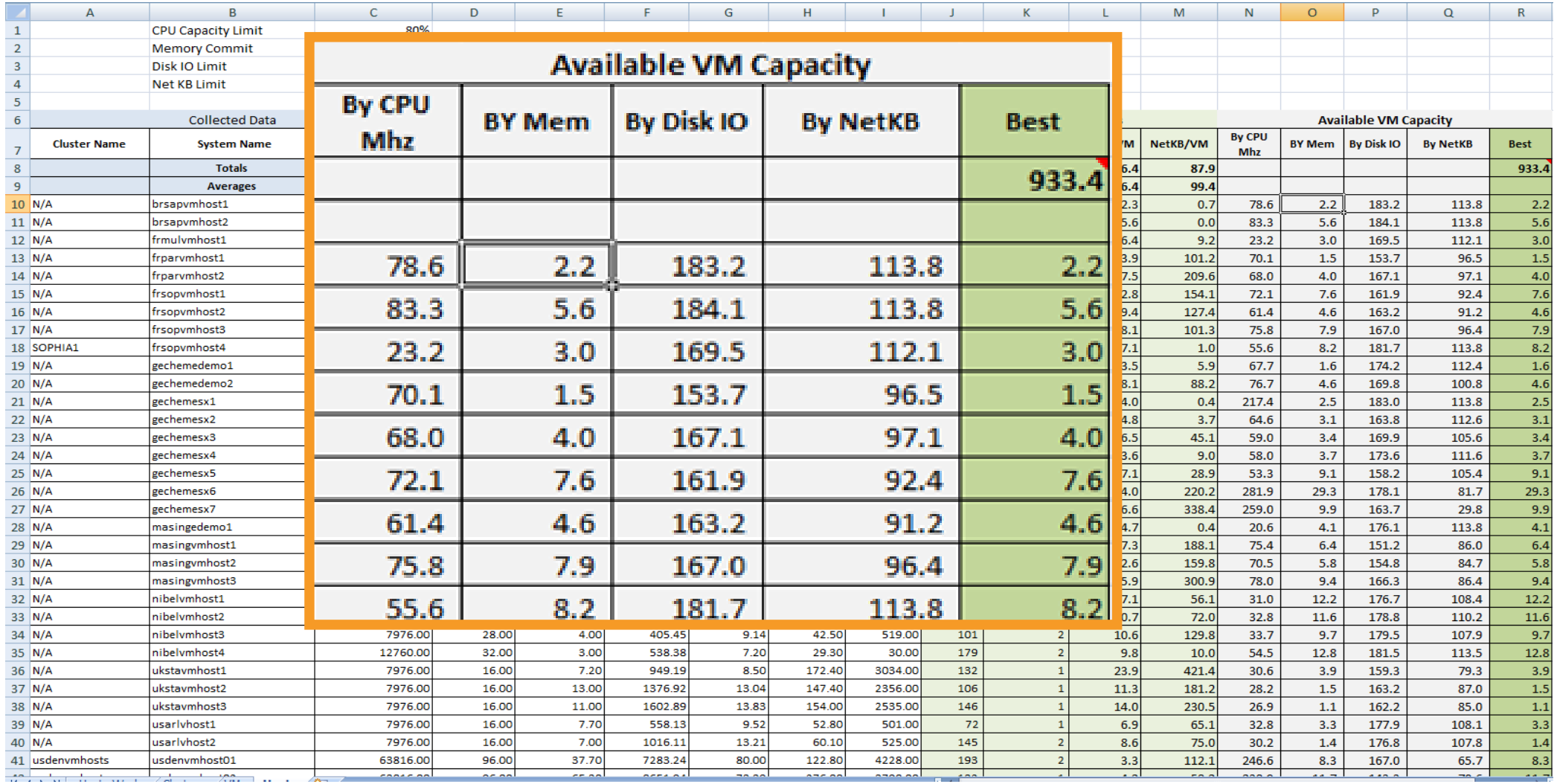
O10 =((D10*Memory_Commit)-G10)/K$8

	A	B	C	D	E	F
1		CPU Capacity Limit	80%			
2		Memory Commit	100%			
3		Disk IO Limit	1200			
4		Net KB Limit	10000	(2500=10MB duplex, 25000=100MB duplex)		
5						

			Collected Data							Average VM Calcs				Available VM Capacity			
7	Cluster Name	System Name	CPU MHz Capacity	Phys Mem GB	Active VMs	CPU MHz Used	VM Alloc GB	Disk IO/Sec	Network KB/Sec	Mhz/VM	MemGB/VM	Disk IO/VM	NetKB/VM	By CPU Mhz	BY Mem	By Disk IO	By NetKB
8		**Totals**	**2,844,948**	**4,919**	**1,598**	**283,663**	**3,097**	**10,306**	**140,399**	**178**	**2**	**6.4**	**87.9**				
9		**Averages**	**33,080.79**	**57.20**	**18.58**	**3,298.41**	**36.01**	**119.84**	**1,847.36**	**178**	**2**	**6.4**	**99.4**				
10	N/A	brsapvmhost1	18616.00	16.00	8.10	945.16	11.74	18.40	6.00	117	1	2.3	0.7	78.6	2.2	183.2	113.8
11	N/A	brsapvmhost2	18616.00	16.00	0.80	109.64	5.24	12.50	0.00	137	7	15.6	0.0	83.3	5.6	184.1	113.8
12	N/A	frmulvmhost1	11968.00	48.00	16.60	5458.31	42.09	106.70	153.00	329	3	6.4	9.2	23.2	3.0	169.5	112.1
						2444.27	13.12	208.90	1518.00	163	1	13.9	101.2	70.1	1.5	153.7	96.5
						691.05	8.26	122.30	1467.00	99	1	17.5	209.6	68.0	4.0	167.1	97.1
						2098.84	17.33	155.70	1880.00	172	1	12.8	154.1	72.1	7.6	161.9	92.4
						3994.32	23.17	147.20	1988.00	256	1	9.4	127.4	61.4	4.6	163.2	91.2
						1429.86	16.74	122.90	1529.00	95	1	8.1	101.3	75.8	7.9	167.0	96.4
						2892.42	16.08	28.50	4.00	723	4	7.1	1.0	55.6	8.2	181.7	113.8
						2877.18	28.99	76.70	129.00	131	1	3.5	5.9	67.7	1.6	174.2	112.4
						1271.46	23.01	104.70	1147.00	98	2	8.1	88.2	76.7	4.6	169.8	100.8
						2253.69	11.07	20.00	2.00	451	2	4.0	0.4	217.4	2.5	183.0	113.8
						3426.21	25.98	143.50	110.00	114	1	4.8	3.7	64.6	3.1	163.8	112.6
						4411.96	25.43	104.60	721.00	276	2	6.5	45.1	59.0	3.4	169.9	105.6
						4600.25	24.83	80.20	198.00	209	1	3.6	9.0	58.0	3.7	173.6	111.6
						4156.72	78.44	179.80	736.00	163	3	7.1	28.9	53.3	9.1	158.2	105.4
						1021.39	39.29	51.60	2818.00	80	3	4.0	220.2	281.9	29.3	178.1	81.7
						5073.73	76.91	144.00	7378.00	233	4	6.6	338.4	259.0	9.9	163.7	29.8
						2720.13	24.04	64.50	5.00	197	2	4.7	0.4	20.6	4.1	176.1	113.8
						2563.19	19.56	225.10	2445.00	197	2	17.3	188.1	75.4	6.4	151.2	86.0
						3441.23	20.77	202.00	2556.00	215	1	12.6	159.8	70.5	5.8	154.8	84.7
						1041.34	13.69	127.20	2407.00	130	2	15.9	300.9	78.0	9.4	166.3	86.4
						880.38	8.35	60.60	477.00	104	1	7.1	56.1	31.0	12.2	176.7	108.4
						567.50	5.60	47.10	317.00	129	1	10.7	72.0	32.8	11.6	178.8	110.2
						405.45	9.14	42.50	519.00	101	2	10.6	129.8	33.7	9.7	179.5	107.9
						538.38	7.20	29.30	30.00	179	2	9.8	10.0	54.5	12.8	181.5	113.5

Available VM Capacity

By CPU Mhz	BY Mem	By Disk IO	By NetKB
78.6	2.2	183.2	113.8
83.3	5.6	184.1	113.8
23.2	3.0	169.5	112.1
70.1	1.5	153.7	96.5
68.0	4.0	167.1	97.1
72.1	7.6	161.9	92.4
61.4	4.6	163.2	91.2



	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
1		CPU Capacity Limit	80%															
2		Memory Commit																
3		Disk IO Limit																
4		Net KB Limit																
5																		
6		Collected Data												Available VM Capacity				
7	Cluster Name	System Name											NetKB/VM	By CPU Mhz	BY Mem	By Disk IO	By NetKB	Best
8		Totals											87.9					933.4
9		Averages											99.4					
10	N/A	brsapvmhost1											0.7	78.6	2.2	183.2	113.8	2.2
11	N/A	brsapvmhost2											0.0	83.3	5.6	184.1	113.8	5.6
12	N/A	frmulvmhost1											9.2	23.2	3.0	169.5	112.1	3.0
13	N/A	frparvmhost1											101.2	70.1	1.5	153.7	96.5	1.5
14	N/A	frparvmhost2											209.6	68.0	4.0	167.1	97.1	4.0
15	N/A	frsopvmhost1											154.1	72.1	7.6	161.9	92.4	7.6
16	N/A	frsopvmhost2											127.4	61.4	4.6	163.2	91.2	4.6
17	N/A	frsopvmhost3											101.3	75.8	7.9	167.0	96.4	7.9
18	SOPHIA1	frsopvmhost4											1.0	55.6	8.2	181.7	113.8	8.2
19	N/A	gechemedemo1											5.9	67.7	1.6	174.2	112.4	1.6
20	N/A	gechemedemo2											88.2	76.7	4.6	169.8	100.8	4.6
21	N/A	gechemesx1											0.4	217.4	2.5	183.0	113.8	2.5
22	N/A	gechemesx2											3.7	64.6	3.1	163.8	112.6	3.1
23	N/A	gechemesx3											45.1	59.0	3.4	169.9	105.6	3.4
24	N/A	gechemesx4											9.0	58.0	3.7	173.6	111.6	3.7
25	N/A	gechemesx5											28.9	53.3	9.1	158.2	105.4	9.1
26	N/A	gechemesx6											220.2	281.9	29.3	178.1	81.7	29.3
27	N/A	gechemesx7											338.4	259.0	9.9	163.7	29.8	9.9
28	N/A	masingedemo1											0.4	20.6	4.1	176.1	113.8	4.1
29	N/A	masingvmhost1											188.1	75.4	6.4	151.2	86.0	6.4
30	N/A	masingvmhost2											159.8	70.5	5.8	154.8	84.7	5.8
31	N/A	masingvmhost3											300.9	78.0	9.4	166.3	86.4	9.4
32	N/A	nibelvmhost1											56.1	31.0	12.2	176.7	108.4	12.2
33	N/A	nibelvmhost2											72.0	32.8	11.6	178.8	110.2	11.6
34	N/A	nibelvmhost3	7976.00	28.00	4.00	405.45	9.14	42.50	519.00	101	2	10.6	129.8	33.7	9.7	179.5	107.9	9.7
35	N/A	nibelvmhost4	12760.00	32.00	3.00	538.38	7.20	29.30	30.00	179	2	9.8	10.0	54.5	12.8	181.5	113.5	12.8
36	N/A	ukstavmhost1	7976.00	16.00	7.20	949.19	8.50	172.40	3034.00	132	1	23.9	421.4	30.6	3.9	159.3	79.3	3.9
37	N/A	ukstavmhost2	7976.00	16.00	13.00	1376.92	13.04	147.40	2356.00	106	1	11.3	181.2	28.2	1.5	163.2	87.0	1.5
38	N/A	ukstavmhost3	7976.00	16.00	11.00	1602.89	13.83	154.00	2535.00	146	1	14.0	230.5	26.9	1.1	162.2	85.0	1.1
39	N/A	usarlvhost1	7976.00	16.00	7.70	558.13	9.52	52.80	501.00	72	1	6.9	65.1	32.8	3.3	177.9	108.1	3.3
40	N/A	usarlvhost2	7976.00	16.00	7.00	1016.11	13.21	60.10	525.00	145	2	8.6	75.0	30.2	1.4	176.8	107.8	1.4
41	usdenvmhosts	usdenvmhost01	63816.00	96.00	37.70	7283.24	80.00	122.80	4228.00	193	2	3.3	112.1	246.6	8.3	167.0	65.7	8.3

Available VM Capacity

By CPU Mhz	BY Mem	By Disk IO	By NetKB	Best
				933.4
78.6	2.2	183.2	113.8	2.2
83.3	5.6	184.1	113.8	5.6
23.2	3.0	169.5	112.1	3.0
70.1	1.5	153.7	96.5	1.5
68.0	4.0	167.1	97.1	4.0
72.1	7.6	161.9	92.4	7.6
61.4	4.6	163.2	91.2	4.6
75.8	7.9	167.0	96.4	7.9
55.6	8.2	181.7	113.8	8.2

Summary

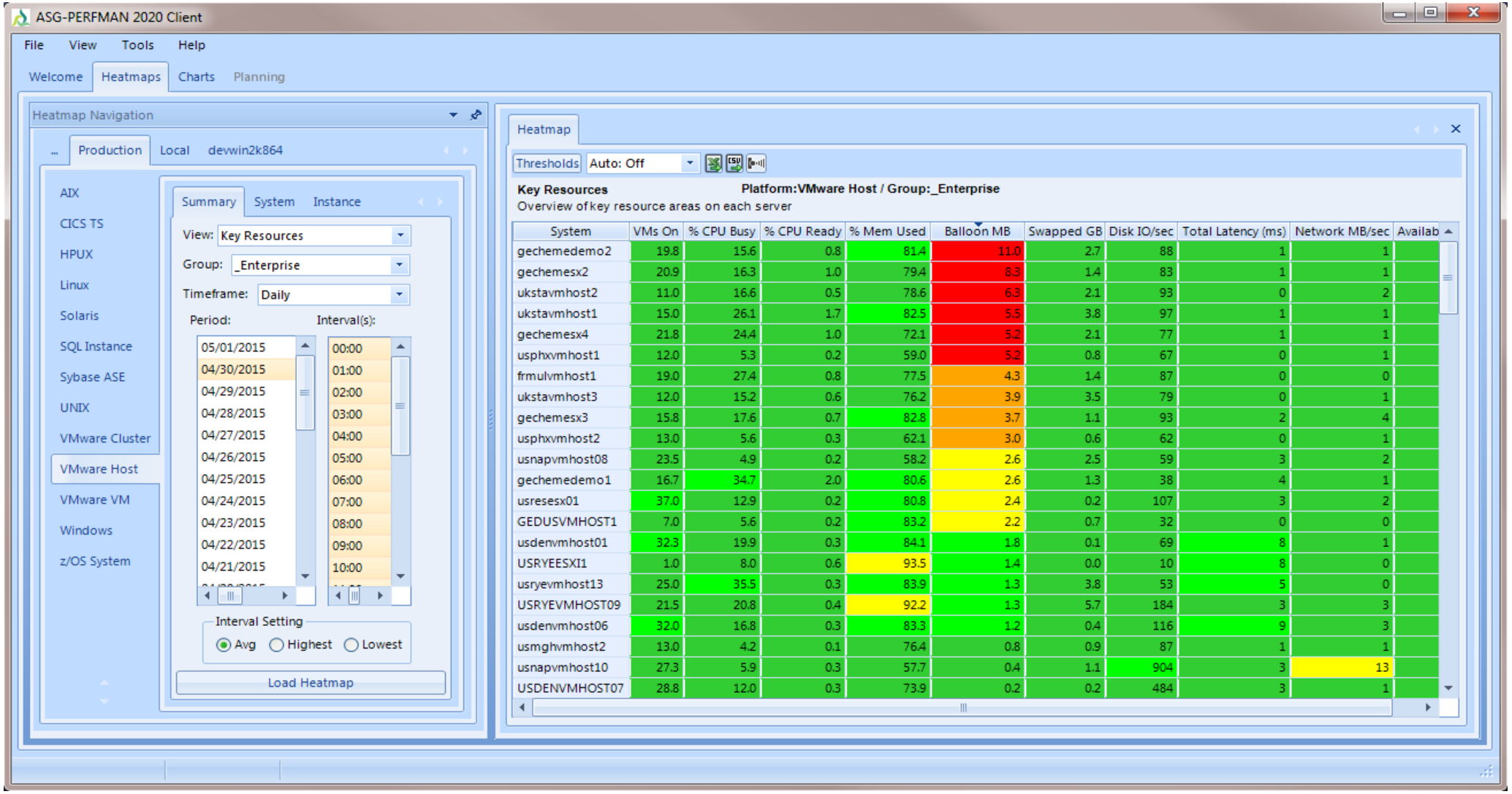
KEY ACTIVITIES & BENEFITS

- CONSISTENTLY GATHER USEFUL RESOURCE CONSUMPTION METRICS
- SUMMARIZE METRICS INTO CONSISTENT HISTORICAL VIEWS
- TURN METRICS INTO USEFUL INFORMATION TO ENABLE DECISIONS
- PROVIDE MEANINGFUL REPORTS TO DECISION-MAKERS
- UNDERSTAND WORKLOADS THAT DRIVE RESOURCE CONSUMPTION
- GATHER BUSINESS DRIVERS OF WORKLOAD GROWTH
- FORECAST FUTURE WORKLOAD REQUIREMENTS - PLAN BUDGETING & PROCUREMENT
- IDENTIFY BOTTLENECKS THAT AFFECT SERVICE DELIVERY

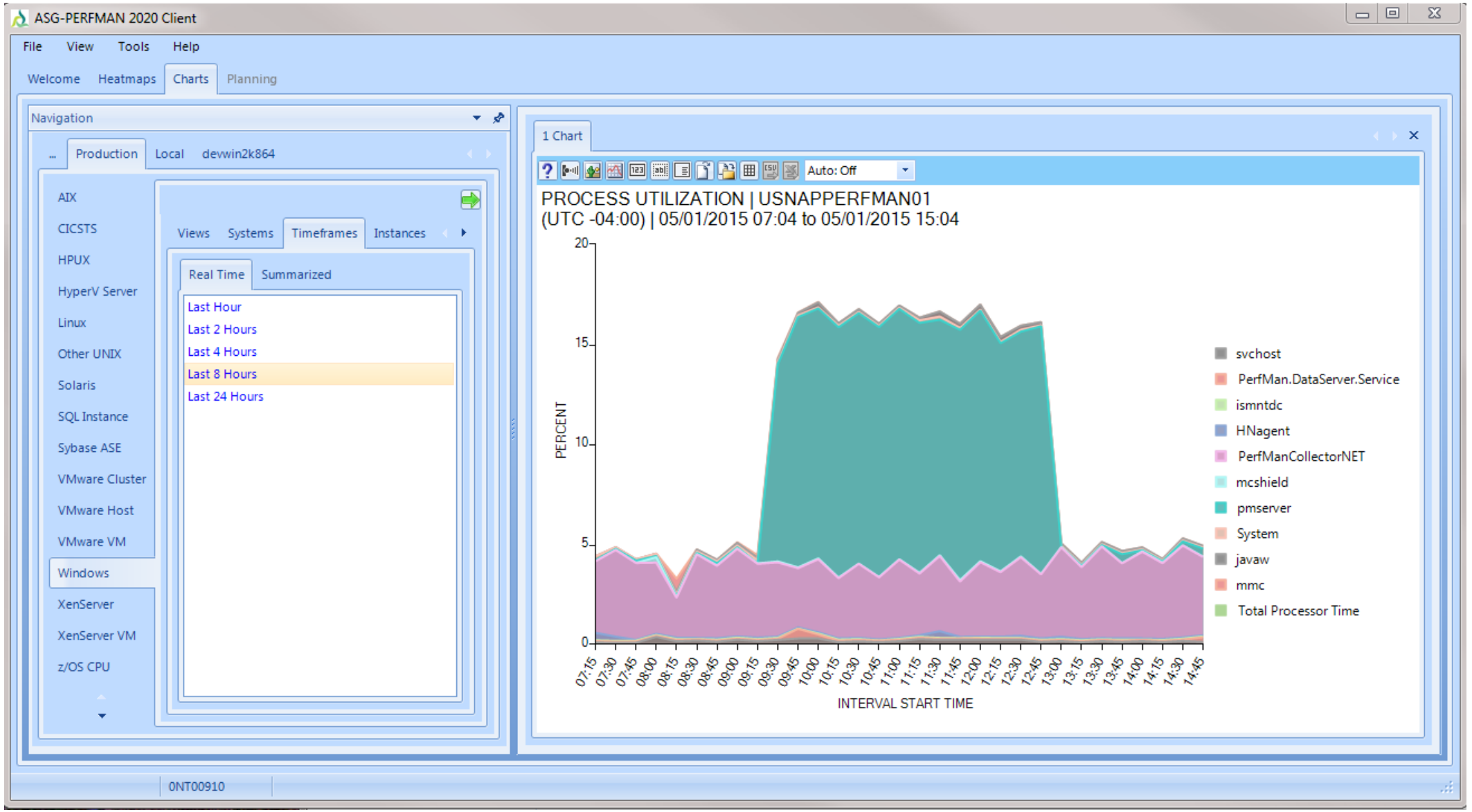
KEY ADVANTAGES

- INTEGRATED, CONSISTENT MULTI-PLATFORM SUPPORT
  - z/OS, CICS, DB2, zLINUX, Tape, UNIX, Linux, Windows, VMWare
- EASY TO INSTALL, WINDOWS SERVER BASED SOLUTION
- QUICK & PAINLESS IMPLEMENTATION
- HIGHLY SCALABLE FOR LARGE DATA CENTERS
- ROBUST, UP-TO-DATE SUPPORT FOR Z/OS
  - No prerequisite z/OS software
- WEB-BASED PORTAL INTERFACE AS WELL AS WINDOWS CLIENT

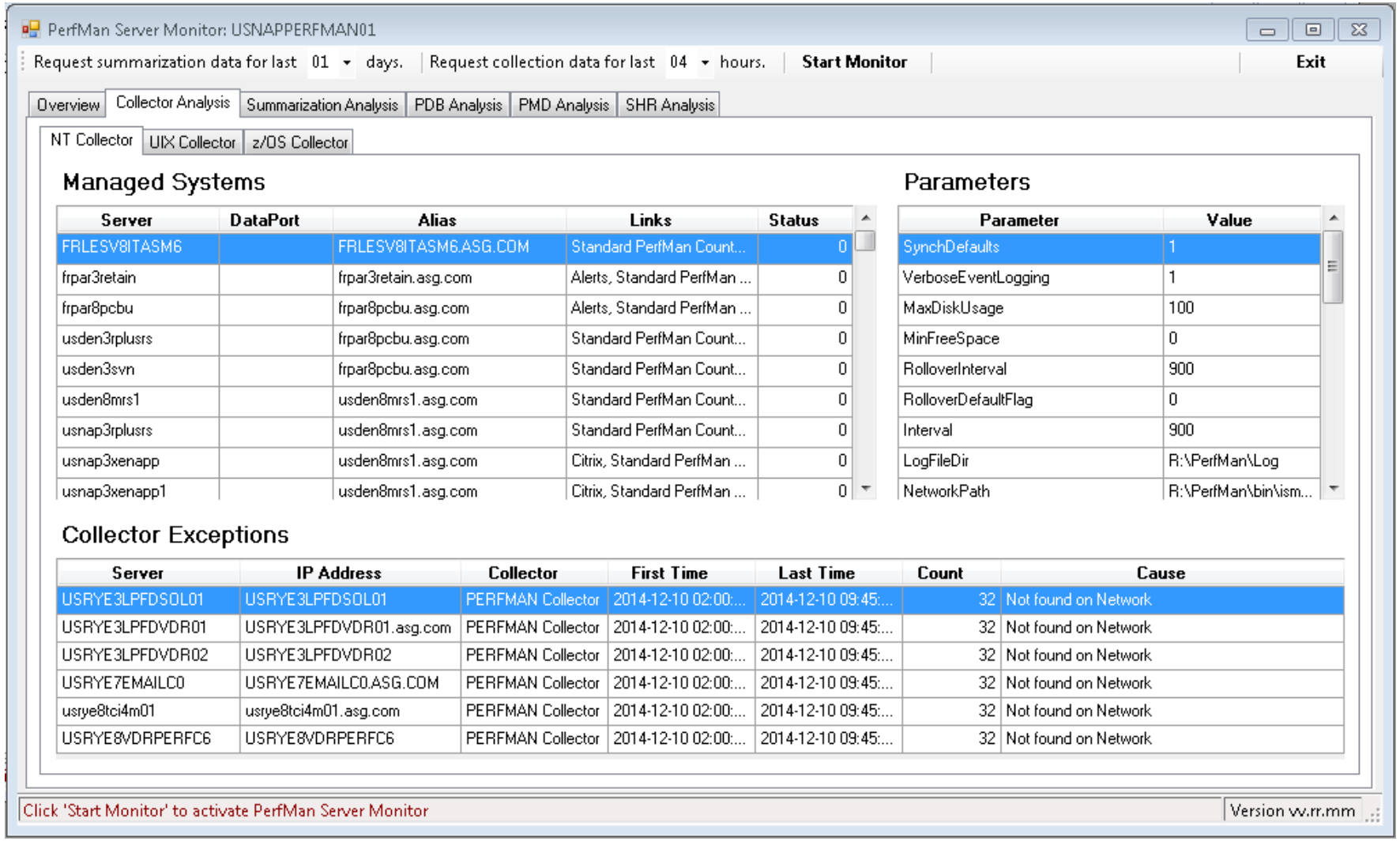
ASG-PERFMAN 2020 Client – V10 GA July 2015



System	VMs On	% CPU Busy	% CPU Ready	% Mem Used	Balloon MB	Swapped GB	Disk IO/sec	Total Latency (ms)	Network MB/sec	Availab
gechemedemo2	19.8	15.6	0.8	81.4	11.0	2.7	88	1	1	
gechemesx2	20.9	16.3	1.0	79.4	8.3	1.4	83	1	1	
ukstavmhost2	11.0	16.6	0.5	78.6	6.3	2.1	93	0	2	
ukstavmhost1	15.0	26.1	1.7	82.5	5.5	3.8	97	1	1	
gechemesx4	21.8	24.4	1.0	72.1	5.2	2.1	77	1	1	
usphxvmhost1	12.0	5.3	0.2	59.0	5.2	0.8	67	0	1	
frmulvmhost1	19.0	27.4	0.8	77.5	4.3	1.4	87	0	0	
ukstavmhost3	12.0	15.2	0.6	76.2	3.9	3.5	79	0	1	
gechemesx3	15.8	17.6	0.7	82.8	3.7	1.1	93	2	4	
usphxvmhost2	13.0	5.6	0.3	62.1	3.0	0.6	62	0	1	
usnapvmhost08	23.5	4.9	0.2	58.2	2.6	2.5	59	3	2	
gechemedemo1	16.7	34.7	2.0	80.6	2.6	1.3	38	4	1	
usresesx01	37.0	12.9	0.2	80.8	2.4	0.2	107	3	2	
GEDUSVMHOST1	7.0	5.6	0.2	83.2	2.2	0.7	32	0	0	
usdenvmhost01	32.3	19.9	0.3	84.1	1.8	0.1	69	8	1	
USRYEESXI1	1.0	8.0	0.6	93.5	1.4	0.0	10	8	0	
usryevmhost13	25.0	35.5	0.3	83.9	1.3	3.8	53	5	0	
USRYEVMHOST09	21.5	20.8	0.4	92.2	1.3	5.7	184	3	3	
usdenvmhost06	32.0	16.8	0.3	83.3	1.2	0.4	116	9	3	
usmghvmhost2	13.0	4.2	0.1	76.4	0.8	0.9	87	1	1	
usnapvmhost10	27.3	5.9	0.3	57.7	0.4	1.1	904	3	13	
USDENVMHOST07	28.8	12.0	0.3	73.9	0.2	0.2	484	3	1	


ASG-PERFMAN 2020 Client
File
View
Tools
Help
Welcome
Heatmaps
Charts
Planning
Navigation
Production
Local
devwin2k864
AIX
CICSTS
HPUX
HyperV Server
Linux
Other UNIX
Solaris
SQL Instance
Sybase ASE
VMware Cluster
VMware Host
VMware VM
Windows
XenServer
XenServer VM
z/OS CPU
Views
Systems
Timeframes
Instances
Real Time
Summarized
Last Hour
Last 2 Hours
Last 4 Hours
Last 8 Hours
Last 24 Hours
1 Chart
Auto: Off
PROCESS UTILIZATION | USNAPPERFMAN01
(UTC -04:00) | 05/01/2015 07:04 to 05/01/2015 15:04
PERCENT
INTERVAL START TIME
svchost
PerfMan.DataServer.Service
ismntdc
HNagent
PerfManCollectorNET
mcshield
pmserver
System
javaw
mmc
Total Processor Time
0NT00910

ASG-PERFMAN Monitor V10 GA July 2015



Thank You!!
Questions?