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Challenges of Capacity Management in Large Mixed Organizations

Glenn Schneck
Sr. Enterprise Solutions Engineer
ASG Software Solutions

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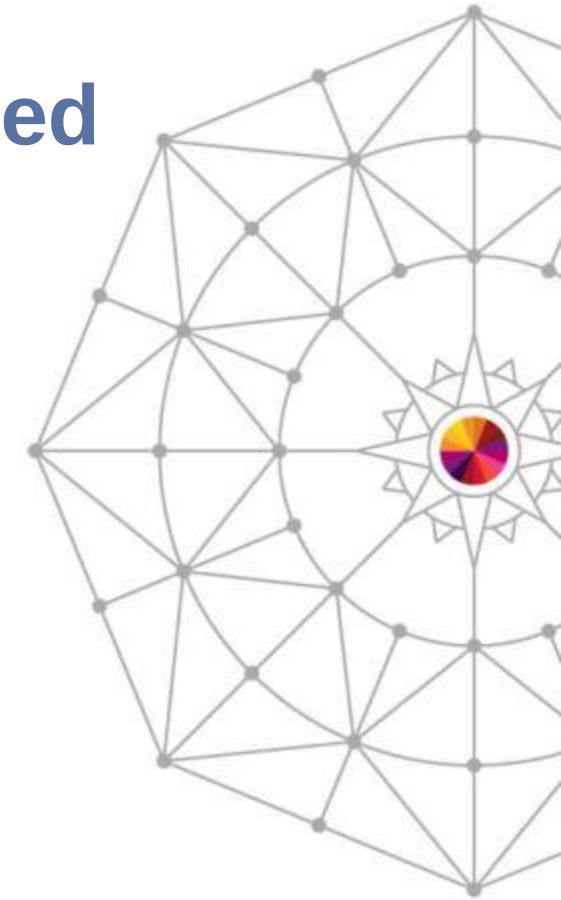
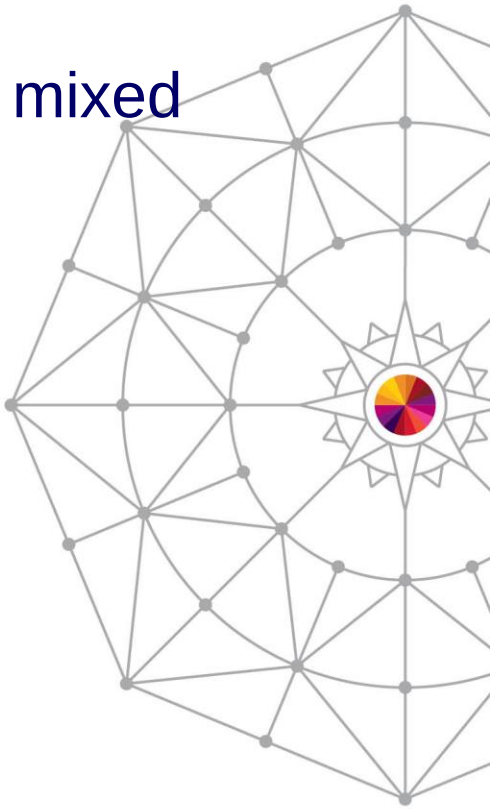


SHARE in Anaheim

Topics

- Capacity planning challenges in a very large mixed environment
- How ASG PERFMAN 2020 could help
- A simplified approach to capacity planning



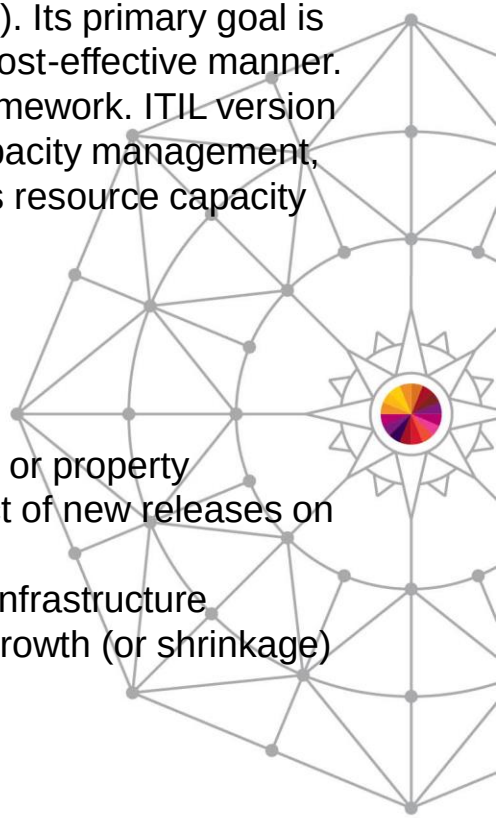
According to ITIL

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).

…

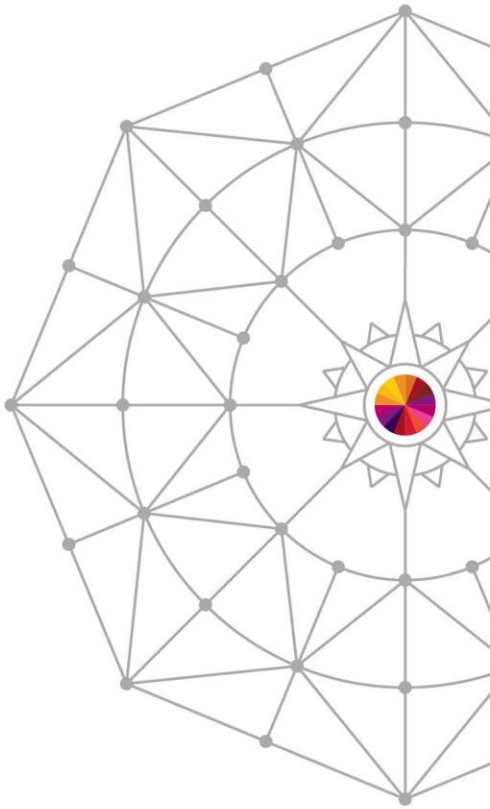
Capacity management is concerned with:

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

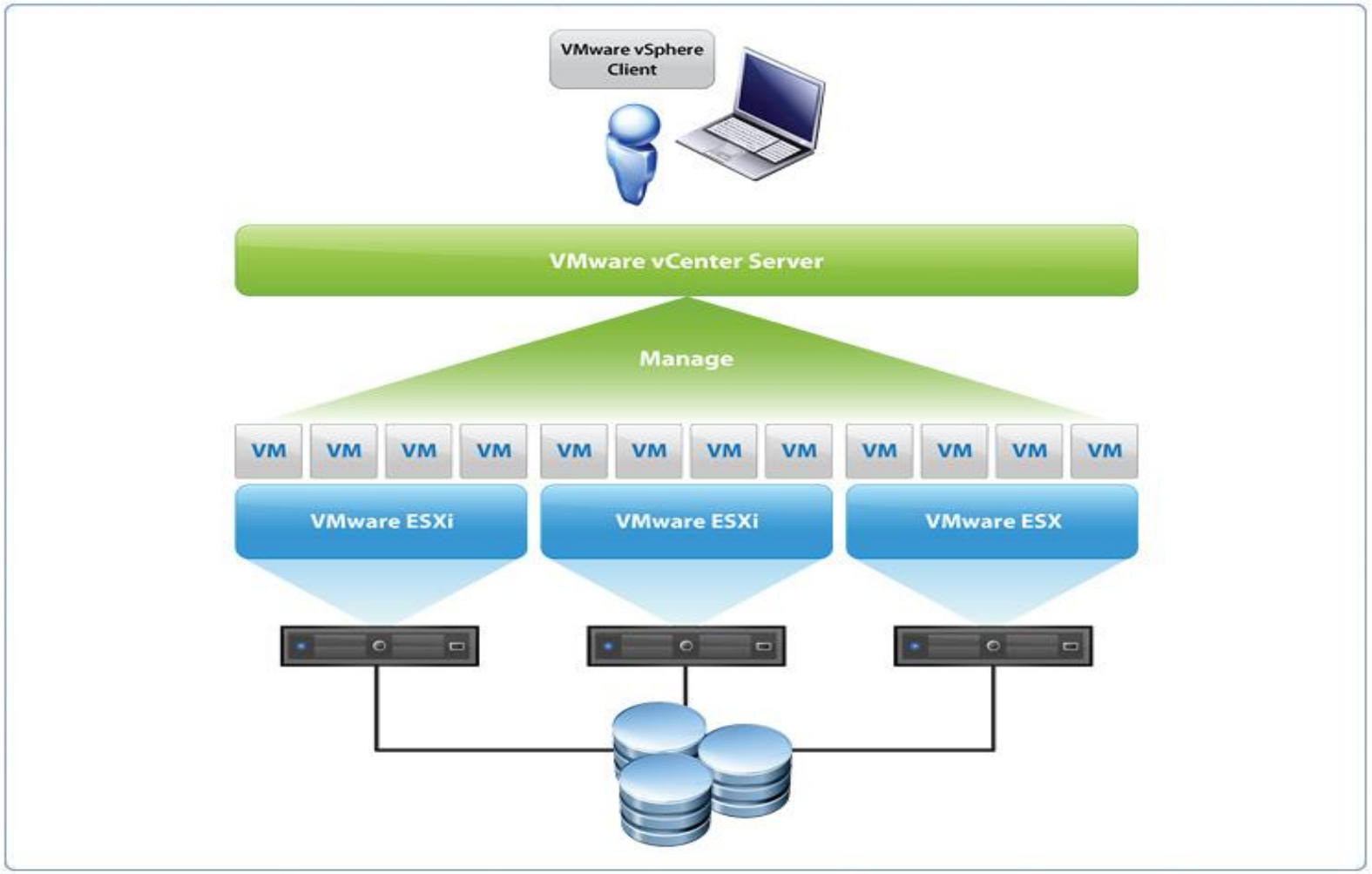


Challenges

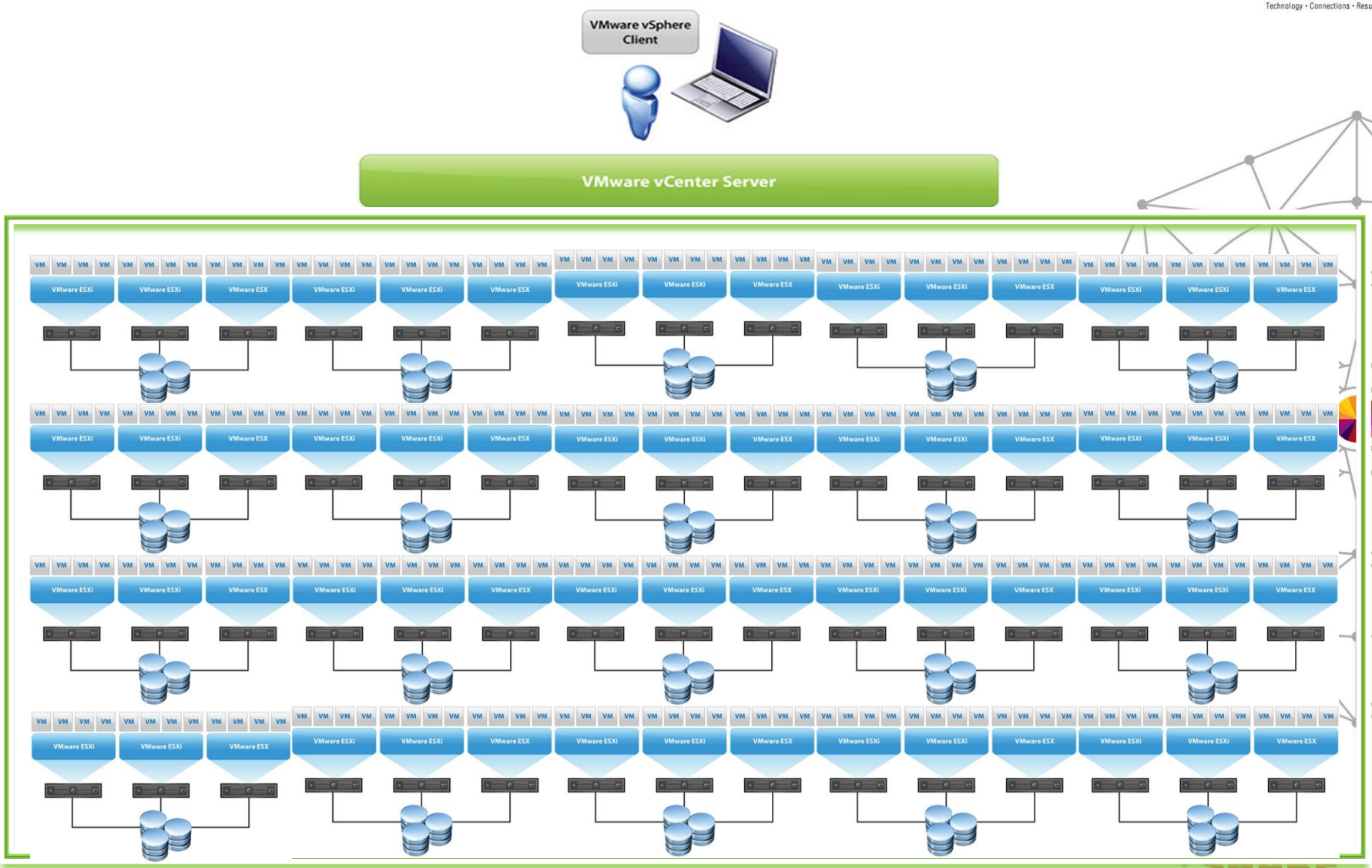
- Scale
- Clusters and Resource Pools
- Self tuning environment
- Power management
- Constantly evolving technology
- … and many more



Scale – The Basic View

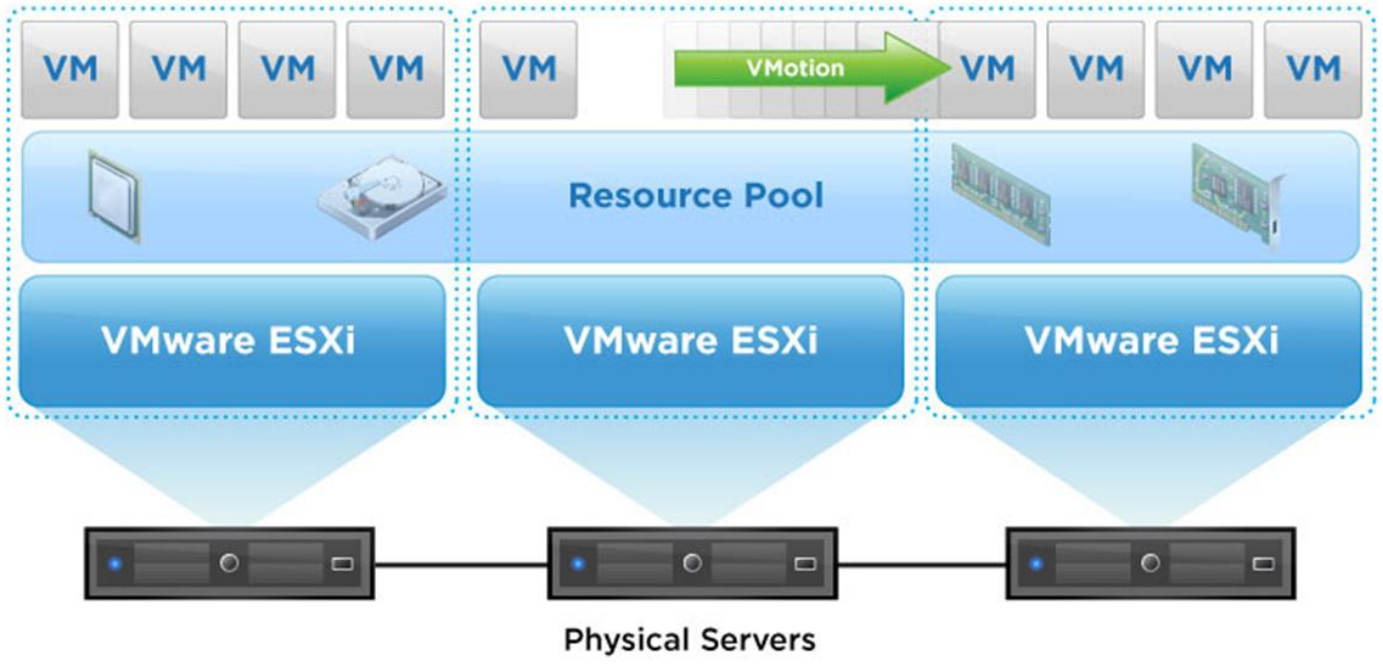


Scale – More Likely



Scale – The Reality

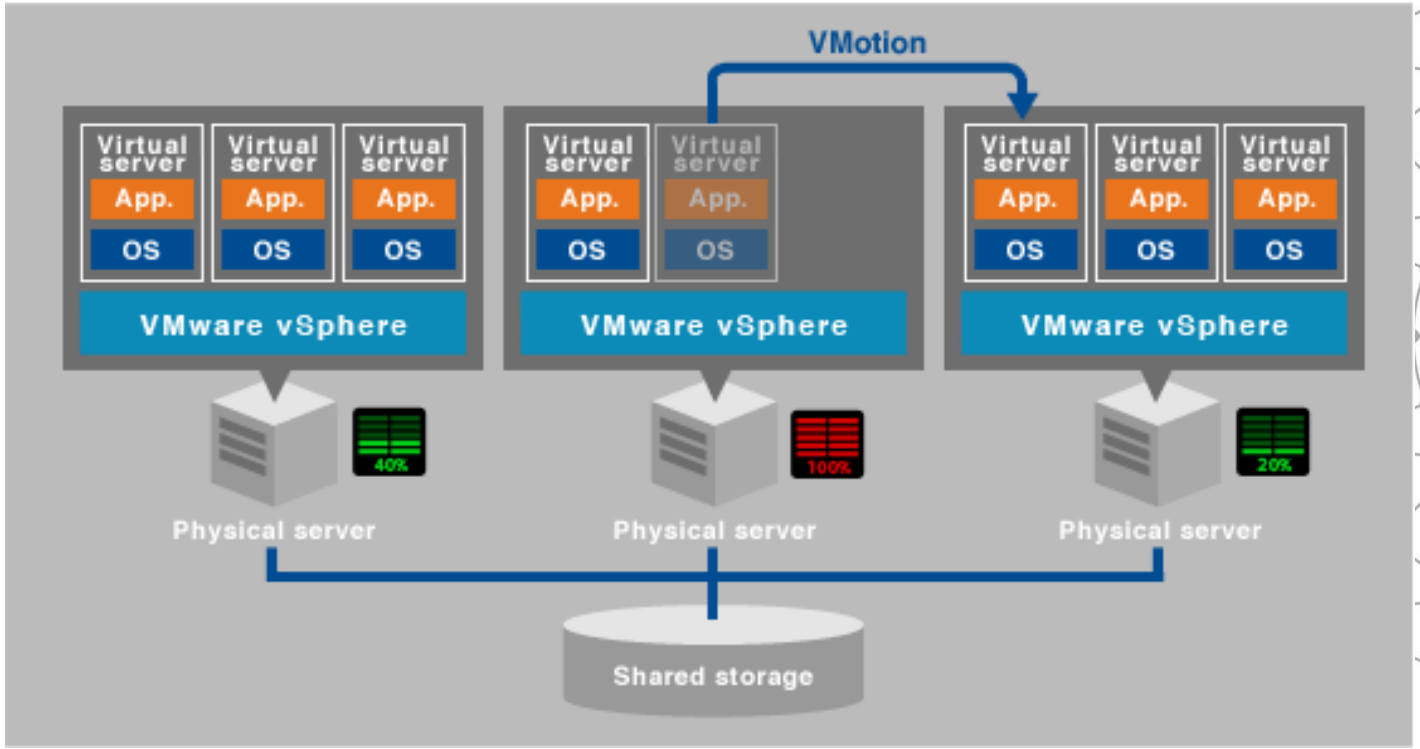
Clusters and Resource Pools



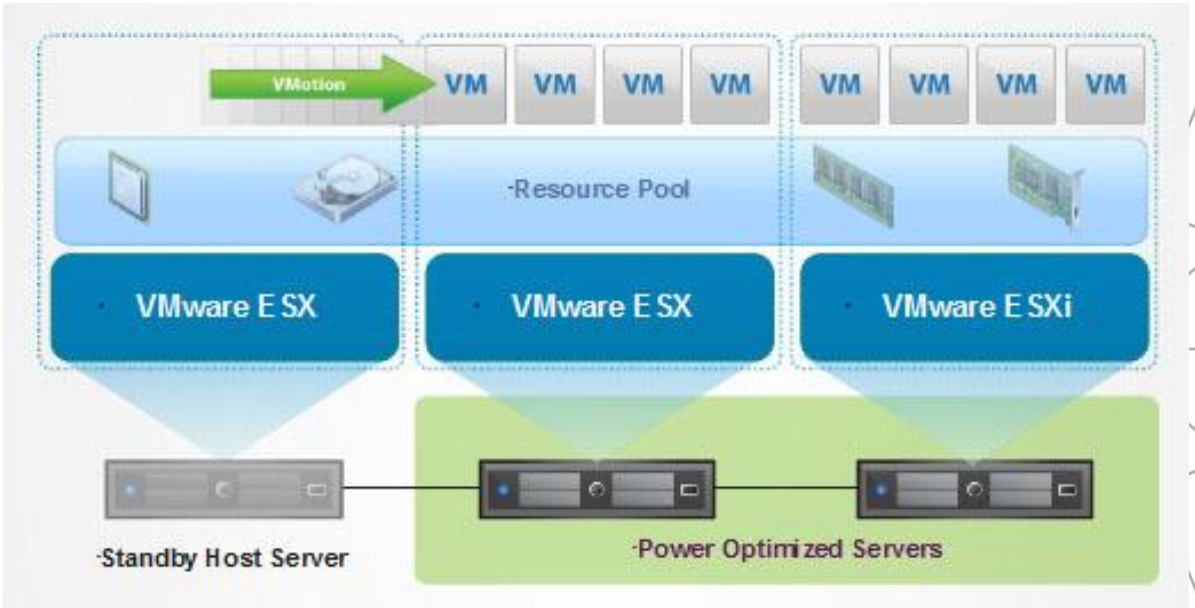
Self Tuning Environment

VMware Distributed Resource Scheduler (DRS)

Automatic resource allocation based on CPU and memory load status

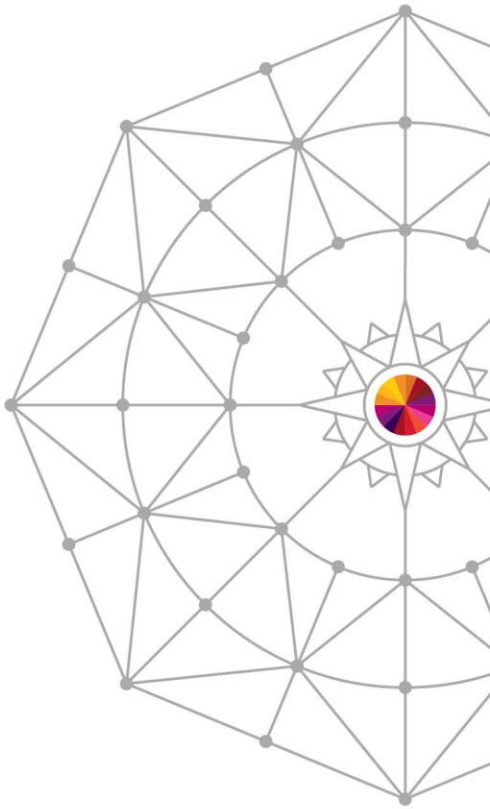


Power Management

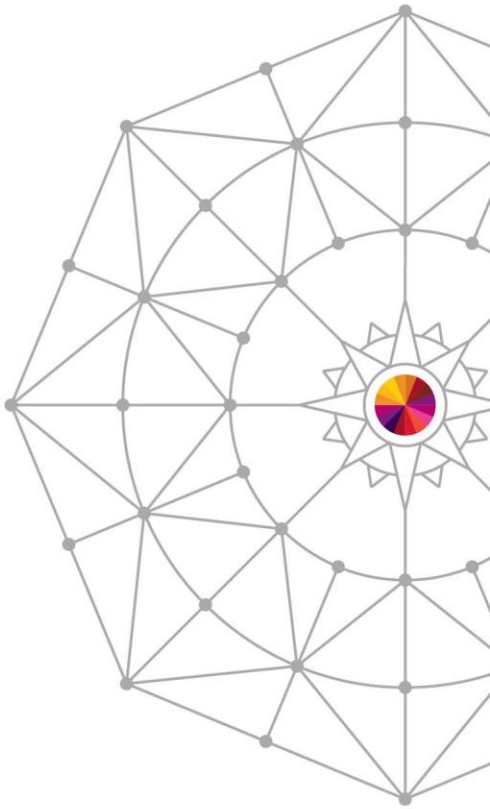


Constantly Evolving Technology

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



How can PERFMAN help?



ASG-PERFMAN 2020 Overview

IBM pSeries

PERFMAN 2020 for UNIX

HP PA-RISC

PERFMAN 2020 for UNIX

IBM zSeries

PERFMAN 2020 for z/OS
PERFMAN 2020 for DB2
PERFMAN 2020 for CICS TS
PERFMAN 2020 for Tape Libraries

PMDB

Sun

PERFMAN 2020 for UNIX

PERFMAN 2020 for VMware
PERFMAN 2020 for Windows
PERFMAN 2020 for Linux

ASG-PERFMAN 2020 is a capacity management solution focused on servers & their workloads

Complete, out-of-the-box solution

- Collection, data management, analysis, reporting, modeling, etc.
- No “roll your own” required
- Professional Services not required for success

Platform-specific collection technologies

Install & run on premise

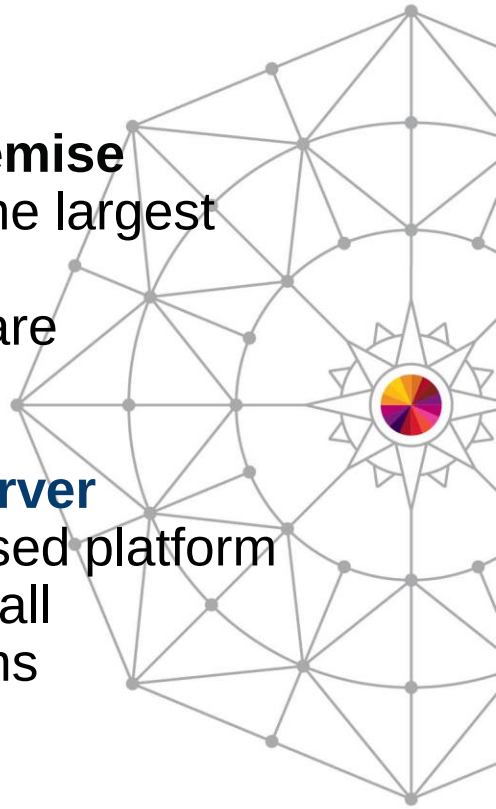
Highly scalable, to the largest IT organizations

No expensive software prerequisites

ASG-PERFMAN Server

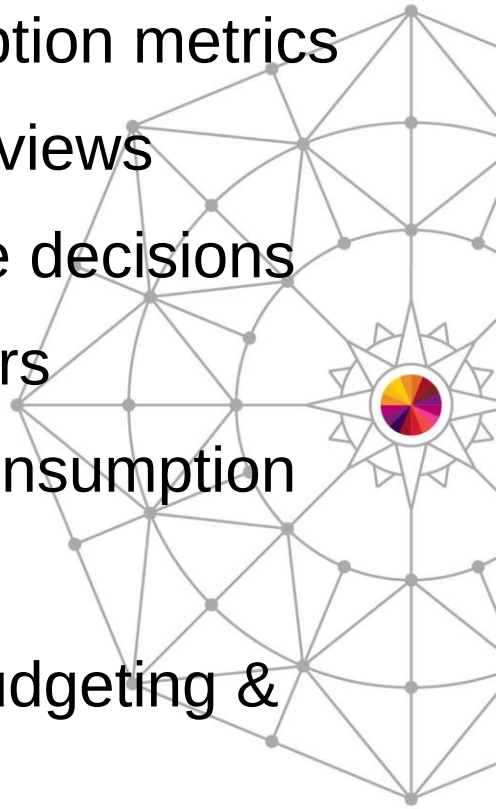
Windows Server-based platform

Core technology for all supported platforms



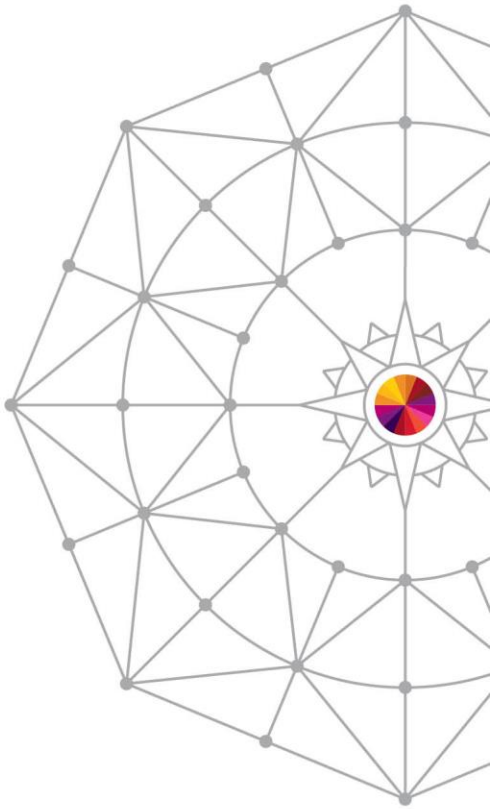
Key Activities & Benefits

- 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 for budgeting & procurement planning purposes
- Identify bottlenecks that affect service delivery



ASG-PERFMAN 2020 Platforms Supported

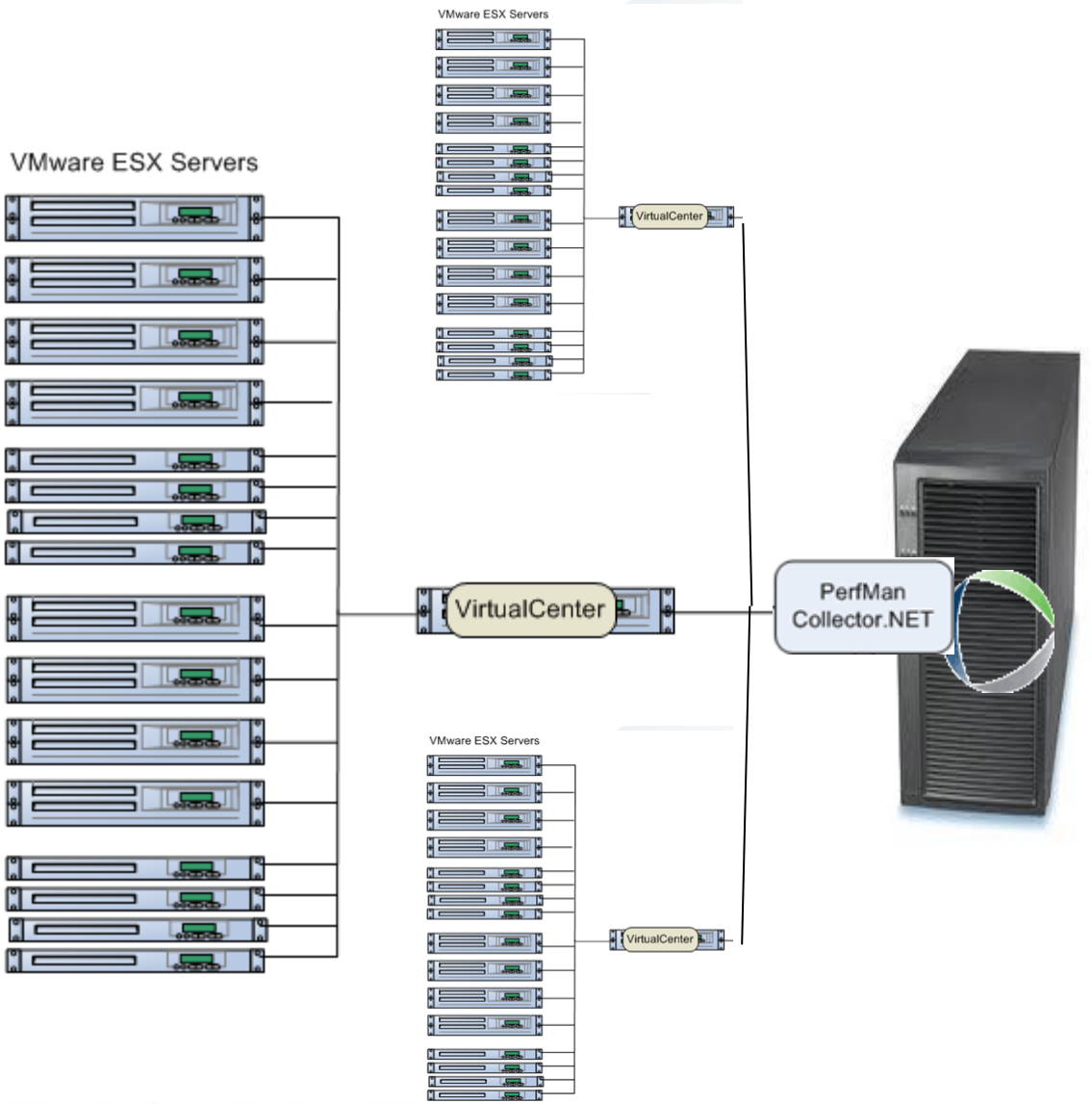
- VMware VI + VSphere
- Windows
  - Including IIS, SQL Server, Exchange, AD, HyperV...
- AIX and PowerVM
- HP-UX
- Solaris
- Linux
  - zLinux
- Oracle
- XenServer
- z/OS:
  - Optional: DB2, CICS TS, Tape Library and Virtual Tape



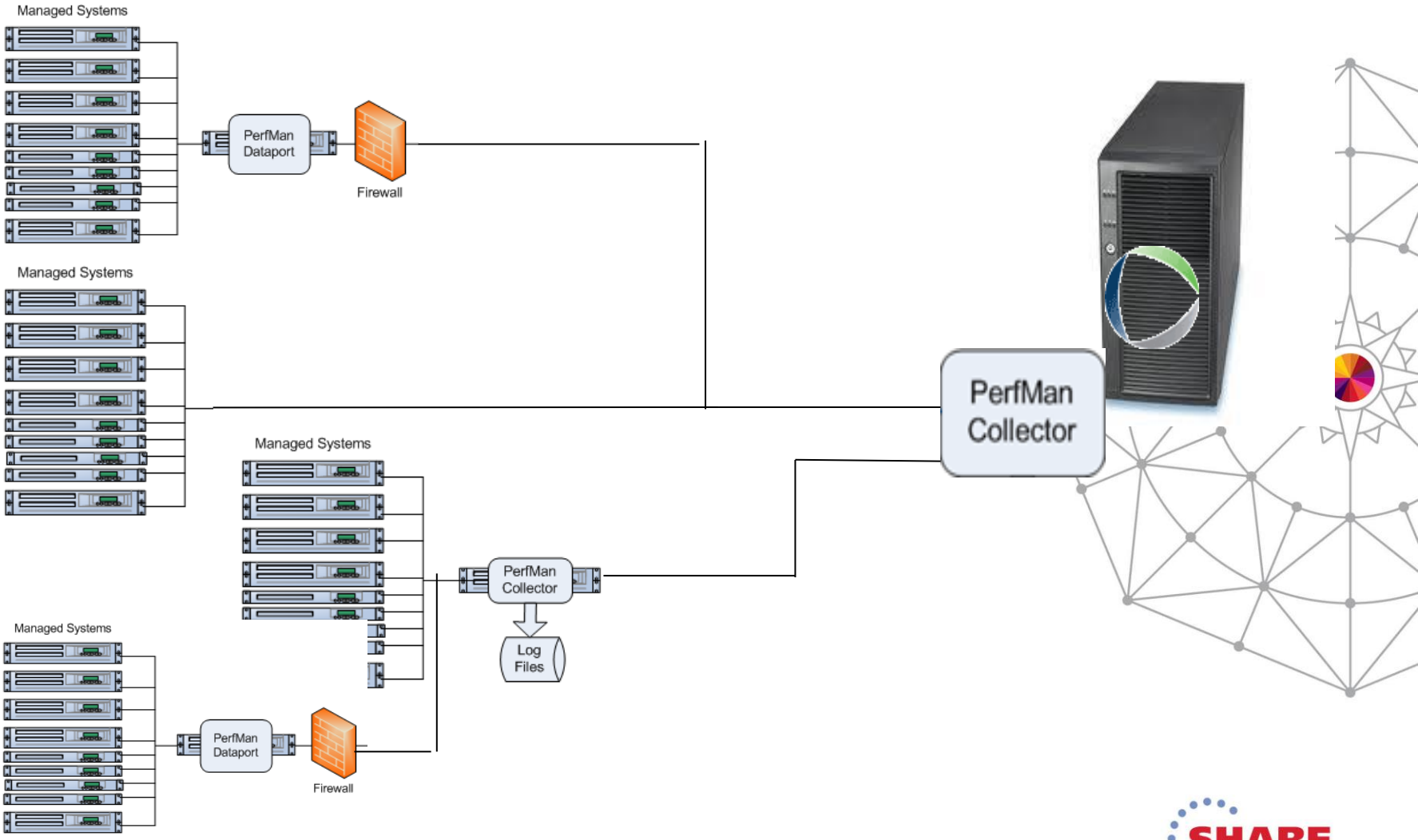
Data Collection – Data Sources

Platform	Data Source	Collector
z/OS (+BUA)	70–75, 78, DCOLLECT (30, 42)	z/OS-based Programs
DB2	100-102	z/OS-based Programs
CICS TS	110	z/OS-based Programs
Tape Libraries	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	Agentless (API)
Oracle	v$tables	Agentless

Data Collection – VMWare



Data Collection – Windows



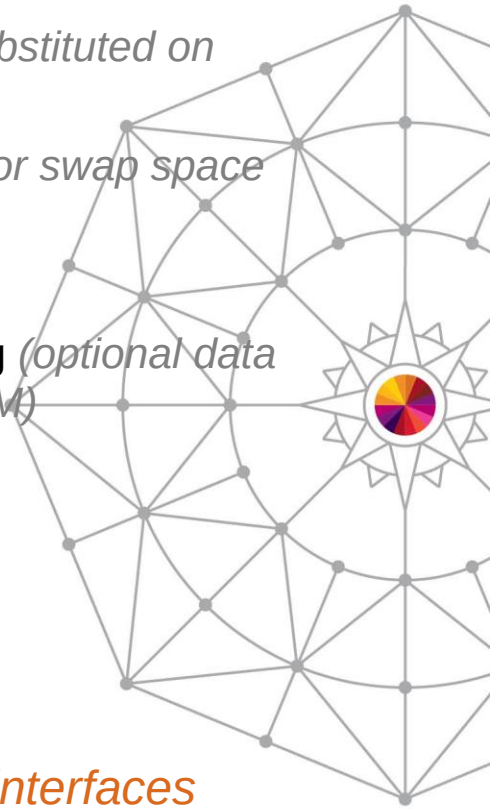
Data Collection – Unix/Linux

- PerfMan for UNIX Agent
  - Shell script deployed via SSH from PerfMan Server
  - Utilizes NMON, PS, IOSTAT, SAR, etc
  - Data forwarded to PerfMan Server after each interval
- HP OpenView Performance Agent support

Data Collection – Unix/Linux

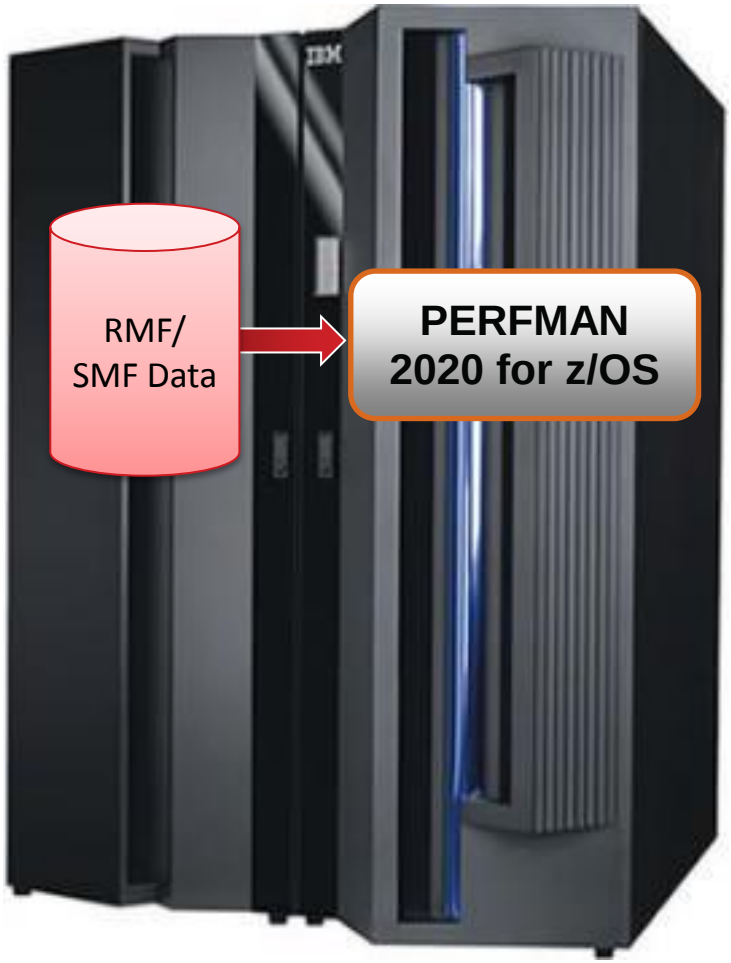
UNIX Utilities & Resources

- CPUINFO *(Linux)*
- DF
- GETCONF *(HP-UX, Linux)*
- IOSTAT
- LPARSTAT *(AIX PowerVM; formerly known as* Advance Power Virtualization [APV]*)*
- LSPS *(AIX, for swap space metric)*
- MPSTAT *(SunOS/Solaris)*
- NETSTAT
- Nmon *(optional data source for AIX PowerVM, AIX and Linux)*
- PAGESIZE *(AIX, SunOS/Solaris)*
- PRTCONF *(AIX, SunOS/Solaris)*
- PS
- SAR *(Nmon may be substituted on AIX/Linux)*
- SW APINFO *(HP-UX, for swap space metric)*
- syslog.log *(HP-UX)*
- TOPAS CEC Recording *(optional data source for AIX PowerVM)*
- UPTIME
- VMSTAT



ASG-PERFMAN also interfaces directly with ***HP Performance Agent*** *to use the data it has already collected.*

Data Collection – z/OS



FTP

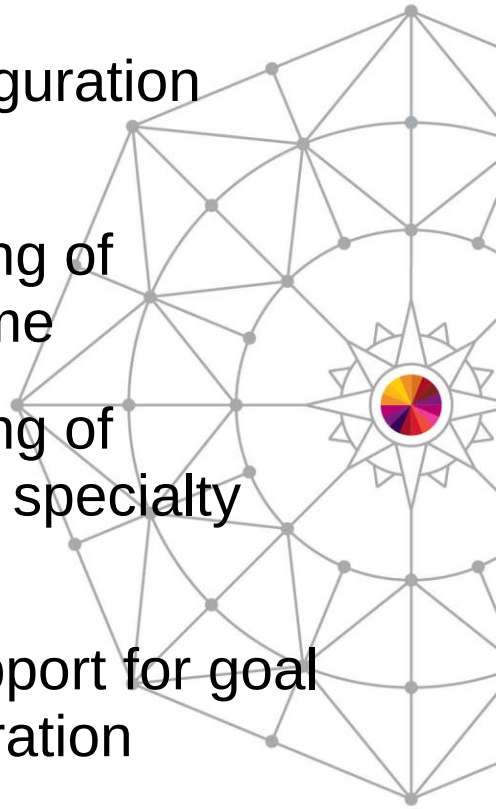
ASG-PERFMAN for z/OS

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

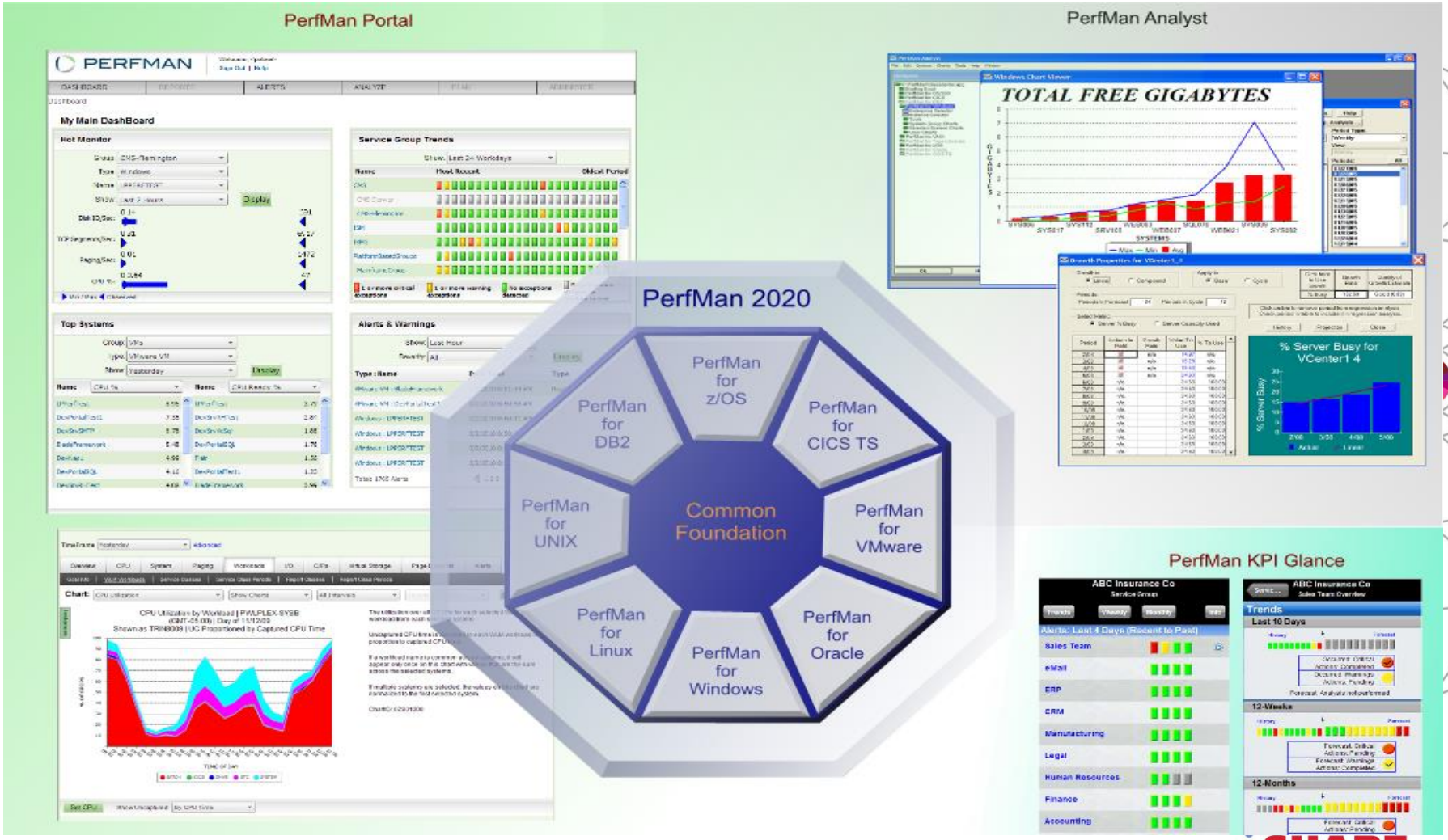
Data Collection – z/OS

- 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

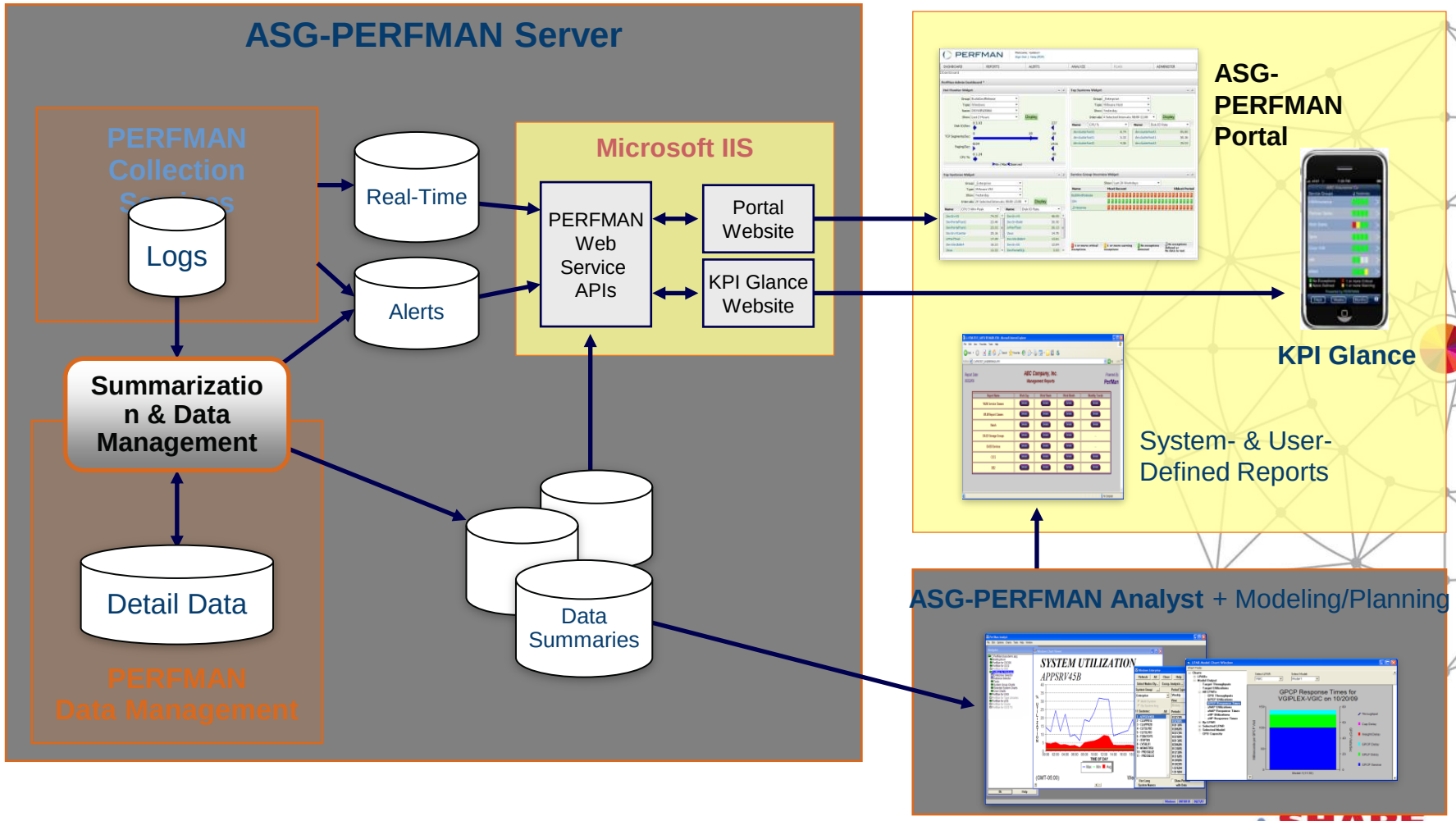
- Automatic handling of dynamic capacity/configuration changes
- Proper handling of uncaptured time
- Proper handling of zIIP/zAAP/IFL specialty processors
- Automatic support for goal mode configuration information
- Turnkey operation – no “parm file” required



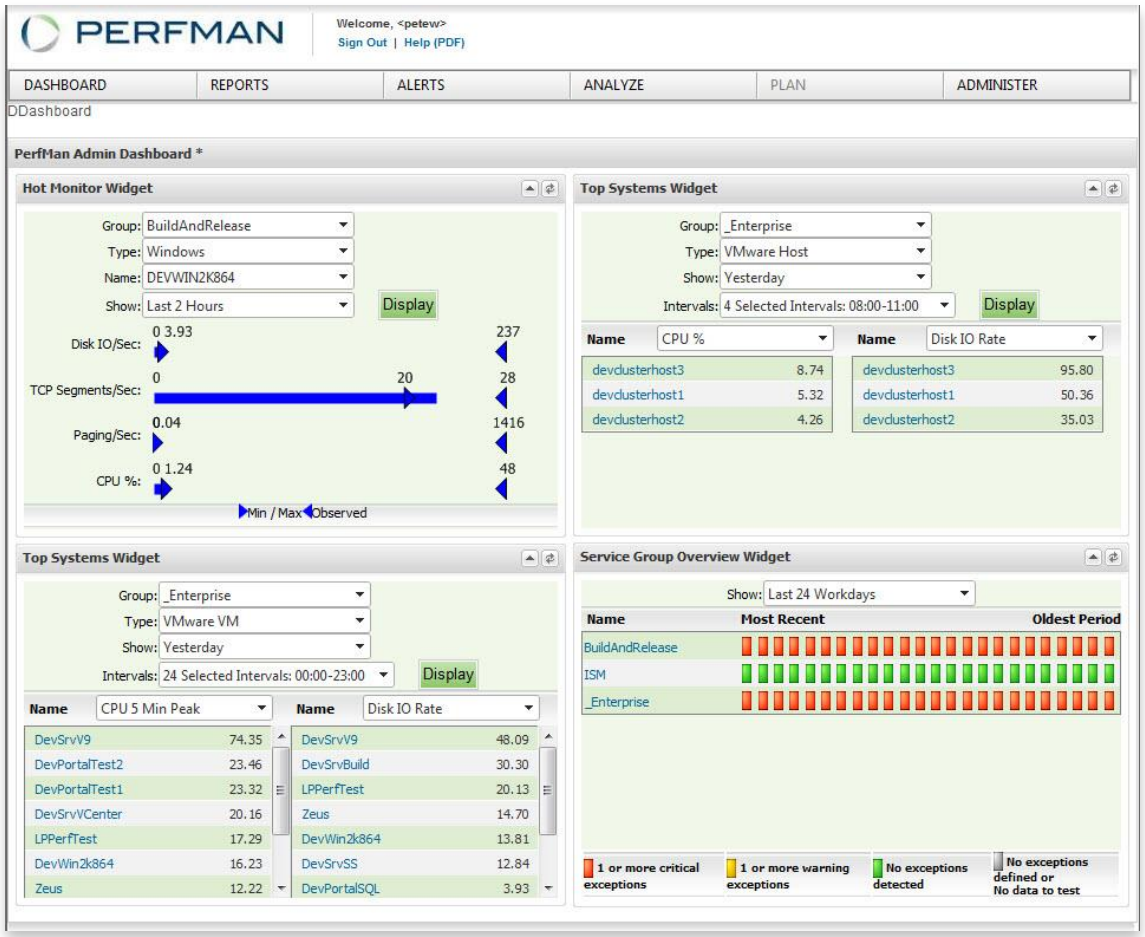
ASG-PERFMAN 2020 Overview



ASG-PERFMAN 2020 Architecture



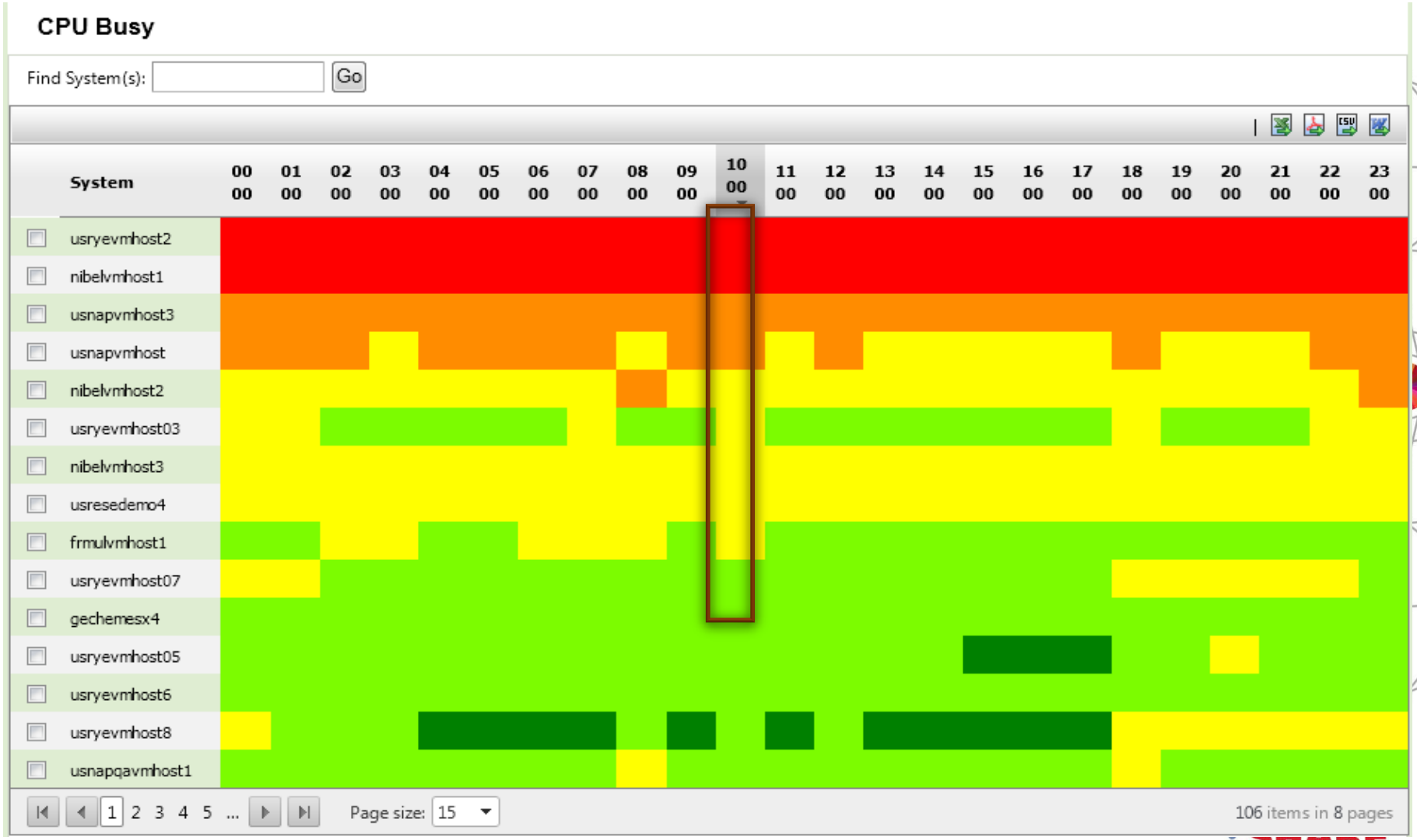
ASG-PERFMAN 2020 Portal



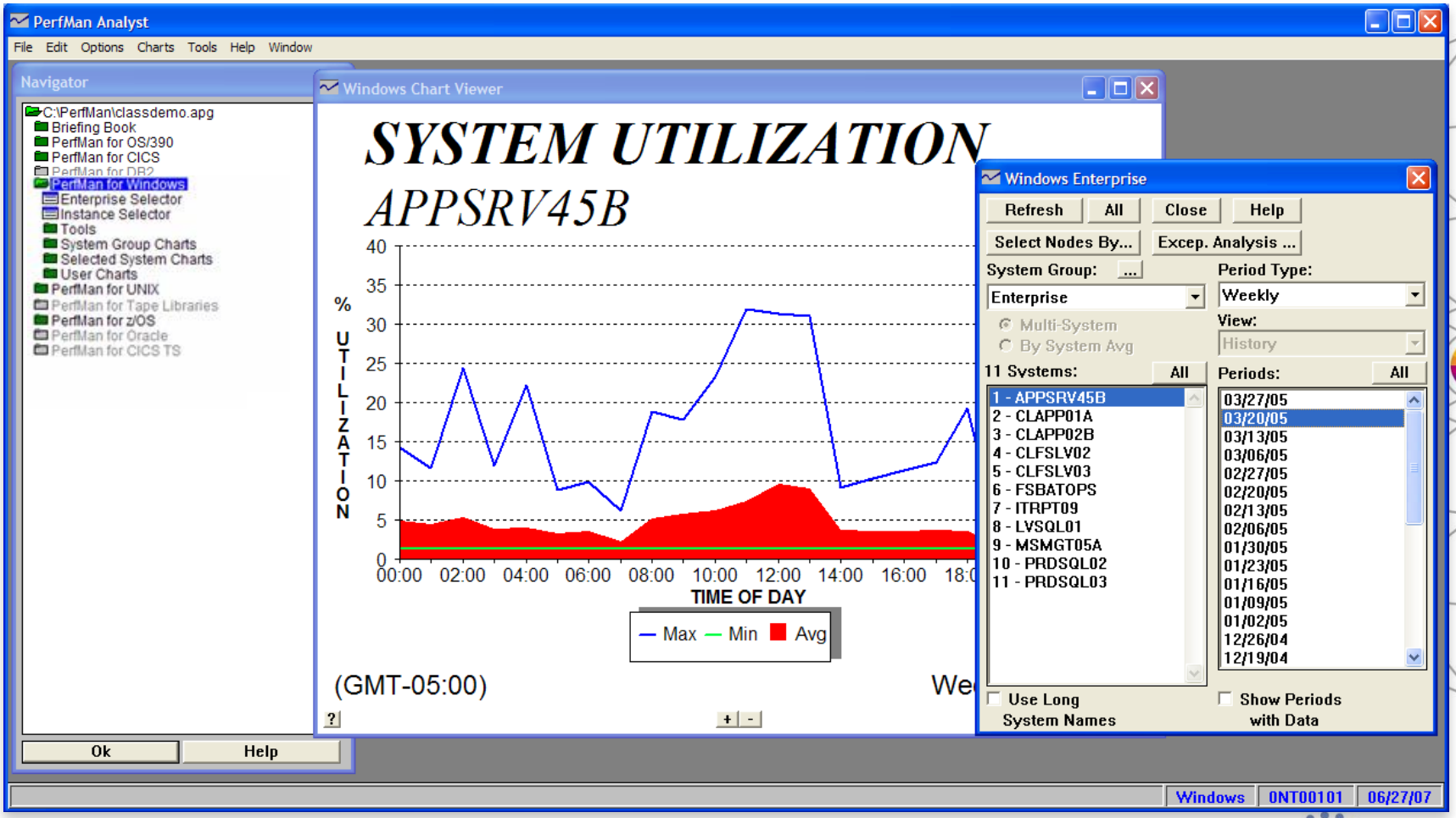
- Fully-integrated, customizable web-based interface
- Access Windows, VMware, UNIX & Linux information as soon as it's collected
- Identify service exceptions for groups or individual systems

ASG-PERFMAN 2020 ‘Heat Map’

ASG-PERFMAN 2020 ‘Heat Map Drilldown’

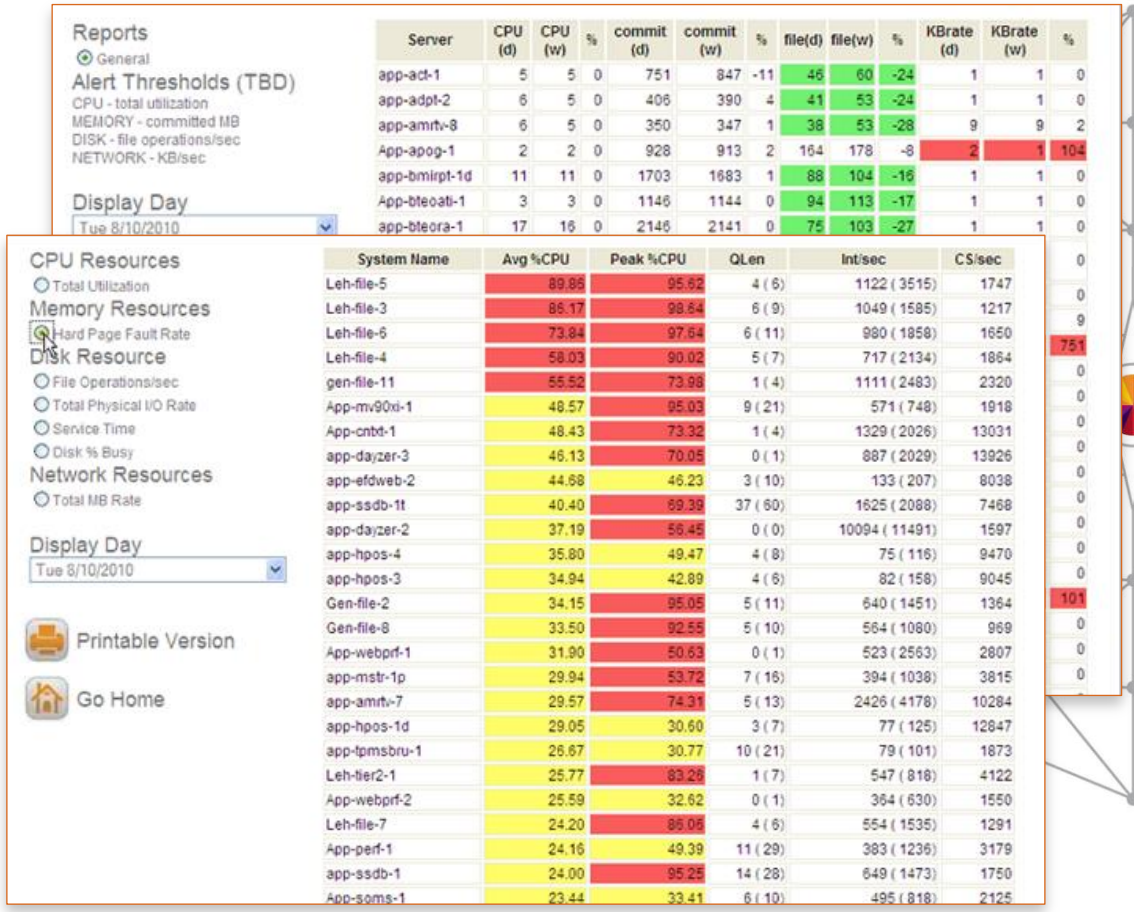


ASG-PERFMAN 2020 Analyst



ASG-PERFMAN 2020 Analyst – Web Publishing

Analyst provides a powerful scripting language that allows customers to **automate repetitive reporting tasks** for viewing via the web.



Server	CPU (d)	CPU (w)	%	commit (d)	commit (w)	%	file(d)	file(w)	%	KBrate (d)	KBrate (w)	%
app-act-1	5	5	0	751	847	-11	46	60	-24	1	1	0
app-adpt-2	6	5	0	406	390	4	41	53	-24	1	1	0
app-amrtv-8	6	5	0	350	347	1	38	53	-28	9	9	2
App-apog-1	2	2	0	928	913	2	164	178	-8	2	1	104
app-bmirpt-1d	11	11	0	1703	1683	1	88	104	-16	1	1	0
App-bteoati-1	3	3	0	1146	1144	0	94	113	-17	1	1	0
app-bteora-1	17	16	0	2146	2141	0	75	103	-27	1	1	0

System Name	Avg %CPU	Peak %CPU	QLen	Int/sec	CS/sec
Leh-file-5	89.86	95.62	4 (6)	1122 (3515)	1747
Leh-file-3	86.17	98.64	6 (9)	1049 (1585)	1217
Leh-file-6	73.84	97.64	6 (11)	980 (1858)	1650
Leh-file-4	58.03	90.02	5 (7)	717 (2134)	1864
gen-file-11	55.52	73.98	1 (4)	1111 (2483)	2320
App-mv90xi-1	48.57	95.03	9 (21)	571 (748)	1918
App-cntxt-1	48.43	73.32	1 (4)	1329 (2026)	13031
app-dayzer-3	46.13	70.05	0 (1)	887 (2029)	13926
app-efdweb-2	44.68	46.23	3 (10)	133 (207)	8038
app-ssdb-1t	40.40	89.39	37 (60)	1625 (2088)	7468
app-dayzer-2	37.19	56.45	0 (0)	10094 (11491)	1597
app-hpos-4	35.80	49.47	4 (8)	75 (116)	9470
app-hpos-3	34.94	42.89	4 (6)	82 (158)	9045
Gen-file-2	34.15	95.05	5 (11)	640 (1451)	1364
Gen-file-8	33.50	92.55	5 (10)	564 (1080)	969
App-webprf-1	31.90	50.63	0 (1)	523 (2563)	2807
app-mstr-1p	29.94	53.72	7 (16)	394 (1038)	3815
app-amrtv-7	29.57	74.31	5 (13)	2426 (4178)	10284
app-hpos-1d	29.05	30.60	3 (7)	77 (125)	12847
app-tpmsbru-1	26.67	30.77	10 (21)	79 (101)	1873
Leh-tier2-1	25.77	83.26	1 (7)	547 (818)	4122
App-webprf-2	25.59	32.62	0 (1)	364 (630)	1550
Leh-file-7	24.20	86.06	4 (6)	554 (1535)	1291
App-perf-1	24.16	49.39	11 (29)	383 (1236)	3179
app-ssdb-1	24.00	95.25	14 (28)	649 (1473)	1750
App-soms-1	23.44	33.41	6 (10)	495 (818)	2125

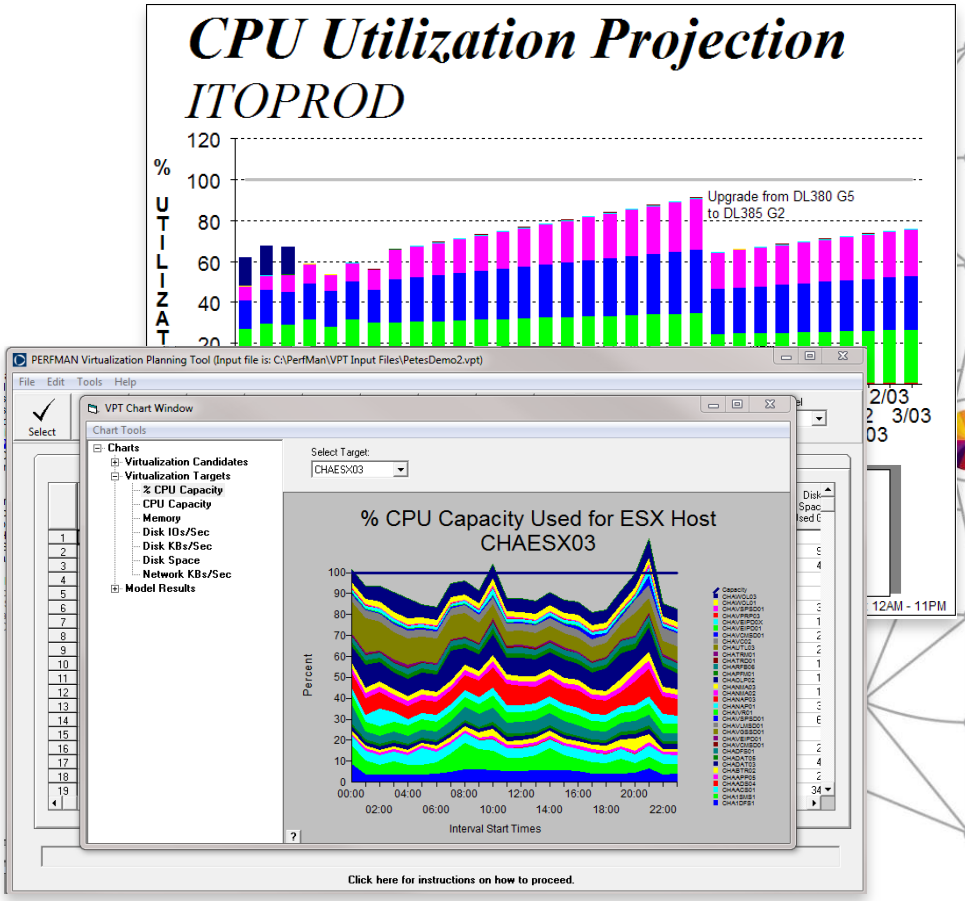
ASG-PERFMAN 2020 Analyst – Planning and Modeling

ASG-PERFMAN for Windows & ASG-PERFMAN for UNIX

- Capacity Planning
- Workload Modeling

ASG-PERFMAN for VMware

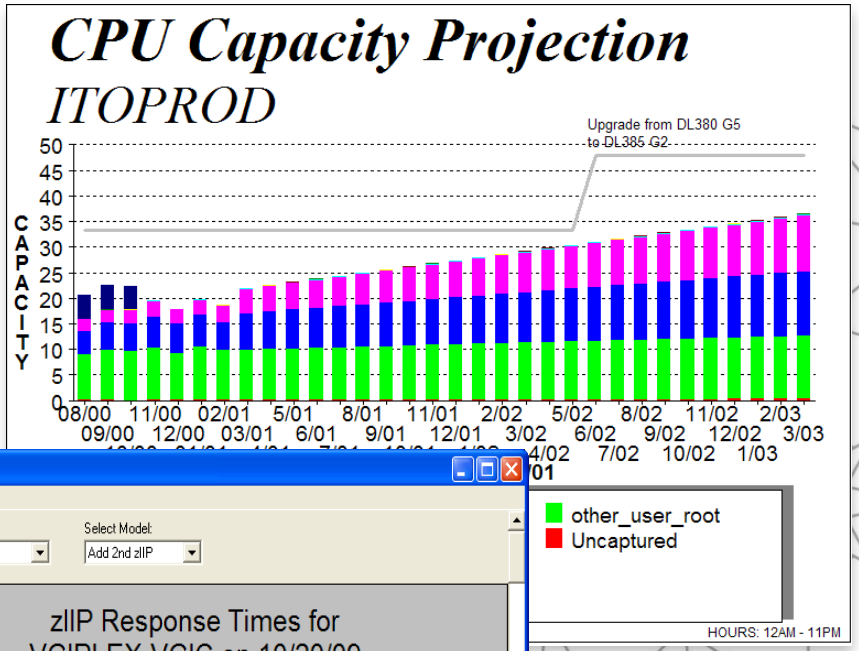
- Capacity Planning
- VM + ESX Modeling
- Virtualization Planning Tool (VPT)

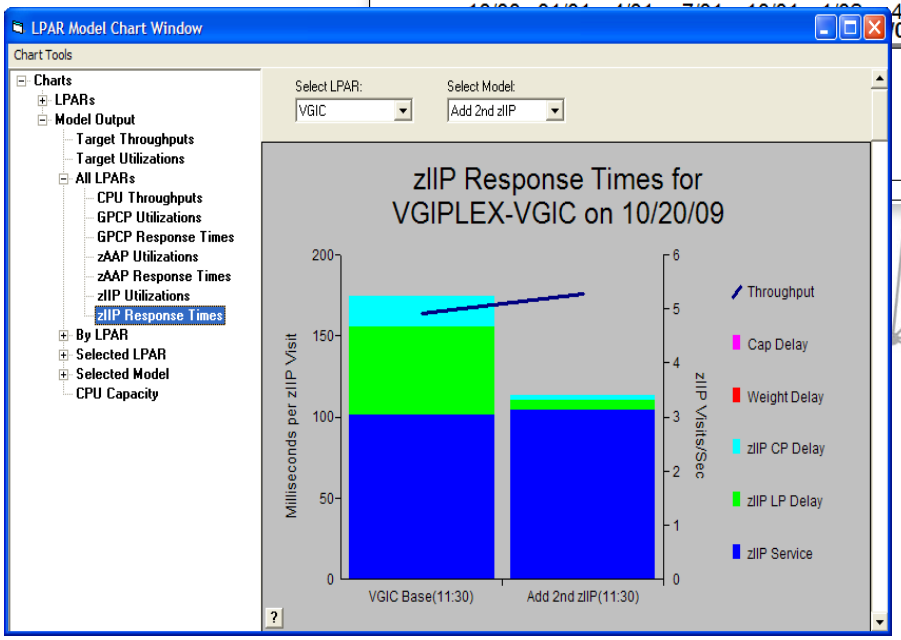


ASG-PERFMAN 2020 Analyst – Planning and Modeling

ASG-PERFMAN for z/OS

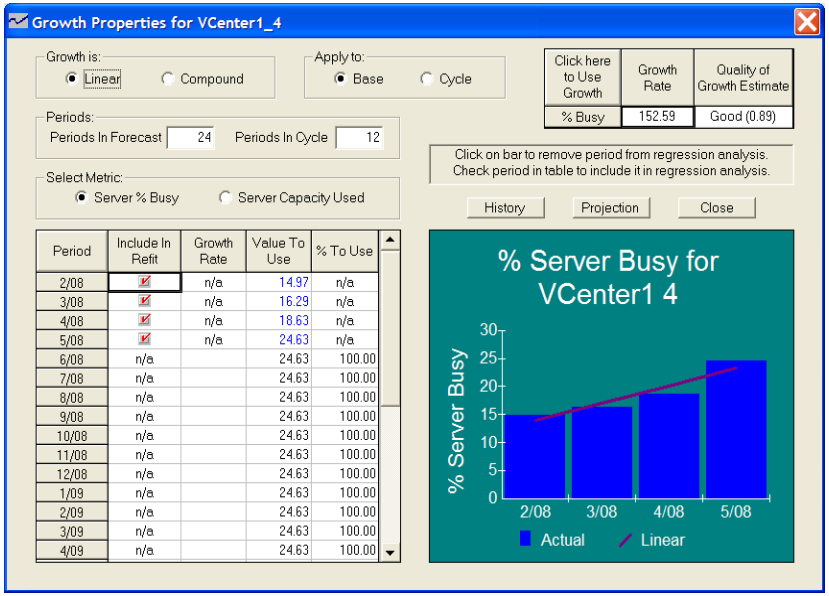
- Capacity Planning
- CPU Modeling
- LPAR Modeling
- Workload Modeling
- zIIP Speciality Processor Monitoring
- Sub Capacity Monitoring
- Analysis
- Forecasting
- Monitoring

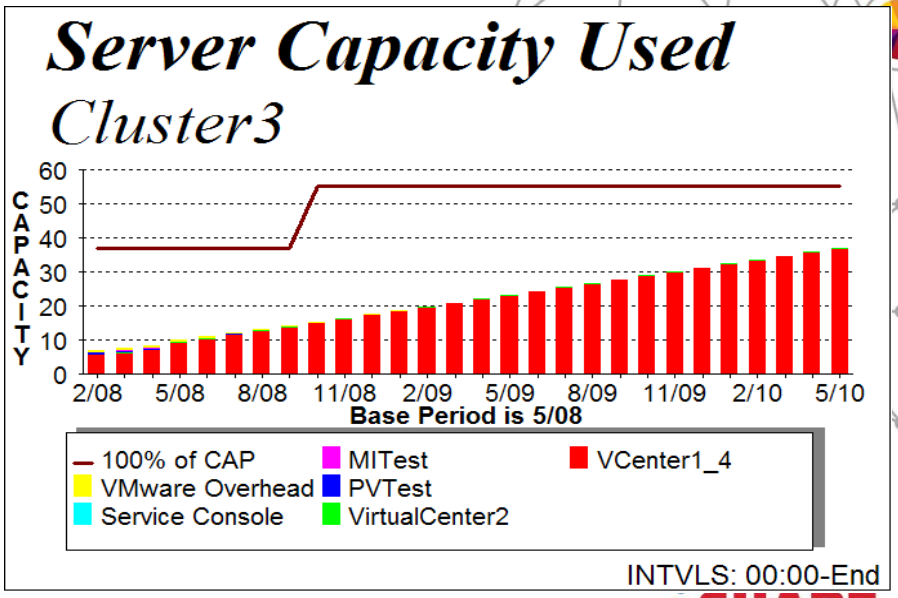




ASG-PERFMAN 2020 What If Capabilities

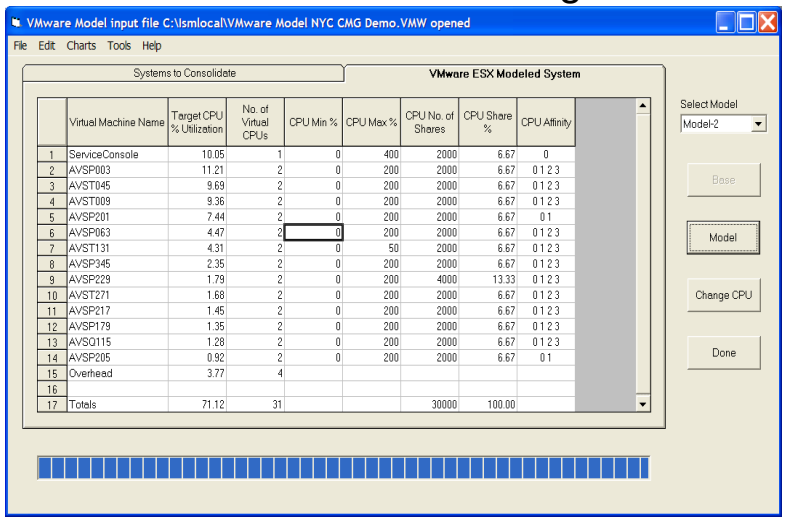
- Capacity Planning (ESX or Cluster level)
  - Allows forecasting of the CPU resource for ESX Hosts or Clusters.
    - Forecasting driven by historical trends.
  - Allows user changes to Workload (VMs) growth trends
    - Including adding and deleting workloads.
  - Allows increases/decreases in future CPU capacity.



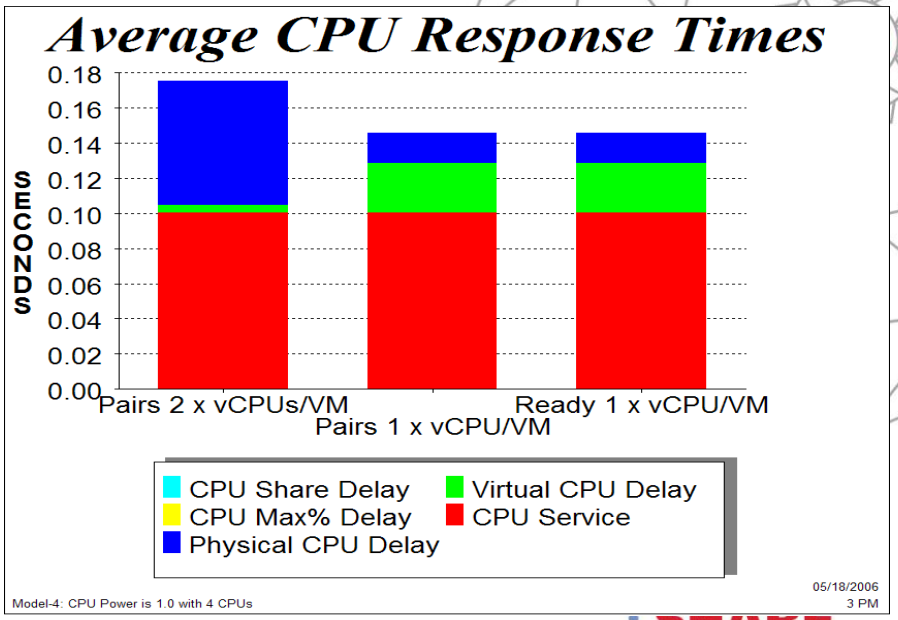


ASG-PERFMAN 2020 What If Capabilities

- CPU Modeling
  - Allows modeling of a single ESX Host
  - Simulation model of CPU response times by Virtual Machine (VM)
  - Models impact of changes to:
    - Workload (VM) Growth
    - VM configuration changes including:
      - *# of virtual CPUs*
      - *Min and Max CPU %s*
      - *CPU Shares*
    - CPU Changes

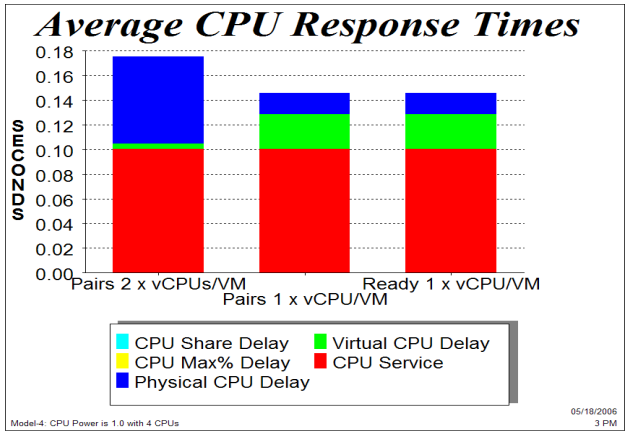


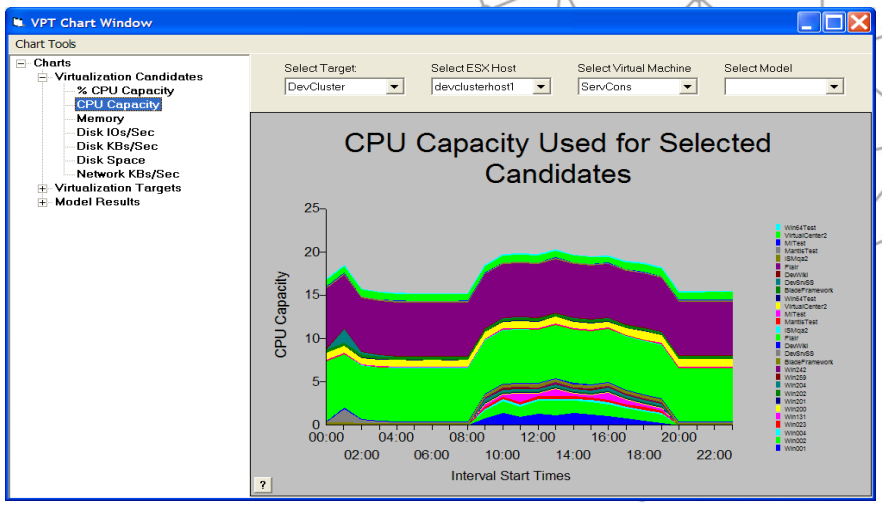
	Virtual Machine Name	Target CPU % Utilization	No. of Virtual CPUs	CPU Min %	CPU Max %	CPU No. of Shares	CPU Share %	CPU Affinity
1	ServiceConsole	10.05	1	0	400	2000	6.67	0
2	AVSP003	11.21	2	0	200	2000	6.67	0 1 2 3
3	AVST045	9.69	2	0	200	2000	6.67	0 1 2 3
4	AVST009	9.36	2	0	200	2000	6.67	0 1 2 3
5	AVSP201	7.44	2	0	200	2000	6.67	0 1
6	AVSP063	4.47	2	0	200	2000	6.67	0 1 2 3
7	AVST131	4.31	2	0	50	2000	6.67	0 1 2 3
8	AVSP345	2.35	2	0	200	2000	6.67	0 1 2 3
9	AVSP229	1.79	2	0	200	4000	13.33	0 1 2 3
10	AVST271	1.68	2	0	200	2000	6.67	0 1 2 3
11	AVSP217	1.45	2	0	200	2000	6.67	0 1 2 3
12	AVSP179	1.35	2	0	200	2000	6.67	0 1 2 3
13	AVSQ115	1.28	2	0	200	2000	6.67	0 1 2 3
14	AVSP205	0.92	2	0	200	2000	6.67	0 1
15	Overhead	3.77	4					
16								
17	Totals	71.12	31			30000	100.00	



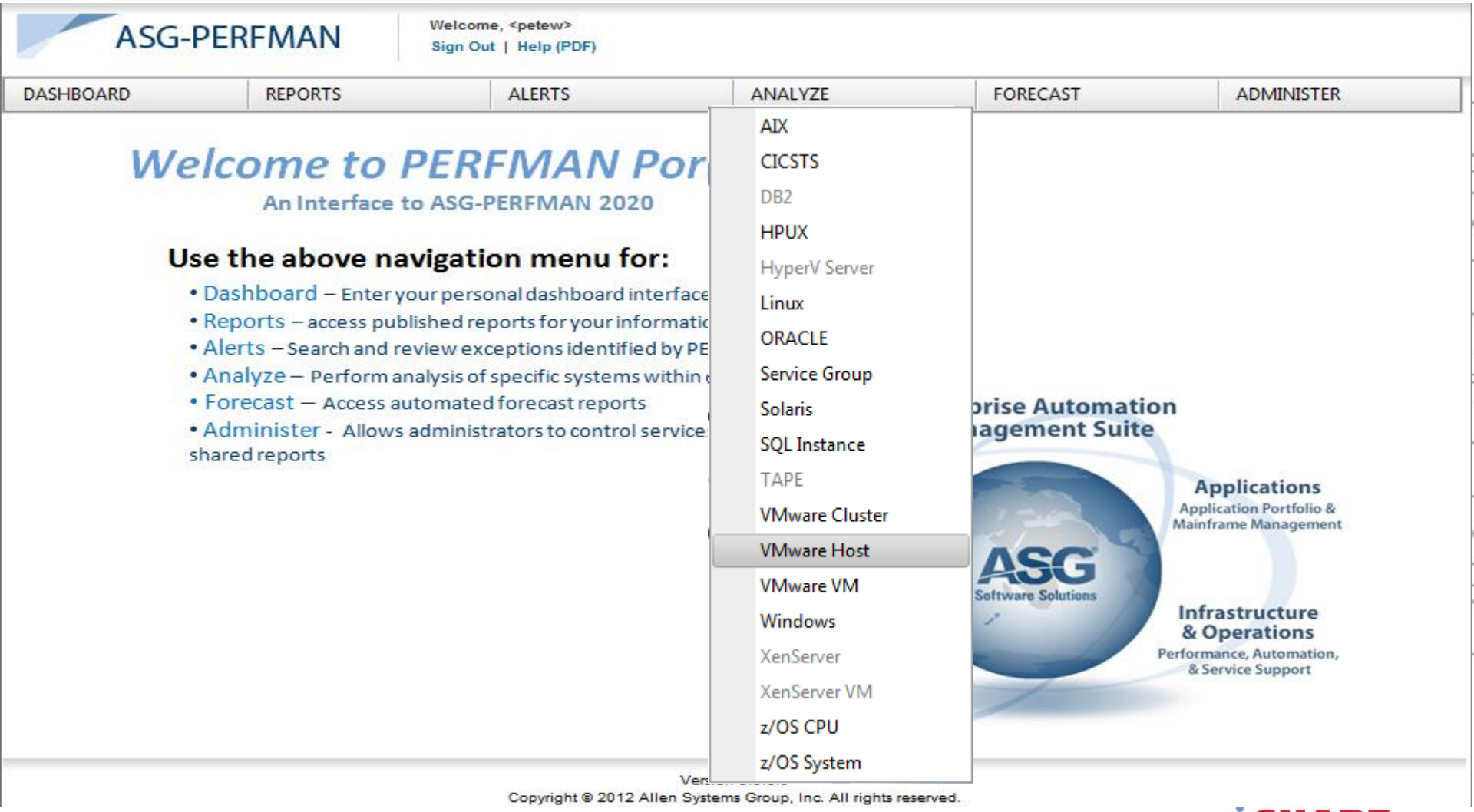
ASG-PERFMAN 2020 What If Capabilities

- **Virtualization Planning Tool (VPT)**
  - Planning tool for P2V and V2V
  - Allows use of data from existing:
    - Physical Windows Servers
    - VMware ESX Hosts
    - VMware Clusters
  - Provides physical candidate selection
  - Allows definition of one or more virtual targets (ESX Hosts or Clusters)
  - Provides automated mapping of both virtual and physical candidates into virtual targets based on user supplied balancing criteria
  - Provides reporting of expected aggregated resource requirements at the Virtual Target (ESX Host and Cluster) level.
  - Provides simulation modeling of each Virtual Target (ESX Host and Cluster)
  - Provides a report of the planned configuration.

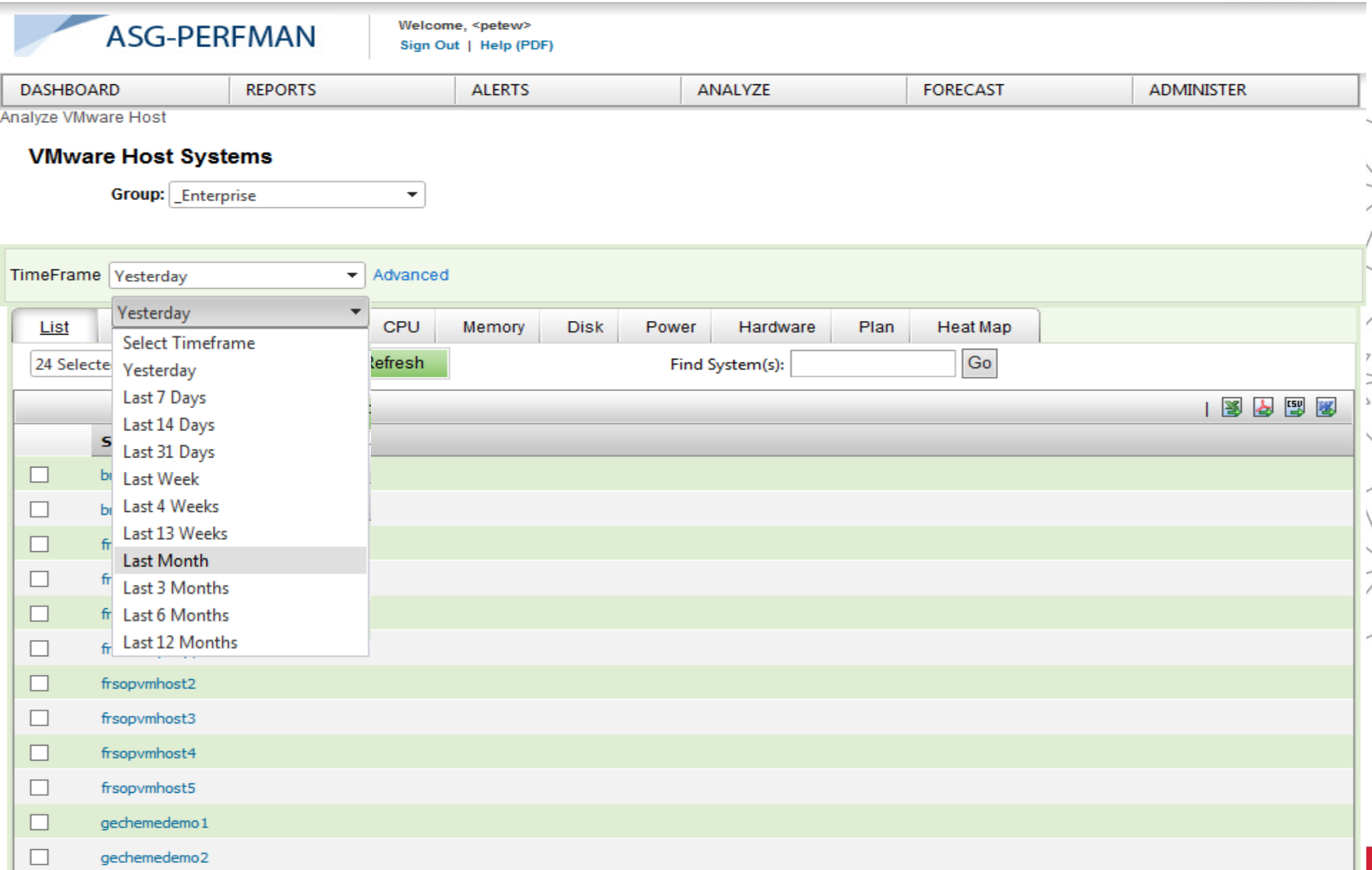




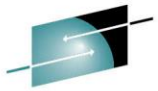
ASG-PERFMAN 2020 Portal Examples

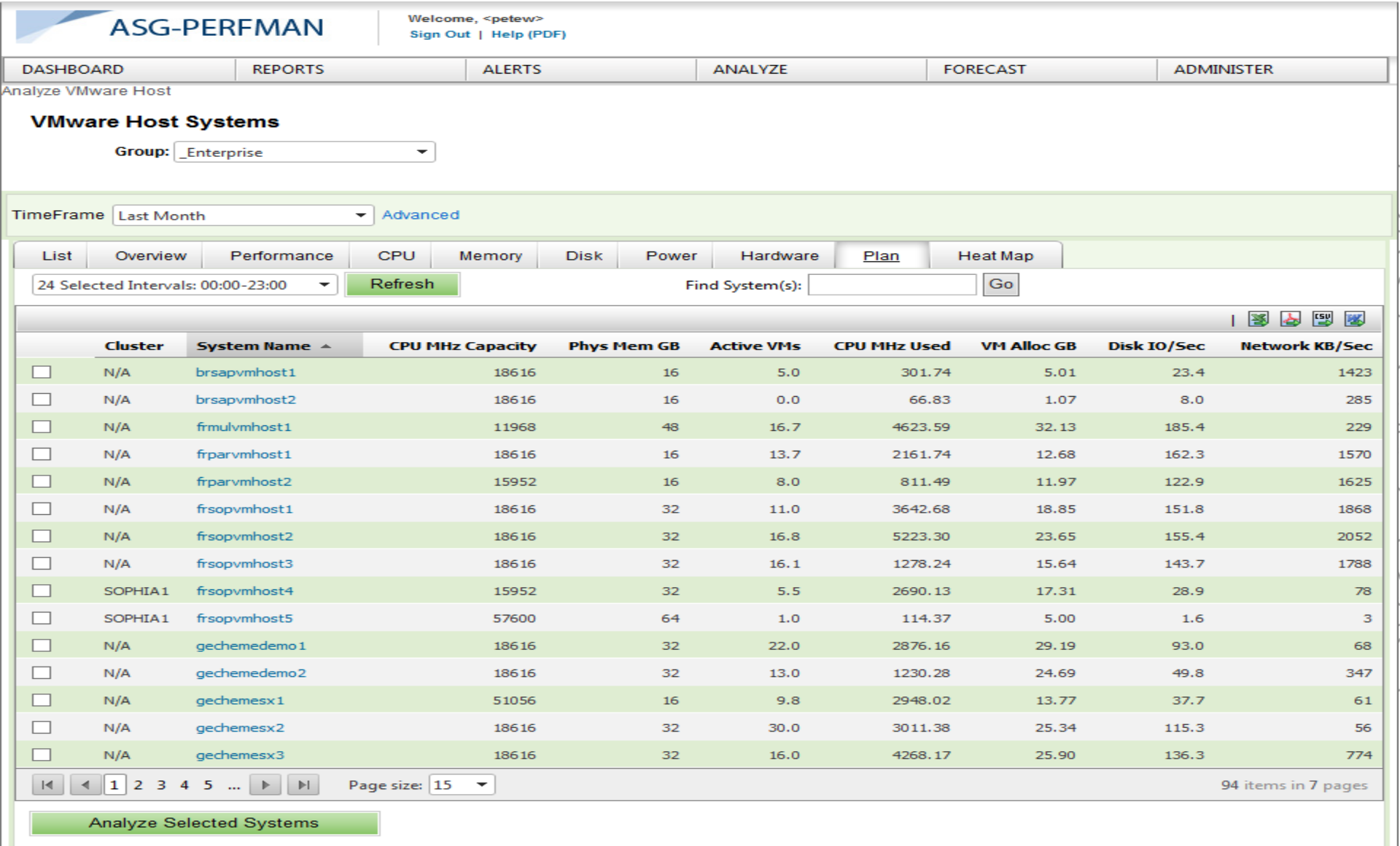


ASG-PERFMAN 2020 Portal Examples

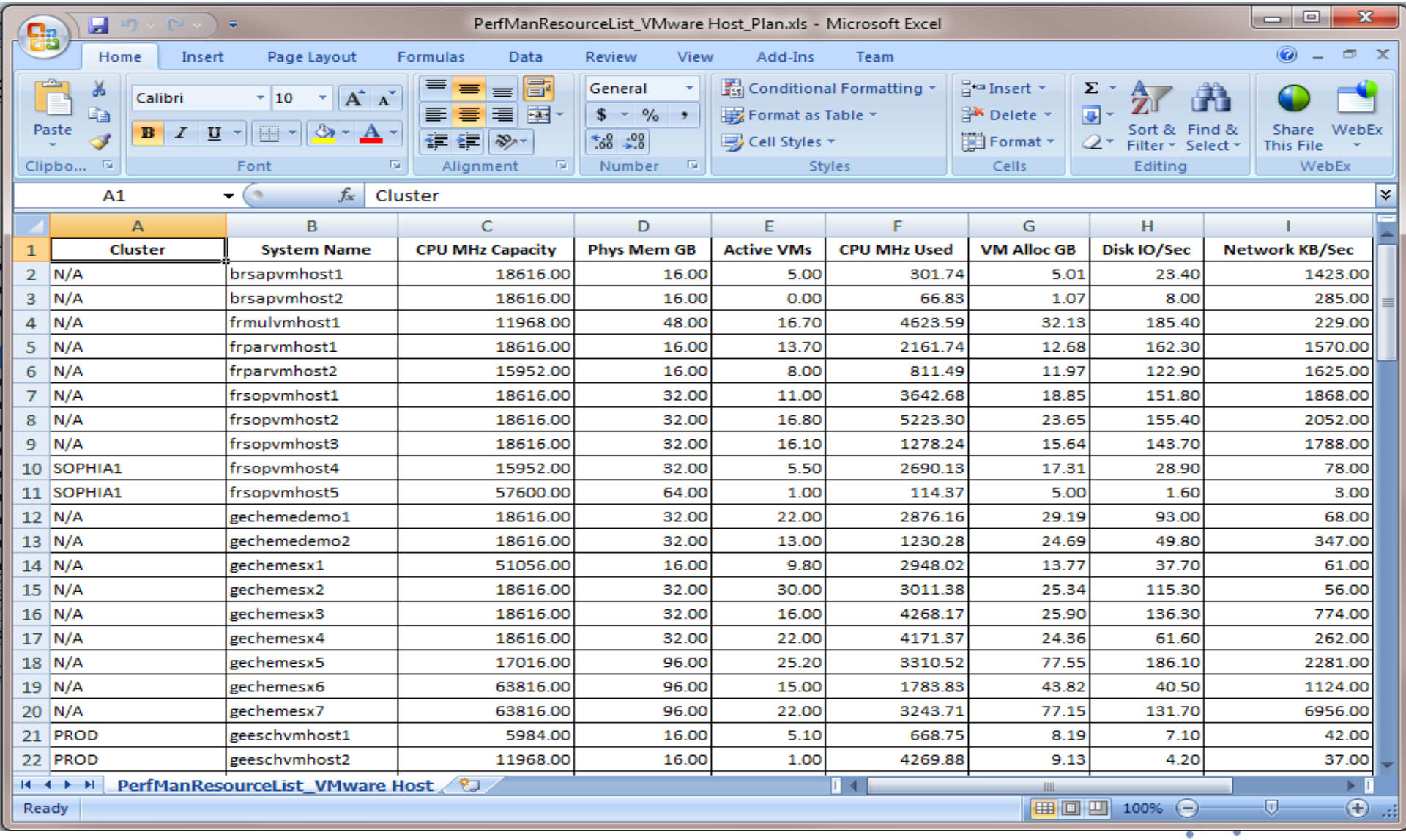


ASG-PERFMAN 2020 Portal Examples





ASG-PERFMAN 2020 Portal Examples



PerfManResourceList_VMware Host_Plan.xls - Microsoft Excel

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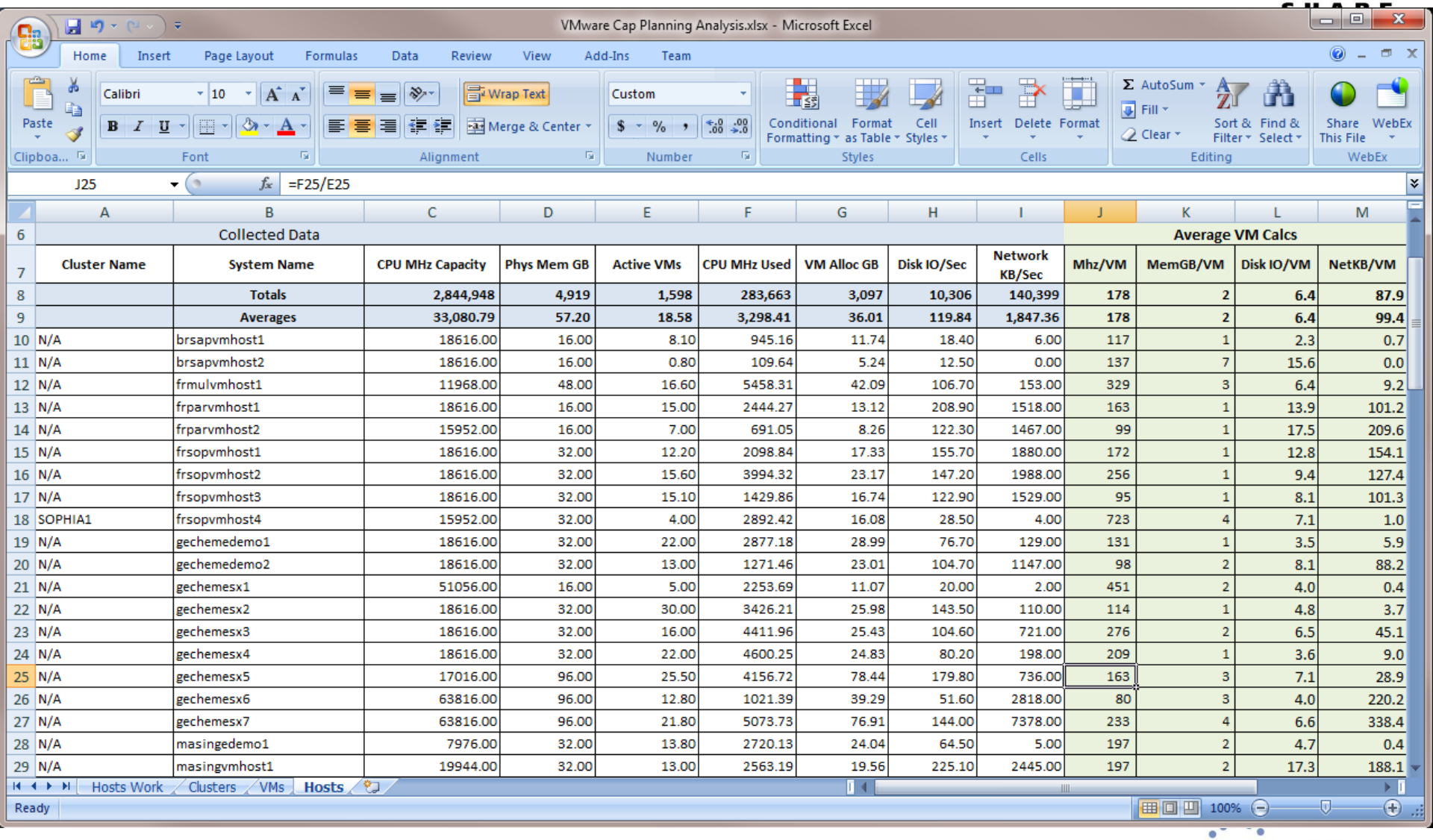
A1 | Cluster

	A	B	C	D	E	F	G	H	I
1	Cluster	System Name	CPU MHz Capacity	Phys Mem GB	Active VMs	CPU MHz Used	VM Alloc GB	Disk IO/Sec	Network KB/Sec
2	N/A	brsapvmhost1	18616.00	16.00	5.00	301.74	5.01	23.40	1423.00
3	N/A	brsapvmhost2	18616.00	16.00	0.00	66.83	1.07	8.00	285.00
4	N/A	frmulvmhost1	11968.00	48.00	16.70	4623.59	32.13	185.40	229.00
5	N/A	frparvmhost1	18616.00	16.00	13.70	2161.74	12.68	162.30	1570.00
6	N/A	frparvmhost2	15952.00	16.00	8.00	811.49	11.97	122.90	1625.00
7	N/A	frsopvmhost1	18616.00	32.00	11.00	3642.68	18.85	151.80	1868.00
8	N/A	frsopvmhost2	18616.00	32.00	16.80	5223.30	23.65	155.40	2052.00
9	N/A	frsopvmhost3	18616.00	32.00	16.10	1278.24	15.64	143.70	1788.00
10	SOPHIA1	frsopvmhost4	15952.00	32.00	5.50	2690.13	17.31	28.90	78.00
11	SOPHIA1	frsopvmhost5	57600.00	64.00	1.00	114.37	5.00	1.60	3.00
12	N/A	gechemedemo1	18616.00	32.00	22.00	2876.16	29.19	93.00	68.00
13	N/A	gechemedemo2	18616.00	32.00	13.00	1230.28	24.69	49.80	347.00
14	N/A	gechemesx1	51056.00	16.00	9.80	2948.02	13.77	37.70	61.00
15	N/A	gechemesx2	18616.00	32.00	30.00	3011.38	25.34	115.30	56.00
16	N/A	gechemesx3	18616.00	32.00	16.00	4268.17	25.90	136.30	774.00
17	N/A	gechemesx4	18616.00	32.00	22.00	4171.37	24.36	61.60	262.00
18	N/A	gechemesx5	17016.00	96.00	25.20	3310.52	77.55	186.10	2281.00
19	N/A	gechemesx6	63816.00	96.00	15.00	1783.83	43.82	40.50	1124.00
20	N/A	gechemesx7	63816.00	96.00	22.00	3243.71	77.15	131.70	6956.00
21	PROD	geeschvmhost1	5984.00	16.00	5.10	668.75	8.19	7.10	42.00
22	PROD	geeschvmhost2	11968.00	16.00	1.00	4269.88	9.13	4.20	37.00

PerfManResourceList_VMware Host

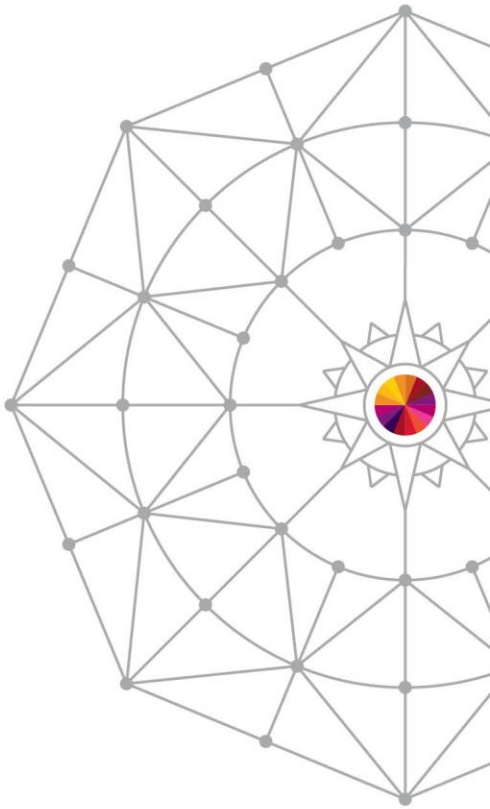
Ready | 100%

ASG-PERFMAN 2020 Portal Examples



	A	B	C	D	E	F	G	H	I	J	K	L	M
6		Collected Data								Average VM Calcs			
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
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
11	N/A	brsapvmhost2	18616.00	16.00	0.80	109.64	5.24	12.50	0.00	137	7	15.6	0.0
12	N/A	frmulvmhost1	11968.00	48.00	16.60	5458.31	42.09	106.70	153.00	329	3	6.4	9.2
13	N/A	frparvmhost1	18616.00	16.00	15.00	2444.27	13.12	208.90	1518.00	163	1	13.9	101.2
14	N/A	frparvmhost2	15952.00	16.00	7.00	691.05	8.26	122.30	1467.00	99	1	17.5	209.6
15	N/A	frsopvmhost1	18616.00	32.00	12.20	2098.84	17.33	155.70	1880.00	172	1	12.8	154.1
16	N/A	frsopvmhost2	18616.00	32.00	15.60	3994.32	23.17	147.20	1988.00	256	1	9.4	127.4
17	N/A	frsopvmhost3	18616.00	32.00	15.10	1429.86	16.74	122.90	1529.00	95	1	8.1	101.3
18	SOPHIA1	frsopvmhost4	15952.00	32.00	4.00	2892.42	16.08	28.50	4.00	723	4	7.1	1.0
19	N/A	gechemedemo1	18616.00	32.00	22.00	2877.18	28.99	76.70	129.00	131	1	3.5	5.9
20	N/A	gechemedemo2	18616.00	32.00	13.00	1271.46	23.01	104.70	1147.00	98	2	8.1	88.2
21	N/A	gechemesx1	51056.00	16.00	5.00	2253.69	11.07	20.00	2.00	451	2	4.0	0.4
22	N/A	gechemesx2	18616.00	32.00	30.00	3426.21	25.98	143.50	110.00	114	1	4.8	3.7
23	N/A	gechemesx3	18616.00	32.00	16.00	4411.96	25.43	104.60	721.00	276	2	6.5	45.1
24	N/A	gechemesx4	18616.00	32.00	22.00	4600.25	24.83	80.20	198.00	209	1	3.6	9.0
25	N/A	gechemesx5	17016.00	96.00	25.50	4156.72	78.44	179.80	736.00	163	3	7.1	28.9
26	N/A	gechemesx6	63816.00	96.00	12.80	1021.39	39.29	51.60	2818.00	80	3	4.0	220.2
27	N/A	gechemesx7	63816.00	96.00	21.80	5073.73	76.91	144.00	7378.00	233	4	6.6	338.4
28	N/A	masingedemo1	7976.00	32.00	13.80	2720.13	24.04	64.50	5.00	197	2	4.7	0.4
29	N/A	masingvmhost1	19944.00	32.00	13.00	2563.19	19.56	225.10	2445.00	197	2	17.3	188.1

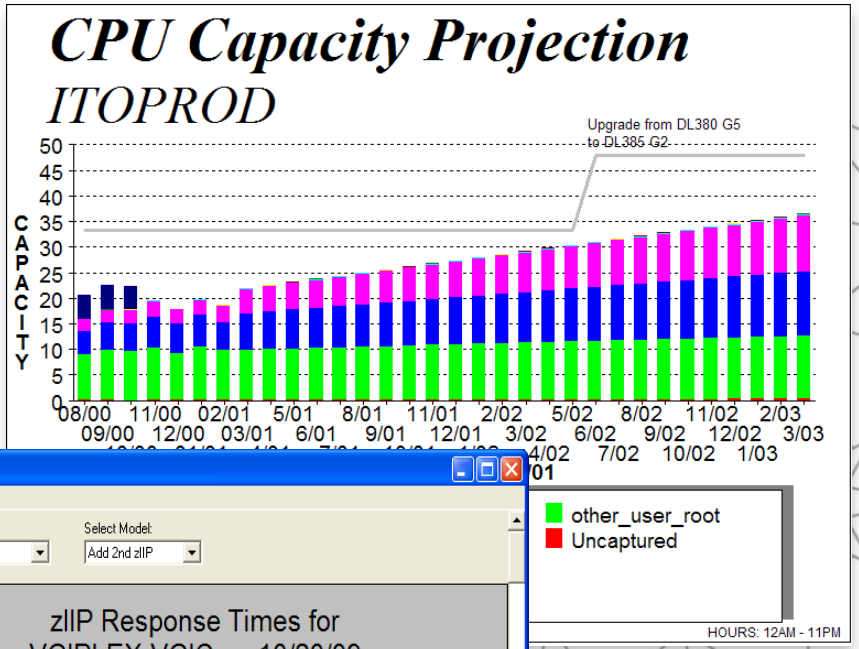
ASG-PERFMAN 2020 – z/OS

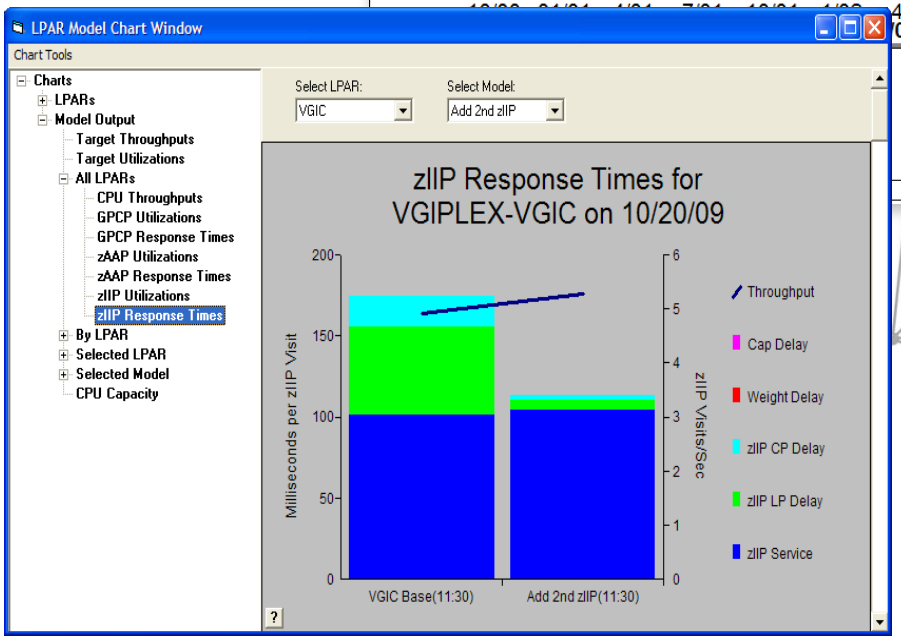


ASG-PERFMAN 2020

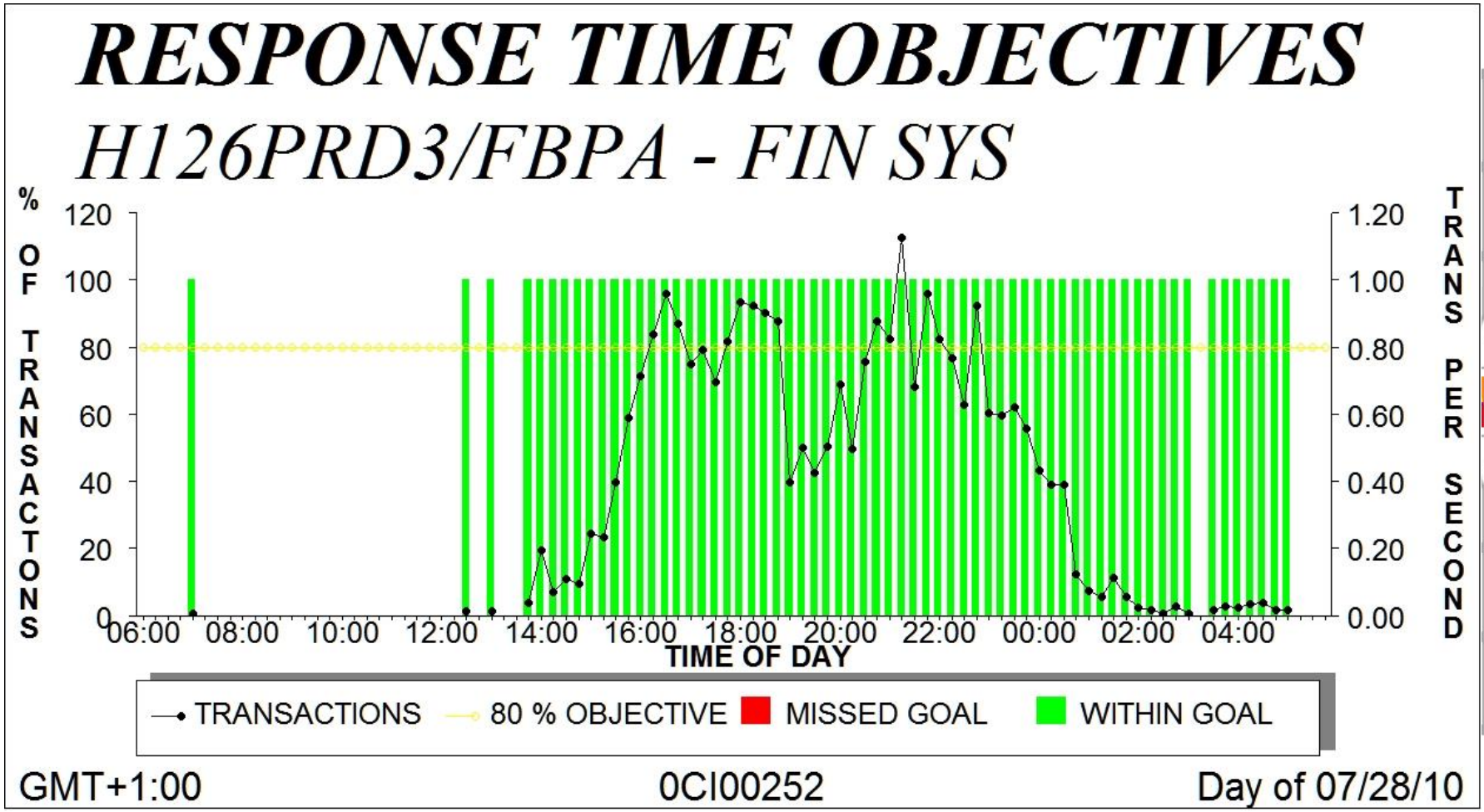
ASG-PERFMAN for z/OS

- Capacity Planning
- CPU Modeling
- LPAR Modeling
- Workload Modeling
- zIIP Speciality Processor Monitoring
- Sub Capacity Monitoring
- Analysis
- Forecasting
- Monitoring

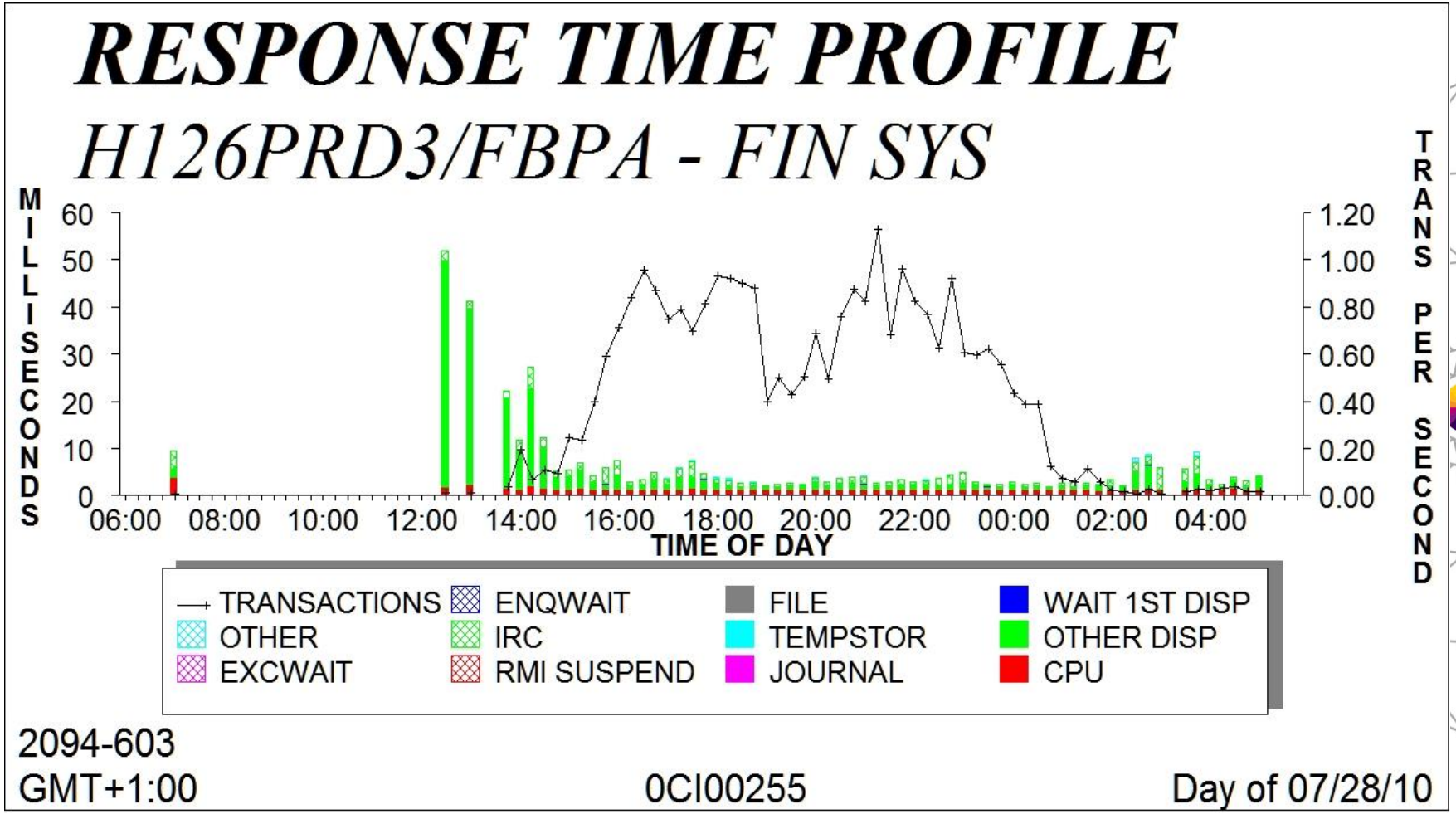




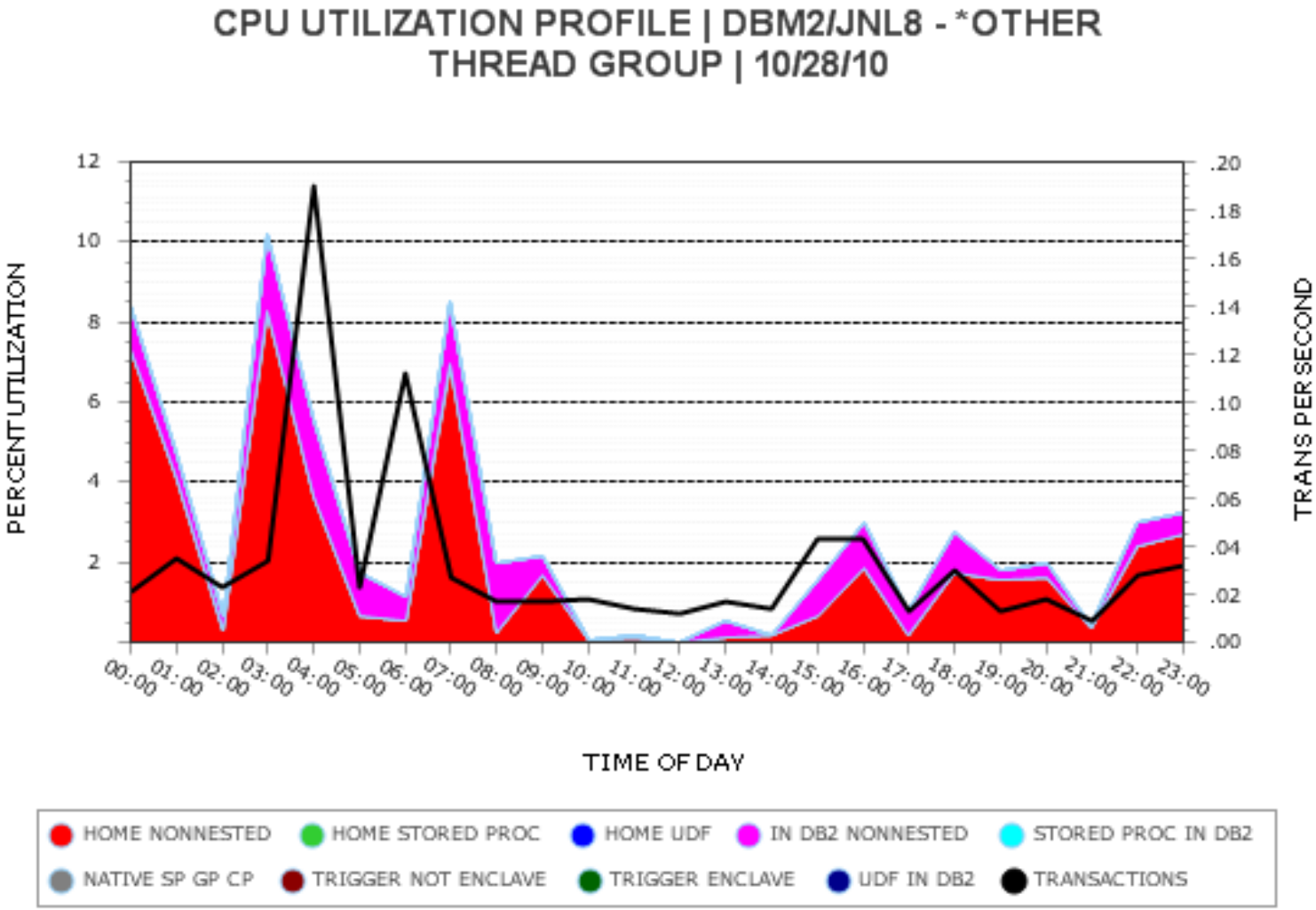
ASG-PERFMAN 2020 – CICS Transaction Group Response Times



ASG-PERFMAN 2020 – CICS Response Time Components for a Tran Group



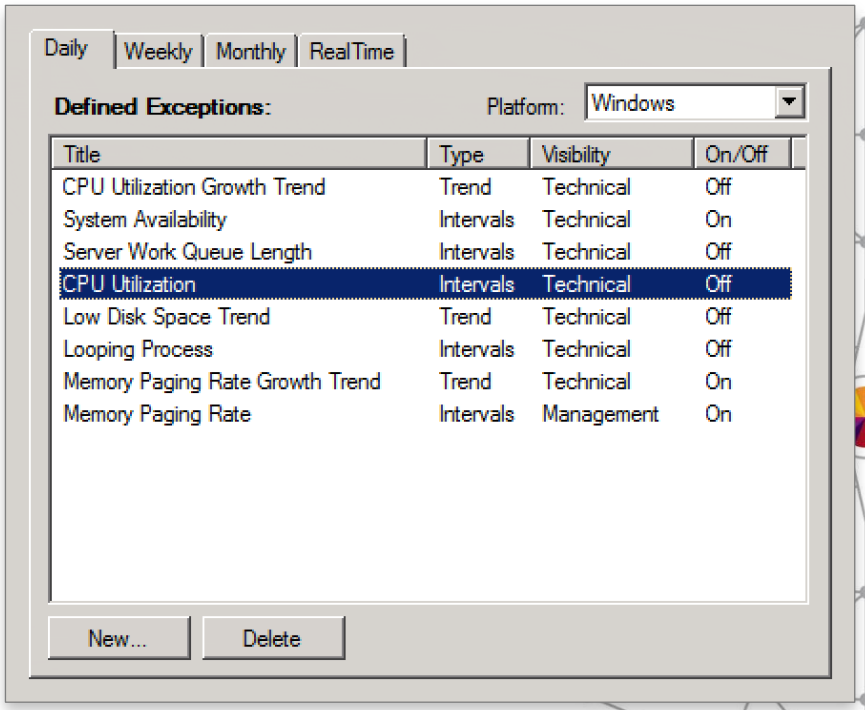
ASG-PERFMAN 2020 – DB2 Response Time Components for a Tran Group



ASG-PERFMAN 2020 – Service Exceptions

Service Exception Types

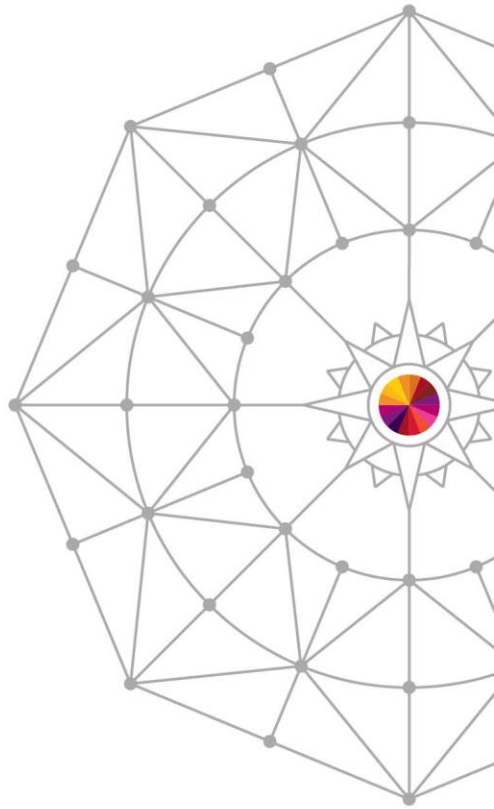
- **Threshold:** A performance metric is met in either real-time or summarized data.
- **Trend Forecasting:** A metric appears to be approaching a specified level.
- **Abnormal Behavior Detection:** A metric is deviating from the expected/historical norms.



Platform-specific ***exceptions are provided as customizable templates.***

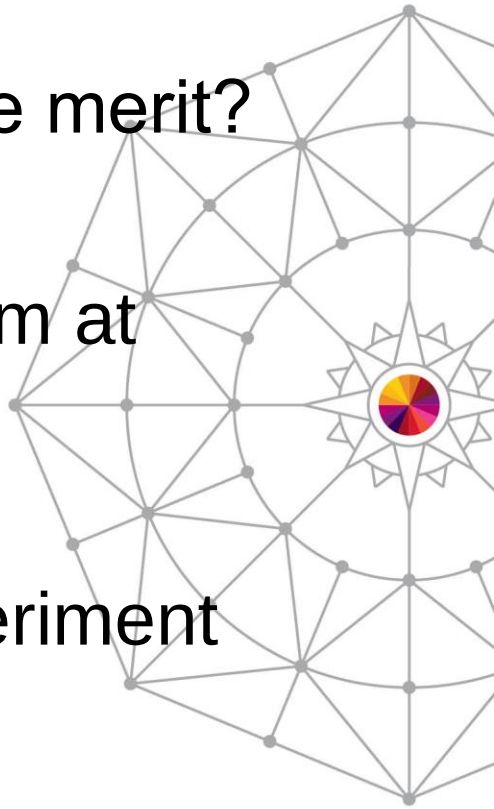
ASG-PERFMAN 2020 – Key Advantages

- Easy to install, Windows-based solution
- Integrated, consistent multi-platform support
- Quick & painless implementation
- Highly scalable for large data centers
- Robust, up-to-date support for z/OS
  - No prerequisite z/OS software
- Web-based interface



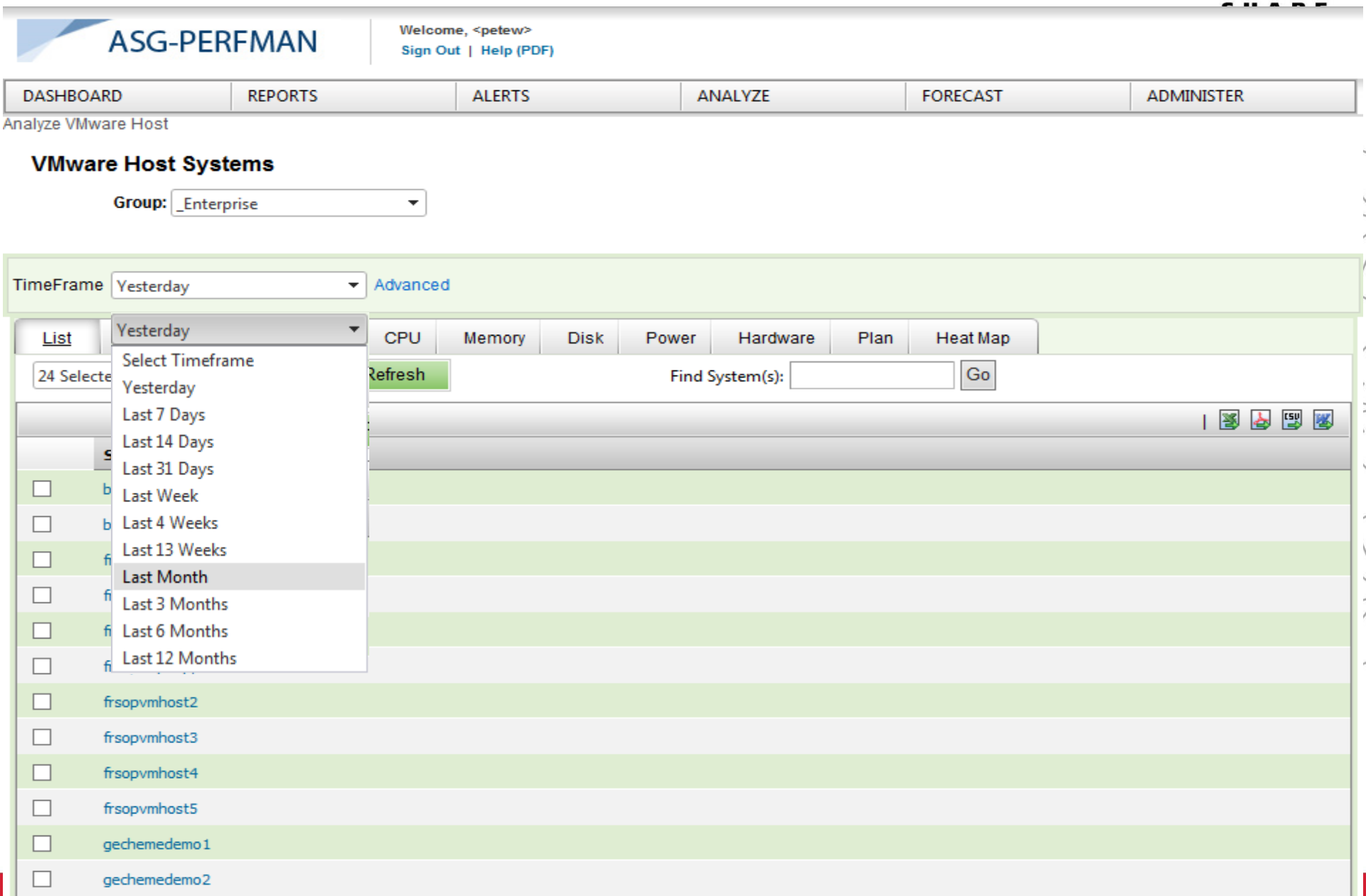
Proposed Methodology

- Did the idea of an “average VM” have merit?
- How could it be applied to the problem at hand?
- I needed ESX host level data to experiment with…

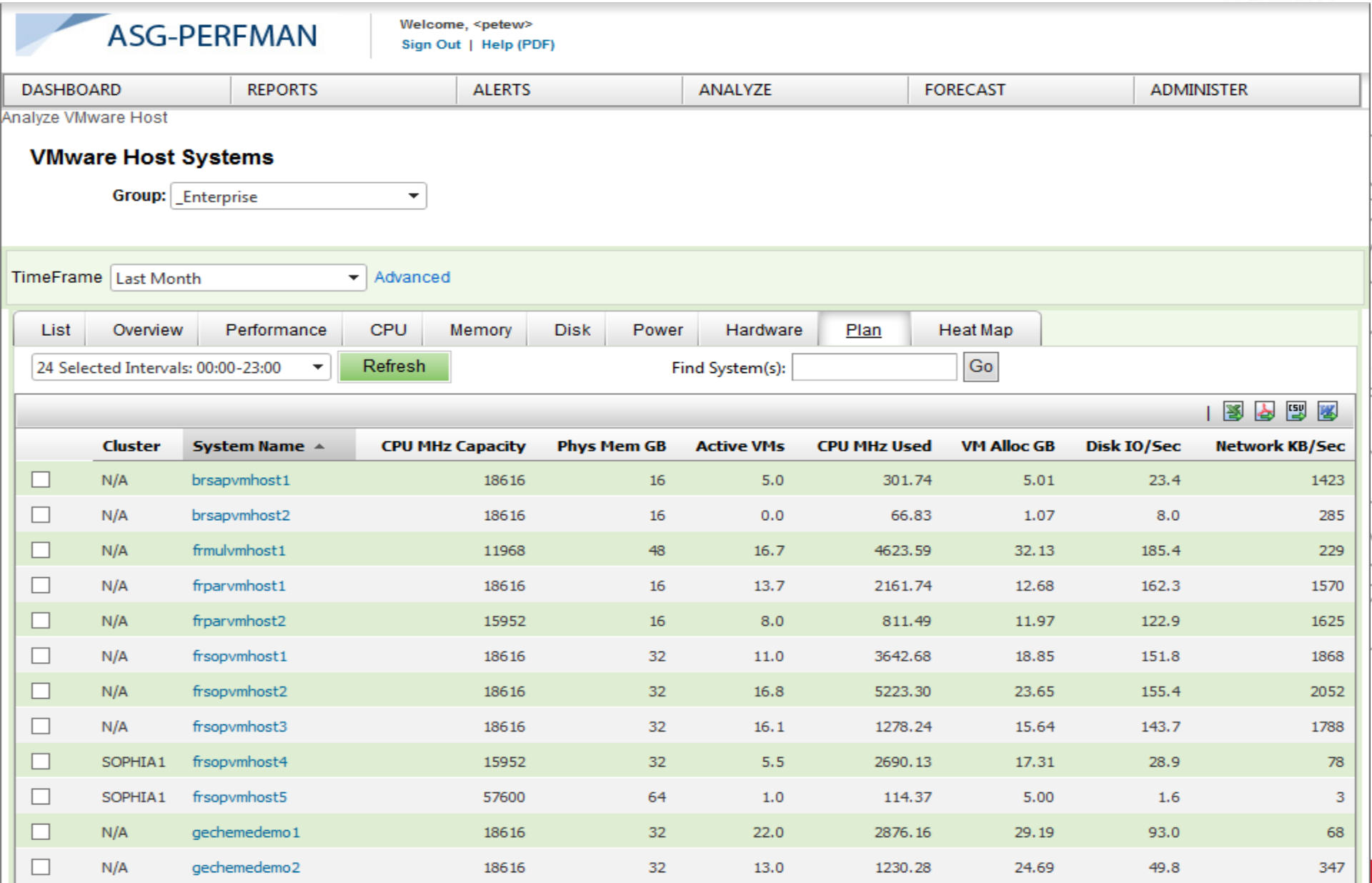


Proposed Methodology

Proposed Methodology

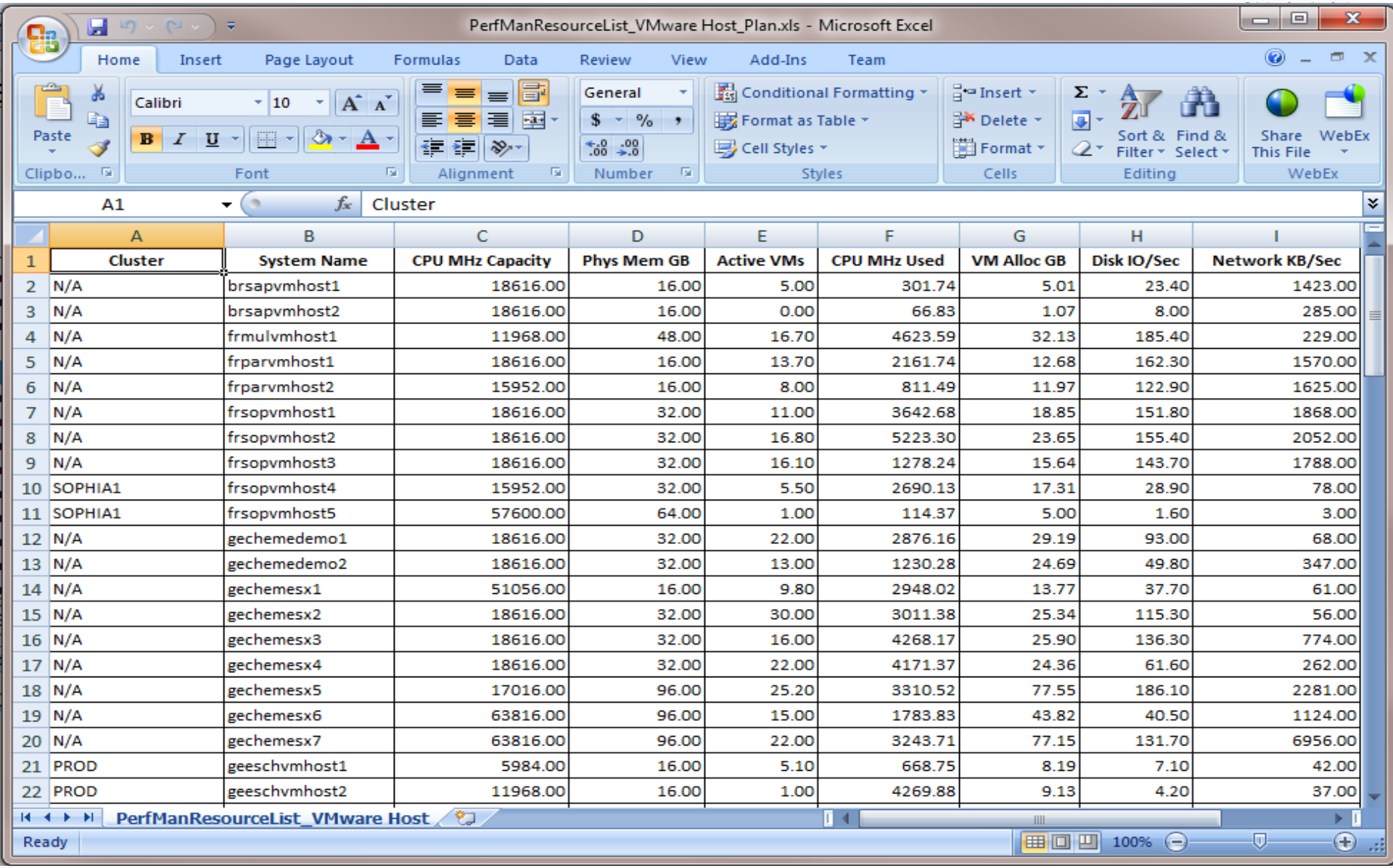


Proposed Methodology



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

Proposed Methodology



PerfManResourceList_VMware Host_Plan.xls - Microsoft Excel

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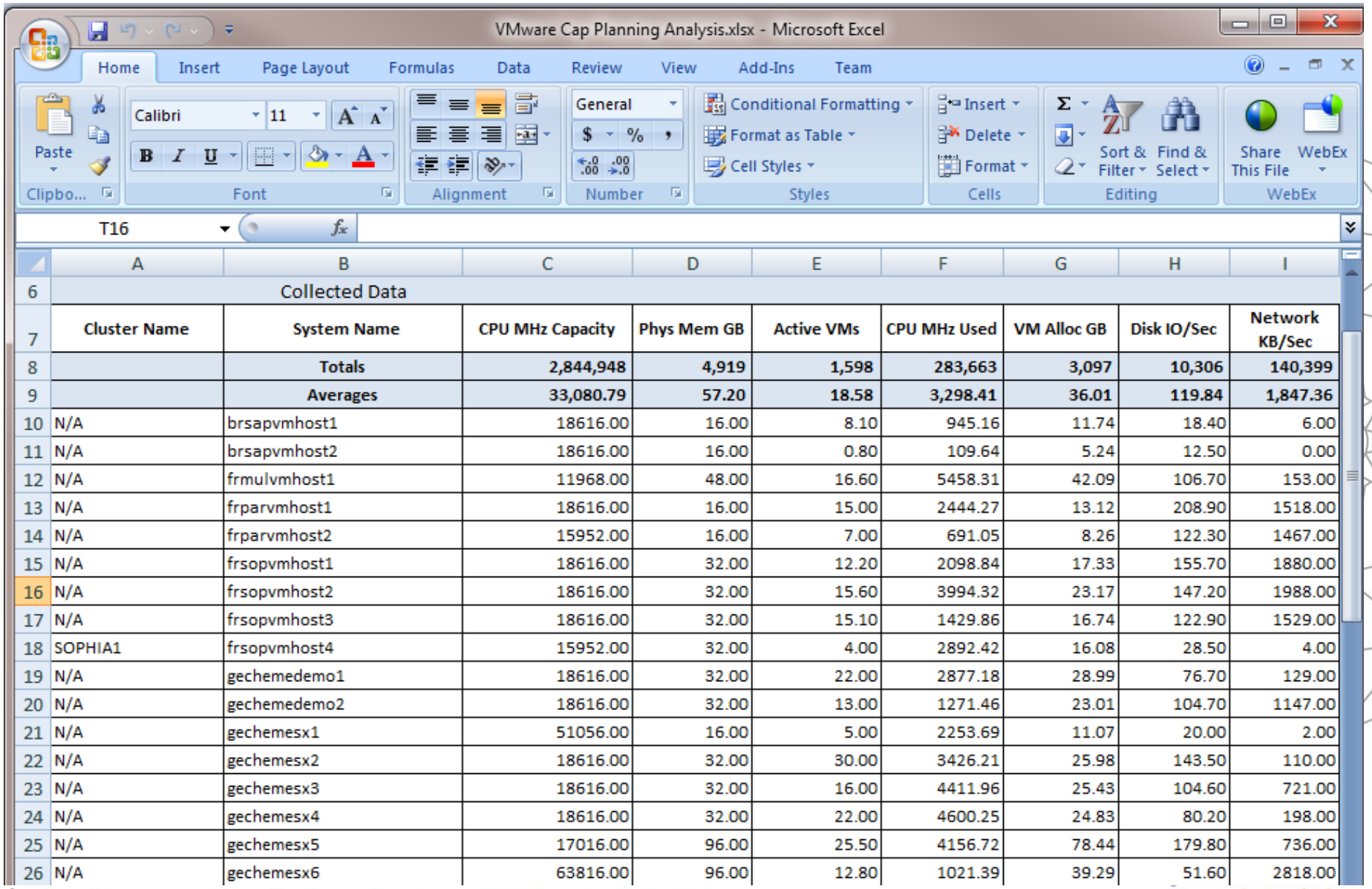
Cell A1: Cluster

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	18616.00	16.00	5.00	301.74	5.01	23.40	1423.00
N/A	brsapvmhost2	18616.00	16.00	0.00	66.83	1.07	8.00	285.00
N/A	frmulvmhost1	11968.00	48.00	16.70	4623.59	32.13	185.40	229.00
N/A	frparvmhost1	18616.00	16.00	13.70	2161.74	12.68	162.30	1570.00
N/A	frparvmhost2	15952.00	16.00	8.00	811.49	11.97	122.90	1625.00
N/A	frsopvmhost1	18616.00	32.00	11.00	3642.68	18.85	151.80	1868.00
N/A	frsopvmhost2	18616.00	32.00	16.80	5223.30	23.65	155.40	2052.00
N/A	frsopvmhost3	18616.00	32.00	16.10	1278.24	15.64	143.70	1788.00
SOPHIA1	frsopvmhost4	15952.00	32.00	5.50	2690.13	17.31	28.90	78.00
SOPHIA1	frsopvmhost5	57600.00	64.00	1.00	114.37	5.00	1.60	3.00
N/A	gechemedemo1	18616.00	32.00	22.00	2876.16	29.19	93.00	68.00
N/A	gechemedemo2	18616.00	32.00	13.00	1230.28	24.69	49.80	347.00
N/A	gechemesx1	51056.00	16.00	9.80	2948.02	13.77	37.70	61.00
N/A	gechemesx2	18616.00	32.00	30.00	3011.38	25.34	115.30	56.00
N/A	gechemesx3	18616.00	32.00	16.00	4268.17	25.90	136.30	774.00
N/A	gechemesx4	18616.00	32.00	22.00	4171.37	24.36	61.60	262.00
N/A	gechemesx5	17016.00	96.00	25.20	3310.52	77.55	186.10	2281.00
N/A	gechemesx6	63816.00	96.00	15.00	1783.83	43.82	40.50	1124.00
N/A	gechemesx7	63816.00	96.00	22.00	3243.71	77.15	131.70	6956.00
PROD	geeschvmhost1	5984.00	16.00	5.10	668.75	8.19	7.10	42.00
PROD	geeschvmhost2	11968.00	16.00	1.00	4269.88	9.13	4.20	37.00

PerfManResourceList_VMware Host

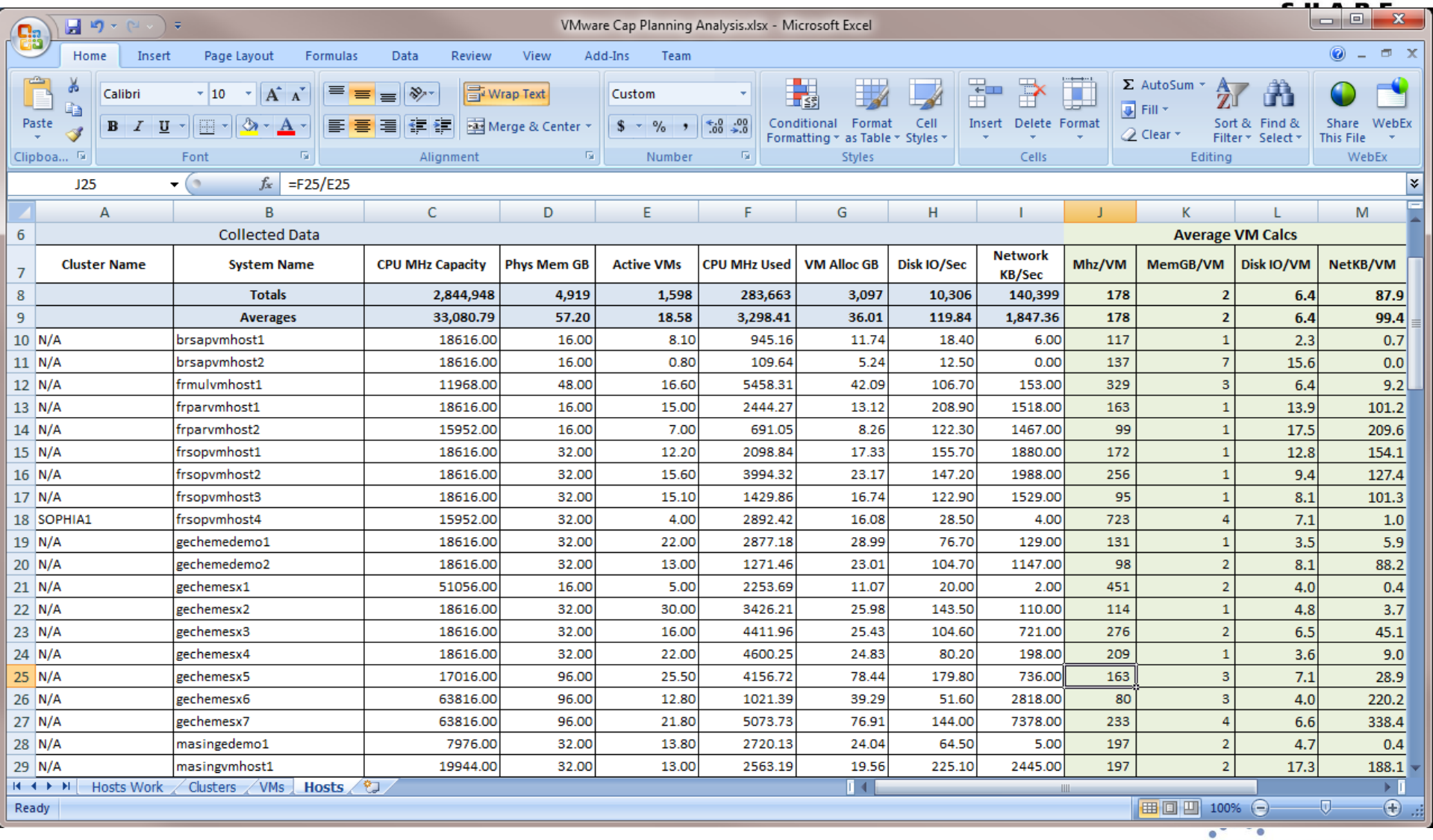
Ready

Proposed Methodology



	A	B	C	D	E	F	G	H	I
6		Collected Data							
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**
8		**Totals**	**2,844,948**	**4,919**	**1,598**	**283,663**	**3,097**	**10,306**	**140,399**
9		**Averages**	**33,080.79**	**57.20**	**18.58**	**3,298.41**	**36.01**	**119.84**	**1,847.36**
10	N/A	brsapvmhost1	18616.00	16.00	8.10	945.16	11.74	18.40	6.00
11	N/A	brsapvmhost2	18616.00	16.00	0.80	109.64	5.24	12.50	0.00
12	N/A	frmulvmhost1	11968.00	48.00	16.60	5458.31	42.09	106.70	153.00
13	N/A	frparvmhost1	18616.00	16.00	15.00	2444.27	13.12	208.90	1518.00
14	N/A	frparvmhost2	15952.00	16.00	7.00	691.05	8.26	122.30	1467.00
15	N/A	frsopvmhost1	18616.00	32.00	12.20	2098.84	17.33	155.70	1880.00
16	N/A	frsopvmhost2	18616.00	32.00	15.60	3994.32	23.17	147.20	1988.00
17	N/A	frsopvmhost3	18616.00	32.00	15.10	1429.86	16.74	122.90	1529.00
18	SOPHIA1	frsopvmhost4	15952.00	32.00	4.00	2892.42	16.08	28.50	4.00
19	N/A	gechemedemo1	18616.00	32.00	22.00	2877.18	28.99	76.70	129.00
20	N/A	gechemedemo2	18616.00	32.00	13.00	1271.46	23.01	104.70	1147.00
21	N/A	gechemesx1	51056.00	16.00	5.00	2253.69	11.07	20.00	2.00
22	N/A	gechemesx2	18616.00	32.00	30.00	3426.21	25.98	143.50	110.00
23	N/A	gechemesx3	18616.00	32.00	16.00	4411.96	25.43	104.60	721.00
24	N/A	gechemesx4	18616.00	32.00	22.00	4600.25	24.83	80.20	198.00
25	N/A	gechemesx5	17016.00	96.00	25.50	4156.72	78.44	179.80	736.00
26	N/A	gechemesx6	63816.00	96.00	12.80	1021.39	39.29	51.60	2818.00

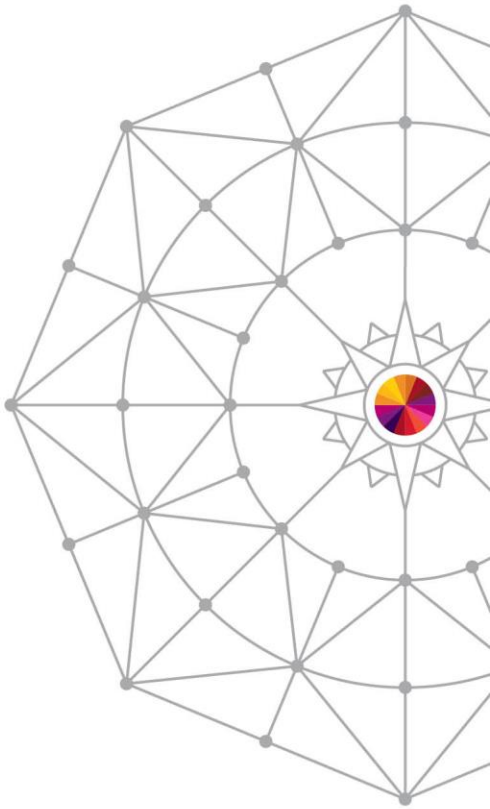
Proposed Methodology



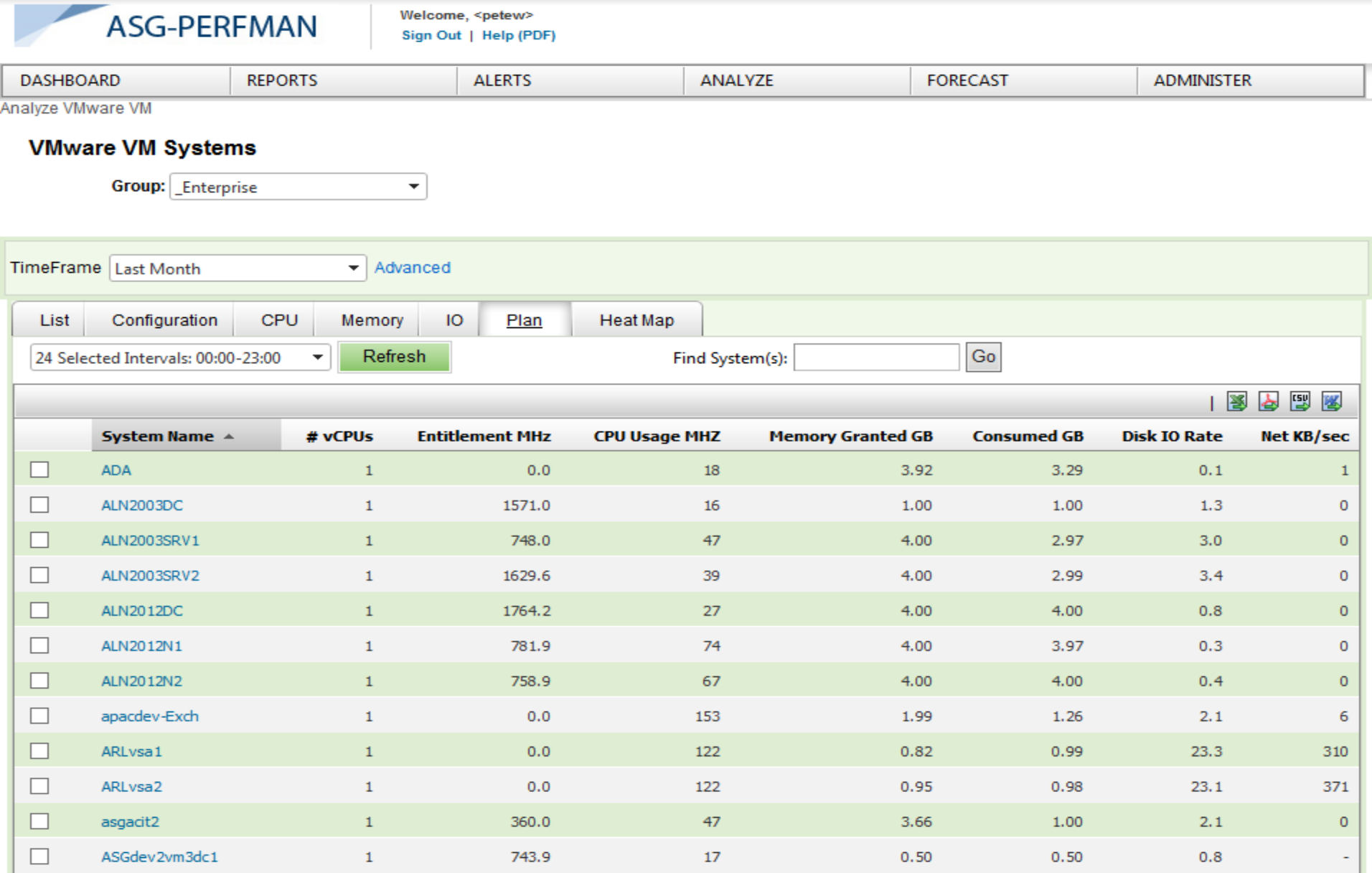
	A	B	C	D	E	F	G	H	I	J	K	L	M
6		Collected Data								Average VM Calcs			
7	Cluster Name	System Name	CPU MHz Capacity	Phys Mem GB	Active VMs	CPU MHz Used	VM Alloc GB	Disk IO/Sec	Network KB/Sec	Mhz/VM	MemGB/VM	Disk IO/VM	NetKB/VM
8		**Totals**	**2,844,948**	**4,919**	**1,598**	**283,663**	**3,097**	**10,306**	**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
11	N/A	brsapvmhost2	18616.00	16.00	0.80	109.64	5.24	12.50	0.00	137	7	15.6	0.0
12	N/A	frmulvmhost1	11968.00	48.00	16.60	5458.31	42.09	106.70	153.00	329	3	6.4	9.2
13	N/A	frparvmhost1	18616.00	16.00	15.00	2444.27	13.12	208.90	1518.00	163	1	13.9	101.2
14	N/A	frparvmhost2	15952.00	16.00	7.00	691.05	8.26	122.30	1467.00	99	1	17.5	209.6
15	N/A	frsopvmhost1	18616.00	32.00	12.20	2098.84	17.33	155.70	1880.00	172	1	12.8	154.1
16	N/A	frsopvmhost2	18616.00	32.00	15.60	3994.32	23.17	147.20	1988.00	256	1	9.4	127.4
17	N/A	frsopvmhost3	18616.00	32.00	15.10	1429.86	16.74	122.90	1529.00	95	1	8.1	101.3
18	SOPHIA1	frsopvmhost4	15952.00	32.00	4.00	2892.42	16.08	28.50	4.00	723	4	7.1	1.0
19	N/A	gechemedemo1	18616.00	32.00	22.00	2877.18	28.99	76.70	129.00	131	1	3.5	5.9
20	N/A	gechemedemo2	18616.00	32.00	13.00	1271.46	23.01	104.70	1147.00	98	2	8.1	88.2
21	N/A	gechemesx1	51056.00	16.00	5.00	2253.69	11.07	20.00	2.00	451	2	4.0	0.4
22	N/A	gechemesx2	18616.00	32.00	30.00	3426.21	25.98	143.50	110.00	114	1	4.8	3.7
23	N/A	gechemesx3	18616.00	32.00	16.00	4411.96	25.43	104.60	721.00	276	2	6.5	45.1
24	N/A	gechemesx4	18616.00	32.00	22.00	4600.25	24.83	80.20	198.00	209	1	3.6	9.0
25	N/A	gechemesx5	17016.00	96.00	25.50	4156.72	78.44	179.80	736.00	163	3	7.1	28.9
26	N/A	gechemesx6	63816.00	96.00	12.80	1021.39	39.29	51.60	2818.00	80	3	4.0	220.2
27	N/A	gechemesx7	63816.00	96.00	21.80	5073.73	76.91	144.00	7378.00	233	4	6.6	338.4
28	N/A	masingedemo1	7976.00	32.00	13.80	2720.13	24.04	64.50	5.00	197	2	4.7	0.4
29	N/A	masingvmhost1	19944.00	32.00	13.00	2563.19	19.56	225.10	2445.00	197	2	17.3	188.1

Proposed Methodology

- How well does the average VM represent typical VM activity?
- We needed VM level data to experiment with…

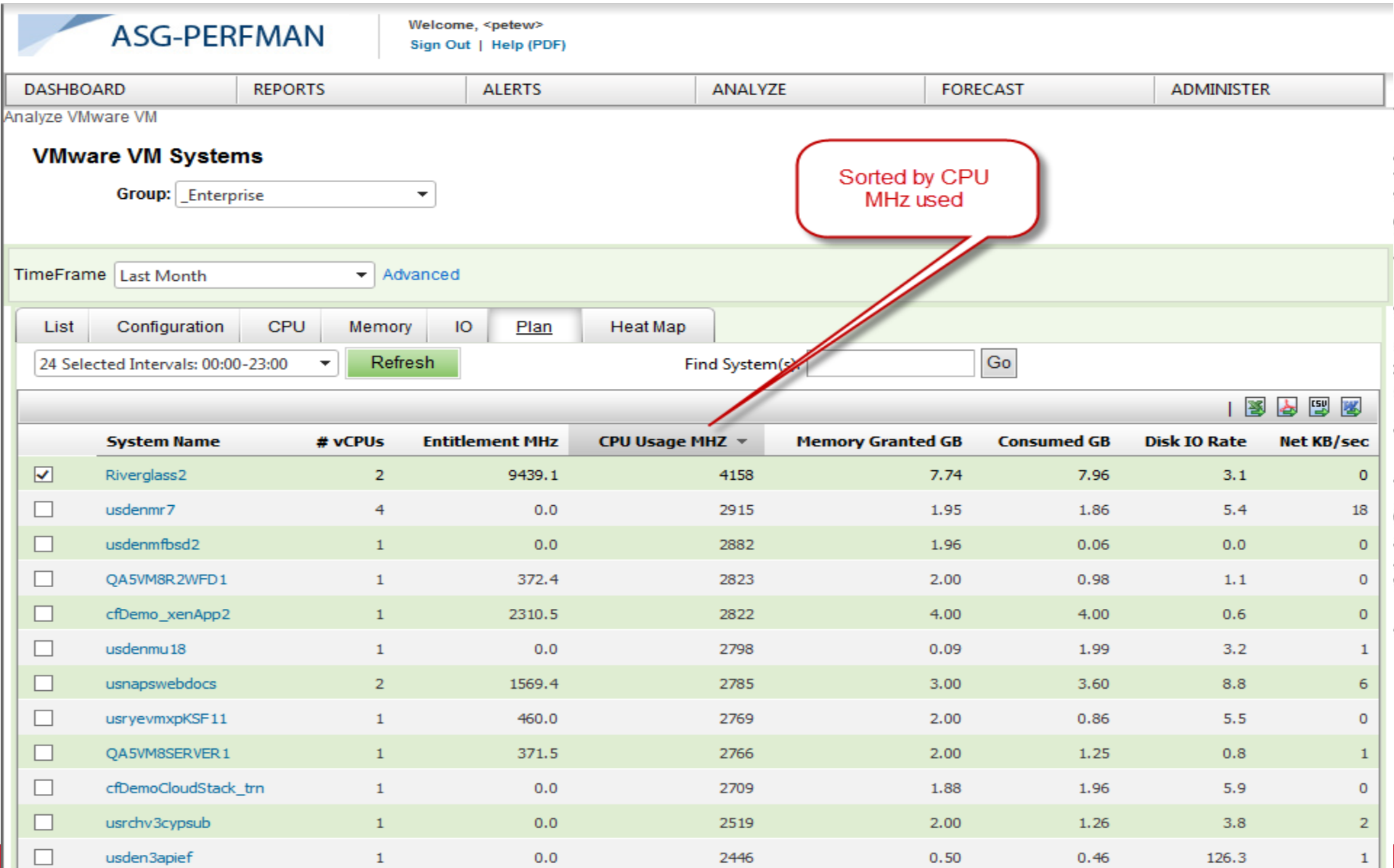


Proposed Methodology



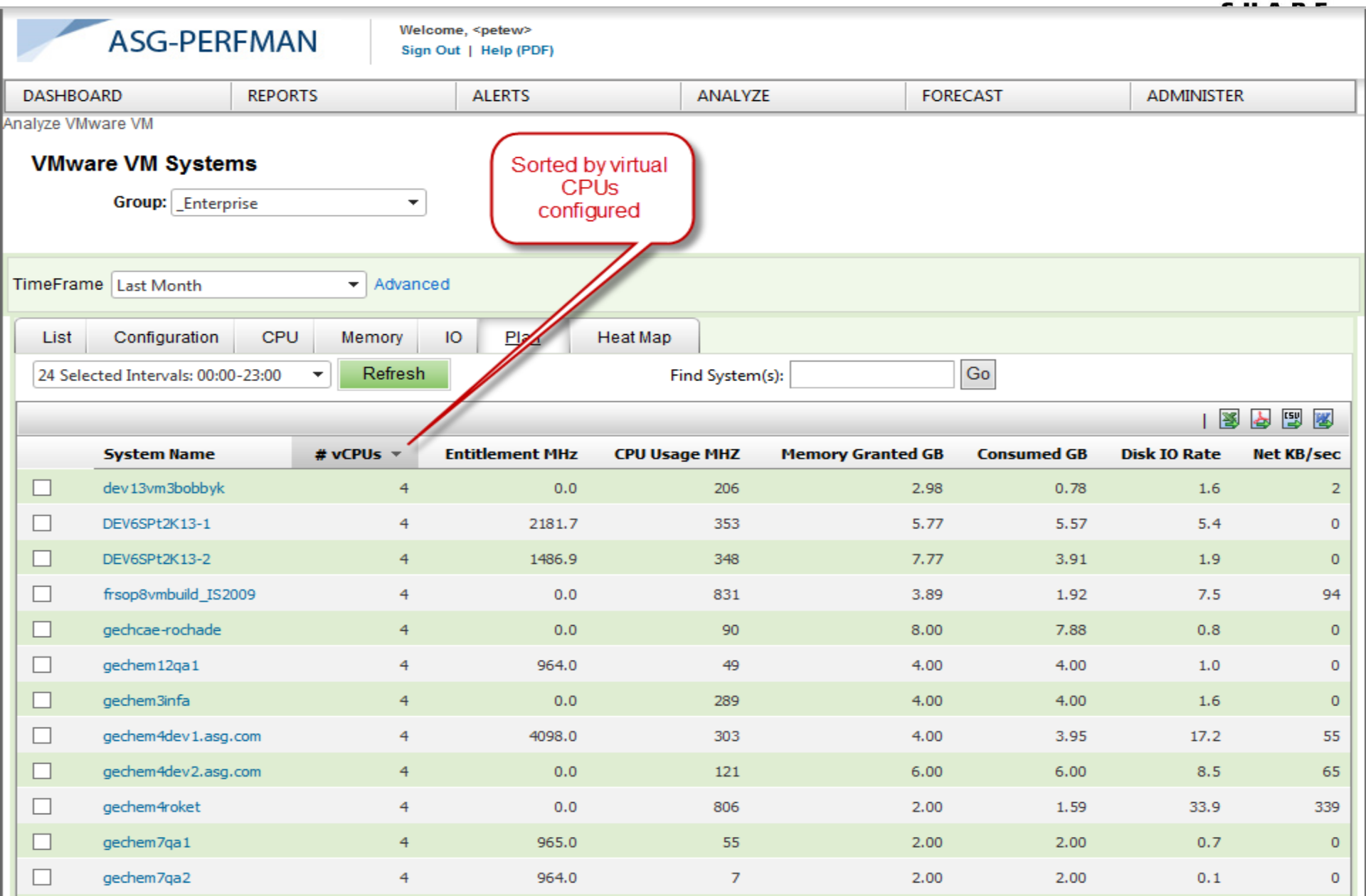
System Name	# vCPUs	Entitlement MHz	CPU Usage MHZ	Memory Granted GB	Consumed GB	Disk IO Rate	Net KB/sec
ADA	1	0.0	18	3.92	3.29	0.1	1
ALN2003DC	1	1571.0	16	1.00	1.00	1.3	0
ALN2003SRV1	1	748.0	47	4.00	2.97	3.0	0
ALN2003SRV2	1	1629.6	39	4.00	2.99	3.4	0
ALN2012DC	1	1764.2	27	4.00	4.00	0.8	0
ALN2012N1	1	781.9	74	4.00	3.97	0.3	0
ALN2012N2	1	758.9	67	4.00	4.00	0.4	0
apacdev-Exch	1	0.0	153	1.99	1.26	2.1	6
ARLvsa1	1	0.0	122	0.82	0.99	23.3	310
ARLvsa2	1	0.0	122	0.95	0.98	23.1	371
asgacit2	1	360.0	47	3.66	1.00	2.1	0
ASGdev2vm3dc1	1	743.9	17	0.50	0.50	0.8	-

Proposed Methodology



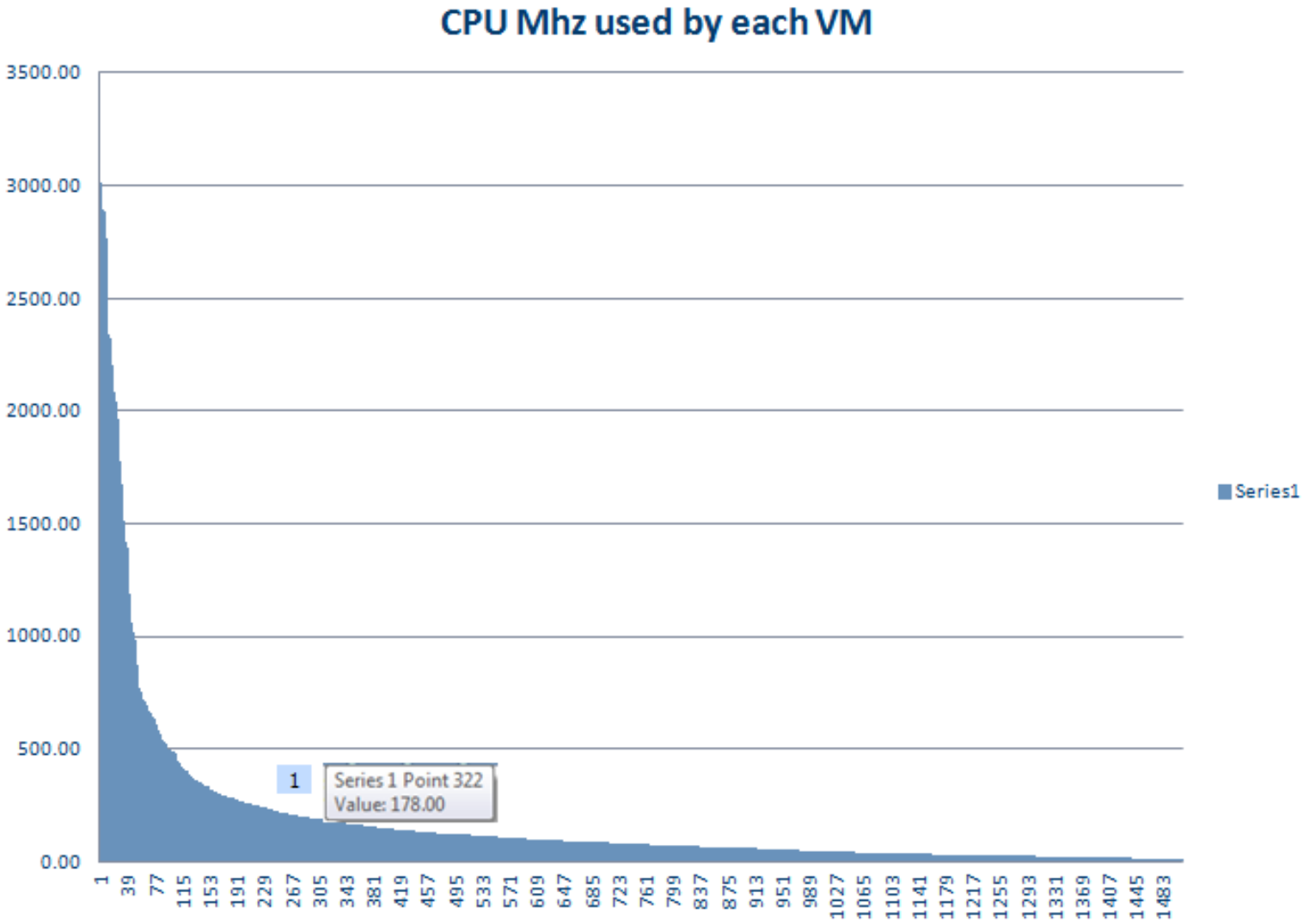
System Name	# vCPUs	Entitlement MHz	CPU Usage MHZ	Memory Granted GB	Consumed GB	Disk IO Rate	Net KB/sec
Riverglass2	2	9439.1	4158	7.74	7.96	3.1	0
usdenmr7	4	0.0	2915	1.95	1.86	5.4	18
usdenmfbsd2	1	0.0	2882	1.96	0.06	0.0	0
QA5VM8R2WFD1	1	372.4	2823	2.00	0.98	1.1	0
cfDemo_xenApp2	1	2310.5	2822	4.00	4.00	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

Proposed Methodology

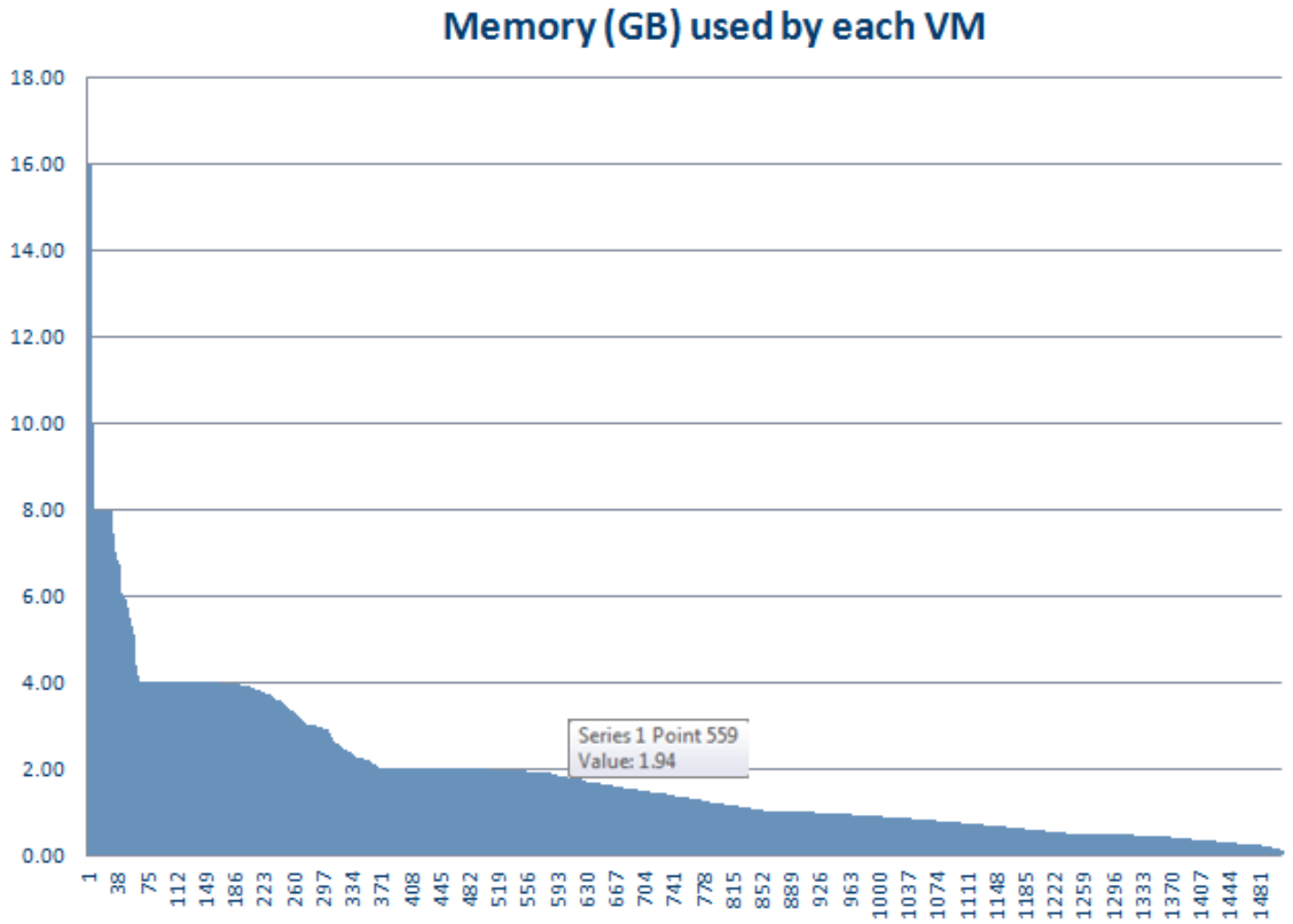


System Name	# vCPUs	Entitlement MHz	CPU Usage MHZ	Memory Granted GB	Consumed GB	Disk IO Rate	Net KB/sec
dev13vm3bobbyk	4	0.0	206	2.98	0.78	1.6	2
DEV6SPt2K13-1	4	2181.7	353	5.77	5.57	5.4	0
DEV6SPt2K13-2	4	1486.9	348	7.77	3.91	1.9	0
frsop8vmbuild_IS2009	4	0.0	831	3.89	1.92	7.5	94
gechcae-rochade	4	0.0	90	8.00	7.88	0.8	0
gechem12qa1	4	964.0	49	4.00	4.00	1.0	0
gechem3infa	4	0.0	289	4.00	4.00	1.6	0
gechem4dev1.asg.com	4	4098.0	303	4.00	3.95	17.2	55
gechem4dev2.asg.com	4	0.0	121	6.00	6.00	8.5	65
gechem4roket	4	0.0	806	2.00	1.59	33.9	339
gechem7qa1	4	965.0	55	2.00	2.00	0.7	0
gechem7qa2	4	964.0	7	2.00	2.00	0.1	0

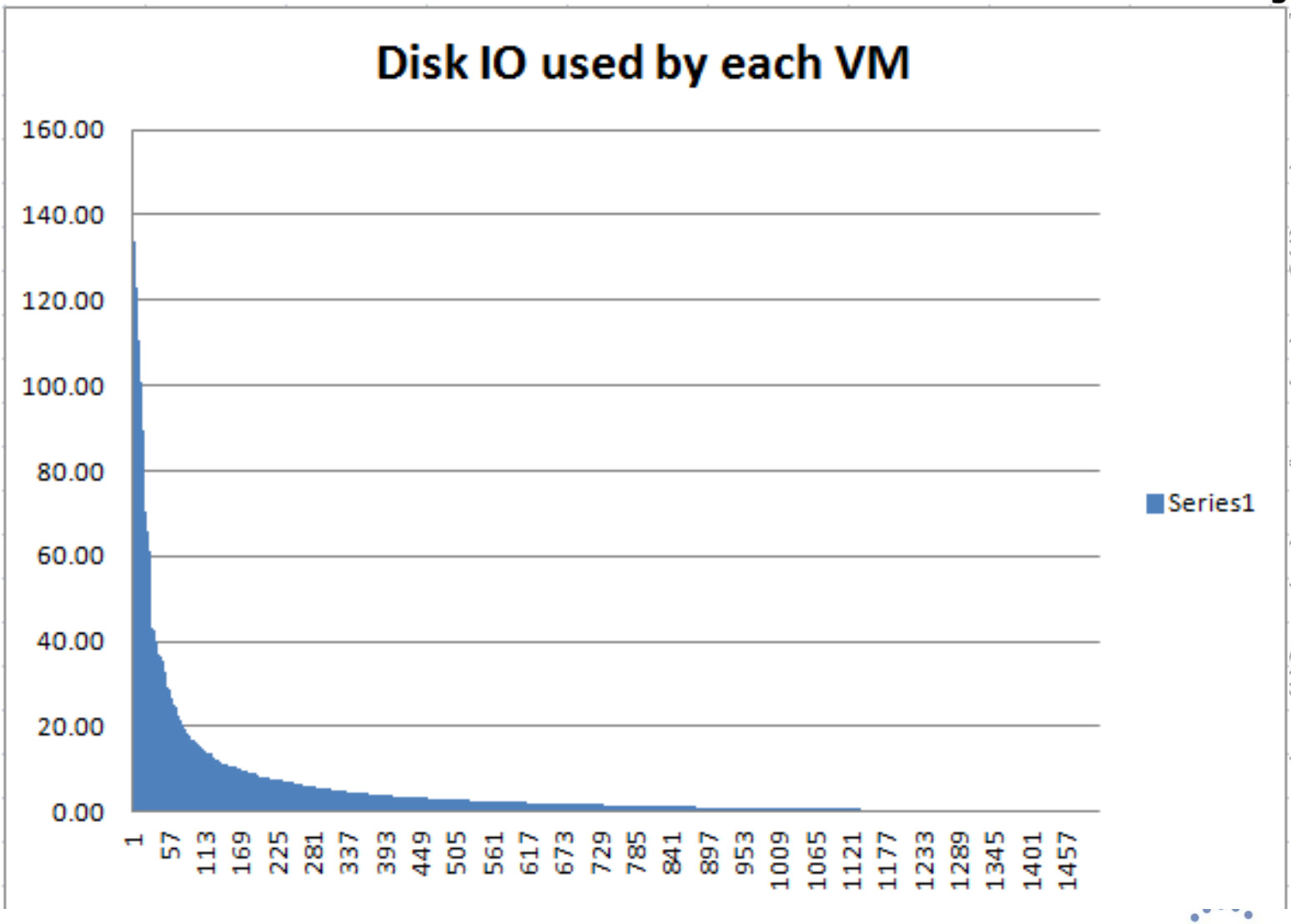
Average VM CPU is 81st Percentile



Average Memory is 63rd Percentile



Average IO is 82nd Percentile



Average VM Calcs

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

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
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																	
6	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
13	N/A	frparvmhost1	18616.00	16.00	15.00	2444.27	13.12	208.90	1518.00	163	1	13.9	101.2	70.1	1.5	153.7	96.5
14	N/A	frparvmhost2	15952.00	16.00	7.00	691.05	8.26	122.30	1467.00	99	1	17.5	209.6	68.0	4.0	167.1	97.1
15	N/A	frsopvmhost1	18616.00	32.00	12.20	2098.84	17.33	155.70	1880.00	172	1	12.8	154.1	72.1	7.6	161.9	92.4
16	N/A	frsopvmhost2	18616.00	32.00	15.60	3994.32	23.17	147.20	1988.00	256	1	9.4	127.4	61.4	4.6	163.2	91.2
17	N/A	frsopvmhost3	18616.00	32.00	15.10	1429.86	16.74	122.90	1529.00	95	1	8.1	101.3	75.8	7.9	167.0	96.4
18	SOPHIA1	frsopvmhost4	15952.00	32.00	4.00	2892.42	16.08	28.50	4.00	723	4	7.1	1.0	55.6	8.2	181.7	113.8
19	N/A	gechemedemo1	18616.00	32.00	22.00	2877.18	28.99	76.70	129.00	131	1	3.5	5.9	67.7	1.6	174.2	112.4
20	N/A	gechemedemo2	18616.00	32.00	13.00	1271.46	23.01	104.70	1147.00	98	2	8.1	88.2	76.7	4.6	169.8	100.8
21	N/A	gechemesx1	51056.00	16.00	5.00	2253.69	11.07	20.00	2.00	451	2	4.0	0.4	217.4	2.5	183.0	113.8
22	N/A	gechemesx2	18616.00	32.00	30.00	3426.21	25.98	143.50	110.00	114	1	4.8	3.7	64.6	3.1	163.8	112.6
23	N/A	gechemesx3	18616.00	32.00	16.00	4411.96	25.43	104.60	721.00	276	2	6.5	45.1	59.0	3.4	169.9	105.6
24	N/A	gechemesx4	18616.00	32.00	22.00	4600.25	24.83	80.20	198.00	209	1	3.6	9.0	58.0	3.7	173.6	111.6
25	N/A	gechemesx5	17016.00	96.00	25.50	4156.72	78.44	179.80	736.00	163	3	7.1	28.9	53.3	9.1	158.2	105.4
26	N/A	gechemesx6	63816.00	96.00	12.80	1021.39	39.29	51.60	2818.00	80	3	4.0	220.2	281.9	29.3	178.1	81.7
27	N/A	gechemesx7	63816.00	96.00	21.80	5073.73	76.91	144.00	7378.00	233	4	6.6	338.4	259.0	9.9	163.7	29.8
28	N/A	masingedemo1	7976.00	32.00	13.80	2720.13	24.04	64.50	5.00	197	2	4.7	0.4	20.6	4.1	176.1	113.8
29	N/A	masingvmhost1	19944.00	32.00	13.00	2563.19	19.56	225.10	2445.00	197	2	17.3	188.1	75.4	6.4	151.2	86.0
30	N/A	masingvmhost2	19944.00	32.00	16.00	3441.23	20.77	202.00	2556.00	215	1	12.6	159.8	70.5	5.8	154.8	84.7
31	N/A	masingvmhost3	18616.00	32.00	8.00	1041.34	13.69	127.20	2407.00	130	2	15.9	300.9	78.0	9.4	166.3	86.4
32	N/A	nibelvmhost1	7976.00	32.00	8.50	880.38	8.35	60.60	477.00	104	1	7.1	56.1	31.0	12.2	176.7	108.4
33	N/A	nibelvmhost2	7976.00	28.00	4.40	567.50	5.60	47.10	317.00	129	1	10.7	72.0	32.8	11.6	178.8	110.2
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
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

Average VM Calcs

	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	100%															
3		Disk IO Limit	1200															
4		Net KB Limit	10000	(2500=10MB duplex, 25000=100MB duplex)														
5																		
6		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	Best
8		Totals	2,844,948	4,919	1,598	283,663	3,097	10,306	140,399	178	2	6.4	87.9					933.4
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	2.2
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	5.6
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	3.0
13	N/A	frparvmhost1	18616.00	16.00	15.00	2444.27	13.12	208.90	1518.00	163	1	13.9	101.2	70.1	1.5	153.7	96.5	1.5
14	N/A	frparvmhost2	15952.00	16.00	7.00	691.05	8.26	122.30	1467.00	99	1	17.5	209.6	68.0	4.0	167.1	97.1	4.0
15	N/A	frsopvmhost1	18616.00	32.00	12.20	2098.84	17.33	155.70	1880.00	172	1	12.8	154.1	72.1	7.6	161.9	92.4	7.6
16	N/A	frsopvmhost2	18616.00	32.00	15.60	3994.32	23.17	147.20	1988.00	256	1	9.4	127.4	61.4	4.6	163.2	91.2	4.6
17	N/A	frsopvmhost3	18616.00	32.00	15.10	1429.86	16.74	122.90	1529.00	95	1	8.1	101.3	75.8	7.9	167.0	96.4	7.9
18	SOPHIA1	frsopvmhost4	15952.00	32.00	4.00	2892.42	16.08	28.50	4.00	723	4	7.1	1.0	55.6	8.2	181.7	113.8	8.2
19	N/A	gechemedemo1	18616.00	32.00	22.00	2877.18	28.99	76.70	129.00	131	1	3.5	5.9	67.7	1.6	174.2	112.4	1.6
20	N/A	gechemedemo2	18616.00	32.00	13.00	1271.46	23.01	104.70	1147.00	98	2	8.1	88.2	76.7	4.6	169.8	100.8	4.6
21	N/A	gechemesx1	51056.00	16.00	5.00	2253.69	11.07	20.00	2.00	451	2	4.0	0.4	217.4	2.5	183.0	113.8	2.5
22	N/A	gechemesx2	18616.00	32.00	30.00	3426.21	25.98	143.50	110.00	114	1	4.8	3.7	64.6	3.1	163.8	112.6	3.1
23	N/A	gechemesx3	18616.00	32.00	16.00	4411.96	25.43	104.60	721.00	276	2	6.5	45.1	59.0	3.4	169.9	105.6	3.4
24	N/A	gechemesx4	18616.00	32.00	22.00	4600.25	24.83	80.20	198.00	209	1	3.6	9.0	58.0	3.7	173.6	111.6	3.7
25	N/A	gechemesx5	17016.00	96.00	25.50	4156.72	78.44	179.80	736.00	163	3	7.1	28.9	53.3	9.1	158.2	105.4	9.1
26	N/A	gechemesx6	63816.00	96.00	12.80	1021.39	39.29	51.60	2818.00	80	3	4.0	220.2	281.9	29.3	178.1	81.7	29.3
27	N/A	gechemesx7	63816.00	96.00	21.80	5073.73	76.91	144.00	7378.00	233	4	6.6	338.4	259.0	9.9	163.7	29.8	9.9
28	N/A	masingedemo1	7976.00	32.00	13.80	2720.13	24.04	64.50	5.00	197	2	4.7	0.4	20.6	4.1	176.1	113.8	4.1
29	N/A	masingvmhost1	19944.00	32.00	13.00	2563.19	19.56	225.10	2445.00	197	2	17.3	188.1	75.4	6.4	151.2	86.0	6.4
30	N/A	masingvmhost2	19944.00	32.00	16.00	3441.23	20.77	202.00	2556.00	215	1	12.6	159.8	70.5	5.8	154.8	84.7	5.8
31	N/A	masingvmhost3	18616.00	32.00	8.00	1041.34	13.69	127.20	2407.00	130	2	15.9	300.9	78.0	9.4	166.3	86.4	9.4
32	N/A	nibelvmhost1	7976.00	32.00	8.50	880.38	8.35	60.60	477.00	104	1	7.1	56.1	31.0	12.2	176.7	108.4	12.2
33	N/A	nibelvmhost2	7976.00	28.00	4.40	567.50	5.60	47.10	317.00	129	1	10.7	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

Questions?

Email : Glenn.Schneck@asg.com

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