

Server Consolidation or Server Replacement? Saving Money and Delivering Performance

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Session MCP4055
Guy Bonney

Agenda

- ◆ Background
- ◆ Replace or Consolidate?
- ◆ Cost versus Performance
- ◆ Analysis Methodology
- ◆ Examples

MGS, Inc.

- ◆ Software Engineering, Product Development & Professional Services firm founded in 1986
- ◆ We provide products and services to solve business problems:
 - ◆ Software Engineering Services
 - ◆ Professional Services
 - ◆ Management Support Services
 - ◆ Consulting and Technical Services
 - ◆ Application Development Services
 - ◆ Training Services
 - ◆ Product Development
 - ◆ ClearPath MCP System Support

Why Listen to MGS?

- ◆ Over 30 years experience in computer solutions
- ◆ Experts in making computer solutions both reliable and efficient
- ◆ Experienced in a variety of hardware/software technologies
- ◆ Experts in operating environment design and management
- ◆ Experts in data communications
- ◆ Experienced in solutions requiring multiple, diverse platforms
- ◆ Expert on ClearPath MCP, Windows, and UNIX platforms.

MGS Software Products

- ◆ MGS Web Services for ClearPath MCP
- ◆ File Manager for ClearPath MCP(FMA)
- ◆ SightLine™ Performance Analyzer
- ◆ SightLine Capacity Manager
- ◆ SightLine Workload Analyzer
- ◆ HVFAX High Volume Facsimile Delivery System
- ◆ Proof of Correctness System (PCS)

MGS Contact Information

Contact the author at:

MGS, Inc.

10901 Trade Road

Richmond, Va 23236

804-379-0230

www.mgsinc.com

Background

- ◆ Server replacement drivers
 - Change in processing requirements
 - Decreasing reliability
 - Increased operational costs
 - Standardize equipment
 - Re-licensing software
- ◆ Consolidation drivers
 - Cost reduction
 - Standardization
 - Server replacement
 - Disaster Recovery

Replacement

- ◆ Single server case
 - Change capacity
 - Reduce cost of ownership
 - Add a server
- ◆ Multiple server case
 - Distinct functions on different servers (production, development, QA, etc.)
 - Security issues
 - Emergency Recovery (ER) needs
 - Same or different locations
 - Disaster Recovery (DR) needs

Sizing Techniques

- ◆ Weather Rock Technique
- ◆ Vendor Proposal approach
- ◆ SWAG
- ◆ Utilization based approach
 - Analyze total CPU, IO, Memory
- ◆ Performance/Capacity Analysis
 - Workload level analysis
 - Growth and trend projection
- ◆ Capacity Planning
 - Model business processing requirements

Cost Reduction Objectives

- ◆ Capital Costs
 - Hardware
 - Software licenses
- ◆ Operating Costs
 - Fixed capacity
 - Variable capacity impact (metering)
- ◆ Infrastructure Costs
 - Network and Network Management
 - Support framework
 - Staff
 - Tools

Performance Improvement

- ◆ Reduce transaction/batch time
- ◆ Maintain service levels with less capacity
- ◆ Increase throughput – maintain service levels

- ◆ All imply an increase in processing capacity (CPU, IO, Memory) – perhaps at reduced cost.

Emergency Recovery

- ◆ Same system (temporary capacity boost)
- ◆ Alternate system
 - Transfer workload to development
 - May require capacity boost
- ◆ Capacity boost based on Capacity On Demand facilities
 - Annual ER/DR keys

Disaster Recovery

- ◆ Alternate system location
- ◆ System sized to
 - support single platform
 - workloads from multiple systems
- ◆ Disaster Recovery keys available based on Capacity on Demand capability.
- ◆ Note that ES7000 architecture for Libra and Dorado have ER/DR advantages

ES7000 Advantage for ER/DR

- ◆ ER failover:
 - production and development/test MCP images in same box
 - Windows production/test
- ◆ DR System
 - Size MCP image for single or multiple systems backup
 - Multiple large Windows images possible
 - Storage subsystem or SAN is a help

ER/DR Business Requirement

- ◆ Determine what is needed to support minimum business needs
- ◆ How much downtime can be sustained before business at risk?
- ◆ How much before government service delivery failure impacts citizens?
- ◆ What's the value of risk mitigation?

Decision Making Process

- ◆ Identify and prioritize the goals
 - IT goals may be different from business goals
- ◆ Determine the capacity and infrastructure needed
- ◆ Quantify the costs versus value
- ◆ Prepare and present the proposal to management

Methodology for Sizing

- ◆ Establish baseline
 - Performance
 - Capacity usage
 - Workload volume
- ◆ Track historical data
- ◆ Perform trend analysis
 - Capacity usage
 - Workload volume
 - Performance
- ◆ Performance:
 - Keep capacity at safe level
 - Project performance using operational analysis techniques
 - Model for best results

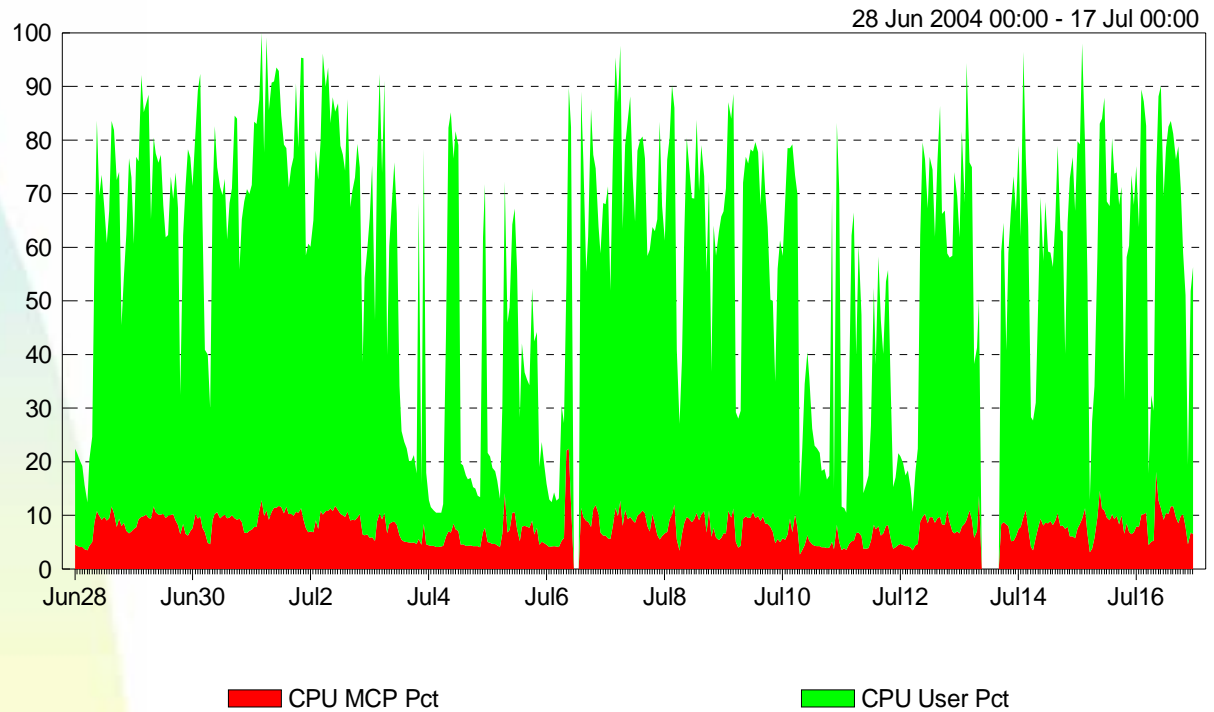
Examples

- ◆ Most of the following analysis was done using SightLine™ Products, including Expert Advisor / Vision, Capacity Manager and WorkLoad Analyzer.
- ◆ Excel™ was used for some projection models and resultant charts.

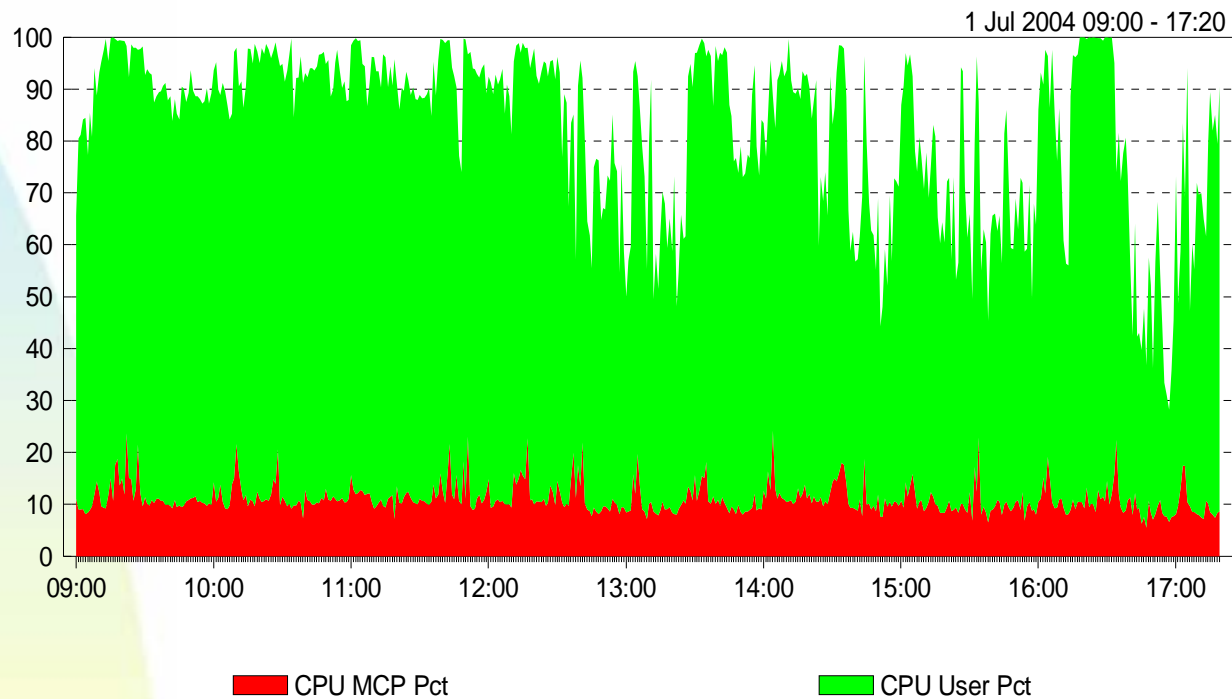
Single System Case

- ◆ Analyze MCP system supporting banking applications
- ◆ Determine if upgrade is feasible or if system replacement required.

Overall CPU Demand



CPU on a Busy Day

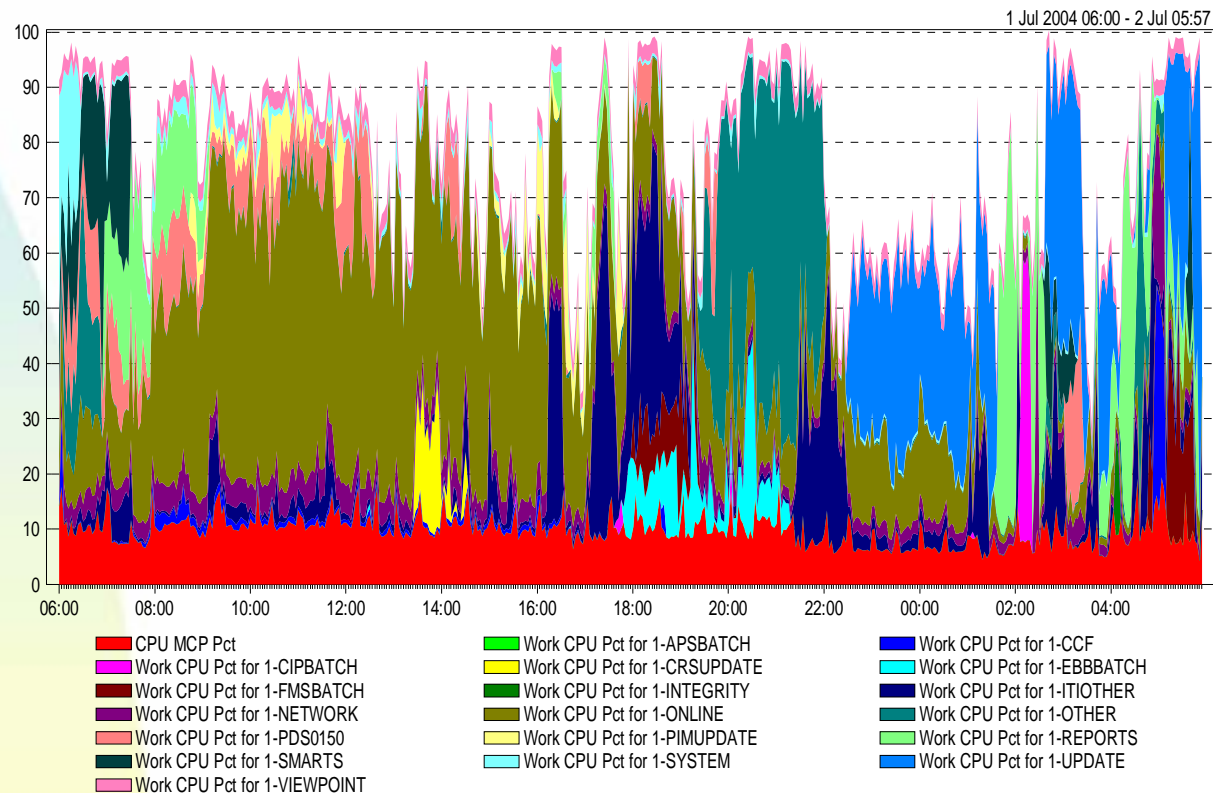


Workload Resource Demand

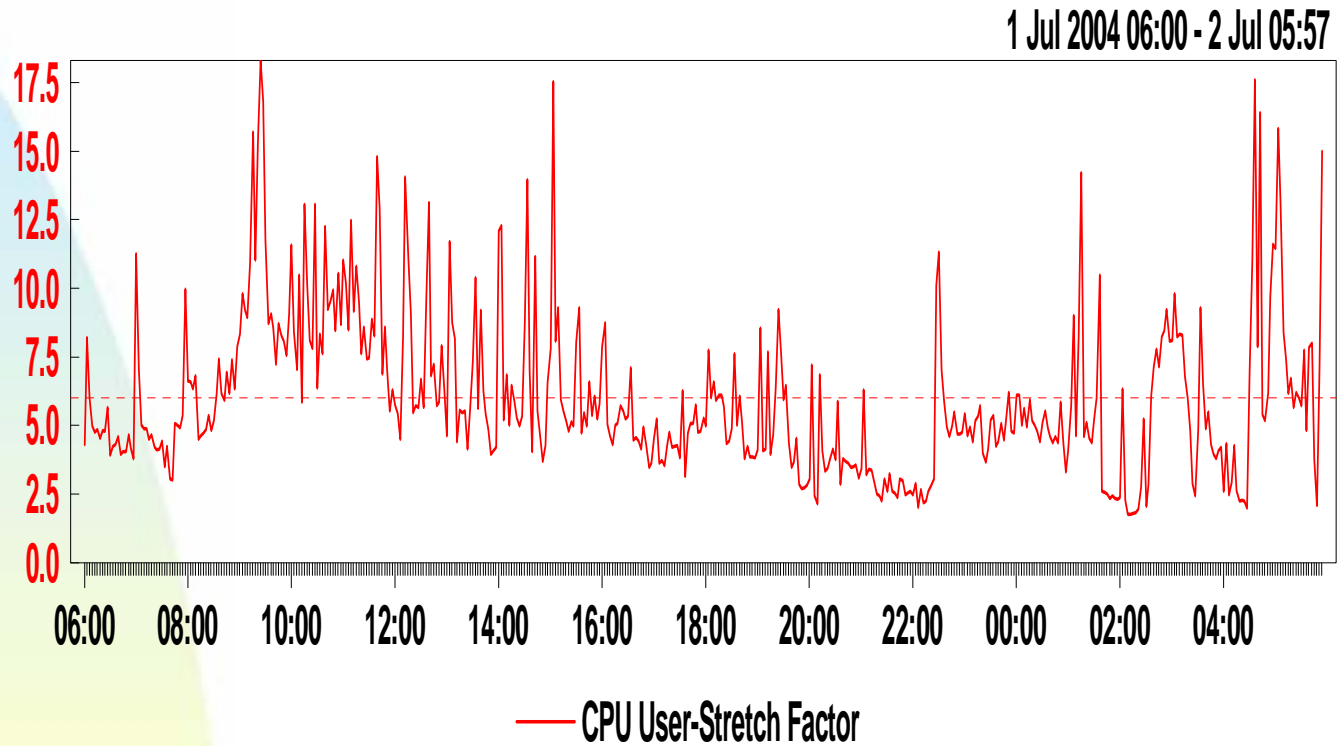
- ◆ Decompose utilization of interest to individual workloads and transactions
- ◆ Processor
 - MCP
 - User
 - Available

- ◆ Workload #1 CPU
- ◆ Workload #2 CPU
 - Transaction Type #1 CPU
 - Transaction Type #2 CPU

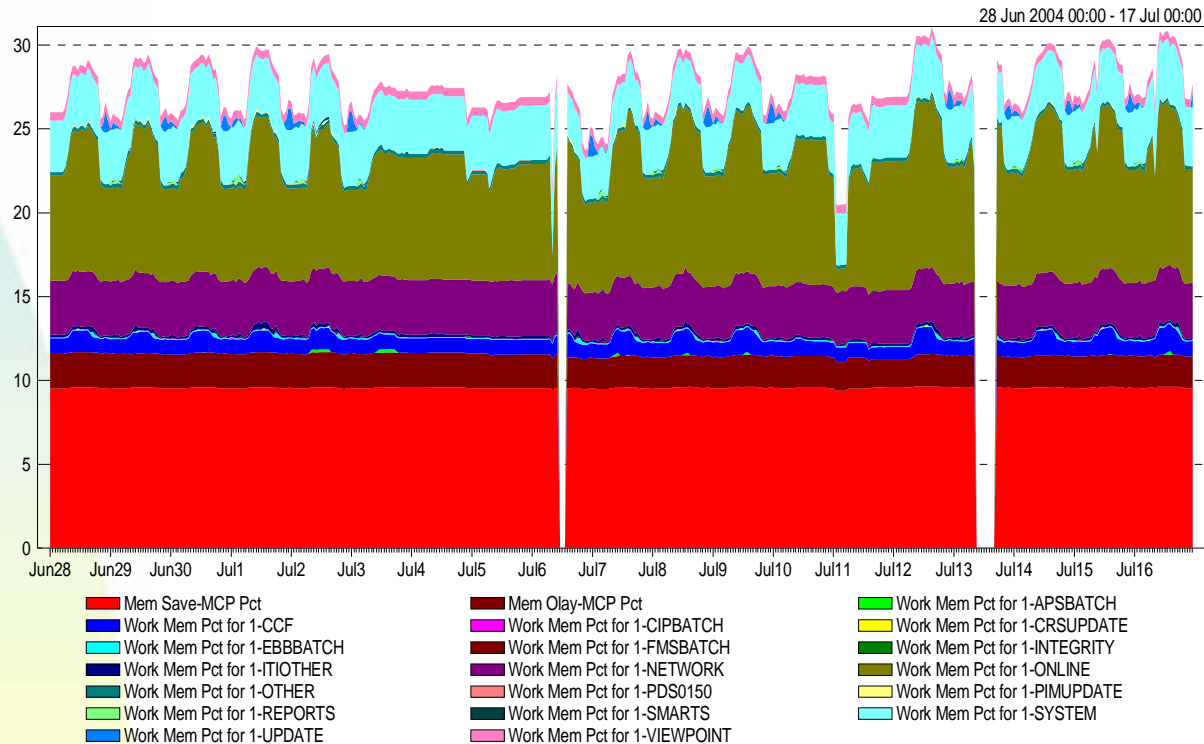
Workload Decomposition



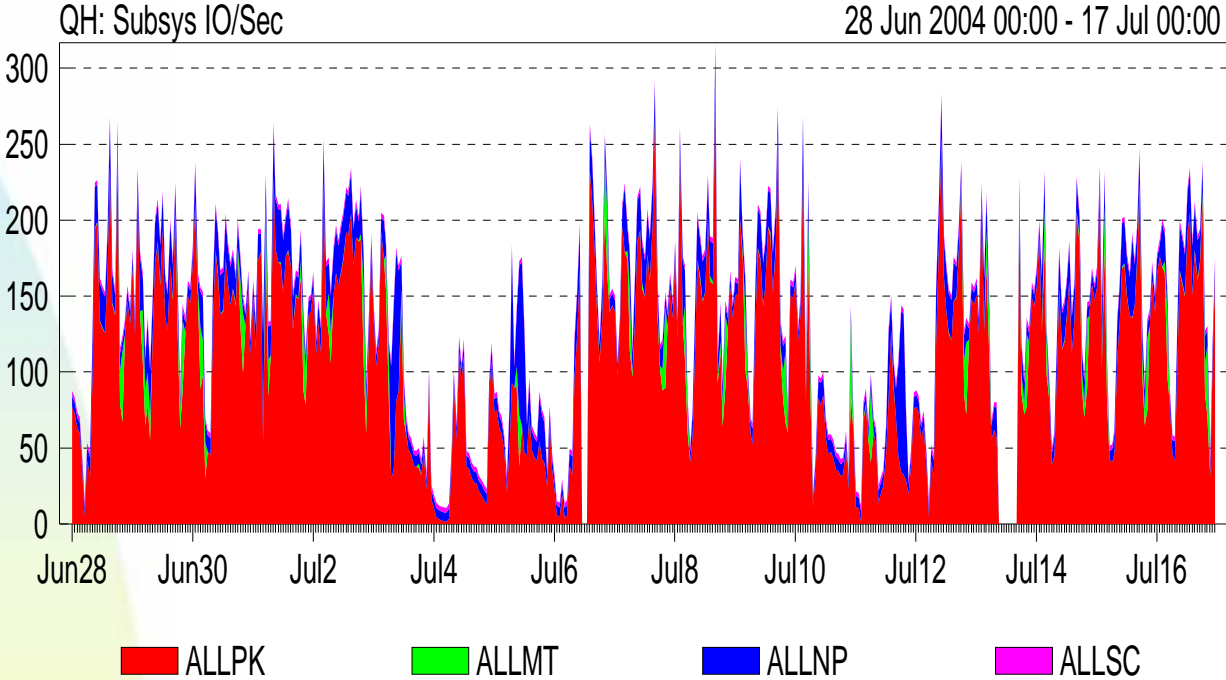
CPU Contention Issue



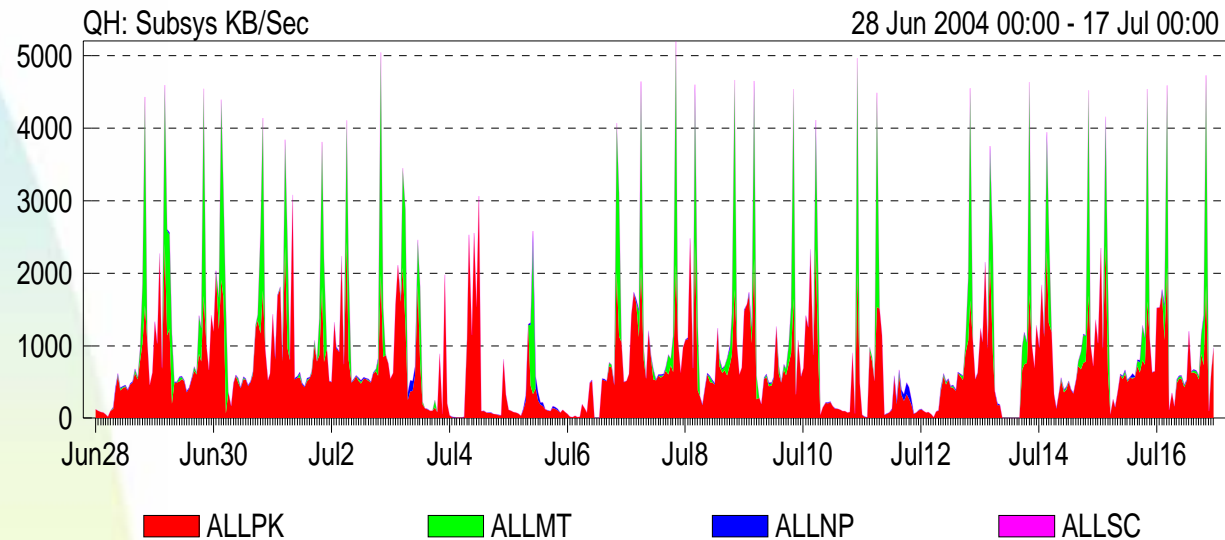
Memory Usage by Workload



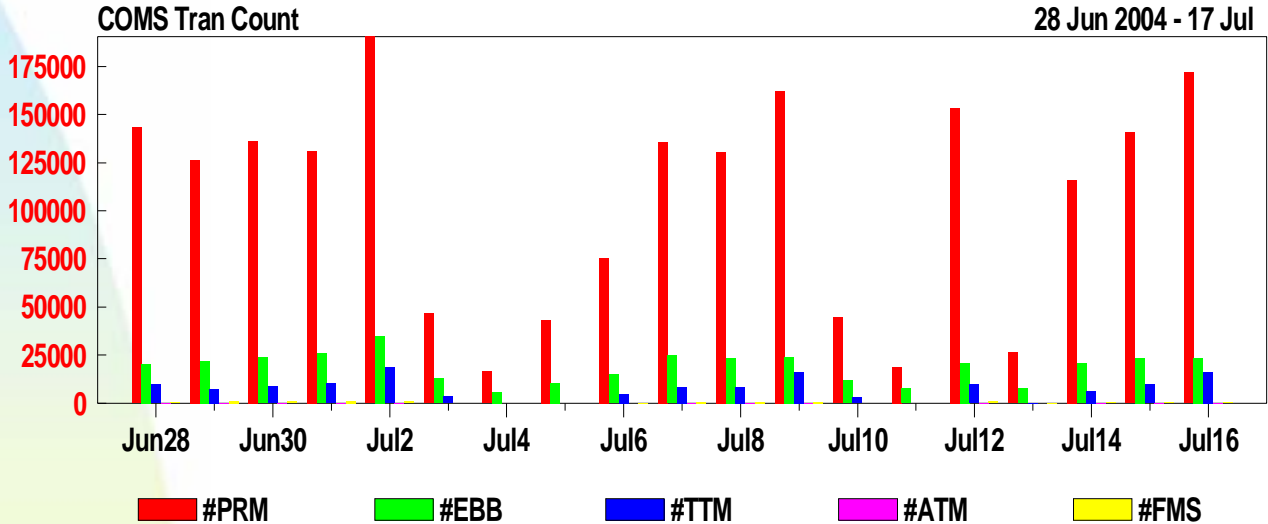
I/O Traffic Rates



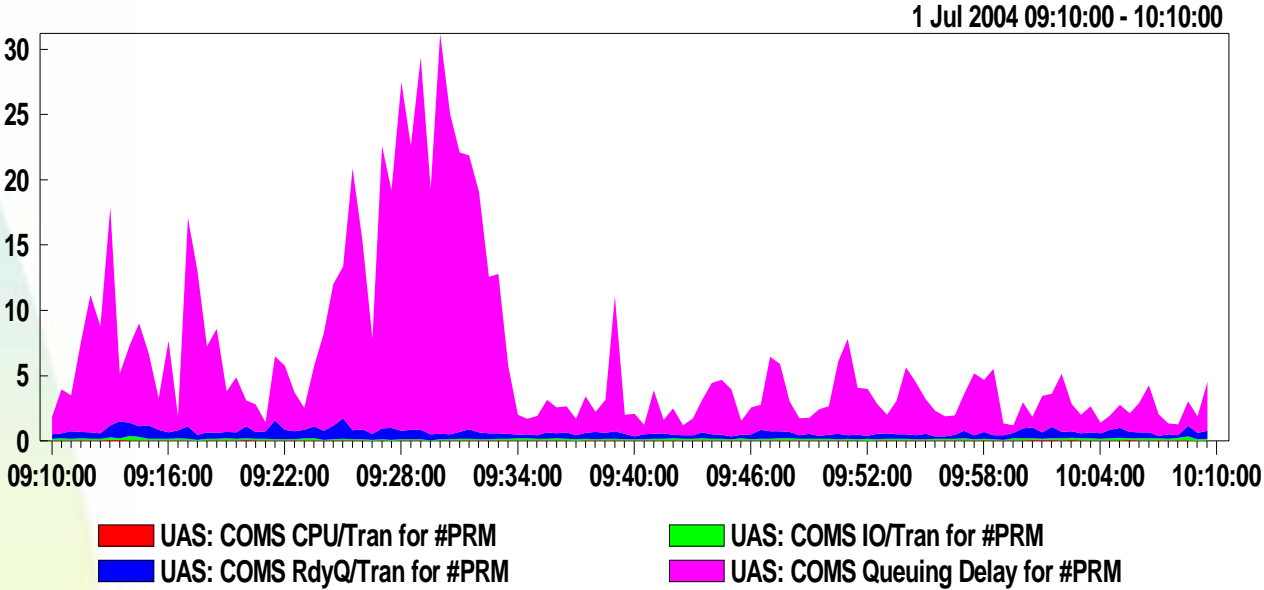
I/O Transfer Rates



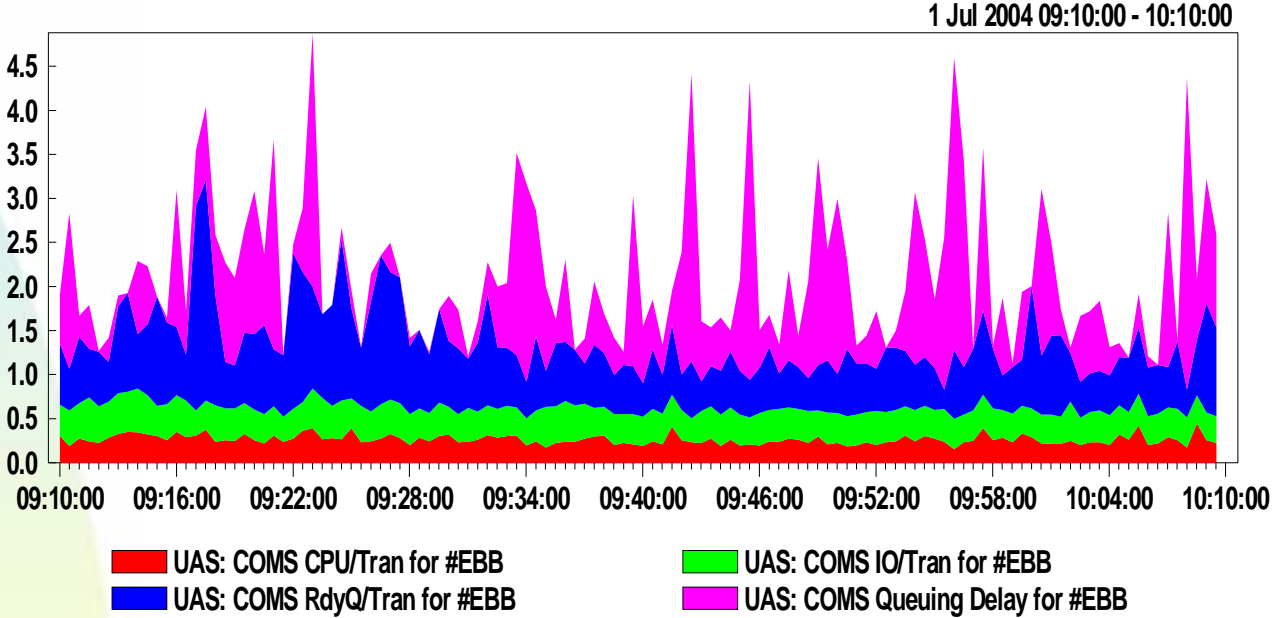
COMS Transaction Volume



COMS Response Time - PRM



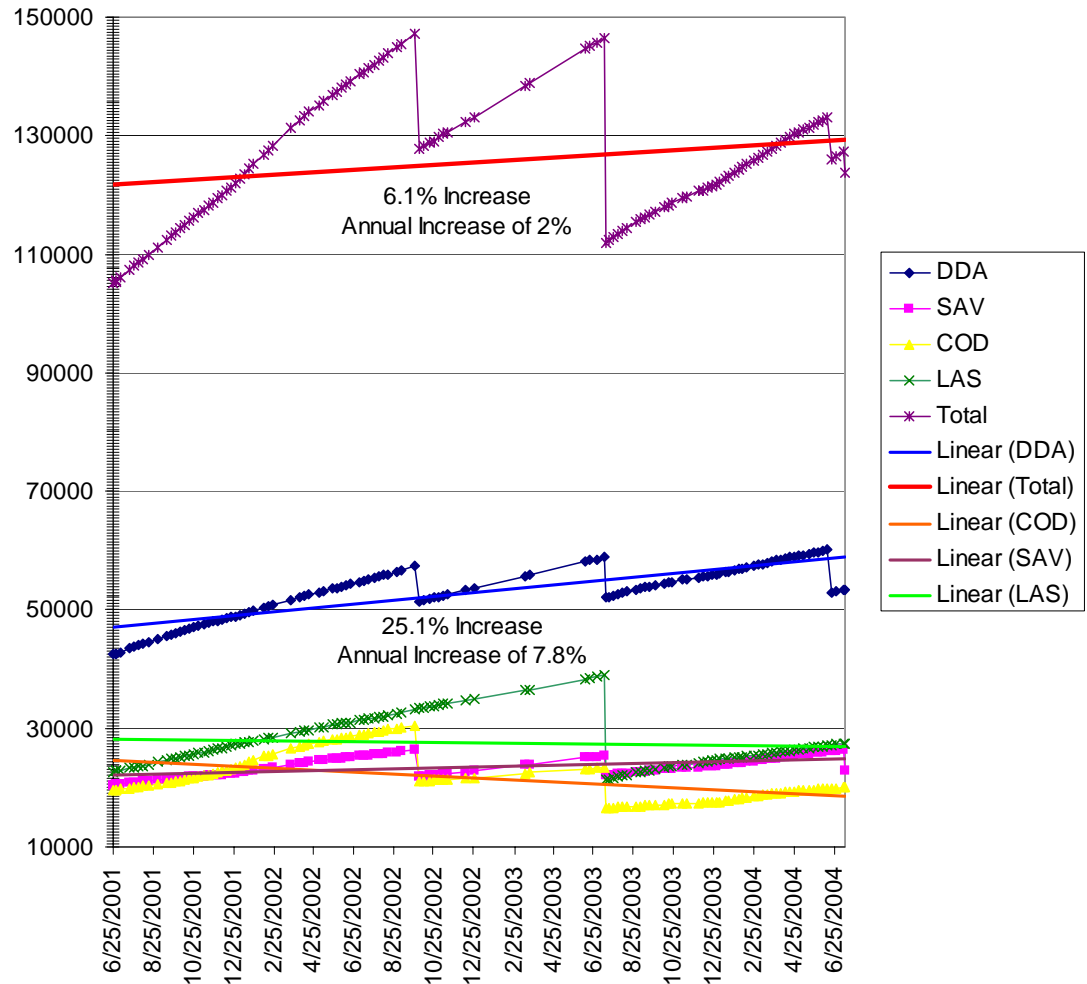
COMS Response Time - EBB



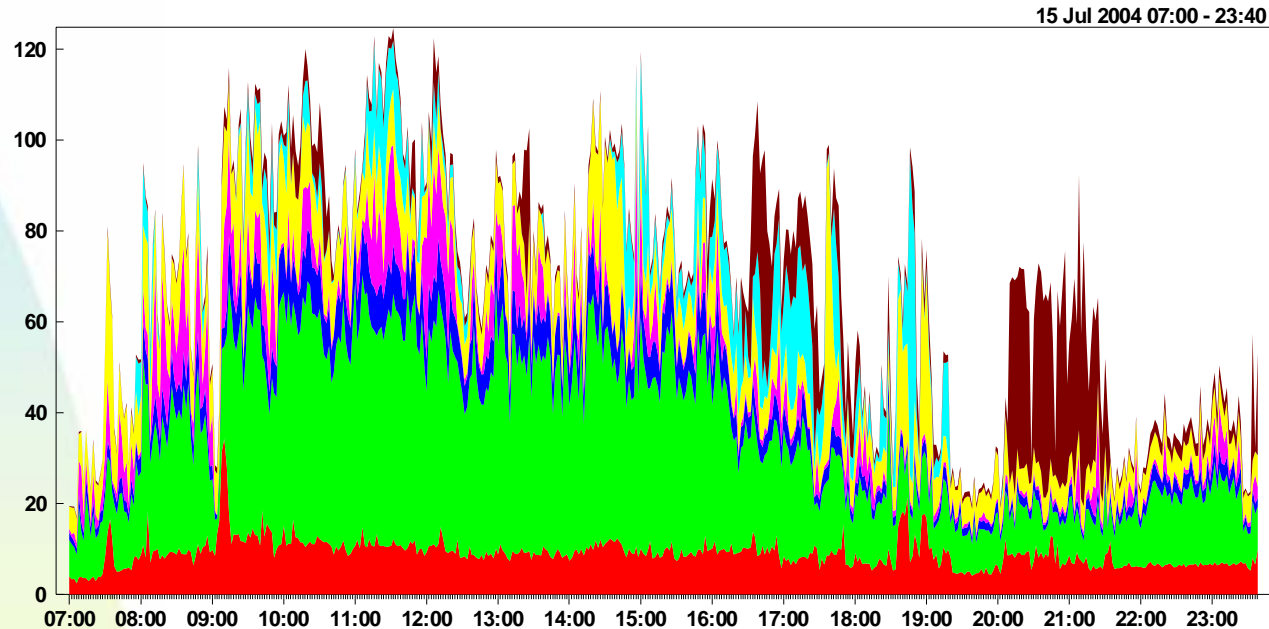
Disk Subsystem Optimization

Family	IO/Sec	Elpase Time	IOs	Service Times	Total IO/Sec	IO Elpase Time Assumes Dual Channel Full Optimization		
B	47.04	9060	426182.4	0.01	4261.82	2131 Seconds	—> 35 Minutes 31 Seconds	Current
C	52.357	9060	474354.42	0.011	5217.90	2609 Seconds	—> 43 Minutes 29 Seconds	
D	36.731	9060	332782.86	0.011	3660.61	1830 Seconds	—> 30 Minutes 30 Seconds	
E	7.483	9060	67795.98	0.007	474.57	237 Seconds	—> 3 Minutes 57 Seconds	
B	47.04	9060	426182.4	0.005	2130.91	1065 Seconds	—> 17 Minutes 45 Seconds	Estimated Improvement
C	52.357	9060	474354.42	0.006	2846.13	1423 Seconds	—> 23 Minutes 43 Seconds	
D	36.731	9060	332782.86	0.006	1996.70	998 Seconds	—> 16 Minutes 38 Seconds	
E	7.483	9060	67795.98	0.004	271.18	136 Seconds	—> 2 Minutes 16 Seconds	

Business Volume History



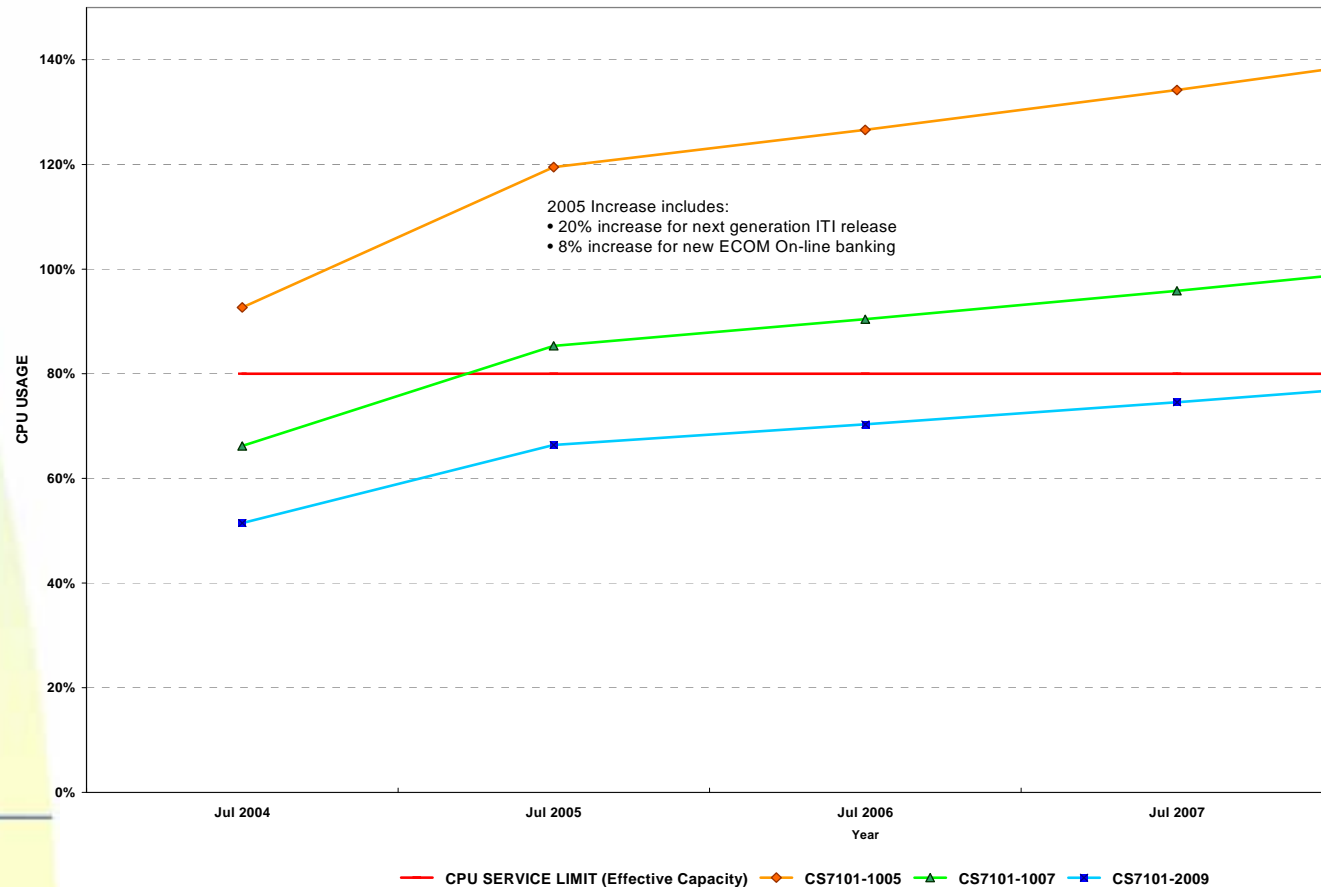
CPU Growth Projection



UAS: MCP CPU Pct
UAS: ITI Upgrade
UAS: System CPU Pct
UAS: Other CPU Pct
UAS: Online CPU Pct
UAS: ECOM Retail Internet Banking
UAS: Ad Hoc Batch CPU Pct

CPU Projection by System

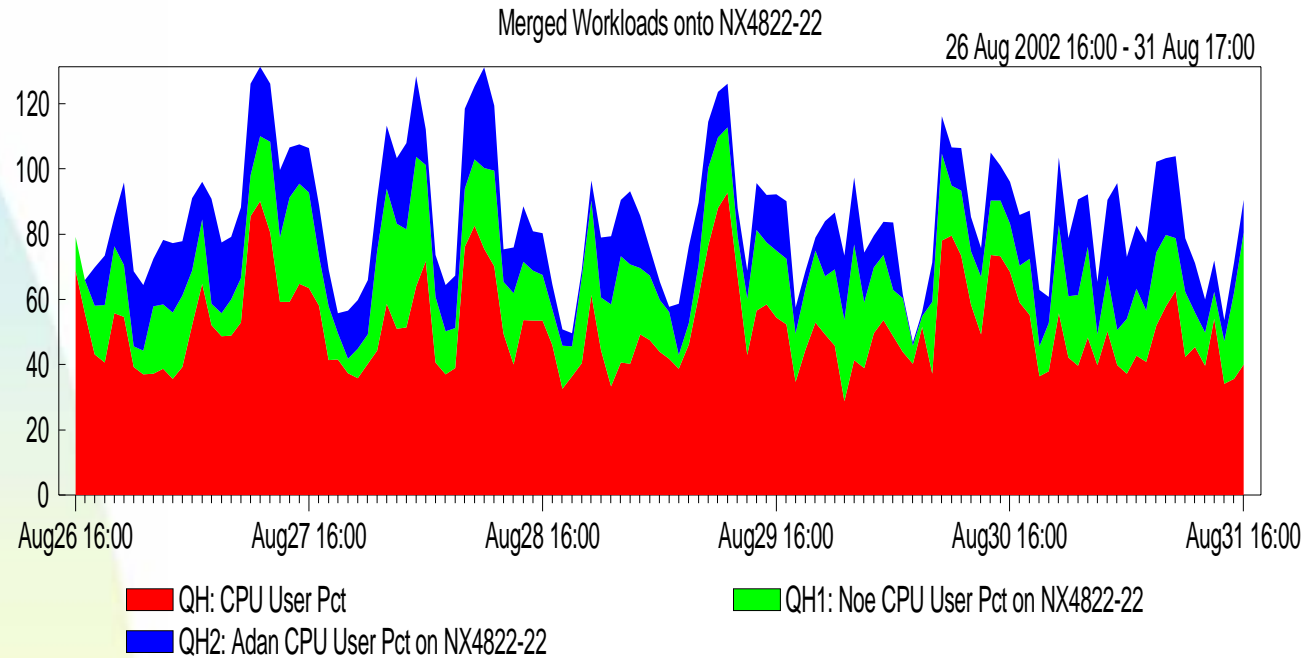
BANK CPU REQUIREMENT PROJECTION
Estimated Growth



Multiple System Case

- ◆ Multiple aging MCP servers must be replaced.
- ◆ Consider merging into single MCP image.
- ◆ Consider that a Disaster Recovery site will be established.

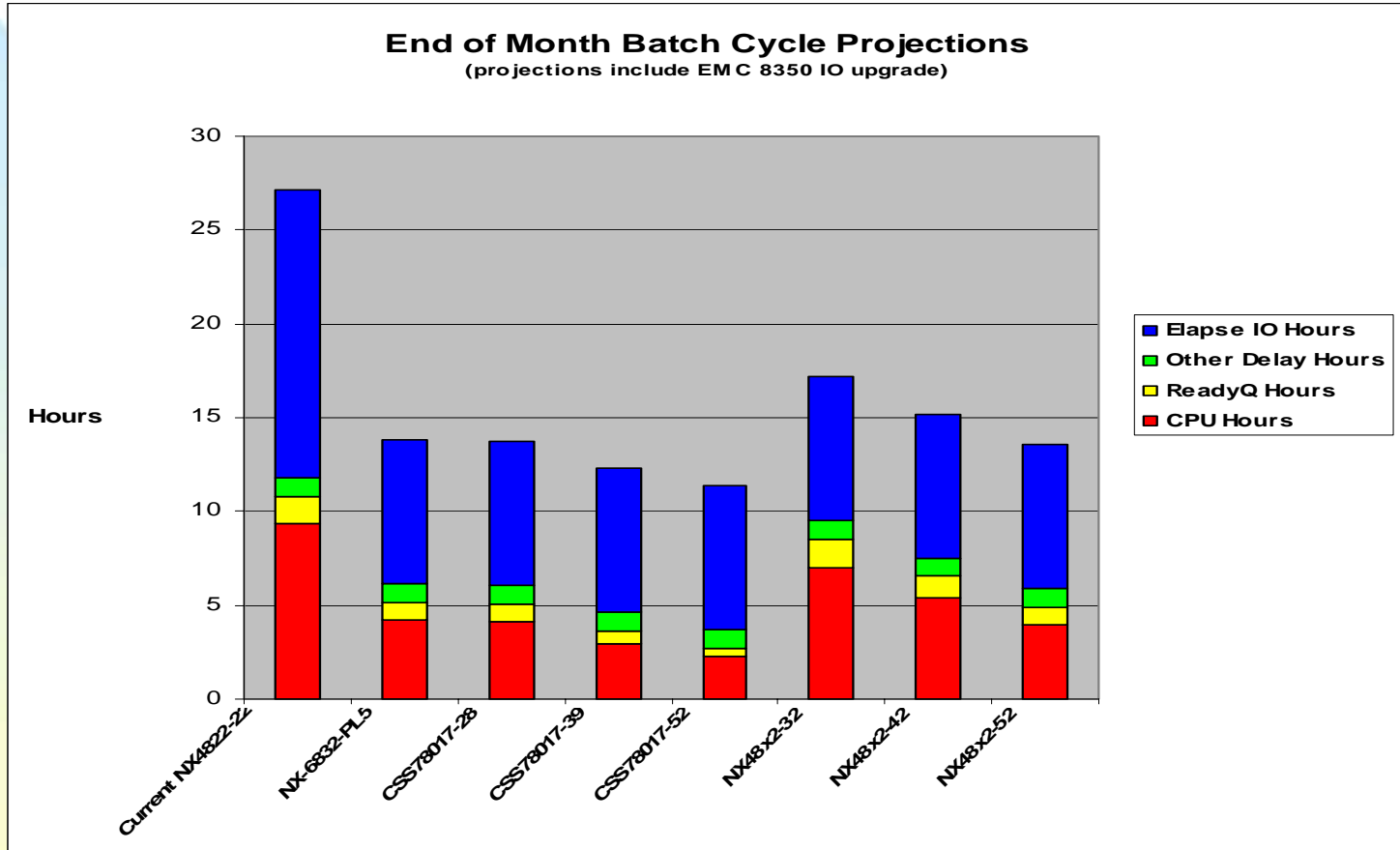
Workload Merger - CPU



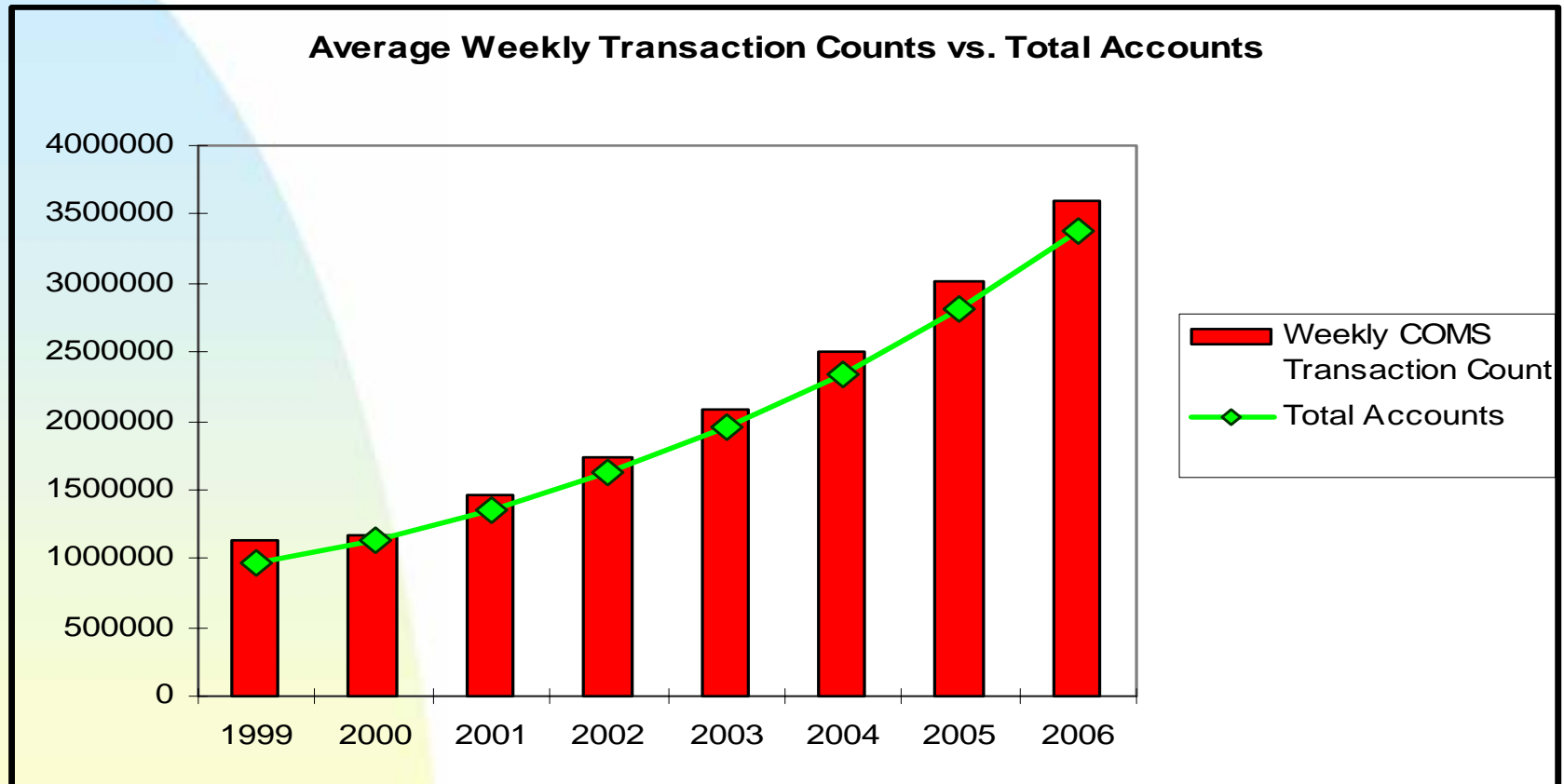
Batch Cycle Table

	CPU Secs	ReadyQ Secs	Other Delay	Elapse IO Sec
Pre-Batch Prep	5100	1083	0	11757
Critical Nightly Batch	10563	2425	614	16993
Post Nightly Batch	17920	1777	2928	26556
Totals	33583	5286	3541	55305

Batch Cycle Model



On-Line Workload Projection



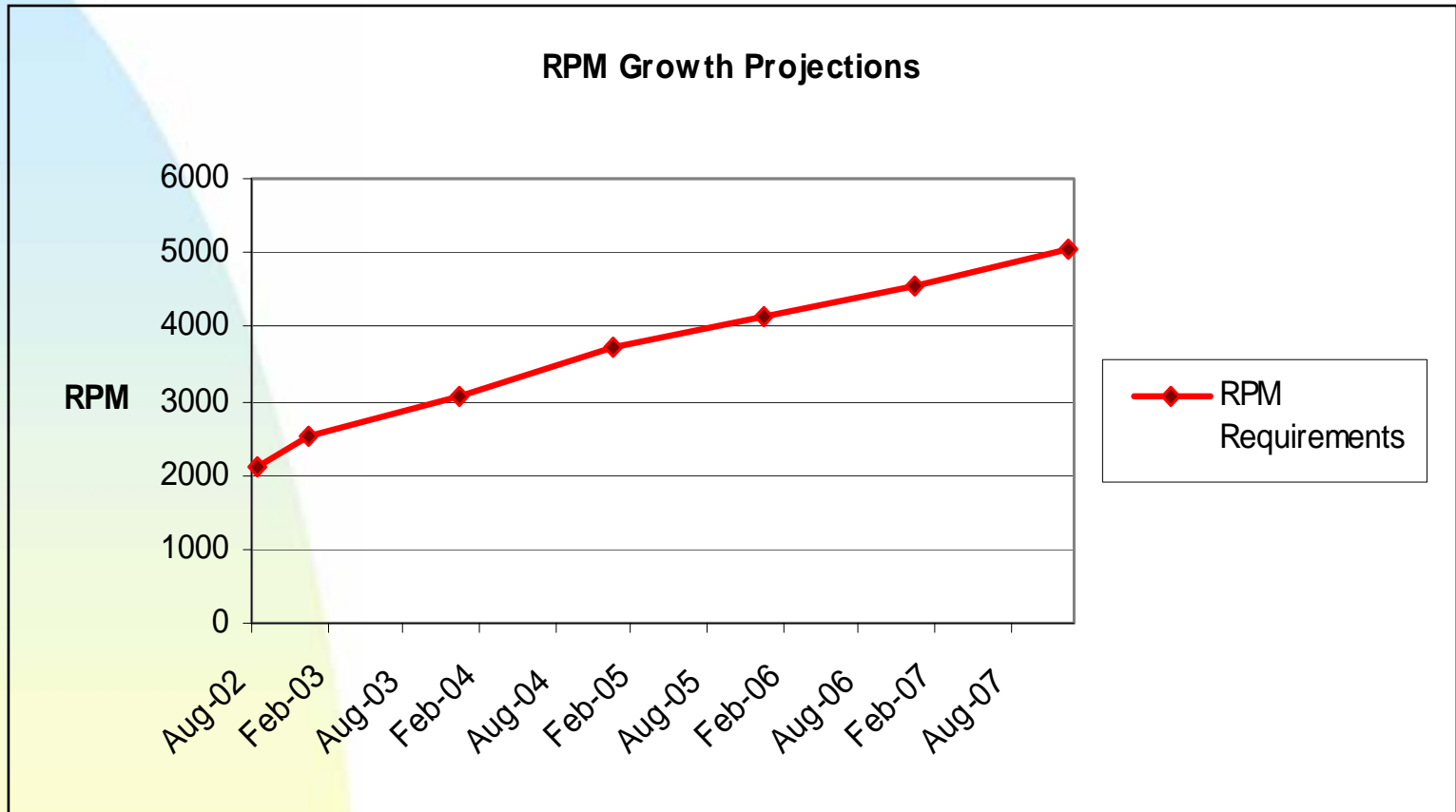
Workload Projection

Consolidated Workloads Peak Composite (based on NX6832-PL5):

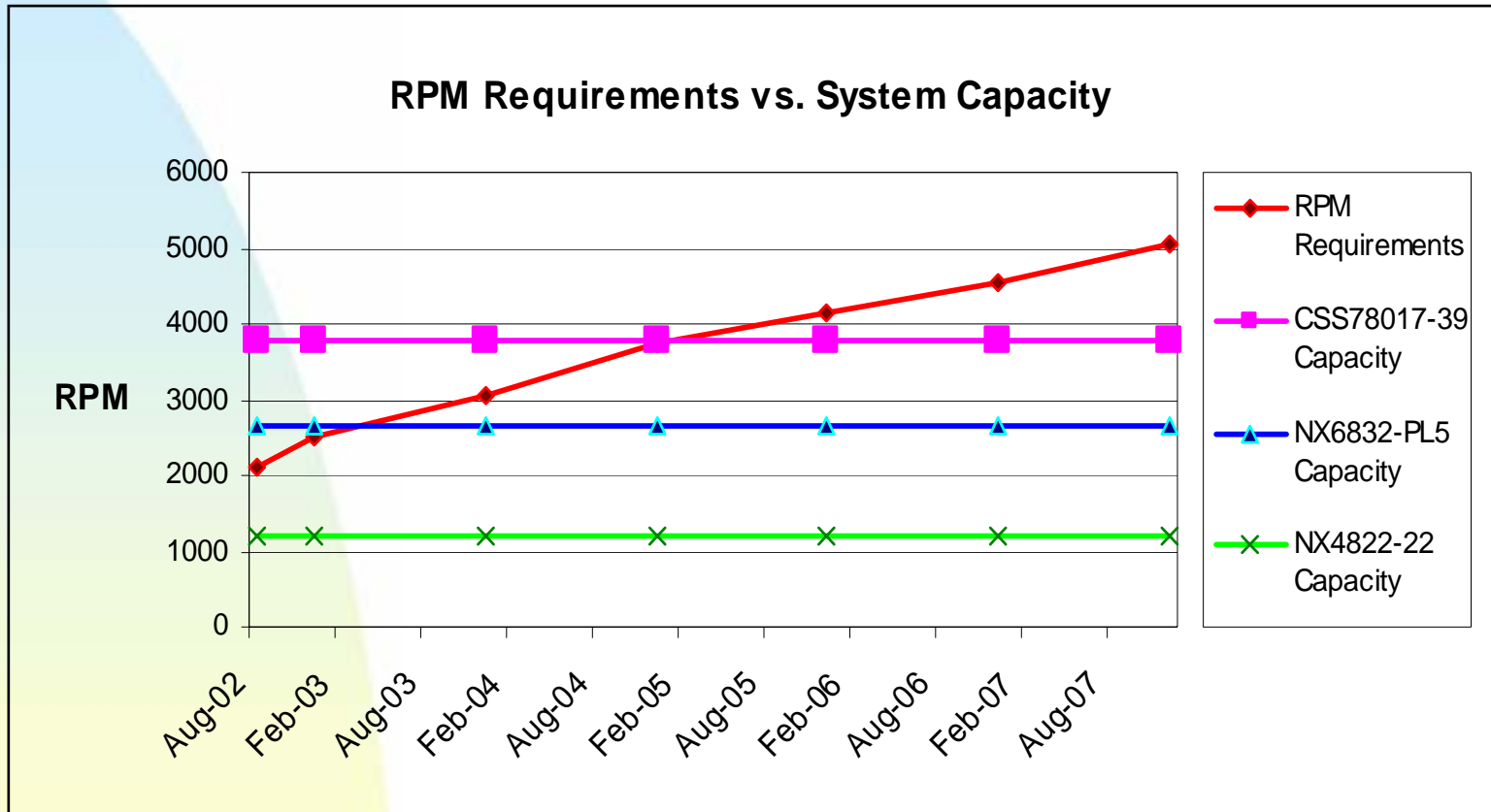
	Dec-02	Dec-03	Dec-04	Dec-05	Dec-06	Dec-07
Sys-1 User Growth Rate	20%	28%	28%	11%	11%	11%
Sys-2 User Growth Rate	20%	10%	10%	10%	10%	10%
Sys-3 User Growth Rate	20%	15%	15%	11%	11%	11%

	Aug-02	Dec-02	Dec-03	Dec-04	Dec-05	Dec-06	Dec-07
CPU MCP %	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Sys-1 CPU User %	41.0	49.2	63.0	80.6	89.5	99.3	110.2
Sys-2 CPU User %	12.3	14.8	16.2	17.9	19.6	21.6	23.8
Sys-3 CPU User %	11.5	13.8	15.9	18.3	20.3	22.5	25.0
Total	69.8	82.8	100.1	121.7	134.4	148.4	164.0

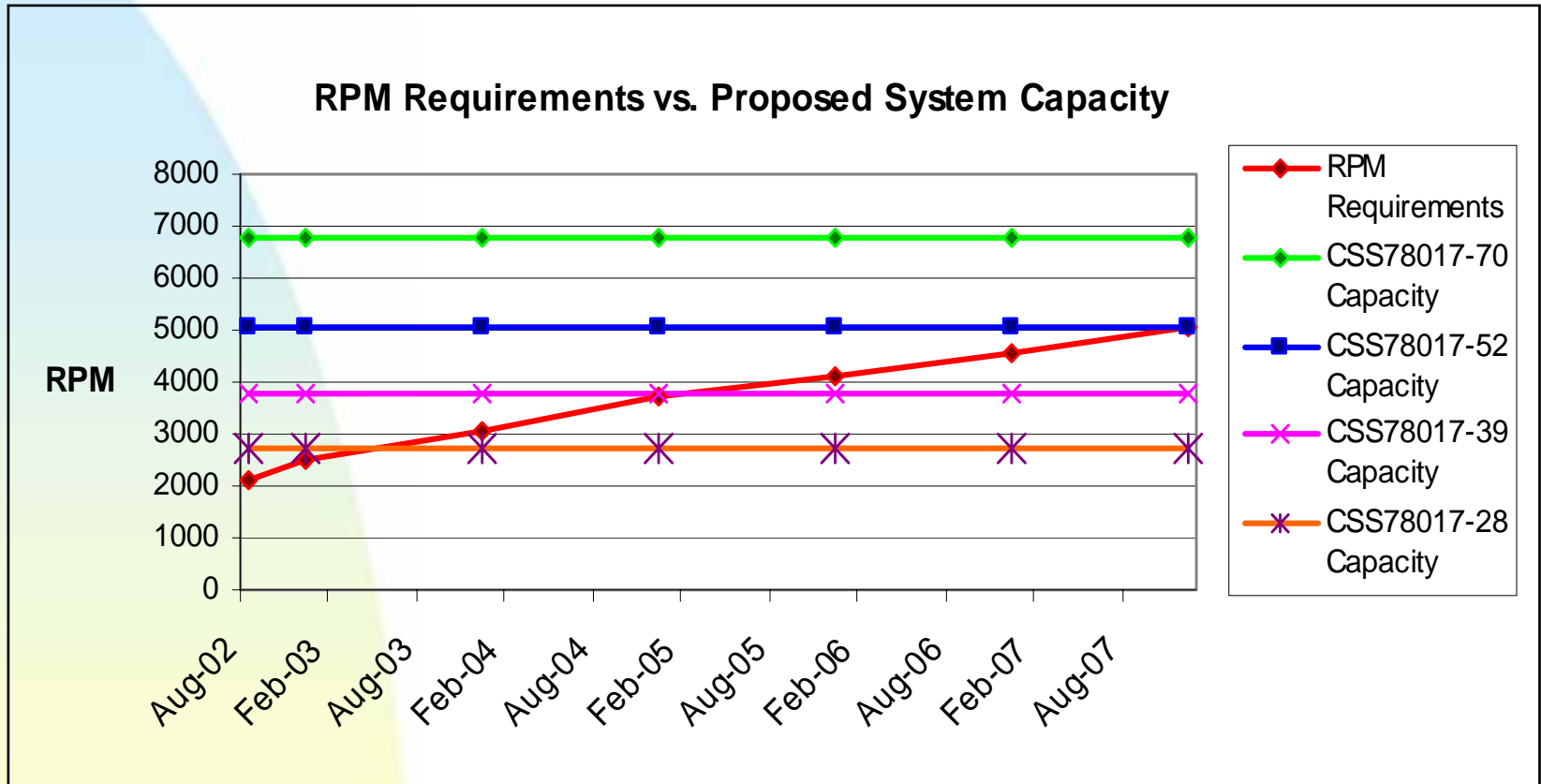
RPM Growth Projection



RPM vs Capacity



RPM Capacity Plan



The Resulting Plan

- ◆ Install Libra Model 180 at capacity level CSS78017-39 offering 3800 RPM useable Now.
- ◆ Purchase Capacity-on-Demand increments as needed in 2004
- ◆ Upgrade to CSS78017-52 (5000 RPM useable) in 2005 if growth projections hold into mid 2004.

Summary

- ◆ We discussed issues and considerations for replacing versus consolidating servers.
- ◆ We reviewed a methodology for sizing server replacements or upgrades.
- ◆ We reviewed a single server case.
- ◆ We reviewed a multiple server consolidation case.

Questions?

- ◆ Thank you for your attention.
- ◆ Are there any questions?

Note that this presentation, including a Windows server consolidation case will be available for download next week at: www.mgsinc.com