

**caWorld<sup>10</sup>**

# Resource Management in the CA data center – a success story

**MR150SN**

Mainframe and Application Development



When the CA Data Center was experiencing some performance problems, who did they call? They called on our in-house CA MICS<sup>®</sup> experts to deliver some ad-hoc system utilization charts. The charts quickly identified system bottlenecks that made it easy to ensure the correct system configuration changes were made. Come listen to the story of how Tim Hofmann and Darrell Faulkner worked together with CA MICS Query & Reporting to develop powerful and revealing charts for CA's Data Center. You will leave with new ideas for helping your data center meet its service levels.

# agenda

- The problem
- The mission and mission goals
- Solutions and benefits

# the problem

- CA is different
- Unlike most CA MICS customers, the major workloads at our data center revolve around software development
  - Hard to predict resource utilization requirements
  - Initiatives like Mainframe 2.0 result in huge resource utilization shifts
- In June 2009, development teams started complaining
  - Response time and batch turnaround time degrading...
    - Despite recent upgrades
    - Despite shifting workloads to non-prime shift periods
- Transition of GIS staff familiar with CA MICS

# the mission

- Internal e-mail: “Attention all mainframe experts!”
  - “Can anyone out there help the GIS team figure out why development z/10 performance has gone to heck?”
- When you get lemons...
  - See if we (CA MICS team) can help GIS and help ourselves
    - Explain perceived capacity dilemma
    - Explore and demonstrate CA MICS Q&R Workstation features
    - Use Q&R at industrial strength levels
    - Create queries for re-use in testing
    - Show how Q&R can be used against tape archives
    - Create charts for OpenViz/ChartFX comparison
    - Review MICS best practices in light of our own environment
    - Promote CA MICS within CA

## – The assignments

- Darrell: Explore CA MICS Hardware and SCP Analyzer files
  - Analyze CPU utilization
  - Explore Service Class performance
  - Requirements: PC upgrade and install Q&R
- Tim: Explore CA MICS Batch and Operations Analyzer files
  - Examine step level files
  - Analyze usage by development group
  - Requirements: Figure out how to bring archive tape data into Q&R

## – Worked with the GA version of CA MICS Q&R Workstation

- 0904 level

# solutions and benefits

## exploring CA MICS Hardware and SCP Analyzer files

- Start by examining engine utilization
  - Examine development z/10 processor engines that support z/OS
  - DAYS timespan PR/SM LPAR Config/Activity (HARLPC) file
    - 32 cycles (approximately one month)
    - Data elements to plot:
      - LPCPCSSU: LPAR Shared CP Processors Utilization
      - LPCPCSZU: LPAR Shared zAAP Processors Utilization
      - LPCPCSDU: LPAR Shared zIIP Processors Utilization
  - Summarized CPC processor % utilization by DATE, HOUR, and LPARNAME
    - Inserted data step to discover high hour per day
  - Plotted 32 days showing high hour per day
    - With LPARs stacked

# solutions and benefits

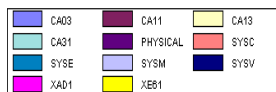
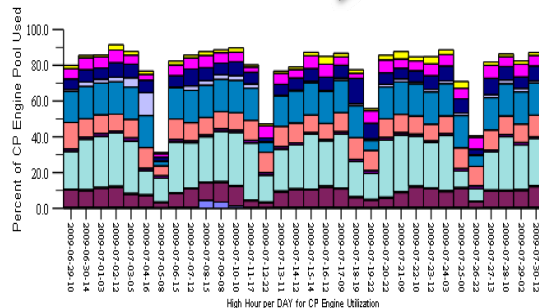
## exploring CA MICS Hardware and SCP Analyzer files

### – Performance problem: Development z/10

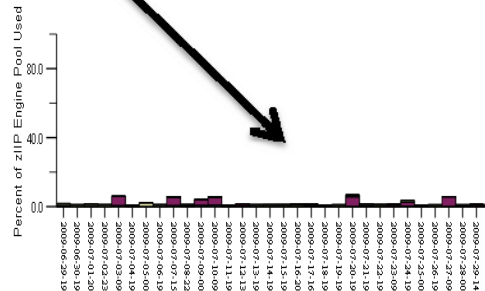
- Plot high hour engine percent utilization from HARLPC file – stack LPARs

- 12 general purpose engines
- 3 zIIP engines for enclave SRB
- 1 zAAP engine for JAVA workloads

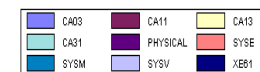
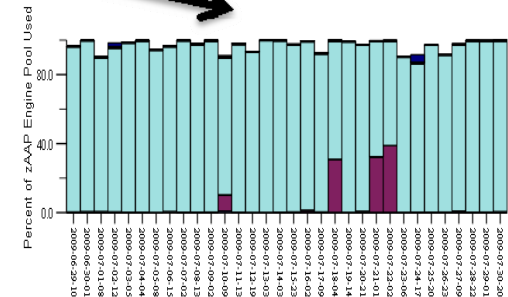
LPAR Shared CP Processors Utilization  
by Date and High Hour for CP  
CPU Type and Model = 2097-112



LPAR Shared zIIP Processors Utilization  
by Date and High Hour for zIIP  
CPU Type and Model = 2097-407



LPAR Shared zAAP Processors Utilization  
by Date and High Hour for zAAP  
CPU Type and Model = 2097-712



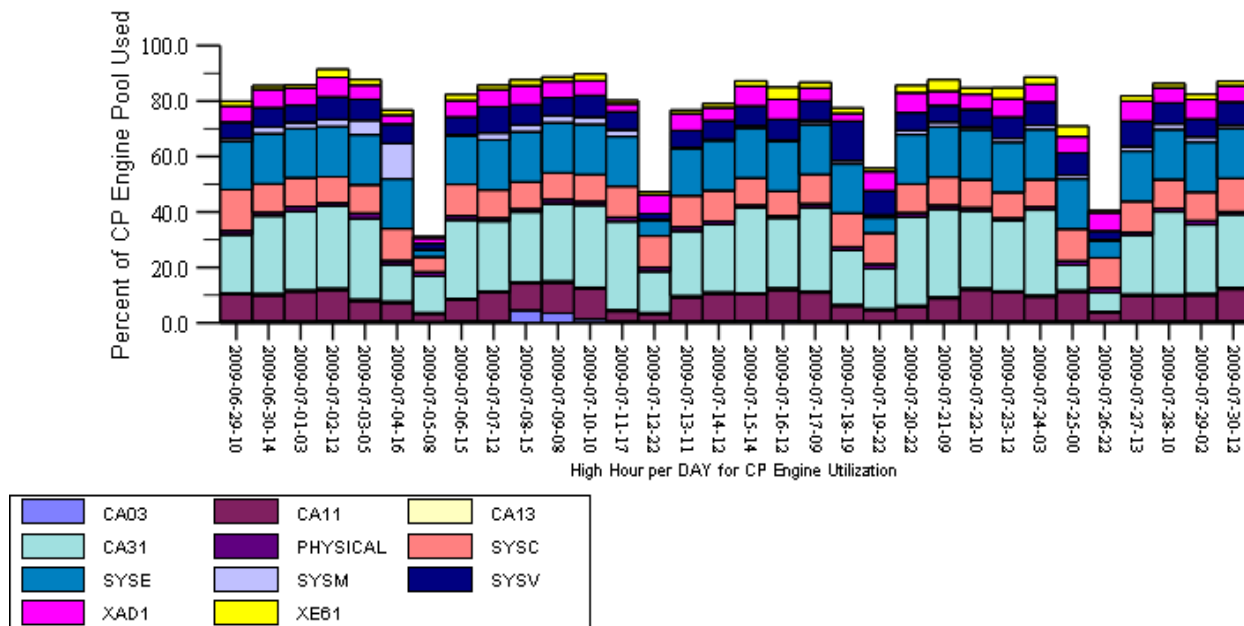


# solutions and benefits

## exploring CA MICS Hardware and SCP Analyzer files

- 12 general purpose CP engines—utilization high but not excessive

LPAR Shared CP Processors Utilization  
by Date and High Hour for CP  
CPU Type and Model = 2097-712

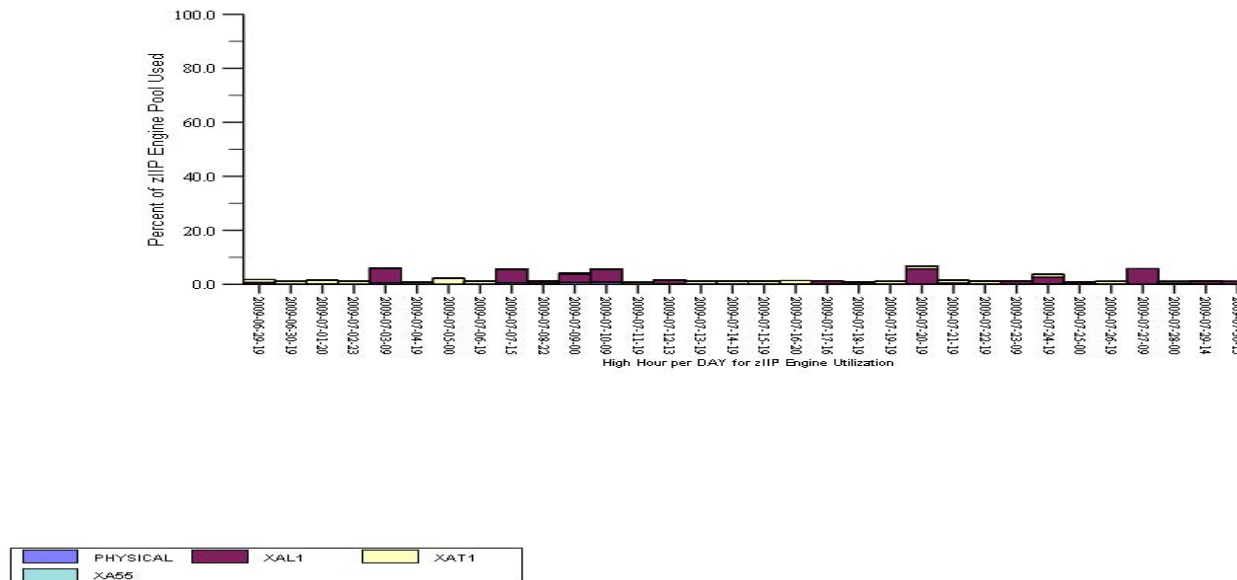


# solutions and benefits

## exploring CA MICS Hardware and SCP Analyzer files

- Three zIIP engines consistently under utilized

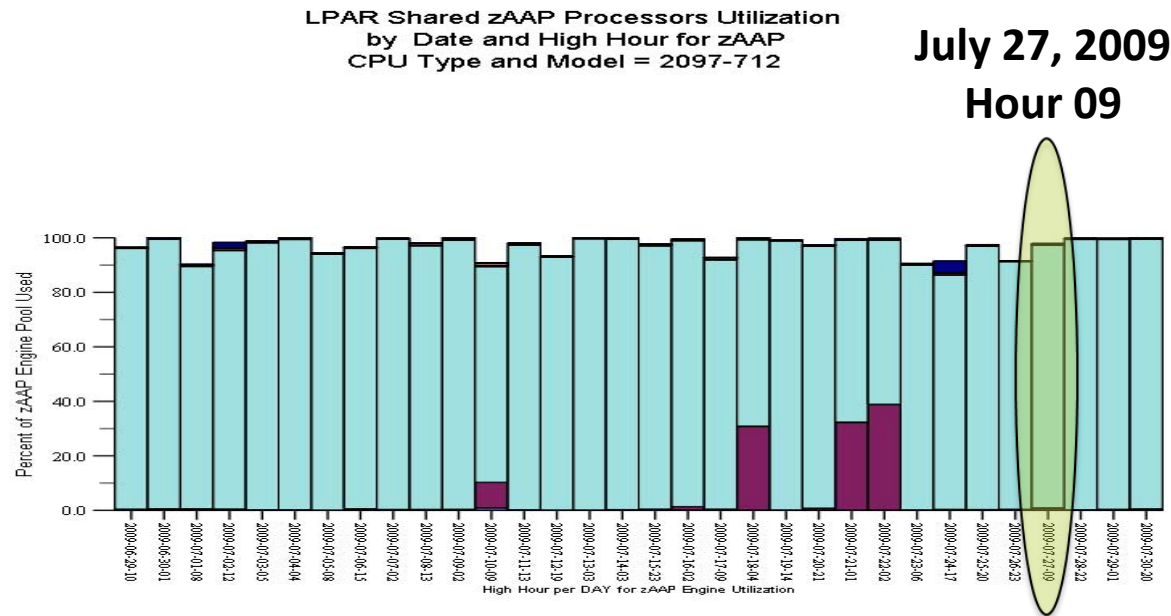
LPAR Shared zIIP Processors Utilization  
by Date and High Hour for zIIP  
CPU Type and Model = 2097-407



# solutions and benefits

## exploring CA MICS Hardware and SCP Analyzer files

- Single zAAP engine consistently fully utilized



# solutions and benefits

## exploring CA MICS Hardware and SCP Analyzer files

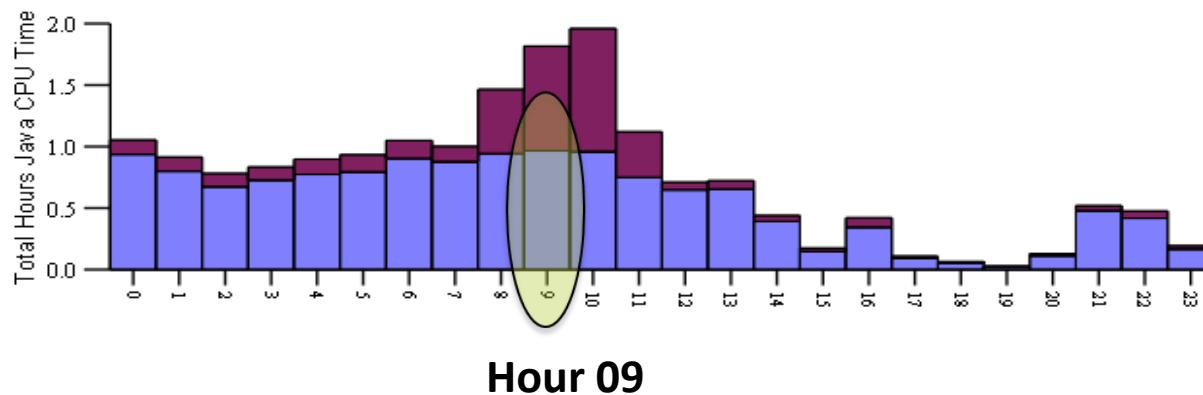
- zAAP engine use merits further exploration
  - Examine workloads (Service Classes)
  - DAYS timespan Service Class Resource Consumption (WLMSEC) file
    - zAAP (and zIIP) actual and eligible CPU time by Service Class Period
      - Determine if zAAP work overflowed to general purpose engines
      - Determine what workloads are using zAAP engines
    - Data elements to plot:
      - SECZAPTM: CPU Time on zAAP (Normalized) **zAAP Actual**
      - SECZAPCT: zAAP Eligible CPU Time on CP **zAAP Eligible**
  - Plot recent day (July 27, 2009) by HOUR
    - First stack actual and eligible: Hours now, not percentages
    - Next stack Service Classes: Two charts – Actual and Eligible

# solutions and benefits

## exploring CA MICS Hardware and SCP Analyzer files

- Does zAAP demand overflow to CP engines?
  - Use WLMSEC file: Actual and Eligible zAAP CPU Time

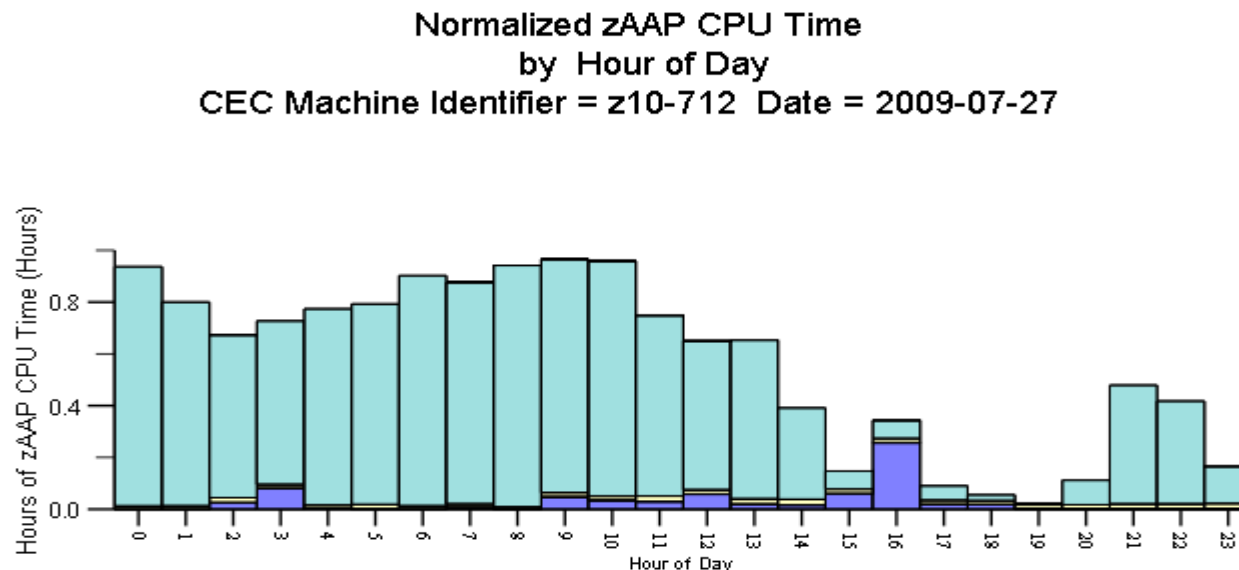
Actual zAAP CPU Time, Eligible zAAP Time on CP  
by Hour of Day  
CEC Machine Identifier = z10-712 Date = 2009-07-27



# solutions and benefits

## exploring CA MICS Hardware and SCP Analyzer files

- What workload is responsible for zAAP engine demand?
  - **Actual** zAAP CPU time by Service Class



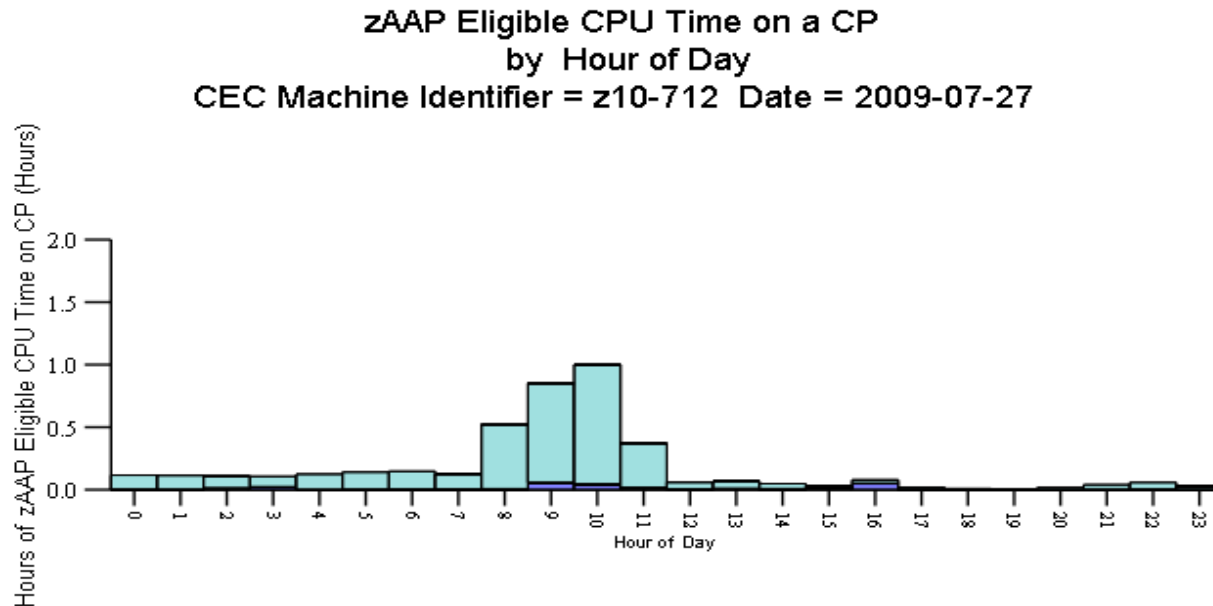
✓ Service Class=MSMSRVR



# solutions and benefits

## exploring CA MICS Hardware and SCP Analyzer files

- What workload is responsible for zAAP engine demand?
  - **Eligible** zAAP CPU time by Service Class



✓ Service Class=MSMSRVR

# solutions and benefits

## exploring CA MICS Hardware and SCP Analyzer files

### – Conclusions

- Mainframe 2.0 stress testing impacting performance
  - Service class “MSMSRVR” is culprit
  - Stress testing MSM JAVA based software delivery product exceeding capacity of single zAAP engine
  - Spillover (zAAP eligible) using valuable general purpose CP engine CPU time
  - Noted: 3 zIIP engines seriously under utilized

### – Actions

- CA had IBM reconfigure one zIIP engine as zAAP engine at minimal cost
  - Two zIIP engines still have excess capacity
  - Two zAAP engines handling over 95% of JAVA demand

### – Results: Frees up CP engine, performance improves, happiness!



# solutions and benefits

## exploring CA MICS Batch and Operations Analyzer files

– Address space study: Examine step (interval) level files

- Six different files:
- BATPGM, BAT\_TS, BAT\_ST, BAT\_TP, BAT\_OE, and BAT\_SA

batch	TSO	started tasks	APPC	USS	system address spaces
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– DETAIL and MONTHS timespans

- Need MONTHS, but only one cycle online

– Challenge: How to bring history files into CA MICS Q&R?

- Solution: LIBNAME statement in Q&R User Code step

# solutions and benefits

## exploring CA MICS Batch and Operations Analyzer files

### — Address space study

- Characterize workloads by business structure and type
- Trend workloads

### — Extract and report - two groups of queries

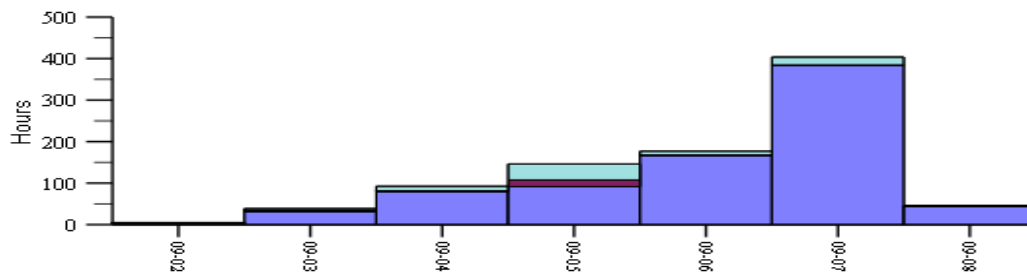
- First set: extract data from history tapes and store in SAS DASD dataset
  - One for each address space type (batch, TSO, started task, etc.)
  - Proof of concept to run as query—could execute as batch job
- Second set: graphics using combined data extract plus month-to-date
  - Develop common SAS steps for knowledge sharing
  - Explores common SAS methods under Q&R
  - Alternative display types

# solutions and benefits

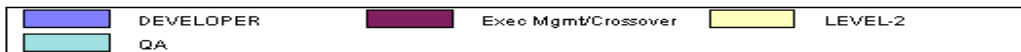
## exploring CA MICS Batch and Operations Analyzer files

– Chart of CPU time by role (development, QA, level 2, etc.)

Role CPU Use  
Central Electronic Complex = z10-712 LOB = R&D BU = ALL FUNCTION = MAINFRAME 2.0



MF 2.0 and MSM testing:  
dramatic increase in  
development usage of  
z10-712



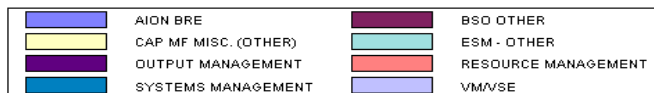
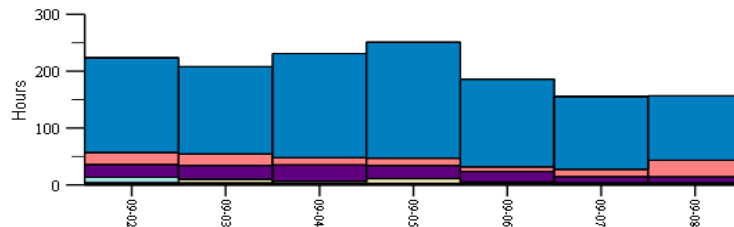
# solutions and benefits

## exploring CA MICS Batch and Operations Analyzer files

### – Charts of CPU time by product line

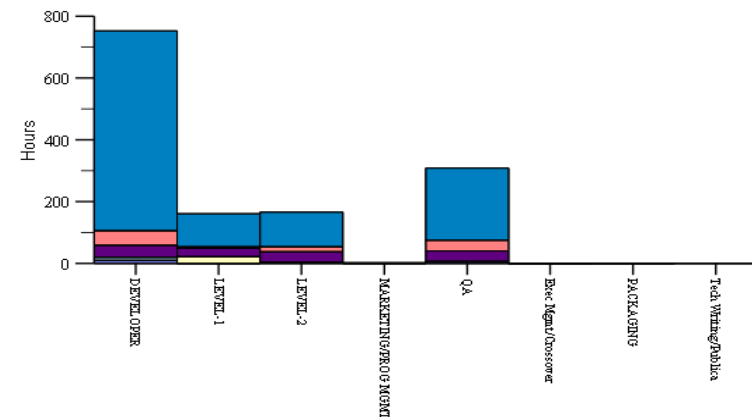
#### Stacked product line by month

Address Space CPU Time over the last 6 months  
Central Electronic Complex (Physical Processor) = z10-712 LOB = R&D BU = MID-ATL



#### Stacked product line totals by role

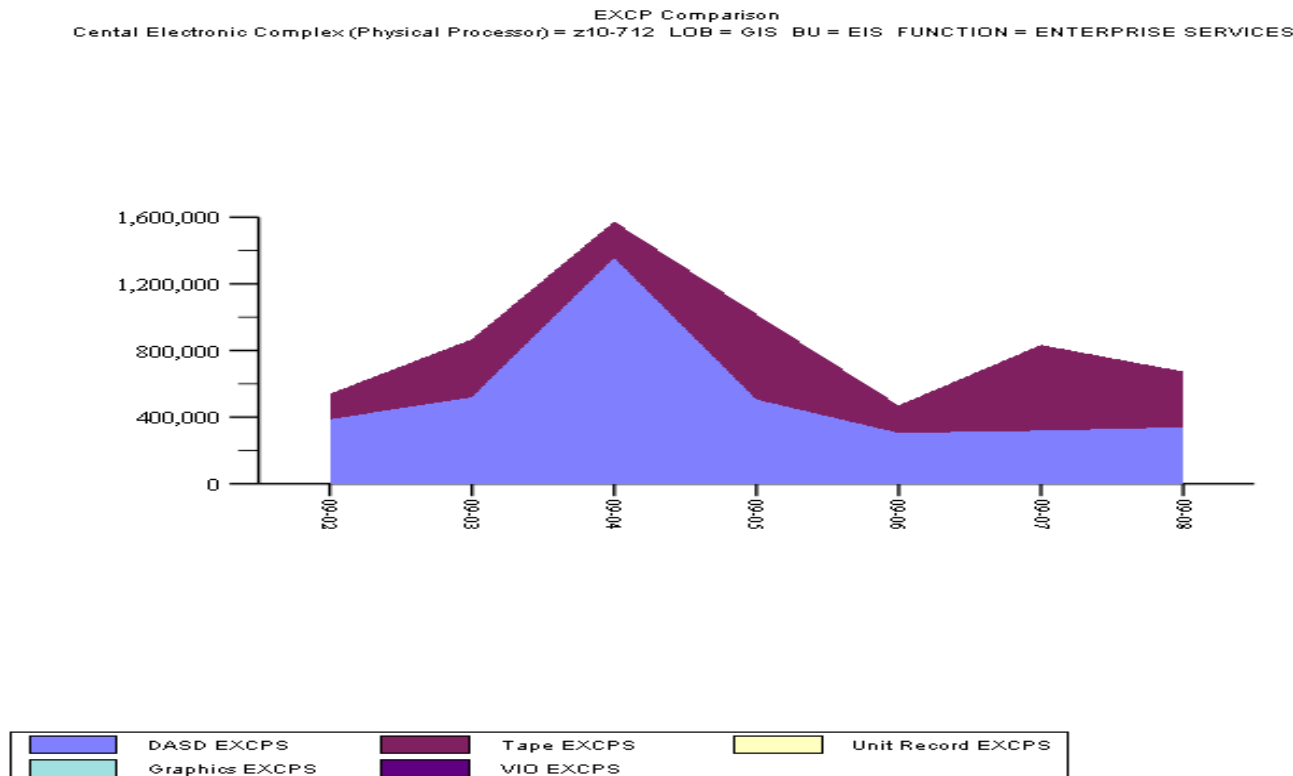
CPU Time by Role and Product Over the Last 6 Months  
Central Electronic Complex = z10-712 LOB = R&D BU = MID-ATL



# solutions and benefits

## exploring CA MICS Batch and Operations Analyzer files

- Stacked area chart of EXCPs by type (DASD, tape, etc.)

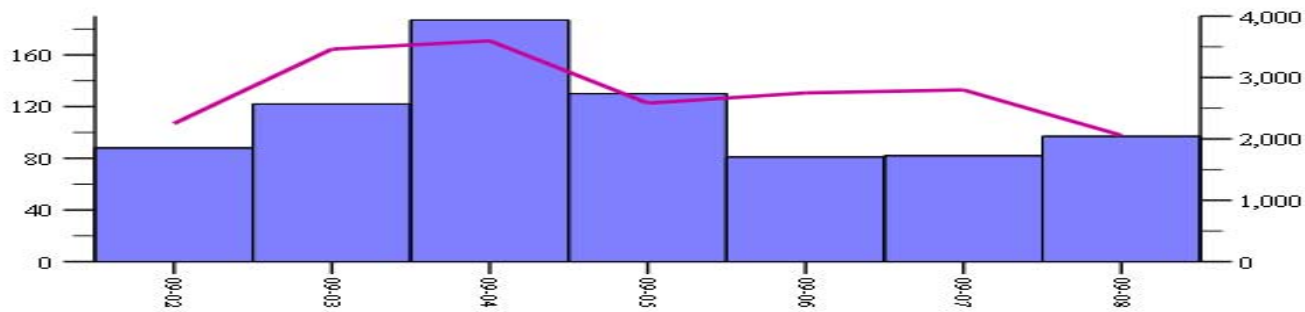


# solutions and benefits

## exploring CA MICS Batch and Operations Analyzer files

- Abend analysis: vertical bar for USER, line for SYSTEM

Abends  
Cental Electronic Complex (Physical Processor) = z10-712 LOB = R&D BU = MID-ATL  
FUNCTION = SYSTEMS MANAGEMENT



Step User Abends

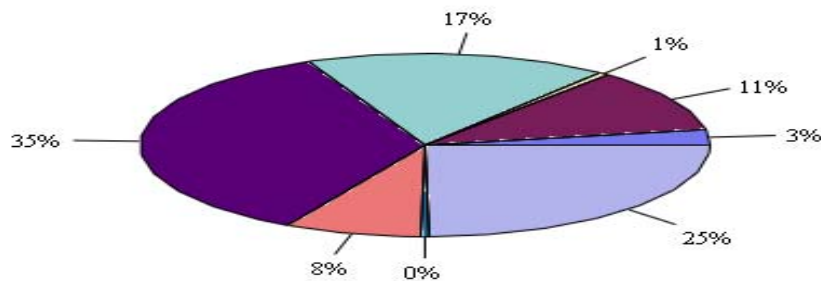
Step System Abends

# solutions and benefits

## exploring CA MICS Batch and Operations Analyzer files

### – Monthly pie chart of CPU hours by business unit

R&D CPU Usage  
Central Electronic Complex (Physical Processor) = z10-712 Year / Month = 09-02



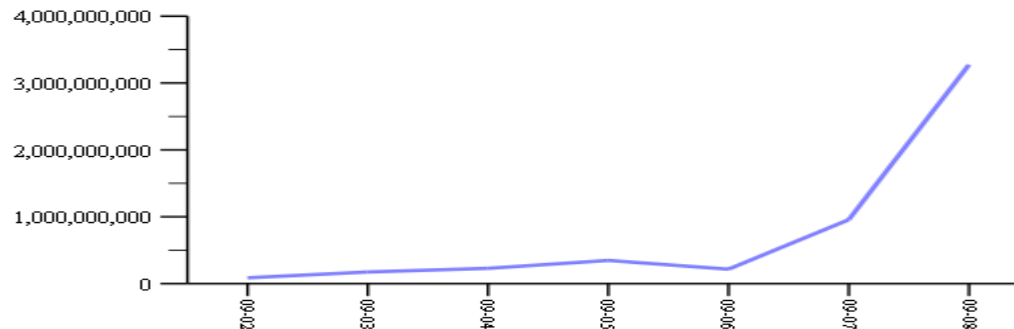
BU: ALL = 127053.851	BU: ESM = 523526.425	BU: MF COE = 27039.7
BU: MID-ATL = 803786	BU: NORTH = 1647710	BU: NORTH-EAST = 364
BU: RE = 21503.21677	BU: SOUTH = 1157577	

# solutions and benefits

## exploring CA MICS Batch and Operations Analyzer files

- I/O service units: Tim ran his queries frequently!

IO Service Units  
Cental Electronic Complex (Physical Processor) = z10-712 LOB = R&D BU = MID-ATL  
FUNCTION = RESOURCE MANAGEMENT



Study was I/O intensive - more than 3 million observations per run!

IO Service Units

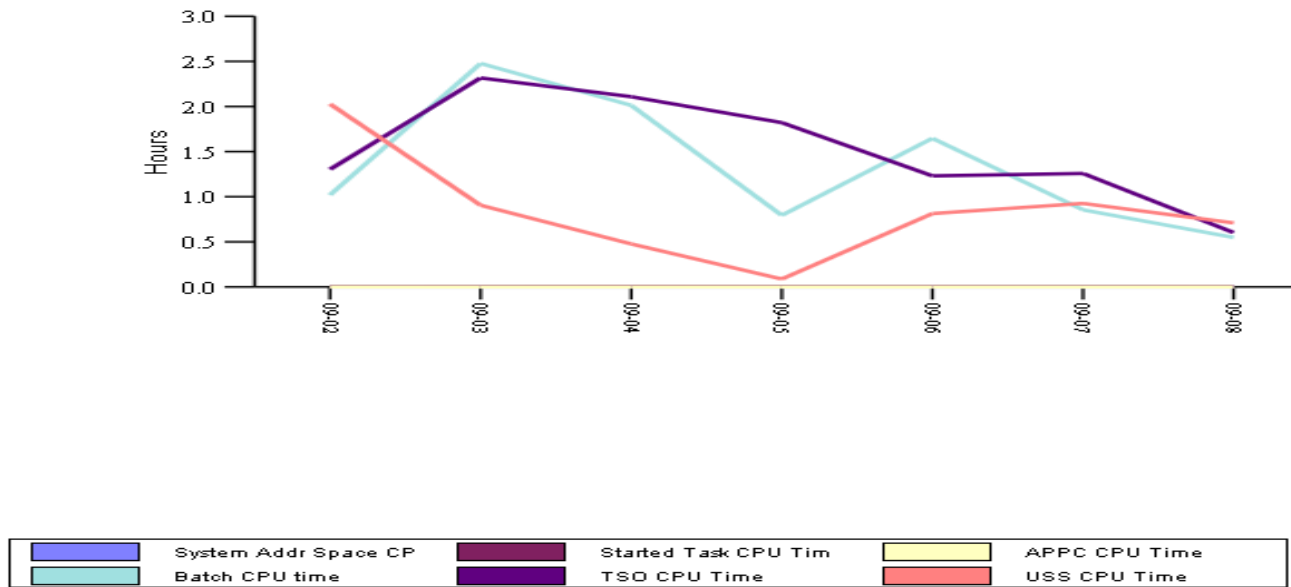


# solutions and benefits

## exploring CA MICS Batch and Operations Analyzer files

### – Month-to-date only: Daily CPU time by address space type

WORKLOAD TYPES BY ROLE  
System Addr Space CPU Time, Started Task CPU Time, APPC CPU Time, Batch CPU time,  
TSO CPU Time, USS CPU Time  
by Year / Month  
Central Electronic Complex = z10-712 LOB = R&D BU = ALL FUNCTION = GLOBAL  
ROLE = LEVEL-1



# solutions and benefits

## exploring CA MICS Batch and Operations Analyzer files

### — Conclusions

- Q&R can bring in tape data via SAS LIBNAME statements
- Q&R understands tape file structure when first file accessed is online
  - Concatenate online file with historical data in user step
- High volume data managed with user KEEP statements and USER work

### — Results

- Presented GIS and development management with a variety of ways to view CA MICS resource utilization data by internal business structures
- Explained impact of Mainframe 2.0 and MSM testing
- Increased awareness of Q&R within the CA MICS development group

# solutions and benefits

## exploring CA MICS Batch and Operations Analyzer files

- General CA MICS Q&R query development tips
  - Explore files
    - Start with single cycle to understand available metrics
    - Make use of dictionary feature
  - Think about the best graphic form to present information
  - What keys make sense?
  - Make use of user defined elements (e.g., concatenate date with hour)
  - Filter data using delimiting IF statements
  - If merging files, always summarize first
  - Make use of Q&R “edit views” to explore different graphical presentations

- CA MICS team achieved resource management hero status!
  - and it really wasn't that difficult...
- We were both impressed with Q&R 12.4
  - Extension of standard query steps was easy with basic SAS knowledge
  - The queries we developed assisted the CA MICS Q&R development team
    - Validate the OpenViz to ChartFX conversion
- Explore CA MICS Q&R – easy to use
  - And 30,000+ metrics to plot!
- For a copy of the .QRQ inquiries used in this session
  - e-mail [darrell.faulkner@ca.com](mailto:darrell.faulkner@ca.com)

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# Q&A

# mainframe networking

Mainframe MIPS Lounge —  
Mainframers can relax and talk  
informally

Islander D  
Monday: 12 PM – 4:45 PM  
Tuesday & Wednesday: 8 AM – 6PM  
Thursday: 8 AM – 12 PM

## Mainframe Networking Lunches

Where: Islander Ballroom, Salon B

When: Tuesday and Wednesday

Time: 12:00pm - 1:15pm



Seating is limited and  
will be on a first  
come, first served  
basis



**Mainframe-only party,** Wed  
night, 7-10pm, House of Blues  
(Mandalay Bay)  
Need entry pin, get them in the  
Mainframe lounge



# related sessions

SESSION #	TITLE	Day / Time Room: <u>Tropics A</u>
MR030SN	CA MICS Technology Support – You Asked, We Delivered!	Monday / 1:15
MR050SN	Have You Checked Your CA MICS Implementation Lately?	Monday / 3:45
MR230SN	CA MICS Observations: Practical Best Practices	Tuesday / 9:00
MR090SN	Digging for Gold – How to Mine and Share CA MICS Data, Quickly and Easily	Tuesday / 2:30
MR210SN	CA MICS Tape Analyzer Option – With Six You Get HYDRA	Tuesday / 3:45
MR110SN	Are You Drowning in SMF Data?	Wednesday / 9:00
MR130SN	Get Your Data Faster (and More Easily) – A User Success Story	Wednesday / 1:15
MR170SN	CA MICS Customer Panel – CA MICS <u>NOTE different room: Islander G</u>	Wednesday / 2:30
MR150SN	CA MICS Resource Management in the CA Data Center – A Success Story	Wednesday / 3:45
MR250SN	CA MICS Global User Community Meeting	Wednesday / 5:00

# exhibition center

## related CA technology

- CA Mainframe area
  - Booth 182 Stop by to see MICS reporting with Q&R
- Exhibition Center Tours
  - Sign up at the Info Desk in the Exhibition Center

# please complete a session evaluation form

- The number for this session is **MR150SN**
- After completing your session evaluation form, place it in the basket at the back of the room

thank you