Enterprise Performance Strategies' Essential z/OS Performance Workshop

Note: Outline is draft and subject to change.

Mainframe Fundamentals Overview

Hardware

Brief overview of names and speeds/feeds

- Processors – naming nomenclature
- Disk Subsystems – major vendors, GiB vs. GB
- Tape Subsystems – VTS discussion
- Coupling Facilities – What is a sysplex, Internal vs. External
- Channel Types – FICON, CF Links, zHyperLink
- Additional features
    - zEDC
    - FlashExpress
    - CryptoCards

CPU Types

- GCP
- zIIP
- zAAP
- IFL
- ICF
- SAP
- IFP

Processor Effective Performance

- Processor cache discussion
- Multi-drawer and multi-book issues
- Capacity Measures: % Busy, MIPS, MSUs, APPL %
- More/slower vs. Fewer/faster
- SMT Introduction

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Software

z/OS Workloads Intro – what work runs here and how

- TSO
- CICS
- DB2
- IMS
- JES / Batch
- MQ
- WAS
- USS

Software Pricing

- Review software types
- MLC & R4HA
- Software pricing drives workload performance and capacity

Sharing

PR/SM

- LPARs
- Weights separate by processor type
- Logical vs. Physicals
- HiperDispatch
- Capping

Sysplex

- Basic vs. Parallel sysplex
- XCF
- Coupling Facilities: internal vs. external
- CF Link types
- Structure Types
- CF Exploiters

Understanding Measurements

Recording Measurements

- Counts vs. Samples vs. Interval Measurement
- RMF & SMF intervals, what is a good interval
  - 15 minute vs. 2 second Averages
- High Frequency Measurements
  - SMF 98 & SMF 99 records
- Resource vs. Workload measurements

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CPU Measurements
- MIPS vs. MSUs vs. Percentages

CPU Decomposition
- CEC Busy -> LPAR Busy -> Workload CPU time
- Capture ratio

Service Units
- SU/Sec
- CPU to SUs
- Service Coefficients

zIIP/zAAP Normalization
- Normalization factor
- zIIP/zAAP on GCP
- Generosity factor

CPU Time Breakdown
- SMF30 measurements
- SMF72 measurements

Logical Measurements
- MVS Busy
- Workload %
- How these numbers compare to physical numbers

Response Time
- Average response time / tran
- Response time distributions
- Internal time vs. network time
- Internal transactions vs. external/business transactions

Memory
- Frame sizes and impact on CPU - TLBs
- Available storage average and minimum
- Paging

Storage Class Memory
- Use Cases
- Measurements

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Simultaneous Multi-Threading

- What is SMT?
- Understanding SMT Measurements
- Should you enable SMT?

Crypto

- CPACF vs. Crypto Cards
- Crypto Card functions
- Crypto Card Measurements

zEDC

- Use cases
- Measurements

Understanding Performance Limitations

Indications of Latent Demand

- Delay Counts (vs. percentages)
- Work Unit Counts
- Utilization

Capping

- LPAR Capping of all types
- Resource groups

Queueing

- Priorities
- Critical Path Analysis

Managing Performance with WLM

WLM in One Page

- Introduces WLM concepts

WLM Pain Points and Concerns

- Active Service Class Periods
- Velocity Goal Evaluation
- WLM Managed Initiators
- Performance Indexes

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I/O

History and emulation

- z/OS Storage Architecture
- Controllers vs disks
- 3990, 2105, 2107
- Why everything is a 3390-9
- EAV

Logical constructs

- CKD vs FB
- Cylinders, tracks, blocks, records
- Access methods
- Extended Format vs Extended Architecture

Hardware

- Mainframe I/O subsystem
- FICON Directors
- Controllers
  - Adaptors and ports
  - Cache, disks, and SSD
  - All flash
- Anatomy of a disk drive

I/O measurements

- Queueing theory
- RMF, GTF, Monitors
- SSCH vs Locate Record
- Response time and subcomponents
- RAID

The life of a mainframe I/O

- Application to return
- Flavors of I/O
  - Read/Write
  - Random/Sequential
- Channel programs, IDAW, MIDAW, zHPF, zHyperlink
- ESCON, FICON, Open Exchanges

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PAV and Multiple Allegiance
- Flavors of concurrency
- Define Extent

Data replication
- Why?
- RTO and RPO
- Sync vs Async
- Flavors: XRC, PPRC…

The "Big Three"
- IBM, HDS, EMC
- Commonalities and comparisons

Performance
- Cache
- Channels vs HA ports
- Tiering
- All Flash
- SSD
- Striping (logical vs physical)
- Compression
- Defrags
- Blocksize and Buffers
- Balance

I/O Performance Triage
- What do you investigate first?