z/OS Performance & Tuning with WLM Training

Duration: **3 Day**

BILGINC IT Academy
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This course gives technical support personnel in a z/OS installation a clear understanding of the tasks involved in effective performance management. It covers conceptual performance issues as well as the significant technical considerations, such as parameters and I/O configurations.

The course also provides a comprehensive overview of the Workload Manager functions. All the key features are described during this course. The course will also include a number of practical online exercises.

As well as covering conceptual performance issues the course concentrates on the significant technical considerations of I/O tuning.

This course is available 'on demand' (minimum 2 students) for public presentations or for one-company, on-site presentations.

Prerequisites

To benefit from this course, participants need familiarity with z/OS internal operations. This prerequisite can be met by completing the courses **'z/OS System Fundamentals Workshop - Part 1** and **z/OS System Fundamentals Workshop - Part 2**.

What You Will Learn

- explain system performance requirements
- explain the role of a performance person
- apply basic MVS tuning
- explain the important WLM considerations
- evaluate a WLM setup
- utilise RMF reports to tune MVS
- define service policies, service classes and classification rules
- describe the mechanisms for managing and balancing any workload in a WLMPlex
- explain the implications of using Workload Managed Batch and Resource Affinity Scheduling
- utilize the latest technology to optimise I/O performance
- decide on what to monitor
- utilise RMF to tune MVS I/O.

Training Outline

What is Performance?

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What is performance?; the performance issues; performance related activities; performance management; a transaction; transaction delay time components; measuring delays; MVS tuning and the Systems Programmer; three kinds of tuning; corrective tuning; preventive tuning; negative tuning; knowing your system.

z/OS Data-In-Memory

Data spaces and hiperspaces in MVS; Data Space & Hiperspace use in MVS; VLF, LLA, DLF and Hiperbatch; VLF and DLF; what is VLF?; setting up VLF; VLF macros; example of VLF parameters; what is LLA?; running LLA in MVS; LLA module staging; example of LLA parameters; Data Lookaside Facility and Hiperbatch; using DLF and Hiperbatch; the DLF Connect/Disconnect exit; Coupling Facility exploitation; IBM software that uses Coupling Facility; VSAM Record Level Sharing; CICS VSAM file accessing applications.

Input/Output Processing

Why I/O processing?; what is I/O?; MVS support for I/O processing software; MVS and I/O processing; Application I/O; the application program; the DD statement; going to the Access Method; the Access Method; getting the channel program started; EXCP - an IOS Driver; IOS 'Front End'; actually starting the I/O; the I/O engine at work; the Channel Sub-System (CSS); Hardware System Area (HSA); "The I/O Farm"; the I/O Interrupt; IOS Post processing; back to the Access Method; the I/O process from A to Z; starting the I/O; going back from starting the I/O; I/O complete; caching concepts; Read Hit; Write commands; Write Hit; Read Miss; Write Miss; cache modes; review questions - Input/Output processing.

Hardware I/O Performance

What is FICON?; FICON features; System attachment considerations; FICON guidelines; the IOSQ time problem; overcoming restrictions; multiple allegiance and Parallel Access Volumes; PAV and cache; PAV RMF support; managing PAVs; what are PAV limitations?; Intelligent Resource Director (IRD); IRD LPAR CPU management; IRD LPAR CPU management (2); Dynamic Channel Path Management (DCM); DCM requirements; DCM definitions and concepts; configuring DCM; RMF Channel Path Activity report; DCM and the I/O queueing report; I/O priority prior to IRD; I/O priority queuing; WLM I/O priority management; UCB & DASD CU I/O priority; CSS I/O priority; enabling Channel Subsystem Priority Queuing; review questions.

RMF Reports for I/O

Resource Measurement Facility; CACHE - Cache Subsystem Activity reports; CHAN - Channel Path Activity report; DEVICE - device activity report; Monitor I shared DASD; Monitor I shared tape activity report; FCD - FICON director activity report; IOQ - I/O queuing activity report (1); PAGESP -Page/Swap data set activity report; PAGING - Paging activity reports; VSAM RLS activity by storage class; VSAM RLS activity by data set; RMF I/O performance exercise.

Workload Management Overview

The Workload Manager (WLM); WLM Goal Mode and Parmlib members; WLM concepts; Service Policies; Multi-system workload management; Workload reporting; Building the service definition; Service Policy; Creating workloads; Creating resource groups; Creating service classes; Goal types;

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Creating Service Classes; IBM specified subsystems; Work qualifiers; Subsystems and work qualifiers; Classification Groups; System-provided Service Classes; Defining service policy overrides; Specifying overriding Goals for a Service Class; The Service Definition; Classification rules for subsystems; Implementing WLM; Create performance objectives; Manuals on WLM.

How WLM works

WLM components; WLM Considerations; Dispatchable Units (DUs); SRB types & priorities; SRB scheduling with IEAMSCHD; SRB Enclaves; Dispatcher queues; Performance Index; Donor and receiver determination; Dispatching Priority Control; Dispatching Priority Assignment; INITTMP; Swap control; Work Requests to WLM; Server Topology; Monitoring environment - CICS & IMS; Enclave management; DASD I/O priority management; Sysplex I/O Priority Management; Parallel Access Volumes (PAV); Policy Adjustment Function; Resource Adjustment Function; Workload management services.

Workload Manager Applications

TSO workloads; Emergency TSO Service Class; WLM Batch Initiators; Scheduling Environment; WLM or JES Initiators?; Batch workloadsBatch workload Goals; Special Service Classes; STC default Service Classes; STC Service Class considerations; SYSSTC Service Class; DB2 Address Spaces; DDF enclaves; Classification rules for DDF; DDF Goal types; DB2 Stored Procedures; Sysplex Query Parallelism; CICS - Types of Goals; CICS Region Management Goal; CICS Transaction Management Goal; Transaction goal rules; Unix System Services (USS); Why USS uses WLM; UNIX Services fork and spawn function calls; USS Service Classes; USS Classification rules; Definitions for OMVS subsystem type work.

Understanding RMF Reports

Resource Measurement Facility; SMF Records; Monitor II; Monitor III; Postprocessor Reports; Workload activity report reporting options; Workload activity report - Goal mode; RMF monitor I service class period report Goal mode; Monitor I workload group and service class period report; CACHE - Cache subsystem summary report; CHAN - Channel path activity report; DEVICE - Device activity report; Monitor I shared DASD activity; Monitor I shared tape activity report; FCD - FICON Director activity report; IOQ - I/O Queuing activity report ; HFS - Hierarchical File System global statistics report; HFS - Hierarchical File System statistics report ; OMVS - OMVS kernel activity report; PAGESP -Page/Swap data set activity report; PAGING - Paging Activity report; VSAM RLS activity by storage class; VSAM RLS activity by data set.

zFS Performance

USS workloads; USS & VLF; environmental variables; cache sizes; resource limit management; PARMLIB issues; monitoring USS; USS performance tools