z/OS Performance & Tuning

This course gives technical support personnel in a z/OS MVS installation an understanding of the tasks involved in MVS 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.

Objectives

On successful completion of this course attendees will be able to:

- 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
- tune HSM
- decide on what to monitor
- utilise RMF to tune MVS I/O
- tune and monitor UNIX System Services.

Who Should Attend

This course is suitable for all Systems Programmers and Performance Analysts working in the zSeries Server environment.

Prerequisites

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

Duration

4 days

Course Code

ZPER

Contents

What is ‘Performance’?
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.

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 Reporting

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; 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 Management Functions

TSO, batch and STC workloads; CICS, IMS, DDF and APPC workloads; non IBM or RYO workloads; DB2 Sysplex Query Parallelism; DB2 stored procedures; HTTP server workloads; UNIX System Services workloads; WLM batch enhancements; WLM Managed Batch (WMB); WLM - JES2 interaction; work classification; Resource Affinity Scheduling; WMB migration issues.

Workload Manager Applications

TSO workloads; Emergency TSO Service Class; WLM Batch Initiators; Scheduling Environment; WLM or JES Initiators?; Batch workloads; Batch 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.

UNIX System Services (USS) Performance

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