Course Outline

z/OS Internals Bootcamp

Course Summary

Description

This course provides an intense examination of z/OS. Topics include an introduction to computer systems hardware and an exploration of architecture, system services and functions, storage management mechanisms, and I/O processes. In the final section a look at system diagnostics and data collection will be examined

Topics

- Architecture and Hardware Basics
- Programs
- Introduction to z/OS
- System Initialization
- System Services (SVC Processing)
- z/OS Storage Management
- Virtual Storage Concepts
- Data Spaces
- Memory Objects
- Job and Program Management
- Inter Address Space Communication
- Cross Memory Services
- Dispatcher
- Recovery Termination Management
- Direct Access Storage Devices (DASD)
- Data Management and I/O Flow
- Resource Management and Control
- Workload Manager and SRM
- Parallel Sysplex
- Control Blocks and Dumps

Audience

This course is designed for system programmers, operators, and application programmers that need an understanding of the z/OS environment and the subsystems supported. Workstations will be used to illustrate concepts and provide basic exposure to the elements of the z/OS environment

Prerequisites

Student should have a solid understanding of the z/OS environment and be comfortable with using the standard tools and utilities available [TSO, ISPF, JCL, etc]. This course does not require any explicit programming knowledge.

Duration

Ten days

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I. Architecture and Hardware Basics
- A. Examine how data is represented in computers, using binary, hexadecimal, and decimal.
- B. Introduction to memory addresses and basic instruction operation
- C. Explore the role of the PSW in machine operations
- D. Introduce basic computer hardware inventory: CPU, Memory, and I/O devices

II. Programs
- A. Examine basic program structure.
- B. Introduction to Linkage Editor functions
- C. Illustrate connection between data, JCL and programs
- D. Introduction to basic TSO/ISPF and SDSF

III. Introduction to z/OS
- A. Evolution of operating systems from MVT/MFT to OS/390 and z/OS.
- B. Examine LPARs and parallel sysplex configurations.

IV. *Systems Initialization*
- A. Review the IPL process
- B. Steps in systems initialization

V. System Services (SVC Processing)
- A. Interrupts and interrupt handling
- B. PARMLIB definitions related to system functions
- C. System Address spaces

VI. z/OS Storage Management
- A. Real storage management:
- B. Central and expanded storage usage
- C. Virtual storage management and concepts:
- D. Paging/Swapping mechanisms
- E. Auxiliary storage management
- F. Data spaces
- G. Memory Objects
- H. Large Page Support (z10)

VII. Job and Program Management
- A. Review of initiator/terminator functions
- B. Recovery Termination Management
- C. Address spaces and task control
- D. Dispatcher
- E. Cross Memory Services
- F. Inter Address Space Communications

VIII. Direct Access Storage Devices (DASD)
- A. Introduction to DASD hardware functions:
  1. CKD, ECKD, and FBA devices
  2. Parallel Access Volumes (PAV)
  3. Volume Affinity
  4. Caching mechanisms
  5. RAID implementations

IX. Data Management and I/O Flow
- A. Components of I/O operation:
- B. Introduction to channel command processing
- C. Access method services
- D. Data set organization and access methods:
  1. Sequential access (SAM)
  2. Basic Partitioned Access (BPAM)
  3. Basic Direct Access (BDAM)
  4. VSAM processing (ESDS, KSDS, RRDS)
- E. Introduction to database processing concepts

X. Resource Management and Control
- A. Examine basic objectives in managing system resources
- B. Explore the process of defining objectives
- C. Discuss the process WLM uses to make decisions and monitoring requirements
- D. Scheduling environments
- E. Intelligent Resource Director

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Course Outline (cont.)

XI. Workload Manager and SRM

A. Service class definitions:
   1. Importance levels
   2. Execution velocity
   3. Response time goals
   4. Performance Index
   5. Classification rules

B. Setting exception conditions
   1. Resource groups
   2. CPU/storage critical settings
   3. C. Service coefficients and options
   4. Service coefficients
   5. I/O priority management
   6. Dynamic alias management

C. Applications environment
   1. Specifying and managing application environments
   2. Server limits for application environment
   3. Understanding enclaves

D. Scheduling environments
   1. Specifying scheduling environments
   2. Managing resource states

E. WLM managed initiators

F. Processor/LPAR management:
   1. CPU metrics
   2. zIIP and zAAP processor configurations
   3. Hiperdispatch

G. Intelligent Resource Director
   1. LPAR CPU Management
   2. Dynamic Channel Path Management
   3. Channel Subsystem Priority Queuing

H. SMF type 99 records

XII. Parallel Sysplex

A. Compare the differences between a base Sysplex and parallel Sysplex

B. Describe the purpose of the Coupling Facilities three Structure forms (Lock, Cache and List)

C. Describe the various Coupling Facility options and their implementations.

D. Review the software concepts of resource versus data sharing through a Coupling Facility

E. Discuss configuration choices and potential impact on performance

F. Identify the required hardware and software components that make up a Parallel Sysplex and describe their function

G. List the factors that will impact the size of Coupling Facility storage needed in the Parallel Sysplex

H. Examine tools and options for sizing a Coupling Facility

I. Describe the reasons for using a stand-alone Coupling Facility vs. an LPAR between systems

J. Understand dynamic CF expansion and dynamic CF dispatching mechanisms

K. Examine XCF and CF RMF Reports examples

L. Describe the requirements for implementing a Coupling Facility and a Structure within it

M. Describe the functions performed by the Coupling Facility channels (Receive and Send) and how they need to be defined through Hardware Configuration Definition

N. List the required data sets for a Sysplex and the purpose of each

O. Indicate the steps necessary to create Sysplex-required data sets

P. Describe the steps necessary to share data between multiple users across different systems in a Sysplex, using the Coupling Facility

Course Outline(cont.)

Q. Describe how data invalidation is handled when that data is maintained in a Coupling Facility Structure
R. Describe the major exploiters of data sharing versus resource sharing and some of the product implementations that can take advantage of the Coupling Facility.

XIII. Control Blocks and Dumps

A. General systems structure
   1. Task management
   2. I/O management
   3. Storage management
   4. Understanding hexadecimal and binary
   5. Understanding the role of registers
   6. Understanding storage addresses
   7. The PSW
B. Locating the failing instruction
C. Locating storage operands
D. Using registers
E. Introduction to system control blocks
F. Documentation