z/OS Boot Camps

Duration: 10 Days

Audience:

This is intended for delegates new to z/OS, specifically Application Developers.

Pre-requisites:

An understanding of computer concepts is assumed.

Course Objectives

This is an intensive 10 days comprising elements from five of our courses, aimed at providing delegates with a range of knowledge and practical skills across the 38 topic areas described below. Although the material is diverse, the emphasis is to provide the ability to edit and maintain data including the submission of batch jobs.

Course Content

Module 1: Introduction to the Mainframe

Correcting perception and avoiding terminology confusion
Common knowledge using PCs as a starting point
Device types PC and Mainframe
User Interaction devices; GUI, 3270 emulators and printers
Cartridges, Cartridge Libraries and Virtual Tape
Traditional disk technologies and their influence
Modern RAID devices; Cache, Duplexing vs Mirroring
Configuration overview
Open System Adapter (OSA) and the LAN
Memory; Terminology, Addressing and its general layout
z/Series Processors; CP, ICF, IFL, SAP, ZAAP and ZIIP
Physical Resource/System Management (PR/SM) and Logical Partitions (LPARS)
Operating Systems; KVM, Linux, Unix, z/OS, z/TPF, z/VM, and z/VSE.
A mainframe cloud, the role of; CICS/TS, HTTP, MQ/Series and WebSphere
Support for; C, C++. JAVA, JSON, Python and XML

Module 2: z/OS Overview

Hypervisors; z/VM and KVM, plus other mainframe Operating Systems
A brief history of z/OS development
z/OS Objectives
Operating System Functions; controlling work and resources, communicating
with the operator, supporting applications, performing I/O, and managing tasks
What is z/OS? A review of the principal components

Module 3: z/OS Structure

Task Management; multi-tasking vs multi-processing, the despatcher and
dispatching priorities
Input/Output processing
The virtual storage operation described
Address space overview including common area descriptions
Some key System Address Spaces described
What constitutes a Sub-System, with key ones described
Other address spaces such as Started Tasks and those required by Users
The role of the Workload Manager (WLM)

Module 4: Data in z/OS

ASCII vs EBCDIC
Packed Decimal notation
z/OS data sets; what are they and how they are located?
Catalogue Structure; Master vs user Catalogues
Disks Volume Table of Contents (VTOC)
The data organizations described
The concept of Record Formats (RECFM)
The effect of grouping records into blocks (LRECL vs BLKSIZE)
The two types of Partitioned Data SET (PDS and PDSE)
Virtual Storage Access Method (VSAM) overview, four types of clusters
UNIX File System, HFS, ZFS, ZFS creation and structure

Module 5: Running work in z/OS

Batch processing overview
The stages of JES2 job processing
A JES3 overview
System Network Architecture (SNA) and Virtual Telecommunications Access Method (VTAM)
TCP/IP Overview
Time Sharing Option Extended (TSO/E) Overview
Customer Control Information System / Transaction Server (CICS/TS) overview
Database overview, DB2, IMS and SQL
Application development; compilers including CICS and DB2 requirements
Modern languages; C, C++, Java and Python
Includes 1 exercise

Module 6: System Managed Storage (DFSMS)

DFSMS Product Family; DFSMStvs, DFSORT and Program Manager
Data Facility Product family (DFSMSdfp); Access Methods, Catalogue Management, ISMF, Utilities and IDCAMS
The aims of System Managed Storage (SMS)
Automatic Class Selection (ACS) and its data set requirements
Hierarchical Storage Manager (DFSMShsm) overview
Data set level backup and availability management
Removable Media Manager (DFSMSrmm) overview
Data Set Service (DFSMSdss) overview
Non-SMS device allocation

Module 7: z/OS Facilities

z/OS UNIX System Services overview, also known as OMVS
Global Resource Serialization (GRS) overview
Data in Memory; DLF, LLA and VLF
System Management Facility (SMF) overview
Authorized Program Facility (APF) overview
Resource Access Control Facility (RACF) overview

Module 8: Diagnostic Aids

The various Console types
SYSPLEX influence on Consoles
Message handling and suppression
The types of abnormal termination codes, Program Interrupts, System and User
Dump Analysis and Elimination (DAE) overview
Environmental Recording and Error Processing (EREP) overview

Module 9: z/OS Command Overview

Automatic commands; PARMLIB members vs Automation Software
Using the Console vs SDSF
Managing tasks; CANCEL, DISPLAY, FORCE, MODIFY, START and STOP
commands
Managing devices; DISPLAY UNITS and VARY commands
Stopping z/OS; HALT command

Module 10: JES2 Command Overview

Starting JES
Managing Initiators; $DI, $PI and $SI commands
Managing Jobs/Tasks; $CJ and $DJ commands
Managing input queues; $AJ, $HJ and $TJ commands
Managing output queues; $CO, $OG, $PO and $R commands
Stopping JES

Module 11: TSO/E Environment

The TSO/E and z/OS relationship
Accessing our system
The initial screen
The difference between SNA and TCP/IP access
Entry to TSO/E
Entry to ISPF/PDF, two views
Behind the scenes; RACF, LOGON JCL, Data Set naming and TSO Profile
TSO in Batch
Includes 2 exercises

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Module 12: ISPF/PDF Overview

TSO/E and ISPF/PDF relationship?
Panel structure
Panel types; Selection, Entry, Member List and Data Display
Primary Option Menu
Program Function Keys and Other Commands
Short-cuts, Scrolling, Screen Splitting, Find, Change, End, Return and Retrieve
Tutorials and Help text
Keyboard customization

Module 13: ISPF Interface

Terminal settings; Input padding, Command delimiter, screen layout and device type
Changing the LOG data set attributes
Changing the LIST data set attributes
Updating the default JCL
Changing the number of Program Function Keys and assignments

Module 14: View Option

Three ways to enter View Mode
Member lists
View a Data Set or Member
Overview of View and Edit Commands
Using the FIND command
The difference between Browse and View
Includes 6 exercises

Module 15: Edit Option (Part 1)

Three ways to enter Edit Mode
Member lists
Edit a Data Set or Member
The EDIT Profile
Primary vs Line commands
Using After, Before, Copy, Delete, Insert, Move and Repeat commands
Lists of Line and Primary commands
Using the CHANGE command
Includes 8 exercises

Module 16: Edit Option (Part 2)

Using the OVERLAY command
Using SHIFT commands
Establishing TABS; Hardware, Logical and Software types
Establishing command boundaries; BOUNDS command
Using COPY and MOVE commands
Using CREATE and REPLACE commands
Using CUT and PASTE commands
Includes 5 exercises

Module 17: ISPF Utilities

The Library Utility (3.1)
The Data Set Utility (3.2)
The Copy / Move Utility (3.3)
The Data Set List Utility (3.4)
The Output Utility (3.8)
The Compare Utility (3.12)
The Search Utility (3.14)
The UNIX Directory List Utility
Includes 13 exercises

Module 18: TSO/E Commands

The TSO/E Command Shell Panel
The available TSO/E Commands
REXX vs CLIST
Allocate your own EXEC library; ALTLIB Command
Interaction with the emulator; Transferring data and Keyboard mapping
Accessing UNIX; OBROWSE, OEDIT and OMVS
Includes 2 exercises

Module 19: Spool Display and Search Facility (SDSF)

SDSF security; ISFPARM vs RACF
The different DISPLAY tasks
Display filtering using PREFIX and OWNER commands
Displaying a specific job's output; s vs ?
Submitting jobs grom the output queue; SJ command
Output capture to a data set; two methods
How to issue JES or z/OS commands
Includes 13 exercises

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Module 20: Background and Syntax

A brief history
What JCL looks like
Statement structure and coding rules
Keyword vs Positional operands
Sub-parameter lists
Statement continuation
Handling special characters
JCL error points
JES2 Control statements
JES3 Control statements
Interactive quiz and 6 exercises

Module 21: JCL, the Resource Manager

Where does resource management start?
Managing processor occupancy; TIME operand
Managing memory allocation; REGION, REGIONX and MEMLIMIT operands
Managing peripherals (I/O devices)
Types of DD statement
Selecting DDNAMEs
Utility DDNAMEs and reserved DDNAMES.
Interactive quiz and 2 exercises

Module 22: JOB statement

Influences on the JOB statement; Exits, JES, RACF and Standards
JOB Naming rules
Programmer's name field explained
Influencing JOB selection; CLASS and PRTY operands
Controlling system output; MSGCLASS and MSGLEVEL operands
Delaying JOB execution; TYPRUN operand
Changing security profile; GROUP, PASSWORD and USER operands
Displaying JOB completion status; NOTIFY operand
JES2 Job Accounting information explained
Interactive quiz and 3 exercises

Module 23: EXEC statement

Influences on the EXEC statement; Exits, JES, RACF and Standards
EXEC statement naming rules
Executing a program vs procedure; PGM and PROC operands
Passing information to a program; PARM operand
Bypassing job steps; COND operand, and its logic
Interactive quiz and 4 exercises

Module 24: Sequential Record File Processing

Data Set Organization (File types); DSORG
Assign an input stream data sets; *, DATA and DLM operands
Assign a print data set; SYSOUT operand
Assign an existing data set; DISP and DSN operands
Assign a new permanent disk data set; BLKSIZE, RECFM, LRECL and SPACE operands, (DCB, UNIT and VOL operands are also mentioned)
Additional operands; LABEL, EXPDT and RETPD
Assign a new temporary data set
Access an existing temporary data set
Interactive quiz and 8 exercises

Module 25: Impact of System Managed Storage (SMS)

Impact overview
Automatic Class Selection; DATACLAS, MGMTCLAS, STORCLAS and STORGRP routines
Amending data set attributes for a new data set; DATACLAS operand
Amending management attributes for a new data set; MGMTCLAS operand
Directing a new data set to alternative volumes; STORCLAS operand
Device independent disk space allocation; AVGREC operand
Using an existing data set as a model; LIKE and REFDD operands
Using LIKE and REFDD with VSAM clusters
Interactive quiz and 4 exercises

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Module 26: Other Miscellaneous Topics

Starting a JOB beyond the first step; RESTART operand
Automatic restart of a job after failure; RD operand
Concatenated data sets
Deferred data sets
Dummy data sets; DUMMY and DSN=NULLFILE operands
Backward references
The OUTPUT statement
Interactive quiz and 5 exercises

Module 27: Generation Data Groups (GDGs)

What is a GDG?
GDG Terminology
Create a base entry
Create a new relative generation
Create a new absolute generation
Checking the status of generations
Alter the base entry
Dealing with ROLLED-OFF generations
How to use the version number
Deleting entries
The effect of GDGBIAS
Interactive quiz and 7 exercises

Module 28: Conditional JCL

The COND operand and its logic
Information available for Conditional JCL
IF / THEN / ELSE / ENDIF construct
Relational expressions described
What JCL is eligible for conditional processing
What JCL is ineligible for conditional processing
What JCL is unaffected by conditional processing
The ability to nest decision making
Interactive quiz and 2 exercises

Module 29: JCL Procedure Overview

What is a procedure?
Catalogued vs In-stream
The default libraries; JES2 and JES3
Assigning alternative libraries; /*JOBPARM and JCLLIB
Library search order
Procedure construction, naming and content
Using nested procedures
INCLUDE groups
Interactive quiz and 4 exercises

Module 30: JCL Procedures - Using Overrides

EXEC statement overrides
DD statement overrides
OUTPUT statement overrides
Interactive quiz and 3 exercises

Module 31: JCL Procedures – Using Symbolic Parameters

What is a symbolic parameter?
Assigning default values
Overriding default values
Concatenating symbols
Using the SET statement
Interactive quiz and 2 exercises

Module 32: Input Stream Symbols

Symbols within a JES2 input stream
Different symbols: JCL vs JES vs System
Using symbols in Batch
Making a symbol available; EXPORT statement
Retrieving symbols in the input stream
Passing symbols via the Internal Reader (INTRDR)
Interactive quiz and 1 exercise

Module 33: Accessing z/OS UNIX System Services files

Condition terminology
File system overview
Security considerations
DD statement operands; PATH, PATHDISP, PATHMODE, PATHOPTS and FILEDATA
The BPXBATCH utility
Deleting a z/OS UNIX file
Obtaining a list of z/OS UNIX files
Interactive quiz and 6 exercises

Module 34: Utilities

This is an overview of various utilities which could be used to perform a variety of common functions. The utilities mentioned are:
ADRDSSU
IDCAMS
IEBCOPY
IEBDG
IEBEDIT
IEBGENER
IEBPTPCH
IEBUPDTE
IEFBR14
IKJEFT01 – TSO
Includes 18 exercises

Module 35 – VSAM Overview

Revision of Data Organisations
Types of Cluster and their structure
Catalogue concepts, ICF Catalogues and their structure
Alternate indices
Includes 2 exercises

Module 36 – Access Method Service

Some AMS Functions; Defining clusters, defining alternate indices and paths, plus User and Master catalogues
Explicit and implicit invocation
Command format rules
Model commands; DO, END, CANCEL, IF/THEN/ELSE and SET
Diagnostics; Messages and Return Codes

Module 37 – Defining Cluster with IDCAMS

The information required
DEFINE command syntax
Naming the cluster
How to allocate volumes, and how to specify CISIZE, Shareability, Retention Period, Record size and re-usability.
Examples for ESDS, KSDS and RRDS
Includes 4 exercises

Module 38 – Defining Cluster without IDCAMS

DD statement, LIKE Operand
DD statement, REFDD Operand
Using the ISPF Panels
TSO ALLOCATE Command
REXX and AMS; Good and bad news
Includes 7 exercises