FICON & Channel Architecture

Duration: 3 Days      Course Code: ESG0G

Overview:
This course provides an overview of current IBM System z family of servers. It gives detailed information on the System z channel architecture, System z High Performance FICON, (zHPF), Fiber connection (FICON) and Enterprise Systems Connection (ESCON) channels. It lists operational and protocol characteristics and use of available tools for problem determination (PD) purposes. It discusses operator commands, directors, and Hardware Management Console (HMC)/Support Element (SE) usage for channel problem determination and resolution. Also discussed is the I/O operations component of System Automation (SA) for z/OS (SA z/OS), its purpose and how it is used to manage and assist in PD for large enterprises with FICON and ESCON configurations. Hands on lab exercises are included to reinforce lecture topics.
The course describes how the OS initiates an I/O request, passes it to the channel subsystem (CSS) and identifies the flow through the CSS, control blocks used, and the associated FICON or ESCON channel path components to the target I/O device. It compares the operation of zHPF capable channels using command mode and transport mode, describing the differences in the channel program command structure and operation. Operational and protocol differences are identified between zHPF, FICON, and ESCON architecture used by the System z servers.
System z channel subsystem enhancements such as: System z high performance FICON (zHPF) architecture, persistent information unit (IU) pacing for extended distances, FICON channel-to-channel (CTC) capabilities and FICON cascaded director support are discussed in detail.
Channel operation and performance between ESCON and FICON are compared and discussed.
The course describes FCS FC-SB missing information unit detection, retry and recovery sequences, channel path problems and what type of indications surface potential trouble areas and corrective action. Operator messages and indications on the z/OS console, Hardware Management Console, (HMC) and SE will be shown. HMC and z/OS command usage will be identified to display current FICON channel and path status.

Target Audience:
This intermediate class should consist of hardware planners, technical support personnel, and system programmers and anyone that needs a complete understanding of the System z channel architecture and how it applies to FICON I/O configurations.

Objectives:
- Describe System z servers in relationship to
- The operating system and the channel subsystem on the mainframe
- Processor unit types and usage
- Servers supporting multiple logical channel subsystems
- Major new functions and features for recent server families
- Models within the server family
- Frame layout and cage usage
- MSU ratings
- Identify an alternative to using an FCV configuration
- Describe FICON director connections
- Identify unique IOCP coding requirements for the director
- Describe how channels can exploit the multiple image facility
- Describe channel usage when the HCD/IOCP coding defines a CHPID as dedicated, reconfigurable, shared, or spanned
- Describe the ESCON protocols and what they are used for within the I/O architecture
- Describe ESCON initialization process
- Identify the maximum number of logical images (Logical partitions)
Describe recent new technology used for processors and the channel subsystem and control unit) that the ESCON architecture supports.

Identify the various server components and how they are involved in a channel operation.

Processors, memory, memory buses, and channels.

Describe the System z channel connectivity provided at the CEC cage.

STI connectivity to I/O cage.

STI connectivity to I/O cage.

zEnterprise EC12 HCA and PCIe connectivity.

System z server connectivity for various types of CF links.

Describe server initialization process and the difference between Basic mode and LPAR mode.

Describe the difference between the term channel and CHPID.

Identify System z channel and CHPID usage.

Describe the hardware configuration definition process.

Hardware definitions.

Software definitions.

How definitions are loaded and activated.

Describe the evolution of the Fibre Channel standard and the FC Single-Byte Command Set protocol used by FICON.

List the Fibre Channel layers FC-0 through FC-4, how they are used and the associated FC terminology.

Define non-cascaded and cascaded switch configurations and how they relate to ESCON.

Describe data framing, buffer credits and classes of service for data delivery.
Identify characteristics unique to the Fibre Channel point-to-point and switched fabric topologies

Define the purpose of high performance FICON (zHPF) on System z servers

Describe the command structure of a channel program using ESCON or FICON (CCW) command operation

Describe the various phases and control blocks used in an I/O operation:

How it is started from the application level and z/OS builds the channel program

How z/OS turns it over to the CSS and identifies if a command mode or transport mode I/O operation is to be performed

How various control blocks and command words are used to perform the actual I/O operation

How the CCS notifies z/OS that channel operation is complete

Identify the components that make up the I/O device path

Identify all available ESCON feature cards for System z servers

Identify all available FICON Express feature cards for all System z servers

List maximum unrepeated and repeated distances for ESCON before performance droop

Describe the purpose of ESCON directors and director port connection types

Identify how port connection types and status can be determined from the director

Identify unique IOCP coding requirements for the director

Use IOCP/HCD to define a FICON cascaded switch configuration

Describe the Initial Program Load (IPL) sequence

Identify where and how the load address, load parameters are defined and used for IPL

Identify three major phases of the IPL

Describe z/OS message format

Identify z/OS display commands that can be used to determine device and channel path status

Interpret the results of various I/O-related commands

Describe the use of VARY and CONFIG z/OS operator commands

Use z/OS commands for I/O problem determination

Describe the purpose of I/O operations in an enterprise

Identify the I/O operations commands and what they do

Identify the different operator interfaces where these commands can be used

Use the various commands from all of the available operators

Identify typical HMC operational errors

Use proper navigation techniques to identify error conditions reported on the HMC

Identify CPC/Image operational status, profile assignments and usage

Log on and navigate the SE workplace

Use the channel problem determination panels
- List maximum unrepeated and repeated distances for FICON and FICON before performance droop
- Identify console messages and indicators of FICON path problems
- Identify FICON feature System z server and connectivity support
- Identify and use operator commands and HMC/SE and FICON director panels for problem determination of FICON related path problems

**Prerequisites:**

You should have an understanding of basic data processing and input/output concepts
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Further Information:
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