ATOS ARISE INTERNSHIP PROGRAM
IN MAINFRAME TECHNOLOGY

Final project report submitted
in partial fulfillment for the award of degree of

Bachelor of Technology in
Computer Science & Engineering

Submitted by

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Under the Directions of

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(Deemed to be University Estd. u/s 3 of UGC Act,1956)
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JUNE – 2024

CERTIFICATE

This is to certify Manoj Kumar Jetti, a student of Vel Tech Rangarajan Dr. Sagunthala R&D Institute of Science and Technology, Avadi, Chennai, India as having completed the internship under ARISE program in Mainframe Technology with Atos Global IT Solutions and Services Private Limited, Global Delivery Center, India from 1st February 2024 to 30th June 2024.

Signature of Program Administrator
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DECLARATION

I hereby declare that I have completed the internship under the ‘Atos ARISE Internship Program in Mainframe Technology’ at Atos Global IT Solutions and Services Private Limited, Global Delivery Centre, India, with the utmost involvement. I have completed the certifications quoted, along with the assessments. I also declare that I have adhered to all the principles with academic honesty and integrity and have not fabricated or falsified any reports or activities during the tenure of the program. I understand and acknowledge that any violation of the above will result in immediate and severe disciplinary action by the company and can evoke penal action against me.

Name: JETTI MANOJ KUMAR
Date: 24/06/2024

APPROVAL SHEET

This internship report entitled “Atos ARISE Internship Program in Mainframe Technology” submitted by Manoj Kumar Jetti (VTU17475) is approved for the degree of Bachelor of Technology in Computer Science & Engineering.

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JETTI MANOJ KUMAR

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ABSTRACT

During a rigorous five-month mainframe internship, I explored the intricate world of these supercomputers. These systems, utilized by Fortune 500 companies, handle critical tasks and vast amounts of data. My journey combined theoretical knowledge with hands-on practice, equipping me for success in this complex ecosystem. The internship began with hardware fundamentals. Processors, akin to engines, drove computations, while memory stored crucial data. Understanding various hardware versions laid a strong foundation. Operating systems bridged the gap between users and the system, ensuring seamless coordination.Good in specialized tools was essential. The TN3270 terminal facilitated communication, and tools like SDSF, ISPF, and TSO became my allies. Learning these tools felt like mastering a new language, unlocking the mainframe's capabilities. Access to specific LPARs (Logical Partitions)—dcub, dcuf, and com2—provided deeper insights. These isolated environments allowed exploration of data-sets and execution of commands. Portfolios within LPARs enhance practical understanding. JCL emerged as the backbone. Precise coding ensured successful task execution. MVS commands complemented JCL, enabling seamless navigation.My specialization centered around CA7, a pivotal tool for batch job scheduling and workflow automation. As a production control operator, I orchestrated job sequences and optimized execution.Beyond technical prowess, soft skills played a crucial role. Weekly sessions focused on communication, leadership, and creative thinking. Effective verbalization and teamwork became second nature. Real-world IPL processes and DASD migration broadened my perspective. Roles like Database Administrator (DBA) and system programmers involved in migration processes added depth.My internship wasn't just learning; it was a journey. Certificates and badges validate progress. Armed with theory and practice.

Keywords: JCL, TSO, SDSF, ISPF, MVS, IPL, SMP/E, OMVS.

LIST OF FIGURES

LIST OF ACRONYMS AND ABBREVIATIONS

AI	Artificial Intelligence
CICS	Customer Information Control System
CPC	Central Processor Complex
DASD	Direct Access Storage Device
DD	Data Difinition
EXEC	Execute
ICF	Integrated Coupling Facility
IFL	Integrated Facility for Linux
ISPF	Interactive System Productivity Facility
ITIL	Information Technology Infrastructure Library
JCL	Job Control Language
JES	Job Entry Subsystem
KVM	Kernal Based Virtual Machine
LDS	Linear Dataset
LPAR	Logical Partition
MVS	Multiple Virtual Storage
OS	Operating System
SDSF	System Display and Search Facility
SAP	System Assistance Processor
TSO	Time Sharing Option

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Chapter 1

Mainframe Systems: A Brief Introduction

1.1 Architecture

Mainframes are powerful, high-performance computers designed for large-scale data processing, transaction handling, and critical business applications. They have a rich history, dating back to the mid-20th century, and continue to play a vital role in various industries.

1.1.1 Hardware Architecture

- **Processors (CPUs):**

  The central processing units (CPUs) are the brain of the mainframe. They execute instructions and perform calculations, enabling the system to run programs and processes. Modern mainframes may have multiple CPUs working together, enhancing their ability to handle vast amounts of data and multiple tasks simultaneously. These processors are designed for high reliability and efficiency, ensuring consistent performance under heavy workloads.

- **Memory:**

  The memory of a mainframe includes both RAM (Random Access Memory) and cache. RAM is the system's primary memory, where data and programs in use are stored for quick access. Cache memory, being faster and smaller than RAM, is used to store frequently accessed data and instructions to speed up processing.

- **Storage Systems:**

  Mainframe storage solutions are designed for high capacity, reliability, and data integrity. They often include advanced features like data mirroring, replication, and backup to prevent data loss and ensure continuous availability.

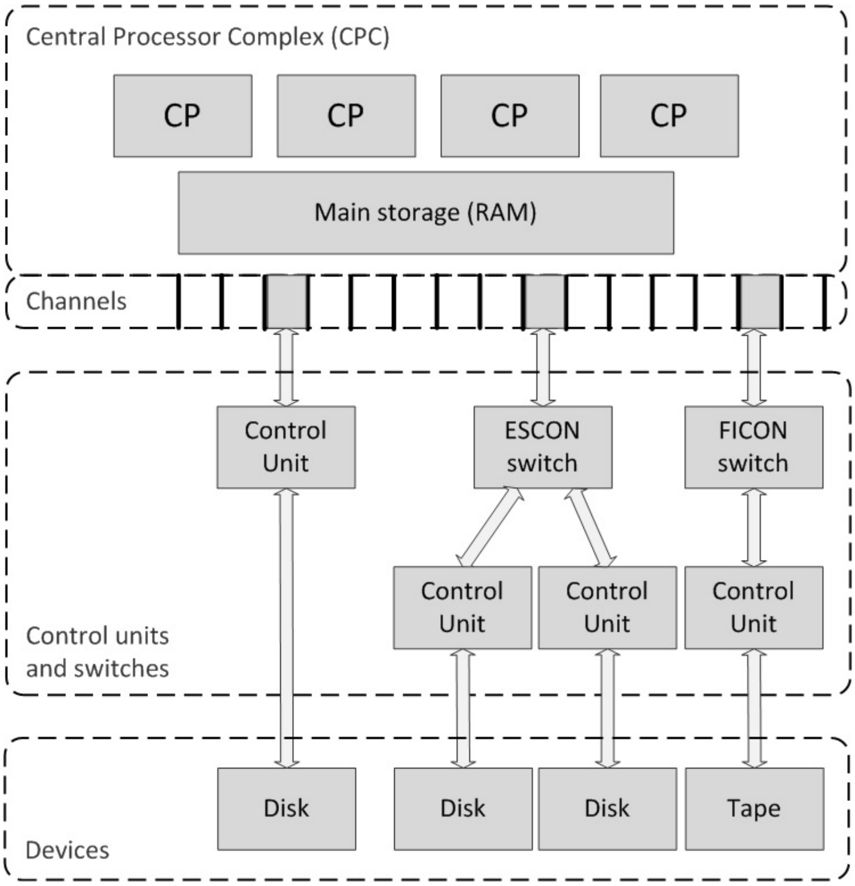


Figure 1.1: Mainframe Architecture

- **I/O Subsystems:**

  The Input/Output subsystems manage all the data exchange between the mainframe and external devices or networks. This includes hardware like channels and controllers, which handle the communication with storage devices, network interfaces, printers, and other peripherals.

1.1.2 Software Architecture

- **Operating System (OS):**

  The core software that manages hardware resources and provides services for applications. Examples include IBM's z/OS.

- **Middleware:**

  Middleware serves as an intermediary layer that connects different applications and manages data exchange between them. It facilitates communication and data management across disparate systems, enhancing interoperability and efficiency.

- **Applications:**
  The end-user software running on the mainframe, such as ERP systems, financial applications, and data processing programs.

1.1.3 Network Architecture

- **Network Interface:**
  The network interface comprises both hardware and software components that enable the mainframe to connect to other systems and networks.
- **Protocols:**
  Protocols are the rules and standards that govern communication between the mainframe and other devices.

1.1.4 System Architecture

- **Redundancy and Failover Mechanisms:**
  Redundancy and failover mechanisms are design principles that ensure the system remains operational even in the event of component failures.
- **Scalability:**
  Scalability refers to the system’s ability to expand resources such as CPUs, memory, and storage to accommodate increasing workloads.
- **Virtualization:**
  Virtualization techniques allow multiple operating systems and applications to run concurrently on the same physical hardware.

1.2 Hardware

- **Central Processor (CPs):** The heart of the mainframe, responsible for executing instructions and managing tasks.

Modern IBM Z hardware supports up to 200 CPs, each capable of executing different instructions simultaneously, offering significant processing power.

- **System Assistance Processors (SAPs):** Run internal microcode to manage the I/O subsystem, ensuring efficient I/O operations. Every mainframe includes at least one SAP.
- **Integrated Facility for Linux (IFL):** A dedicated processor for running the Linux OS on the mainframe, it is a standard processor with z/OS-specific instructions disabled, making it cost- effective for Linux workloads.
- **z System Application Assist Processor (zAAP):** Previously used for running Java workloads under z/OS, zAAP functions are now handled by zIIPs in newer models.
- **z System Integrated Information Processor (zIIP):** Initially designed for Db2 workloads, zIIPs now also handle former zAAP workloads, optimizing costs by offloading certain processing tasks from general CPs.
- **Integrated Coupling Facility (ICF):** Facilitates data sharing and load balancing across multiple IBM mainframes, crucial for data consistency and high availability.
- **Spare Processors:** Run internal microcode to manage the I/O subsystem, ensuring efficient I/O operations. Every mainframe includes at least one SAP.Kept in reserve to replace any failing CPs, ensuring continuous operation and minimizing downtime.
- **Capacity on Demand:** IBM offers options like Customer Initiated Upgrade (CIU) for permanent capacity increases, On/Off Capacity on Demand (On/Off CoD) for temporary boosts, and Capacity Backup Upgrade (CBU) for emergency backup capacity. The IBM Z Flexible Capacity for Cyber Resiliency allows workload shifts between sites for up to a year.

1.3 Storages in Mainframe

- **Real Storage:** Also known as processor storage or real memory, it is where program instructions and data reside during execution, crucial for running applications efficiently.

- **Auxiliary Storage:** Used when real storage is insufficient, includes devices like DASD, tape, and cartridge storage, serving as overflow storage and paging data in and out of real storage as needed.

1.4 Channel Subsystem

The channel subsystem manages data transfer between the mainframe and external devices such as DASD, printers, tapes, and cartridges. It is essential for handling extensive I/O operations, ensuring that data flows efficiently between the mainframe and peripheral devices

1.5 Sysplex

Sysplex (SYStem comPLEX) allows multiple mainframes to share data and system resources, enhancing processing power and reliability. A typical Sysplex configuration includes coupling facilities for data sharing, high-speed links for connectivity, and a Server Time Protocol (STP) facility for time synchronization. This configuration ensures high availability, load balancing, and efficient resource utilization across multiple mainframes.

1.6 Logical Partitions (LPARs)

Logical Partitions (LPARs) allow a single mainframe to be segmented into multiple virtual machines, each running its own operating system and applications independently. This virtualization facilitates different environments such as development, testing, and production to coexist on the same physical hardware. Current mainframe technology supports up to 16 TB of memory per LPAR, offering substantial resources for even the most demanding workloads.

1.7 The Latest Mainframe Processor - IBM z16 Features

- **On-chip AI Acceleration:** The IBM z16 mainframe processor includes built-in AI acceleration, which is designed to efficiently handle large-scale workloads. This feature allows for high-speed data processing and real-time analytics, making it ideal for tasks such as fraud detection. The integrated AI capabilities ensure that these processes are carried out quickly and accurately, enhancing overall system performance.

- **Quantum-safe Crypto Discovery:** As technology advances, so do security threats, particularly with the emergence of quantum computing. The IBM z16 addresses these concerns with quantum-safe cryptography. This feature helps organizations transition to cryptographic methods that are secure against quantum attacks, ensuring that their data remains protected well into the future.
- **Simplified Compliance:** Maintaining compliance with regulatory standards can be complex and costly. The IBM z16 simplifies this process by providing advanced tools that streamline compliance tasks. These tools help reduce the cost and effort associated with meeting regulatory requirements, allowing staff to focus on other critical activities.
- **Flexible Capacity:** To ensure uninterrupted service, the IBM z16 offers flexible capacity management. This feature allows organizations to manage computing resources dynamically, adjusting capacity as needed to handle changing workloads. This capability helps prevent service disruptions and ensures optimal performance across all operations.
- **Modernize Applications:** Modernizing legacy applications is often a challenging and expensive endeavor. The IBM z16, together with the IBM Z and Cloud Modernization Center, provides a framework to simplify and accelerate the modernization process. This helps organizations update their applications efficiently, reducing risk and costs while improving integration with modern cloud services.

1.8 Operating System

Mainframe operating systems play a critical role in supporting diverse computing environments, each designed to cater to specific needs within enterprise computing. Here’s an overview of key mainframe operating systems and their roles.

- **z/OS:** The premier IBM operating system, z/OS, traces its lineage back to the 1960s with the development of OS for System/360. Over the years, it evolved through various iterations like MVS, MVS/XA, MVS/ESA, OS/390, and finally z/OS, offering a robust platform capable of supporting thousands of concurrent users and programs.
- **KVM (Kernel-based Virtual Machine):** Recently integrated into z/VM offerings, KVM provides an open-source virtualization solution alongside z/VM, offering flexibility in virtualization strategies.
- **z/VSE:** z/VSE caters to smaller mainframe installations, offering a streamlined batch and transaction processing framework. It often coexists with z/VM, enabling z/VSE application development and system management through a user-friendly interface.
- **Linux on IBM Z:** Linux on IBM Z is a UNIX variant renowned for its versatility and cost- effectiveness. Multiple Linux instances can run on a single z/VM, leveraging shared resources and offering potential performance enhancements through application segregation.
- **z/VM (Virtual Machine):** z/VM is a versatile operating system facilitating the execution of multiple operating systems on a single mainframe. It serves as a hypervisor, creating virtual machines from hardware resources, allowing for the concurrent operation of z/OS, Linux on IBM Z, z/VSE, and z/TPF. Organizations benefit from z/VM's ability to consolidate Linux instances onto a single mainframe, simplifying management and resource utilization.
- **z/TPF (Transaction Processing Facility):** Tailored for high-volume transaction environments like airlines and financial institutions, z/TPF ensures uninterrupted availability while handling massive transaction volumes across multiple mainframes.

1.9 The Latest z/OS version – z/OS 3.1

1.9.1 AI and Analytics Integration

- **AI Framework Support:** z/OS 3.1 integrates AI to optimize IT processes, simplify management, improve performance, and reduce skill requirements. This enhancement enables intelligent automation and accelerated inferencing at scale, facilitating the extraction of valuable data insights.
- **AI-Powered WLM:** Introduces AI-powered workload management (WLM) to predict upcoming batch workloads and optimize system resources dynamically, enhancing operational efficiency.

1.9.2 Enhanced Cloud-Native Management

- **z/OS Container Extensions (zCX):** Enhanced with improved performance and security features, zCX supports NFS, HTTPS, and IBM WebSphere Hybrid Edition, facilitating seamless integration of z/OS workloads with hybrid cloud environments.
- **Data Set File System:** Introduces a new physical file system for z/OS UNIX utilities, ensuring transparent and secure access to data across environments.

1.9.3 Security Enhancements:

- **Extended z/OS Security:** Enhances defense-in-depth capabilities to mitigate data privacy risks and strengthen overall system hardening. Features include new cryptographic capabilities, simplified crypto interfaces, and compliance support enhancements.
- **System SSL/TLS Enhancements:** Introduces improvements such as TLS 1.3 cached handshakes to optimize secure communications and expedite compliance efforts.

1.9.4 Performance and Scalability:

- **z/OS Parallel Sysplex Enhancements:** Enhances performance, scalability, and resiliency for z/OS environments using IBM z16 CFLEVEL 25, supporting high availability and efficient workload management.
- **Dedicated Real Memory Pools:** Introduces support for dedicated real memory pools to optimize memory allocation and improve application performance for memory-intensive workloads.

Chapter 2

Mainframe Portfolio

System programmer

- **Role Overview:** System programmers are the backbone of mainframe maintenance. They are responsible for installing, configuring, and maintaining the system software.
- **Responsibilities:** Their tasks include updating operating systems, applying patches, and ensuring the system runs efficiently. They also troubleshoot and resolve complex software issues that arise.

System administrators

- **Role Overview:** System administrators manage the overall health of the mainframe.
- **Responsibilities:** They handle user accounts, manage system resources, and ensure data security. Their role is crucial in maintaining system stability and performance.

Production control analysts

- **Role Overview:** Production control analysts oversee the production environment, ensuring that batch jobs and transactions are processed efficiently.
- **Responsibilities:** They schedule and monitor batch jobs, ensuring they run at appropriate times without conflicts. They also handle workload balancing to optimize syst.em performance.

Application designers

- **Role Overview:** These individuals design and develop the applications that run on mainframes.
- **Responsibilities:** They work on coding new applications and updating existing ones to meet user needs. Their work ensures that the mainframe can support various business processes and user activities.

System operators

- **Role Overview:** Introduces support for dedicated real memory pools to optimize memory allocation and improve application performance for memory-intensive workloads.
- **Responsibilities:** System operators are the frontline workers who monitor and control the day-to-day operations of the mainframe.

Networking Operator

- **Role Overview:** Networking professionals in mainframe environments focus on designing, implementing, and maintaining the network infrastructure that supports communication between mainframe systems, clients, and other networked devices.
- **Responsibilities:** Design and plan network architecture to ensure efficient and secure communication within the mainframe environment and between different systems.

Chapter 3

Basic Mainframe Tools

Basic Mainframe tools such as TN3270 enable PC access to mainframe applications through terminal emulation and secure data transmission. TSO provides a command-driven interface for real-time interaction and batch processing, enhancing user productivity with personalized workflows. ISPF offers a comprehensive menu-driven environment for data management and application development, including robust text editing and file manipulation utilities. SDSF monitors job status, resource utilization, and facilitates job management and troubleshooting, ensuring optimal system performance in mainframe environments. These tools are essential for maintaining efficiency and security across diverse mainframe operations.

3.1 TN3270

- **Overview:**

  TN3270 is a protocol that allows a terminal emulator to communicate with an IBM mainframe. It extends the Telnet protocol specifically to handle 3270 data streams used by mainframe terminals. This protocol enables PCs or workstations to emulate 3270 terminals, facilitating access to mainframe applications over a network.

- **Key Features and Benefits:**

  Terminal Emulation: Allows PCs to function like traditional 3270 terminals, enabling data entry and retrieval in a familiar interface.

  Compatibility: Works with various operating systems and terminal emulation software, ensuring versatility in deployment.

Security: Supports secure connections, encrypting data during transmission to protect sensitive information.

Customization: Can be customized to meet specific user requirements and integrate seamlessly with modern IT infrastructures.

Cost Efficiency: Reduces reliance on physical terminal hardware, lowering operational costs for organizations.

3.2 Time Sharing Option (TSO)

- **Overview:**

  TSO provides a command-driven interface that allows multiple users to interact with the mainframe simultaneously. It serves as an interactive platform where users can execute commands, manage files, and run programs in real-time.

- **Key Features and Benefits:**

  Interactive Environment: Supports real-time command execution and program management, enhancing user productivity.

  Batch Processing: Enables scheduling and automation of tasks, improving operational efficiency.

  Personalization: Allows users to create personalized command lists and scripts, tailoring the interface to individual preferences.

  Integration: Seamlessly integrates with other mainframe tools, providing a cohesive user experience across different functionalities.

  Security and Administration: Facilitates user management, resource allocation, access control, and auditing of user activities, enhancing system security and governance.

3.3 Interactive System Productivity Facility (ISPF)

- **Overview:**

  ISPF is a menu-driven interface used for managing and editing data on the mainframe. It offers a comprehensive suite of tools for developers and system administrators, including a powerful text editor and utilities for file management and manipulation

- **Key Features and Benefits:**

  Editing: Supports creation, modification, and management of source code, scripts, and data files with a robust text editor.

  File Management: Includes tools for browsing, copying, moving, deleting, cataloging, and renaming files, enhancing efficiency in file operations.

  Utilities: Provides search, compare, and data manipulation utilities for handling large datasets effectively.

  Customization: Allows customization of menus and panels to streamline workflows and adapt to user-specific needs.

  Integration: Integrates seamlessly with other mainframe applications, supporting version control and change management for code and data integrity.

3.4 System Display and Search Facility (SDSF)

- **Overview:**

  SDSF is a tool used for monitoring and controlling jobs, output, and system resources on the mainframe. It provides real-time insights into system activity, job status, and resource utilization.

- **Key Features and Benefits:**

  Real-Time Monitoring: Offers a live view of system activity, job status, and resource metrics such as CPU, memory, and I/O.

Job Management: Allows users to manage job priorities, scheduling, and execution, optimizing system resource usage.

Output Management: Facilitates viewing, filtering, and searching job output and logs, aiding in troubleshooting and information retrieval.

Automation: Supports automation of routine monitoring tasks, improving operational efficiency and reducing manual effort.

Security and Access Control: Enhances security by controlling access to job information and system resources, ensuring data confidentiality and integrity.

Chapter 4

Mainframe Programming Fundamentals

4.1 Job Control Language (JCL)

In a Mainframe environment, JCL (Job Control Language) is used to instruct the system on how to execute a batch job. When a JCL is run, it is referred to as submitting the JOB. These jobs can include tasks like processing data, running programs, and managing input and output.

4.2 Structure of JCL

A JCL script consists of multiple statements that define how a job should be executed. A job can have one or more steps, and each step runs a single program.The Fig 4.1 is showing the flow of JCL statements.

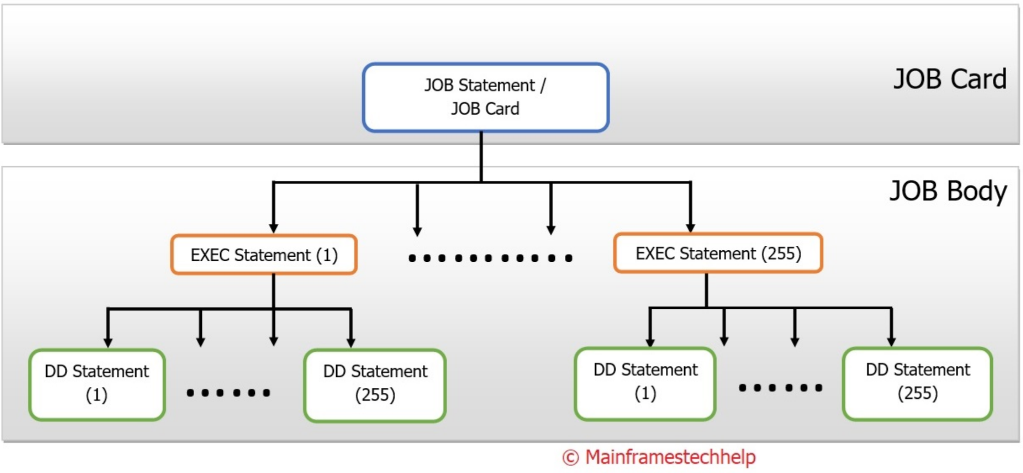


Figure 4.1: Structure of JCL

- **JOB Statement:**
  Provides details for executing the job as a whole.
- **EXEC Statement:**
  Specifies details for executing a particular step within the job.
- **DD (Data Definition) Statement:**
  Specifies the data files required to execute a program in a step.

4.3 General Format of JCL Statement

JCL statements are coded as 80-byte records and categorized into the following fields.

- **IDENTIFIER Field:**
  Indicates a JCL statement, coded in columns 1 to 2 with // or /*.
- **NAME Field:**
  Specifies a name for the JCL statement. Must start with an alphabet and be between 1 to 8 alphanumeric characters. Begins in column 3 and can extend to column 10, followed by at least one blank space.
- **OPERATION Field:**
  Specifies the type of JCL statement (e.g., EXEC, DD, PROC, PEND). Must be preceded and succeeded by at least one blank space to avoid errors.
- **PARAMETER Field:**
  Following the OPERATION field and are separated by commas. While discussing the Parameter Field, I want to dive deeper and explain its significance further, as it is the most critical component in JCL." "In JCL, we will work with three statements: JOB, EXEC, and DD. Each of these statements contains a parameter field that plays a crucial role in defining the specifics of the job execution:

4.4 JOB Statement

The JOB Statement specifies details about the job being submitted to the mainframe. It includes:

4.4.1 Positional Parameters

- **Accounting Info:**
  Information related to accounting or charge-back purposes.
- **Programmer Name:**
  Name of the programmer or individual responsible for the job.

4.4.2 Keyword Parameters

- **MSGCLASS:**
  Specifies the output message class for the job.
- **CLASS:**
  Specifies the job class, influencing its scheduling priority.
- **NOTIFY:**
  Specifies who should be notified upon job completion or errors.
- **REGION:**
  Defines the amount of main storage (memory) allocated to the job.
- **PRTY:**
  Sets the job's priority in the job queue.

4.5 Utilities

In JCL mainframe environments, utilities are essential tools that streamline and manage various data processing tasks. They help perform operations such as copying, managing, and allocating datasets efficiently. By utilizing these utilities, mainframe professionals can automate routine tasks, ensure data integrity, and maintain smooth system operations. Here are a few key utilities and their purposes:

4.5.1 IEFBR14

- IEFBR14 is a dummy utility that performs no actual operation. It is commonly used to create, delete, or allocate datasets within a JCL step without executing any program logic. It’s often used for dataset allocation or to set return codes.

4.5.2 IEBGENER

- IEBGENER is used for copying or generating datasets. It can be used to copy data from one dataset to another, create empty datasets, or manipulate data within datasets. It is also useful for creating reports by copying selected records.

4.5.3 IEBCOPY

- IEBCOPY is used to copy, merge, and compress partitioned datasets (PDS) or partitioned dataset extended (PDSE). It is particularly useful for creating backup copies of libraries, copying members between libraries, and reorganizing libraries to free up unused space.

4.5.4 IDCAMS

- IDCAMS (Integrated Data Cluster Access Method Services) is used for defining and managing datasets, especially VSAM datasets. It can perform tasks such as creating, deleting, renaming, and cataloging datasets, as well as printing and altering dataset information.

4.5.5 ADRDSSU

- ADRDSSU (DFSMSdss) is a utility used for data movement and storage management tasks. It can perform full-volume and dataset-level backups, restores, copies, and migrations. It is particularly powerful for disaster recovery and storage management.

Chapter 5

Specialization Training

5.1 Concepts and Functionality of CA-7

5.1.1 Overview of CA-7

CA-7 is an online, real-time, interactive system for scheduling and managing work based on time-driven and event-driven activities.

5.1.2 Jobs in CA-7

Jobs are units of work scheduled and managed by CA-7. Each job can be part of different batch cycles and is identified by a unique Schdid (Schedule ID).

5.1.3 Scheduling

CA-7 provides online scheduling capabilities. Jobs can be scheduled to run based on predefined time (time-based) or dependencies with other jobs (event-based).

5.1.4 Batch Cycle

The sequencing of jobs to run in order is called a batch cycle. Successive jobs are automatically initiated when preceding jobs are completed and all requirements are satisfied.

5.1.5 Schedule ID

SCHID (Schedule ID) refers to a unique identifier assigned to each schedule or job stream variation. SCIDs range from 1 to 255 and are essential for distinguishing different configurations of jobs within CA-7. They enable the scheduling of the same job in multiple batch cycles with varying requirements or conditions, ensuring flexibility and control over job execution based on specific operational needs and dependencies. Each job running in CA-7 must be associated with a SCID to manage its scheduling and execution within the system effectively.

5.1.6 Job Dependencies

Jobs can have dependencies where one job (predecessor) must complete successfully before another job (successor) can start.

5.1.7 Trigger

Used to describe relationships between jobs in the same schedule. For example, Job1 can trigger Job2, making Job2 dependent on Job1.

5.1.8 Stand Alone Jobs

Jobs that do not trigger any other jobs are called stand-alone jobs.

5.1.9 Queues in CA-7

Request Queue:

Jobs waiting to be submitted. They wait for dataset dependencies and submit times. Once all requirements are met, they move to the ready queue.

Ready Queue:

Jobs ready to execute. Jobs may be held up here due to data contention, initiator availability, or syntax errors.

Active Queue:

Jobs currently executing move to the active queue upon starting execution.

5.2 Job Attributes in CA-7

- **Submit Time:** Time when a job should be submitted to the operating system.
- **Deadline Time:** Time by which a job should start successfully.
- **Due Out Time:** Time by which a job should complete successfully.
- **Elapsed Time:** Average time of the last five successful runs of a job.
- **Lead Time/Look Back Time:** Time to look back for execution of the job in the previous run to post requirements if met. Lead time varies from 0 to 99.

  0 -> Indicates no lead time is to be considered when satisfying this job's requirements.

  98 -> maximum lead time value is 98 hours.

5.3 HOLD

Places a job on hold, preventing its execution until the hold is released.

- HOLD,JOB=JOBNAME,REASON=RELATED MATTER
- In XQM panel we can hold the job by giving H
- In DB.3.6 panel we can hold the job
- ADDRQ,JO=JOBNAME,USER=HOLD,REASON=RELATED MATTER
- In DB.1 we can able to hold the job

Chapter 6

Mini Project

6.1 Migration Project Observations

During my internship, I observed two significant production changes: the migration from IBM Z14 to Z16 and the DASD migration. This report summarizes the technical and procedural understanding of these activities.

6.1.1 Roles Involved

- **Ptoject Manager:**
  Led the migration projects, coordinated between teams, and ensured timelines and objectives were met.
- **System Engineers:**
  Configured and tested the new system environment, ensured all components were compatible with the Z16 architecture, and managed DASD migrations.
- **Network Engineers:**
  Established and validated network configurations to support the new system.
- **DBA Architect:**
  Handled database architecture, including data backup, transfer, and integrity checks to ensure a seamless transition.
- **Application Support Team:**
  Ensured all applications were compatible with Z16, conducted thorough testing, and resolved any issues.
- **Quality Assurance Team:**
  Conducted final testing to ensure the system met performance and reliability standards.

6.2 Migration Process

Pre-Migration Process:

System Engineers and Project Manager developed detailed migration plans for both Z14 to Z16 and DASD migration, considering technical requirements and risk factors. Network Engineers tested network connections between systems and validated configurations. DBA Architect prepared comprehensive backups of all databases for both migrations. Application Support Team identified applications for migration and conducted initial compatibility tests.

System Preparation:

System Engineers configured the Z16 environment and managed DASD migrations according to the migration blueprints. DBA Architect executed data backup and restoration processes, followed by integrity checks to ensure data consistency. System Engineers managed DASD migration, ensuring data transfer and validation across storage systems.

Application Migration:

Application Support Team transferred applications to Z16, conducted functionality and performance tests, and resolved compatibility issues. Quality Assurance Team performed rigorous testing to confirm application stability and performance metrics.

Post-Migration Validation:

System Engineers conducted final checks to ensure all components were correctly migrated and operational. Application Support Team carried out user testing to confirm seamless application operation on the new system. System Engineers monitored systems continuously post-migration to resolve emerging issues promptly.

Completion and Handover:

System Engineers updated documentation and records to reflect post-migration changes. Project Manager conducted a review of the migration processes and documented lessons learned. The new systems and configurations were handed over to respective teams for ongoing management and maintenance.

Key Changes Observed: Pre and Post-Migration

From my observation, job holding was minimal, but here are potential situations where jobs might be held. Prevents conflicts during critical updates, ensuring data integrity and system stability. Manages resource contention by prioritizing high-priority tasks and optimizing resource utilization. Ensures data consistency during backup or recovery operations, avoiding interference with data integrity. Ensures dependent tasks do not run prematurely, preventing errors or incomplete processing. Maintains a controlled environment during testing, allowing thorough testing without interference. Alleviates system load during performance degradation, aiding in identifying and resolving issues.

Observations and Lessons Learned:

The migrations from Z14 to Z16 and DASD migration required meticulous planning and coordination among various teams to ensure successful execution. Continuous monitoring and validation post-migration were essential to identify and resolve any emerging issues promptly. These migrations provided valuable insights into handling complex production changes and highlighted the importance of comprehensive planning, testing, and teamwork in achieving successful outcomes.

Chapter 7

Process Training: ITIL

7.1 Introduction to ITIL

Information Technology Infrastructure Library (ITIL) is a framework designed to standardize and improve the management of IT services within an organization. It acts as a playbook for IT teams, providing best practices to ensure that technology aligns with business needs and operates smoothly.

Incident Management

Incident management is a key aspect of ITIL, focusing on handling unplanned disruptions in IT services. Using ticketing systems like ServiceNow, teams log and track incidents, assigning them different levels of priority based on urgency. For example, a server crash would be a high-priority incident, demanding immediate attention. ITIL guides teams through a structured process of identifying, diagnosing, and resolving incidents while adhering to predefined Service Level Agreements (SLAs) that outline response and resolution times.

Severity levels range from 1 to 4:

- Severity 1 (Highest) requires immediate attention as it involves critical systems or services being down, posing a severe risk to business operations.
- Severity 2 (High) demands prompt action for important systems or services that are degraded or unavailable, impacting business operation.
- Severity 3 (Medium) necessitates timely attention as it affects systems or services, with manageable limitations on operations.
- Severity 4 (Lowest) requires routine handling as it causes minimal impact, with business operations mostly unaffected.

Problem Management

Problem management focuses on identifying and addressing the root causes of recurring incidents. While incident management deals with resolving immediate issues, problem management looks deeper to prevent similar incidents from occurring in the future. ITIL helps teams investigate the underlying causes of problems, develop and implement solutions, and continuously improve IT processes to minimize the impact of incidents over time.

Change Management

Change management is about making modifications to IT systems in a controlled, organized manner. Whether it's updating software or reconfiguring networks, changes need to be carefully evaluated, approved, and implemented. ITIL provides a framework for assessing proposed changes, obtaining necessary approvals, and documenting the entire process. This ensures that changes are implemented smoothly without causing disruptions to ongoing operations.

Service Level Agreements (SLAs):

Agreements between service providers and customers that define the level of service expected. For example, an SLA might specify that critical incidents must be resolved within 30 minutes.

Service Delivery Managers (SDMs):

Play a crucial role in ensuring that these SLAs are met. They facilitate communication between service providers and customers, coordinate responses to incidents through bridge calls, and oversee the overall delivery of IT services.

Chapter 8

Communication Enhancement Program

Duration: February 2, 2024, to May 29, 2024

Over the course of four months, I participated in an English Language Communication Enhancement Program that significantly improved my professional communication skills. Initially, I struggled with shyness and found it difficult to start conversations with new people, especially women. However, this program brought about a noticeable transformation in my communication abilities, boosting my confidence and competence in various settings.

Key Improvements and Learnings:

1. Pronunciation and Accent Reduction:

One of the most significant changes I experienced was in my pronunciation and a bit in my accent. The program provided extensive training on word stress and correct pronunciation, helping me reduce the impact of Mother Tongue Influence (MTI) on my speech. This improvement made my communication clearer and more easily understood by others. Additionally, I learned about the importance of silent letters, which can significantly affect the meaning of words.

2. Framing Questions and Understanding Behavior:

Understanding and correctly framing questions were also key components of the training. Through detailed video explanations, I learned how to ask questions appropriately, enhancing my inquiry skills and making my conversations more engaging and meaningful. These videos also provided insights into different human behaviors, helping me understand and adapt to various interpersonal dynamics.

3. Practical Application and Group Activities:

The program emphasized the importance of active participation and practical application of skills. We were divided into smaller groups for various activities, which made communication practice more manageable and effective. One such activity was a group presentation on parts of speech, promoting collaborative learning and allowing us to apply grammatical concepts in a practical context. This interactive session was instrumental in building my confidence and improving my public speaking skills.

4. Watching Movies for Language Acquisition:

One particularly useful suggestion from our trainer was to watch the same movie multiple times rather than watching different movies. This approach helps in getting familiar with accents and speech patterns, making it easier to learn and internalize various aspects of the language.

5. Understanding First Impressions and Dress Colors

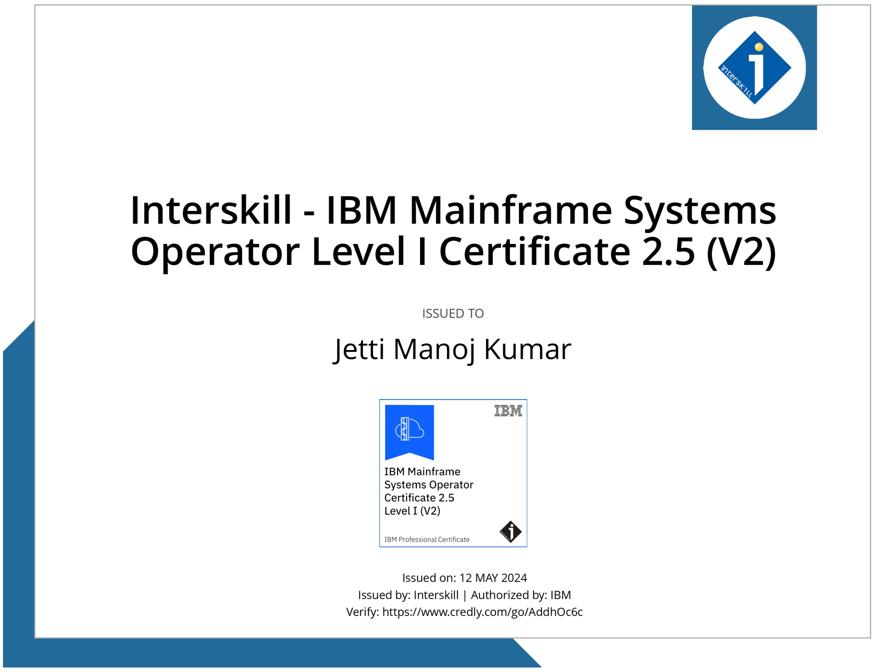
Additionally, I learned about the importance of first impressions and the meaning of dress colors. For example, wearing blue gives a feeling of confidence and trustworthiness, while red is associated with passion and energy. This understanding has helped me choose appropriate attire for various occasions, enhancing my professional image.

Conclusion

The Communication Enhancement Program has equipped me with essential skills for professional success. The training has resulted in my becoming a more competent and self-assured communicator, capable of expressing myself effectively in diverse settings. This program has been a transformative experience, providing me with the knowledge necessary to excel in both my professional and personal life.

Chapter 9

Certificates/Badges



Interskill - IBM Mainframe Systems Operator Level I Certificate 2.5 (V2)

ISSUED TO

Jetti Manoj Kumar

IBM

IBM Mainframe Systems Operator Certificate 2.5 Level I (V2)

IBM Professional Certificate

Issued on: 12 MAY 2024

Issued by: Interskill | Authorized by: IBM

Verify: https://www.credly.com/go/AddhOc6c

Figure 9.1: System Operator Level 1 Certificate

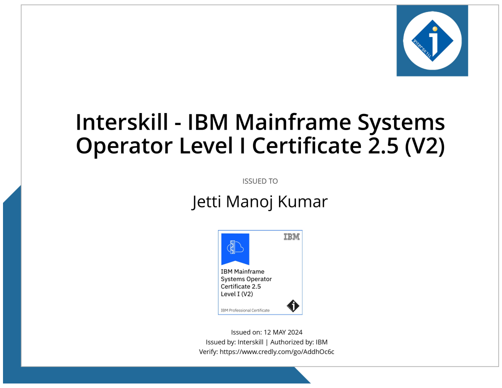


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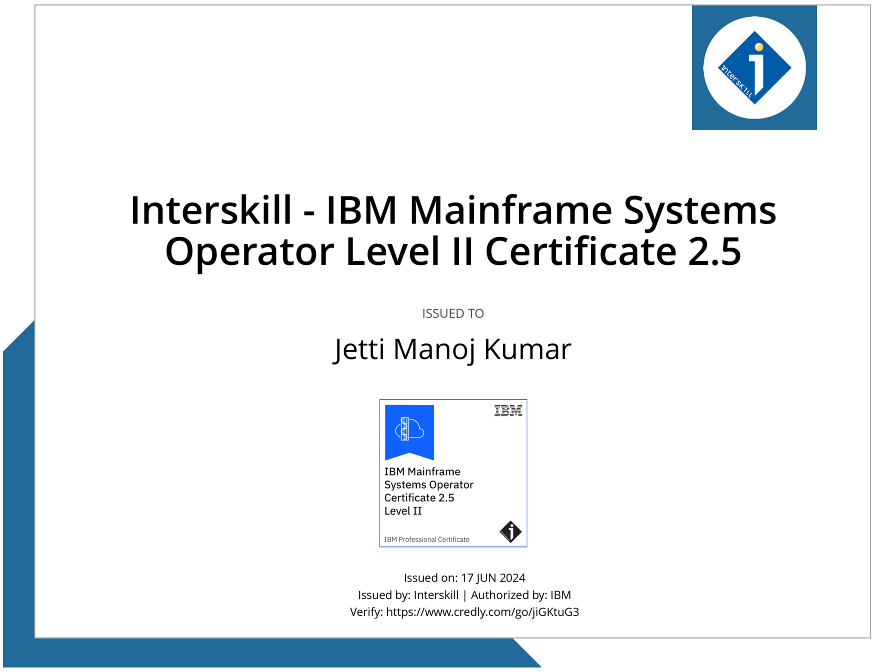
Figure 9.2: System Operator Level 1 Badge

https://www.credly.com/badges/a799983e-a1cf-41ea-8b09-fec0b99417db/public$_{url}$



Interskill - IBM Mainframe Systems Operator Level II Certificate 2.5

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Jetti Manoj Kumar

IBM
IBM Mainframe Systems Operator Certificate 2.5 Level II
IBM Professional Certificate

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Verify: https://www.credly.com/go/jiGKtuG3

Figure 9.3: System Operator Level 2 Badge

Figure 9.4: System Operator Level 2 Badge

https://www.credly.com/badges/a799983e-a1cf-41ea-8b09-fec0b99417db/public$_{url}$

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Chapter 10

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