Introduction to z/OS

Introduction to z/OS - Course Objectives

On successful completion of this class, the student should be able to:

1. Describe the concepts underlying IBM zSeries computer systems in general (hardware: processors, memory, tape, disk, devices in general; software: operating systems, application environment, application programs)

2. Correctly use terms related to mainframe computer systems: such as data set / file, fields, records, data set organization

3. Understand terms specifically related to z/OS, such as DDname, data set name, PDS, PDSE, VSAM, label, VTOC, directory, catalog, TSO, ISPF, JCL

4. Describe the role SMS (System Managed Storage) plays in z/OS

5. Describe the roles played in application development of CLIST, REXX, JCL, and TSO/ISPF

6. Describe the role of Unicode in the mainframe world, and the support for Unicode provided in z/OS

7. Describe capabilities of the latest IBM compilers for COBOL, PL/I, and C as well as the Assembler, the binder, and Language Environment

8. Describe the capabilities of Db2, in broad, general terms, and understand the salient features of the latest version of Db2

9. Compare and contrast the two major transaction processing environments: CICS/TS and IMS, and the role of MQSeries

10. Describe the facilities available under z/OS for running UNIX applications, including a web server and email

11. Send text messages to a cell phone and / or emails to the Internet from a batch job, (providing their system is configured to do so).

Introduction to z/OS - Topical Outline

Introduction: What's Hot? What's Cold? What's Strange?
z/Architecture - A hardware overview
- zSeries
- CPC - Central Processor Complex
- I/O Channels, PR/SM, LPARs, and Sysplex, zBX, Tapes and Disk

z/OS - A software overview
z/OS Workloads
- Capacity utilization
- Workload manager
- z/OS Workloads
- Tuning

z/OS Fundamentals
- Data management terms
- Data organizations
- Sequential data set
- VTOC
- Partioned Data Set (PDS)
- Catalog
- PDSE
- The UNIX File model: the z/OS File System (zFS)
- Batch
- JCL
- TSO/ISPF
- CLIST and REXX
- Dialog manager
- SMS - System Managed Storage

Unicode
- z/OS support for Unicode

Db2 - IBM's Premier relational data base
- The Basics
- Indexes
- Db2 Architecture
- Embedded SQL
- Components
- Db2 LUW

Transaction monitors
- CICS/TS
- IMS
- The role of MQSeries

Languages
- Common threads
- Language Environment (LE)
- Assembler
- Enterprise COBOL
- Enterprise PL/I
- C/C++
- The program binder

z/OS and UNIX System Services
- TSO User ID
- Profiles
- UNIX User ID
- z/OS UNIX - The shell interface under OMVS
- Things you can do under z/OS UNIX
  - Standard commands and utilities
  - Compile / assemble / bind
  - HTTP sever - host web site
  - Use sed file to convert flat file to HTML
  - Use sendmail and ftp
  - Code / compile / run Java

Sending notes, e-mails, and text messages
- Communications possibilities
- Sending emails from a batch job
- Sending text messages from a batch job to a cell phone
- SMTP notes
- Communications possibilities conclusion

Conclusion - Final thoughts

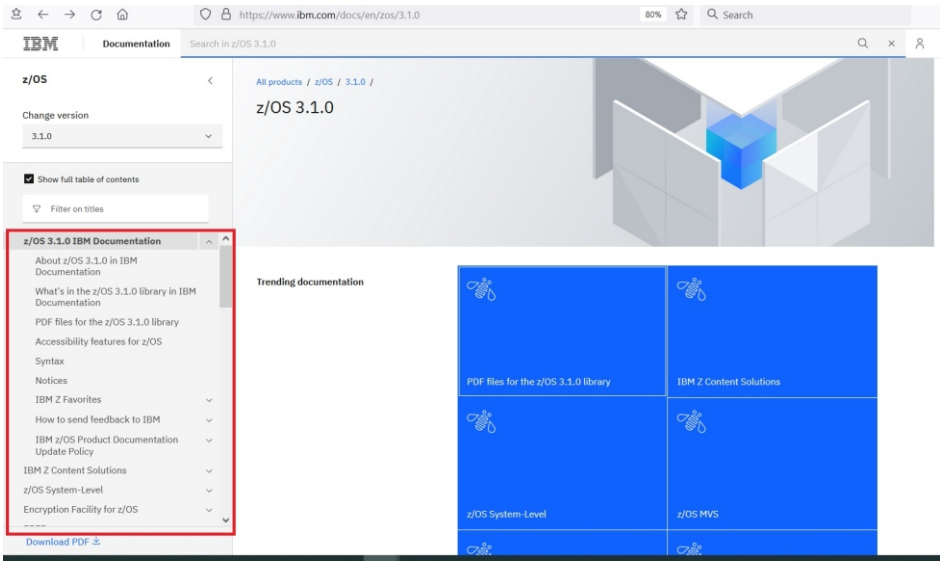
Sources of information

To get to relevant IBM manuals on the web, start with:

https://www.ibm.com/docs/en/zos/

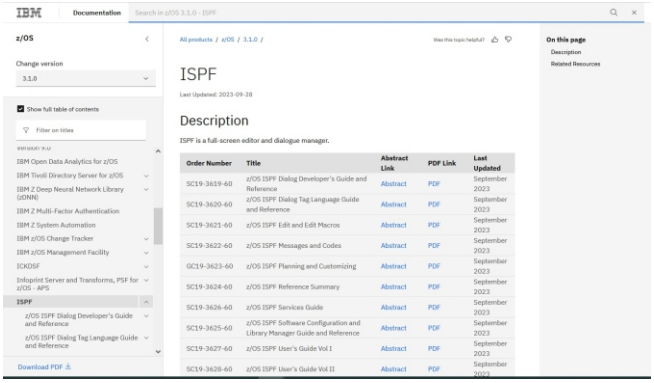
You will see a page something like this:

Click on the box for the version of z/OS you are running and you'll see something like this:

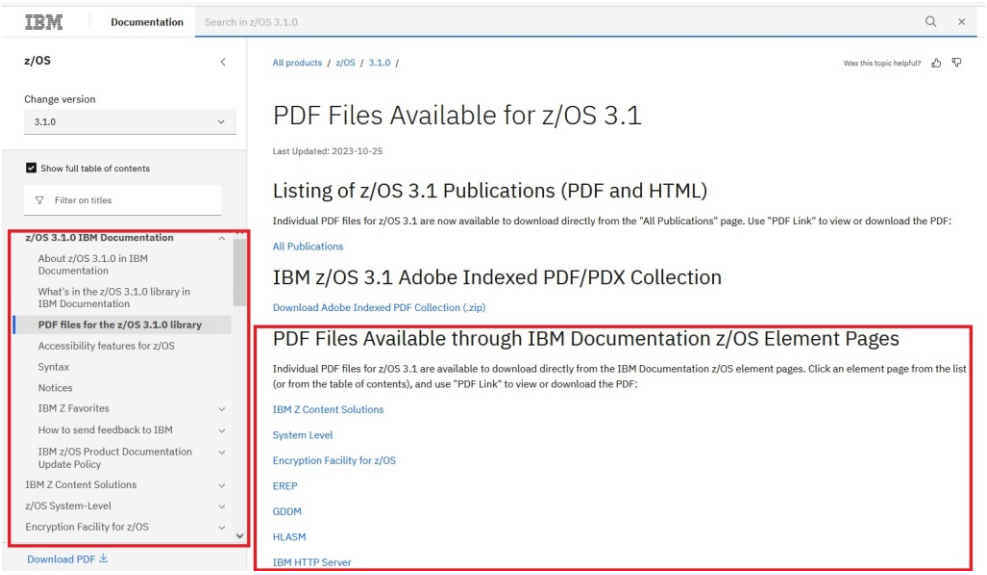


On the left hand side is a scrollable box of topics, some even of interest (ISPF, MVS, TSO/E, and so on). If you click on one of these, you will see a list of related documents and you can download the PDF version of any of these, say, ISPF:

Sources of information, continued



Or, if instead you click on the blue box on the right labeled "PDF files for the z/OS v.r.m library", you get a different scrollable list, *e.g.*:



And both lists shown in boxes above are scrollable.

Notice these methods allow you access to a large number of documents, including Assembler (HLASM), REXX, DFSORT, C/C++. But, if you want information on COBOL or PL/I. use these links:

https://www.ibm.com/support/pages/enterprise-cobol-zos-documentation-library

https://www.ibm.com/docs/en/epfz

Sources of information, continued

For information about other components / products:

Db2

https://www.ibm.com/support/pages/db2-12-zos-product-documentation
https://www.ibm.com/docs/en/db2-for-zos/13

CICS

https://www.ibm.com/docs/en/cics-ts/6.1?topic=available-documentation-in-pdf

IMS

https://www.ibm.com/docs/en/ims

MQ (formerly MQSeries)

https://www.ibm.com/docs/en/ibm-mq/9.3

What's The Hottest "Thing" in IT?

❒ **The Internet and the World Wide Web**

Everyone has to have a "web presence"

Everyone has to have their applications "web enabled"

Everyone needs to support eCommerce

❒ **What technologies are driving the Internet and the Web?**

UNIX - which says ASCII and Unicode

C, C++, Java, perl, awk, php, ruby - all originally from the UNIX world

HTML, XML - which require Unicode

TCP/IP - and sockets

Objects - CORBA, DOM, SOAP

Open source - *e.g.*: **Linux**

Web Services - dynamic discovery and use of available resources

Mobile apps - tablets and phones run web-style apps

What's the Coldest, Oldest "Thing" in IT?

- **The Mainframe - perceived as**

  1960's technology

  EBCDIC, closed, proprietary

  COBOL, PL/I, Assembler

  Batch

  Expensive - high total cost of ownership

- **Although some may concede a few benefits**

  Rock solid - seldom crashes

  High performance - especially I/O and transaction rates

  Secure - never hacked

  Evolutionary - old code still runs, even as new features have been added

  Returns real value - recent survey: 5-10% of corporate net profits from IT attributed to eCommerce, 90-95% to traditional processing

What's The Strangest "Thing" in IT?

❒ **The mainframe has been transformed over the last 15-20 years**

❒ **Today's mainframe has hardware that supports**

64-bit addressing

Null-terminated strings, ASCII data, Unicode data

Support dozens of processors in a single system, with built in cryptograhy, encryption, error detection and correction

On-chip Artificial Intelligence ("AI") acceleration

Linux in native mode

❒ **Today's mainframe has software that supports**

All the traditional environments (CICS, IMS, TSO, batch)

Relational database that support triggers, stored procedures, remote access, BLOBs and CLOBs, the cloud

UNIX System Services - which implies

- ✗ Internet / Web capabilities
- ✗ C, C++, Java, perl, awk, php, ruby
- ✗ HTML, XML
- ✗ TCP/IP, sockets, including IPv6 and SSL

Which Means...

- **Your mainframe can run all your mission critical, day to day, "bread-and-butter" applications**

  Securely, at higher and higher speeds

- **PLUS your UNIX / Intranet / Internet / Web apps**

  All on a single box (or complex of boxes)

- **The major pieces of this story are...**

  z/Architecture - a new class of machines; the latest mainframe hardware

  z/OS - the latest mainframe operating system; the 64-bit version of MVS and OS/390

  Language Environment - a software component of z/OS (and OS/390) that enables easier communication between programs written in different languages as well as providing a suite of callable services

  UNIX System Services - the ability to run UNIX on the mainframe

  New compilers for COBOL, PL/I, C, C++, and full Java support