

Enterprise COBOL – For Business Application Programming

No-Charge Entry Level training provided by IBM

Length:

- 24 separate one-hour modules
 - Two classes/per week – Tuesdays and Thursdays, 9:00 AM Eastern
 - Additional hours will be required if you choose to do the COBOL z/OS hands-on workshops
- Optional “Office hours” (instructor-led Q&A) will be available each week for 1X1 mentoring

Format:

- Remote Instructor-Led Training - delivered by an IBM instructor with over 35 years of COBOL experience and 10 years of Entry-Level z/OS training
- Hands-on Workshops will be done using the IBM Z Open Development IDE (the 90-day trial) and either an IBM mainframe system or your own LPAR
- All the workshop resources will be made available if you would like to run the labs in your mainframe environment. If you choose to do this you will be responsible for setting up the environment

Book & Reference Materials:

- A detailed COBOL learning PDF – containing workshops, examples, terms & concepts for all of the course modules and labs is supplied
- Various links to free online learning sources will be noted throughout the course, with links from Modules to specific online content
 - Books and white papers
 - COBOL video instruction
 - IBM Knowledge Center
- All class modules will be recorded and made available
- All training is done in English – as are the printed materials for the class

Course Objectives:

- *After successfully completing the course, attendees will be able to complete COBOL development and maintenance tasks – and be ready to advance to more complex topics through independent study or in-house mentoring.*

Attendee qualifications - if doing the hands-on labs:

- **High School Diploma or better**
 - High level of math competency
 - Quality typing skills will be necessary to complete the COBOL workshops
- **Basic PC, Internet, GUI tooling knowledge and skills**
 - Zip/Unzip
 - Windows, Mac or Linux OS navigation, files/folders terms & concepts
- **PC/Laptop configuration:**
 - Windows, Mac or Linux
 - Intel Core i5 or better
 - 4GB RAM – minimum
 - 8GB or better is preferable
 - Min. 40 Gigs Disk Space
 - **Connectivity to the Internet - with free & clear access to port 4035**
 - Note that some corporate Intranets firewall off specific ports that may be needed for class
 - If that is the case you will need to contact your I/T staff
 - Additional software installation will be required
 - **ZOD Integrated Development Environment**
 - 90-Day Trial License
 - **An interest and willingness to set aside 3-4 hours/per week to do the hands-on COBOL labs and workshops**
 - The material can be understood conceptually from the Modules
 - But COBOL programming skills and expertise only come from successfully completing the labs

Syllabus - *Note that these modules are subject to change*

Week 1 – Course introduction, z/OS and COBOL Overview

- **Enterprise I/T 2020 – Introduction, terms and concepts**
 - z/OS
 - Build
 - Data sources
 - COBOL and JCL
 - z/OS Data Set Names
- **ZOD:**
 - Installation
 - Connecting to the IBM LPAR and running a setup job
- **COBOL z/OS Development Tools**
 - Terms and concepts
 - z/OS Navigation
 - Creating files and PDS members
 - Code editing
 - Build and Run JCL
 - Debug
 - JES and Job management

Week 2 – Basic COBOL Language Framework

- **Basic language and programming constructs**
 - COBOL source record areas
 - Program Structure
 - Divisions
 - Keywords
- **Variable definitions**
 - Variable Declarations
 - String/Numeric
 - Level numbers, PIC clauses and types
 - Hierarchical Data Structures; Group → Elementary
- **MOVE statements**
 - Elementary, Group, Numeric, Alphanumeric
 - Difference between alphanumeric and numeric MOVE process
 - Data Truncation and overflow
- **Conditional statements**
 - Simple IF
 - Compound IF
- **Compute statement**

Week 3 – Introduction to File I/O and Sequential File Handling

- **Sequential File Data**
- **COBOL language constructs for processing sequential files**
 - OPEN/CLOSE
 - READ INTO/WRITE FROM
 - FILE SECTION
 - ENVIRONMENT DIVISION
 - Syntax
 - External Data Files and COBOL Internal File Section/FD
- **Structured Programming:**
 - Functional Decomposition
 - Hierarchy charting
 - Paragraphs and Iteration
 - Read input file until EOF
 - PERFORM N Times
 - PERFORM UNTIL
- **Desk-Checking code**
 - Manually
 - Under DEBUG
- **JCL – External File Data**
 - Existing DSN=
 - Instream Data

Week 4 – COBOL Logic and Math operations

- **Nested IF and complex conditional expressions;**
 - IF/THEN/ELSE
 - AND/OR logic
 - Forcing precedence
 - EVALUATE
 - Alternative program design strategies
- **Math operations: Deep Dive:**
 - COMPUTE
 - order of precedence
 - Translating equations
 - Alternative math verbs:
 - ADD, SUBTRACT, DIVIDE, MULTIPLY
 - ROUNDED
 - ON SIZE ERROR

Week 5 – Internal Data Representation and Introduction to ABENDs

- **COBOL Internal Data Types and z/OS Data**
 - COMP
 - COMP-3
 - EBCDIC Hex Representation
- **Common COBOL ABENDs**
 - Data issues
 - Procedural problems
 - Debugging techniques to diagnose ABEND issues
 - MVS ABENDs
 - S0C7
 - S0C1

Week 6 – COBOL Programming Best Practices

- **COBOL Coding standards**
 - Initializing data
 - Copying reusable code from existing programs
 - Code Formatting – for maintenance and application shelf life
 - Variable and Paragraph naming conventions
 - Documentation (Comment) standards
 - Use of END-keyword scope modifiers
 - Recognizing common COBOL field types:
 - Flags
 - Hold-fields
 - Counters
 - Accumulators
- **COBOL output report formatting**
 - Numeric edited PIC clauses
 - Complex report generation

Week 7 – String Parsing & COBOL Intrinsic Functions and Copybooks

- **COBOL Intrinsic functions**
 - Date manipulation
 - MAX/MIN/SUM
- **String handling in COBOL**
 - STRING/UNSTRING
 - REDEFINES
 - INSPECT
 - Reference Modification
- **Copybook concepts:**
 - Usage
 - Syntax
 - COPY REPLACING

Week 8 – COBOL Table Handling Part 1

- **Introduction to COBOL tables**
 - Table-handling concepts
 - One-Dim OCCURS
 - Linear Search
 - Value Clause and REDEFINE
- **Intermediate table handling**
 - Loading Tables from external data files
 - SEARCH ALL vs. Linear SEARCH

Week 9 – COBOL Table Handling Part 2 – Control Break Logic

- **Advanced Table Handling**
 - Understanding Two-Dim Tables
 - Processing Two-Dim Tables
 - Table-handling Efficiency techniques
 - Debugging with large tables
- **Control Break Program Logic**
 - External SORT (MVS Utility)
 - Control Break algorithm
 - Two-Level Control Break example

Week 10 – Subprograms and ISPF

- **COBOL Application Design**
 - Calling Subprograms
 - Dynamic Call
 - Static Call
 - LINK EDIT requirements:
 - Parameter passing requirements (positional parameters)
 - ENTRY USING
 - LINKAGE SECTION
- **Using ISPF for COBOL Development**
 - Concepts and navigation
 - PF-Keys and Option 0 entries
 - Editing and Browsing source files
 - File navigation and paging
 - Command Line Commands
 - Prefix Are Commands
 - Split screen
 - Hex On
 - 3270 Control Keys
 - Data Set Utilities
 - Introduction to SDSF

Week 11 - Application and COBOL Analysis – Maintaining COBOL Programs

- **Debugging as dynamic code analysis**
 - Debug tools and features applied to code analysis
 - Monitors
 - Record/Playback
 - Visual Debug
- **Static code analysis:**
 - Control Flow (procedural) Analysis
 - Data Flow Analysis
 - Occurrences in Compilation Unit

Week 12 – Additional Enterprise Application Topics

- **Indexed (VSAM) Files**
 - Concepts
 - Code Examples
- **Online Systems – Terms and Concepts**
 - CICS
 - IMS TM
- **Relational Database Management Systems (DB2)**
 - The Relational Model
 - Tables
 - Terms and Concepts
 - SQL
 - Interactive
 - Embedded