

PL/I Intermediate Programming

Duration	5 days.
Participants	PL/ I applications programmers.
Objectives	Upon successful completion of this course, you will be able to • Choose the appropriate data type, organization, and storage class for program variables. • Understand and apply the concept of based variables. • Understand the effects of alignment on program efficiency and structure mapping. • Understand the concept of the block structure of a PL/ I program. • Code function procedures. • Code argument/ parameter passing for a procedure. • Diagnose expression evaluation and data conversion errors, and provide solutions to their pitfalls. • Code preprocessor replacements and simple macros.
Description	This course presents topics of interest to a programmer who has basic knowledge of PL/ I. Its purpose is to increase the programmer's knowledge of the PL/ I language by presenting the concepts, applications, efficiencies, and pitfalls of each topic covered.
General Topics	Day 1: Data Types and Organizations Day 2: Data Conversions and Expression Evaluation Day 3: Procedure Coding Day 4: Storage Classes and Management Day 5: The Preprocessor
Format	Lecture and discussion with daily hands-on exercises.
Prerequisites	Previous attendance at a basic PL/ I programming course or six months PL/ I applications programming experience is recommended.
Topic Outline	
Day 1: Data Types and Organization	The DECLARE Statement Review Scalars and Aggregates Data Formats, Attributes and Usage Strings Arithmetic DEFAULT Statement

PL/I Intermediate Programming *(continued)*

Topic Outline

Arrays

- Dimension Attribute
- Initialization
- Multi-dimensional
- Cross-Sections

Structures

Arrays of Structures

- Multi-dimensional
- Cross-Sections

Data Type Alignment

- ALIGNED attribute
- UNALIGNED attribute
- Effects on program efficiency

Structure Mapping

- Effects of alignment on structure mapping
- Mapping pairs

Day 2: Assignment, Expression Evaluation, and Conversions

Assignment

- String assignment rules
- Arithmetic assignment rules
- Array assignment rules
- Structure Assignment rules
 - by position
 - BY NAME

Expression Evaluation

- Operational Expressions
- Builtin Functions
 - Arithmetic
 - Operations on scalars and aggregates
 - Fixed-point division pitfall, DIVIDE builtin function
 - Binary fraction pitfall, DECIMAL builtin function
 - Concatenation
 - Operation evaluation
 - STRING and REPEAT builtin functions
 - Logical Operations
 - Operation evaluation
 - BOOL, ANY, ALL builtin functions
 - Comparison operations
 - Comparison rules
 - Builtin functions for comparison

Data Conversions

- Fixed and Character conversions
- Character and Bit conversions
- UNSPEC builtin function
- Conversion rules

PL/I Intermediate Programming *(continued)*

Topic Outline

Day 3: Procedure Coding

Block Environment

- Prolog
- Epilog
- Scope of a variable's name

BEGIN Blocks

- Syntax
- Use

PROCEDURE Blocks

- Syntax
- Flow of Control
- Argument/ Parameter Coding and Use
- Dummy argument creation
- CONNECTED attribute for parameters
- * attribute for parameters

External Procedure Coding

- ENTRY attribute
 - Declaring an external entry point
 - Parameter attribute descriptor list
- RETURNS attribute
- *PROCESS statement

Subroutine Procedures

- Syntax
- Flow of Control
- Use

Function Procedures

- Syntax
- Flow of Control
- Use

Secondary Entry Points

- Entry statement
- Use

Topic Outline

Day 4: Storage Classes

Storage Classes Overview

- Types
- Storage Region

AUTOMATIC Storage

- Definition
- Use
- Efficiencies and Pitfalls
- Location

STATIC Storage

- Definition
- Use
- Efficiencies and Pitfalls
- Location

External Storage

- Storage Classes for
 - Definition
 - Use
 - Efficiencies and Pitfalls
 - Location

BASED Storage

- Definition
- Uses
 - ADDR builtin function for storage overlay
- DEFINED vs. BASED Storage
- ALLOCATE statement for Based Storage
- Record I/ O Locate Mode
- Reading multi-format record structures
- SCALARVARYING attribute for varying length string I/ O
- REFER option for self-defining data

CONTROLLED Storage

- Definition
- Use
- Inefficiencies and Pitfalls
- Location
- ALLOCATE and FREE statements
- Delaying Allocation and Stacking

Storage Class Management

- Storage Requirements Table
- Requesting the ISA
- PLIXOPT variable
- Storage Management Report

Topic Outline

Day 5: The Preprocessor

The Compiler Overview

The Compile Time Facilities

Inclusion of External Text

INCLUDE and MACRO compiler options

%INCLUDE statement

Source Code Replacement

%DECLARE statement

%assign statement

Uses for preprocessor replacement

Source Code Generation

Preprocessor procedure concepts

%PROCEDURE statement

Uses for preprocessor procedures

Preprocessor builtin functions

Preprocessor Concepts

Scanning and Rescanning

Insource and Source

Activation and Deactivation