



Technical Educational Services

Course Specification

Course Number: N6400

Course Title: PowerMAXION System Maintenance

Course Duration: 10 Days

Purpose:

The Concurrent PowerMAXION 6400-series is a family of real-time, symmetric-multiprocessing super-microcomputers based on the PowerPC 604 microprocessor. Consisting of the four processor 6400 and the eight processor 6408, these systems provide the customer with commercial off-the-shelf technology coupled with industry standard interfaces to satisfy their real-time processing demands. In order to effectively perform system installation/configuration, preventive maintenance and initial corrective maintenance procedures, support personnel require some knowledge of the PowerMAXION system hardware and software. The primary course objective of the PowerMAXION System Maintenance course is to provide the student with the necessary instruction and hands-on experience to achieve this level of knowledge.

This course is designed to provide the necessary instruction required for line replaceable unit (LRU) level corrective maintenance of any PowerMAXION 640x computer system. Major course topics include system component physical descriptions, a detailed console command set description, and in-depth functional overviews of all major system components. Installation procedures for both hardware and PowerMAX OS software are presented, and the 6400 diagnostic products are described in full. Disaster recovery is presented to teach proper system backup and restore methods. System upgrades are also discussed, with procedures for installing and configuring additional system modules into an existing 6400 computer system.

Course Objectives:

Upon successful completion of this course students are able to:

- Perform various system operational procedures, including system power-up and initialization, boot procedures for PowerMAX OS, and both standalone and online diagnostic execution
- Utilize console commands to perform system initialization, booting, and initial fault analysis.
- Boot PowerMAX OS into both single and multi-user modes of operation, and define the capabilities of each mode.
- Execute both standalone diagnostics and online exercisers, to both verify system functionality and to perform initial fault analysis.
- Define the physical design of the PowerMAXION 6400 computer system, including system rack breakdown, major assembly locations, and peripheral device breakdowns. Also identify

both intra-rack, and external cabling requirements for external devices.

- List all modules required by the 6400 computer system, and provide brief functional descriptions of each.
 - Define the components which make up the disc, tape, and communications subsystems, and provide a brief functional description of each component.
 - Monitor system error logs to detect system malfunctions, and interpret error indicators to identify the failing test sequence.
 - Perform a complete system backup, then restore that backup onto a replacement master disk drive.
 - Perform corrective maintenance to the LRU level on the 6400 computer system using logical troubleshooting techniques.
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Prerequisites:

- UNIX System Capability - Students need to understand and be able to use basic UNIX system commands such as those taught in a UNIX introductory course.
 - A working knowledge of the **vi** editor is assumed
 - Prior computer maintenance experience is highly desirable, though not required.
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Course Topic Outline:

- I. PowerMAXION System Architecture (10 hours)
 - A. System Overview
 - B. PowerPC 604e MPU
 - C. Memory Storage Subsystem
 - D. Interrupt Controller
 - E. VME(64)Bus
 - F. Console Processor
 - G. PowerMAX OS Overview
- II. PowerMAXION Physical Descriptions (6 hours)
 - A. System Module Descriptions
 - B. System Cabling
 - C. Physical Description Lab Exercise
- III. PowerMAXION Power-up and Initialization (7 hours)
 - A. System Controls and Indicators
 - B. Console Processor Initialization
 - C. **init** and **boot** Console Script Customization

- D. Power-up/Initialization Lab Exercise
- IV. PowerMAXION Console Processor Interface (12 hours)
 - A. Special Console Key Sequences
 - B. Console Address and Data Entry formats
 - C. General Console Command Set
 - D. System Configuration Commands
 - E. System Configuration Command Lab Exercise
 - F. File Access Commands
 - G. System Boot Overview
 - H. File Access Commands Lab Exercise
- V. PowerMAXION Diagnostics (7 hours)
 - A. Standalone Diagnostics
 - B. Standalone Interface (**saint**)
 - C. Online Exercisers (**powerat** and **powerio**)
 - D. Diagnostic Lab Exercise
- VI. PowerMAXION Boot Sequence (7 hours)
 - A. PowerMAX OS Boot Loader (**/stand/boot**)
 - B. PowerMAX OS Kernel Initialization
 - C. PowerMAX OS Run State Descriptions
 - D. PowerMAX OS Init Processing
 - E. PowerMAX OS Initialization Scripts
 - F. PowerMAX OS Boot Sequence Lab Exercise
- VII. PowerMAX OS Kernel Configuration and Tuning (3.5 hours)
 - A. PowerMAX OS System Configuration files
 - B. Manipulating Kernel Modules
 - C. Manipulating Hardware Adapters
 - D. PowerMAX OS System Tunables
 - E. System Configuration Utility (**config**)
- VIII. PowerMAX OS Storage Device Management (7 hours)
 - A. Disk Drive Configuration and Management
 - B. Tape Drive Configuration and Management
 - C. System Backup and Restore

- D. Storage Device Management Lab Exercise
 - IX. PowerMAX OS Networking Configuration (3.5 hours)
 - A. Ethernet Hardware Configuration
 - B. TCP/IP Software Configuration
 - C. Network File System (NFS) Configuration
 - X. PowerMAX OS Panic Troubleshooting..... (3.5 hours)
 - A. PowerMAX OS Panic Sequence
 - B. Basic Kernel Debugger (**kdb**) Commands
 - C. PowerMAX OS Crash Utility (**crash**) Commands
 - D. Troubleshooting System Panics
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Laboratory Exercises:

Exercises are provided for all topics presented and consist of two basic types:

- Review exercises are fill-in type questions that require the student to review the material presented to respond. These questions reinforce the important points presented in each topic.
- Hands-on exercises provide the student with experience in using the commands, utilities, calls, and techniques from the material allowing the student to better understand what he or she has learned.