

# HP Education Services

HP Integrity NonStop Operating System Architecture (U8609S)



This course provides an in-depth understanding of the H-series and J-series operating systems architecture. It includes Itanium2-based processors and modular I/O. Post S-series changes include debugging, run-time architecture, memory, process control, and synchronization. TNS and TNS/E process executions are explained along with the internals that support user services. User services such as Guardian and Open System Services (OSS) file systems and process control are also examined. The five-day course is a combination of lecture and live demonstration using HP servers.

## Audience

- System programmers
- Field analysts
- Application designers

## Prerequisites

- Concepts and Facilities for NonStop Systems (U4147S) and
- HP NonStop Kernel Principles (U4179S) and
- Working knowledge of C/C++ or pTAL

## Course objective

At the conclusion of this course you should be able to:

- Understand Itanium-based systems
- Know when to use a particular debugger
- Understand ordinary DLLs and programs using DLLs

**Course title:** HP Integrity NonStop Operating System Architecture

**HP product number:** U8609S

**Category/Subcategory:** NonStop / Operations Management

**Course length:** 5 days

**Level:** Advanced

**Delivery language:** English

**To order:** To review course schedules and to register for a course, visit [www.hp.com/learn/nonstop](http://www.hp.com/learn/nonstop) and select your country from the drop down menu, or, contact your HP sales representative or HP authorized channel partner.

- Describe how virtual addressing is supported by the addressing schemes of both TNS and TNS/E processes
- Understand the fundamental tools and mechanisms used by the NonStop operating system
- Describe memory management process functions
- Understand the Guardian and OSS file systems and their supporting structures
- Know the elements of the NonStop operating system that constitute the message system
- Support HP software products

## Benefits to you

- Gain an understanding of the NonStop operating system in Itanium-based processors in order to design programs and subsystems more effectively
- Learn how to support NonStop software products more efficiently

## Why education services from HP?

- Focus on job-specific skills
- Hands-on practice
- Experienced and best-in-the-field HP instructors
- Comprehensive student materials
- More than 80 training locations worldwide
- Customized on-site delivery

## Next steps

- Consider attending the other advanced learning courses in the HP NonStop Operations Management curriculum

## Detailed course outline

### Module 1 - NS-series and NB-series Hardware and Software Overview

- NonStop Advanced Architecture (NSAA) hardware
- NonStop Multi-core Architecture (NSMA) hardware
- Modular I/O
- CLIM hardware
- Code generation, address space, code space, and process execution
- Interprocessor and I/O architecture
- Message-based operating system
- Software layers

### Module 2 - Debuggers

- NS-series debuggers
- Debugger selection

- eGarth and eInspect
- Visual Inspect (VI) and Inspect

### Module 3 - Process Run-Time Architecture

- TNS/E processes
- Building TNS/E programs and libraries
- TNS processes
- Legacy TNS processes
- Interpreted TNS on Itanium
- TNS accelerated on Itanium
- TNS transitions
- TNS calling native procedures
- TNS application migration and debugging

### Module 4 - Addressing

- Itanium processor address architecture
- Extended data areas
- TNS/E process layout
- TNS process layout

### Module 5 - Interrupts and Exceptions

- Interrupts
- NSAA interrupts
- Synchronization and coordination mechanisms
- Interrupt and auxiliary processes

### Module 6 - Operating System Tools and Mechanisms

- Data structures
- Time services
- Process events
- PROCESS\_WAIT\_ and PROCESS\_AWAKE\_
- Classic privileged semaphores

### Module 7 - Memory Access and Management

- Hardware
- Physical layer
- Logical segments
- Logical map
- Sharing
- Priv considerations
- Page faults

### **Module 8 - The Message System**

- Interprocess communication within the same node
- ServerNet topology and the message system
- MQCs
- Communication across nodes
- Expand
- ServerNet clusters
- QIO

### **Module 9 - Guardian Process Control**

- Guardian process creation
- Process states
- Process synchronization
- Monitor process operation
- Processor load and reload

### **Module 10 - OSS Process Control**

- OSS process creation
- fork() and exec()
- Process termination

### **Module 11 - Guardian File System**

- Functions of the file system
- Control structures
- Open request processing
- Receive depth
- Nowait depth
- Sync depth
- Peek and poke

### **Module 12 - OSS File System**

- File systems
- OSS file system and support
- OSS file organization
- OSS pathname mapping
- OSS open

### **Module 13 - The I/O Subsystem**

- Storage I/O: architecture, operation, completion
- Configuring storage device
- Comparing storage and comm I/O
- QIO
- Outgoing comm I/O
- Incoming comm I/O
- WAN I/O
- Other devices

### **Onsite Delivery Equipment Requirements**

- One Integrity NonStop NS-series or NB-series server with NonStop operating system version H06.03 or later
- One PC compatible workstation per attendee and instructor

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