Exam Preparation Guide: Exam # HP0-664
NonStop Data Application Design and Development – Level 1

Check the web site for course descriptions and prerequisites at:
http://education.hp.com/curr-nonstop.htm (Instructor-Led Training)
http://education.nonstop.compaq.com/us/cat/httoc.htm (Self-Study Training)

You can also call (800) 621-9198 in North America, to speak with one of our education consultants or register for courses.
Or, you can email us at: nonstop.training@hp.com

Exam Status

The NonStop Application Design and Development - Level 1 exam has completed beta testing and is now live. This exam is administered by Prometric Regional Service Centers in North America (other locations may have different delivery methods). Refer to the Prometric website http://www.2test.com

Exam Details

Number of test items: 79
Time allotted to take test: 75 minutes
Passing Score: 63% - 50 items correct

You are not allowed to refer to any books or reference material during the NonStop Himalaya Application Design and Development - Level 1 exam.
Audience

This exam is targeted for the following personnel, with a minimum of one-year experience on the NonStop S-Series platforms running the G-Series NonStop Kernel Operating System:

- Authorized Service and Support personnel (field support technicians), who perform installations, upgrades, troubleshooting and maintenance tasks.

- Global Customer Support Center (GCSC) personnel, who may have specialized technical expertise in the operating system (e.g., security features, hardware, subsystems) and serve as support for both field support technicians and customers.

- Analyst SEs or Pre-SalesTechnical Support (PSTS) personnel, who perform pre-sales consulting and technical account support, including tasks such as assessment of customer needs, system sizing and configuration, installation consulting, and so forth.

- NonStop Kernel Software Developers, System Integrators and Consultant Partners, Application Designers and Developers, Authorized Service Channel Partners and Distributors, Customers authorized to service their own equipment.
What You’ll Be Tested On

Exam questions were written to evaluate your knowledge of the following objectives. The percentage of items dedicated to each major category is included in parenthesis.

1) Application Design Lifecycle (10%)

1.1 Describe the major components of an application requirements specification

1.2 Describe the purpose of the technical specification

1.3 Discuss availability issues
   • Quality
   • SLA
   • Cost of downtime
   • Minimum accepted workload

1.4 Describe various security risks
   • Security policy
   • Authentication
   • Data integrity

1.5 Describe scalability issues
   • Future growth
   • Average peak data volume and transaction rate

1.6 Discuss performance-related issues
   • Response time
   • Workload
   • Resources

1.7 Describe the major components of the functional design
   • Describe the purpose of the business process
   • Describe the principles of logical database design
   • Describe the major properties of the transactions
     • Transaction Profiles/Volumes
     • Complexity

1.8 Describe the elements of technical design
   • Parameters needed for sizing
   • Transactions
   • Database
   • Number of users

1.9 Describe the variety of application architectures (Client/Network/Server)
   • Distributed Application (Monolithic)
- Distributed Database
- Client/Server

1.10 Discuss the considerations for process design
- Transaction grouping
- Service grouping
- Presentation services

1.11 Describe the process of physical database design
- Table design
- (De)normalization
- Primary key/index
- Foreign key
- Partitioning/distribution
- Access plans

1.12 Describe the security elements
- Logon server
- Protection views
- Application level

1.13 Discuss the impact of different network protocols
- Describe network protocol considerations
- TCP/IP
- OSI protocols
- SNA protocols

1.14 Describe the components of application development
- Discuss criteria for language choice
- Discuss methodology

1.15 Discuss choice and use of different development tools
- Identify program entities
- Coding standards
- Libraries
- Error handling
- Debugging methods
- Code optimization
- Documentation standards

1.16 Describe the testing process
- Module testing
- Path testing
- Integration testing
- System testing
- Operations testing
- Failure testing
• Stress/performance testing
• User acceptance testing

2) Products and Tools (21%)

2.1 Describe the products and tools used to work with a database
• Define the features and use of
  • SQLCI (Conversational I/F)
  • FUP
  • MXCI
  • ENABLE
  • ENFORM

2.2 Describe characteristics of the major NonStop Pathway subsystems
• Describe the major components and functions of
  • Pathway/TS
  • TS/MP
  • Pathway/XM

2.3 Demonstrate knowledge of NonStop middleware components
• Describe the major components and functions of NonStop CORBA and NonStop JORB
• Describe the major components and functions of NonStop ODBC
• Describe the major components and functions of RSC/MP
• Describe the major components and functions of NonStop DCE (Distributed Computing Environment)
• Describe the major components and functions of NonStop DTE (Data Transformation Engine, Mercator) e.g. ETLs (Extract Transformation and Loads)
• Describe the major components and functions of OSI/MHS (Message Handling System)
• Describe the major components and functions of NonStop EAS (Enterprise Java Beans)
• Describe the major components and functions of TUXEDO
• Describe the major components and functions of NonStop Server Object Gateway

2.4 Demonstrate knowledge of NonStop development tools
• Define the features and use
  • DDL (Data Definition Language)
  • SCUP
  • SCOBOL
  • SQLCOMP
  • NonStop Java
  • TAL/pTAL
  • COBOL85
  • C/C++
• Native mode compilers
• AXCEL code accelerator
• BIND/NLD/NOFT
• TEMPL/TEMPLI
• TACL
• IDL (I/F Definition Language)
• PATHMAKER
• Himalaya Integrated Development Environment
• JDB Java Debugger
• INSPECT, VISUAL INSPECT, DEBUG

2.5 Demonstrate knowledge of NonStop transaction monitoring facility and related tools (TMF)
• Describe the major stages of the TMF transaction lifecycle
  • BEGIN/END
  • COMMIT
  • ABORT
• Describe the purpose and usage of transaction identifiers
• Describe the relationship between TMF and OTS/JTS (Transaction Services)
• Identify the use of AutoTMF

2.6 Demonstrate knowledge of NonStop web interfaces and products
• Describe the major components and functions of iTP WebServer
  • Pathway/CGI
  • Servelets
  • Java Server Pages
  • Active Transaction Pages
• Describe the major components and functions of Pathway/iTS
• Describe the functionality of
  • JDBC
  • JPATHSEND
  • JEnscribe

2.7 Demonstrate knowledge of instrumentation capabilities
• Describe components of the EMS subsystem
• Define the features and use of EMS/Faststart
• Describe components of the SPI architecture
• Describe the use of Measure

2.8 Demonstrate knowledge of data replication facilities
• Describe the major components and functions of RDF
• Describe the relationship between NonStop RDF and TMF
3) Application Architecture (16%)

3.1 Discuss the techniques used to optimize performance of a NonStop application
   • Describe how to recognize code that can be accelerated
   • Discuss the use of server classes versus named processes
   • Discuss how to utilize memory efficiently
   • Discuss techniques to optimize disk I/O
     • Use of explain plan in SQL
     • Design for serial inserts
     • Optimal ratio of records/rows to blocks
     • Types of files suitable for different uses
   • Discuss use of waited and nowaited I/O
   • Discuss the use of process priorities
   • Describe how to minimize the number of process-to-process hops to process a transaction

3.2 Discuss the techniques to achieve required availability of a NonStop application
   • Describe how named process pairs provide availability
     • Checkpointing
     • Active versus Passive backup processes
   • Describe how persistent processes provide availability (including management by persistent monitors such as PATHMON)

3.3 Discuss the techniques to achieve required scalability
   • Discuss use of PATHWAY serverclasses
   • Discuss transaction isolation (independence of this transaction from others)
   • Discuss how atomicity (context-free units of work) improves scalability
   • Discuss the use of application partitioning to achieve “ultimate” scalability

3.4 Discuss the “ACID” properties of well-designed transactions
   • Define Atomicity
     (Changes are done completely or completely undone)
   • Define Consistency
     (Effects of a transaction are preserved invariant properties of system)
   • Define Isolation
     (Intermediate states are not visible to other transactions)
   • Define Durability

3.5 Discuss the benefits and uses of different application architecture models
   • Discuss the Requester/Server model
   • Discuss the Client/Server model
   • Discuss web application models
   • Define what is meant by context-free and context-sensitive servers
   • Discuss the use of shared memory
3.6 Discuss NonStop application limits
   • Discuss message system considerations and limitations
     • IPC size limitations
     • Number of opens
     • Impact of network messages on TMF
     • Discuss transaction boundaries

3.7 Discuss application portability to a NonStop system
   • Define requirements for Java portability
   • Define requirements for porting UNIX programs to OSS

3.8 Discuss distributed application design
   • Define distributed transactions (multiple nodes)
   • Define distributed processes
   • Discuss heterogeneous applications
     • Message queuing
     • Message formatting and data conversion
     • Communications interfaces
     • File transfer methodology

3.9 Discuss considerations of the different operating system personalities
   • Define how to talk from OSS to Guardian
   • Describe how to define Guardian and OSS servers in TS/MP
   • Discuss file system differences, or relationships
   • Discuss functions of the /G and /E OSS directory interfaces
   • Describe how to invoke TACL commands from OSS shell

4) Database Design (10%)

4.1 Describe principles of logical database design
   • Demonstrate knowledge of Entity/Relationship analysis
   • Demonstrate knowledge of the normalization process

4.2 Describe principles of physical database design
   • Discuss the considerations for choosing file systems
     • Enscribe
     • OSS
     • NonStop SQL
   • Discuss the considerations for choosing specific file types
   • Discuss the following:
     • Primary key / index
     • De-normalization
     • Database sizing
     • Partitioning
     • File placement
     • Backup/recovery strategies
     • Selection of data types
- Data compression
- Cache management

4.3 Discuss the functions and use of catalogs
- Program validation
- Statistics
- Catalog (metadata)

4.4 Discuss considerations related to performance/availability
- Key lengths
- Locks and lock lengths
- Query design
- Control statements/control table
- Parallel processing

4.5 Discuss file size considerations
- Maximum partitions on an Enscribe file
- Maximum blocksize in an Enscribe file
- Maximum extents in a Enscribe file or SQL table
- SQL table limitations
- Use of format2 files

5) Security (5%)

5.1 Describe how and when to use encryption
- Describe why encryption is necessary
- Describe the NonStop facilities for encryption
- Describe difference between hardware and software encryption
- Identify encryption techniques
  - Symmetric versus asymmetric encryption
  - Private and public key encryption
  - Privacy
  - Non-repudiation
  - DES
  - PKI
- Identify functionality (functional capability) of Atalla products
- Identify NonStop Kernel products used to implement SSL, PKI, VPN (Web) technologies

5.2 Discuss the need for firewalls
- Identify the purpose of a firewall
- Describe when to use a firewall
- Describe how presence of a firewall affects a NonStop design

5.3 Describe GUARDIAN security
- Demonstrate knowledge of GUARDIAN users and groups
- Describe the Guardian file security string (RWEP->AN,CG,UA-*)
- Explain the use of REMOTE PASSWORDs for distributed applications
• Describe how an application program can authenticate a user using GUARDIAN system procedure calls
• Describe features available for securing applications
• Describe Safeguard security features for application programs

5.4 Describe OSS security
• Describe OSS security features available to applications programmers
• Describe the differences between GUARDIAN and OSS Security

6) Designing for Change: Best Practices (5%)

6.1 Describe best practices for future change
• Discuss considerations for portability
• Describe isolating data from the application
• Demonstrate how to use a modular design
• Discuss the use of version-labeled interfaces for intermodule communication (message versioning)
• Identify implementation support techniques
• Discuss handling changes in the initialization information
• Describe server-based client executable code management
• Demonstrate knowledge of avoiding hard coding the names of physical objects
• Describe best practices for changing a NonStop SQL/MP program or database

6.2 Describe migration information sources available to application developers

7) Application Development on NSK (16%)

7.1 Identify the development environments available for the NonStop Kernel (Guardian and OSS)

7.2 Explain the techniques of fault tolerant programming
• Describe process pairs
• Describe persistent processes
• Describe Checkpointing

7.3 Describe the usage of information sources/resources available to developers

7.4 Describe the functions of code generators
• Describe the features of Pathmaker
• Describe the functions of SCUP
• Describe the normal use of ENABLE

7.5 Discuss source code management
• Describe the purpose of source code management
• Describe the usage of VPROC for an application
7.6 Describe the different methods of object code creation
- Describe the differences between non-native, native and accelerated object code
- Describe the static vs dynamic SQL/MP compilation process
- Describe the steps to compile a program containing embedded SQL/MP statements
- Demonstrate knowledge of the bind (BIND and NLD) process

7.7 Identify the available debugging tools
- Describe the differences between INSPECT and VISUAL INSPECT
- Describe when you would use DEBUG
- Explain the use of the IMON process
- Define the naming convention of Saveabend files

7.8 Demonstrate knowledge of DEFINES, ASSIGN, PARAMS and late binding
- Describe the difference between DEFINES and ASSIGNS
- Describe the purpose of PARAM
- Describe the purpose of environment variables (OSS)
- Identify when “Late Binding” is required
- Describe the relationship between DEFINES and Pathway server classes

7.9 Demonstrate knowledge of Pathway and Tuxedo Transaction Services
- Describe the function of PATHSEND
- Discuss the proper implementation of TS/MP server protocol
- Describe how to invoke a TUXEDO service

7.10 Discuss EMS logging
- Define the elements of a tokenized message
- Describe how to create a tokenized message
- Describe the usage of EMS templates
- Identify tools used to create EMS templates (EMS Fast Start)
- Describe how to activate EMS templates
- Describe EMS collectors

7.11 Demonstrate knowledge of batch processing techniques
- Identify considerations associated with batch processing and TMF
- Describe the advantages of using DataLoader/MP

8) Application Management (11%)

8.1 Describe the tools/utilities used in performance and tuning
- Describe the types of data available from MEASURE
- Describe the output of GPA
- Describe the use of the statistics provided by Pathway
- Describe method for obtaining statistics for an SQLCI query
8.2 Demonstrate knowledge of capacity planning
- Describe the features of TCM
- Describe the features of TPDC

8.3 Describe the main configurable components of an application
- Describe the attributes of the PATHWAY environment
- Describe the attributes in a Pathway server class
- Describe the attributes in a TCP
- Describe the configurable attributes of Tuxedo
- Describe the configurable attributes of batch suites, such as NetBatch

8.4 Demonstrate knowledge of backup and recovery utilities
- Describe the function of
  - BACKUP
  - RESTORE
  - TMF DUMP FILES
  - TMF RECOVER FILES
  - PAX

8.5 Identify the tools available for manageability
- Describe the use of
  - VHS
  - OMF
  - EMS
  - MEASURE
  - NetBatch
  - SQLCI
  - ENFORM
  - ASAP

8.6 Demonstrate knowledge of TACL (Tandem Advanced Command Language)
- Describe the use of TACL Macros and Obey Files
- Describe the function of the PMSEARCHLIST
- Describe the function of the DEFINE=_DEFAULTS

8.7 Demonstrate knowledge of ViewPoint and Web ViewPoint
- Identify the TACL Macro to start ViewPoint
- Describe the purpose of FILTERS
- Describe the advantage of using Web Viewpoint
9) Error Handling and Recovery (6%)

9.1 Demonstrate knowledge of runtime errors
   - Demonstrate knowledge of file system error documentation
     - Define file system errors
     - Define file system warnings
     - Explain some common file system errors
   - Demonstrate knowledge of programming techniques for capturing and recovering from file system errors
   - Demonstrate coding to detect file system errors
   - Demonstrate ability to recover from file system errors

9.2 Demonstrate knowledge of programming techniques for capturing and recovering from SQL errors
   - Demonstrate knowledge of SQL errors
     - Demonstrate knowledge of SQL error documentation
     - Define SQL errors
     - Define SQL warnings
     - Explain some common SQL errors
       - Explain the difference in error reporting in SQL and file system errors
     - Demonstrate differences in SQL error checking for NonStop SQL/MX

9.3 Demonstrate knowledge of programming techniques for capturing and recovering from various subsystem errors
   - Demonstrate knowledge of subsystem errors
     - Demonstrate knowledge of subsystem error documentation
     - Define subsystem errors
     - Explain some common subsystem errors
   - Demonstrate knowledge of programming techniques for capturing and recovering from subsystem errors
     - Describe coding to detect subsystem errors
     - Demonstrate the ability to recover from subsystem errors
     - Demonstrate knowledge of subsystem error documentation
     - Demonstrate the ability to test for SPI errors
     - Demonstrate knowledge of aborting a transaction
Related Training and Study References

The NonStop Systems Certification (Level 1) includes references to a variety of materials that provide information included on this certification exam. Completion of courses and review of materials is recommended, but not required, for success on this exam.

Recommended Minimum Courses

<table>
<thead>
<tr>
<th>Course Title</th>
<th>Part Number</th>
<th>Type</th>
<th>Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concepts and Facilities</td>
<td>U4147S</td>
<td>ILT</td>
<td>4 days</td>
</tr>
<tr>
<td>NonStop SQL/MP Essentials</td>
<td>U4181S</td>
<td>ILT</td>
<td>4 days</td>
</tr>
<tr>
<td>NonStop SQL/MP Overview</td>
<td>101477</td>
<td>ISP</td>
<td>8 hours</td>
</tr>
<tr>
<td>Object-Oriented Analysis - Dynamic Modeling (C and C++)</td>
<td>CBTEG168</td>
<td>ISP</td>
<td>6 hours</td>
</tr>
<tr>
<td>Open System Services (OSS) Operations and Management</td>
<td>U4188S</td>
<td>ILT</td>
<td>5 days</td>
</tr>
<tr>
<td>Pathway Application Programming Education Series</td>
<td>86273</td>
<td>ISP</td>
<td>35 hours</td>
</tr>
<tr>
<td>NonStop TUXEDO System Administration</td>
<td>424370-001</td>
<td>ISP</td>
<td>8-10 hours</td>
</tr>
</tbody>
</table>

Additional Highly Recommended Courses

<table>
<thead>
<tr>
<th>Course Title</th>
<th>Part Number</th>
<th>Type</th>
<th>Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corba Programming on NonStop Systems</td>
<td>U4148S</td>
<td>ILT</td>
<td>4 days</td>
</tr>
<tr>
<td><em>NonStop™</em> SQL/MP Conversational Interface</td>
<td>101478</td>
<td>ISP</td>
<td>18 hours</td>
</tr>
<tr>
<td><em>NonStop™</em> SQL/MP Physical Database Design</td>
<td>U5082S</td>
<td>ILT</td>
<td>2 days</td>
</tr>
<tr>
<td><em>NonStop™</em> SQL/MP Programmatic Interface</td>
<td>11990</td>
<td>ISP</td>
<td>18 hours</td>
</tr>
<tr>
<td><em>NonStop™</em> SQL/MP Query Design for Performance</td>
<td>522621-001</td>
<td>ILT</td>
<td>4 days</td>
</tr>
<tr>
<td>Object-Oriented Analysis - Objects and Classes (C and C++)</td>
<td>CBTEG169</td>
<td>ISP</td>
<td>5 hours</td>
</tr>
<tr>
<td>Object-Oriented Design - (C and C++)</td>
<td>CBTEG170</td>
<td>ISP</td>
<td>3 hours</td>
</tr>
<tr>
<td>Pathway System Management</td>
<td>U9194S</td>
<td>ILT</td>
<td>3 days</td>
</tr>
</tbody>
</table>

ILT = Instructor-Led Training
SST = Self-Study Training

Check web site course descriptions for prerequisites at:

Additional Recommended Reference Materials for This Exam

Go to the link for the Application Design chapter and review it for this exam:

References to the majority of questions found in this exam can be found in manuals contained in the Online TIM (Total Information Manager) collections (This guide typically references the latest release available in the TIM Document Collection). TIM is a single interface to all NonStop Systems documentation and support information. External users must subscribe to the TIM CD collection. See your Compaq Representative for more information.

NOTE: TIM must be installed on your system before using the following default access settings. [http://tex.tandem.com/cgi-bin/timcfg.exe](http://tex.tandem.com/cgi-bin/timcfg.exe)
Documentation
The references below are based on information available as of May 2001. Information nested (~) and in quotation marks (") indicates subsections emphasized in the document.

- Application Design (54179)
  ~ Life Cycle and Methodology
  ~ What is Application Availability?
  ~ Designing Applications for Change “Application Architecture”
- Availability Guide for Application Design (124511)
  ~ What is Application Availability?
  ~ Overview of Server and Network Fault Tolerance
  ~ Data Protection and Recovery
  ~ Increasing the Availability of Open Applications
  ~ Availability in the Pathway Transaction-Processing Environment
  ~ Availability through Process-Pairs and Monitors
  ~ Instrumenting an Application Availability
  ~ Minimizing Programming Errors
  ~ Development Methodology “Specify and Review the Requirements”
  ~ What is Application Availability
- Cobol 85 for NonStop Systems Manual (429297-001) “Using COBOL85 in the Open System Services (OSS) Environment”
- Data Definition Language (DDL) Reference Manual (426798-001), “Introduction to DDL”
- DataLoader/MP Reference Manual (142887) “Intro to Data/Loader/MP”
- Debug Manual, (421921-001) “Introduction”
- DSM Template Services Manual (427187-001) “Introduction” and “Installing Templates”
- EMS Manual (426909-001)
  ~ Introduction to EMS
  ~ Configuring EMS
  ~ Web ViewPoint documentation
- ENABLE Users Guide (082571)
- ENFORM Users Guide (058058) “Developing an ENFORM Query”
- Enscribe Programmers Guide (137692) “General File Creation and Access Information”
- GPA Manual (135081)
- Getting Started with Visual Inspect (131794)
- Guardian Disk and Tape Utilities Reference Manual (426958-001)
- Guardian Procedure Errors and Messages Manual (420035-001)
- Guardian Programmers Guide (421922-001) “Creating and Managing Processes”
- Guardian Users Guide (425266-001)
- Inspect Manual (118810) “Debugging Processes and Save Files”
- Introduction to Data Management (015873) “Managing Data on the Tandem Systems”
- Introduction to NonStop Operations Management (125507)
- Introduction to NonStop Transaction Manager/MF (TMF) (124757) “Application Programming
for the TMF Subsystem"
- Introduction to Tandem NonStop S-Series Servers (130961)
  ~ Online Transaction Processing Systems
  ~ The Transaction Processing Environments
- iTP Active Transaction Pages (424331-001) “ATP Web Page and Script Structure”
- Measure Reference Manual (425077-001)
- NLD and NOFT Manual (427686-00) “Introduction to the Utilities”
- NetBatch Manual (142530) “Job Planning, Submission, and Management”
- NonStop AutoTMF User's Guide (427642-001) "Preparing Programs"
- NonStop RSC/MP 6.1 Installation and Configuration Guide (425709-001) “Configuring and Managing the RSC/MP TDP Process”
- NonStop RSC/MP Programming Manual (425711-001) “Introduction to Remote Server Call (RSC/MP)”
- NonStop S-Series Server Description Manual (425160-001)
- NonStop Server for Java (NSJ) Tools Reference (426948-001) “Java Debugger”
- NonStop Server for JAVA 1.5 (422097-001) "Accessing NonStop SQL/MP Databases”
- NonStop SQL/MP Installation and Management (424912-001) "Managing Database Applications”
- NonStop SQL/MP Query Guide (429826-001)
  ~ Cancel Command
  ~ Data Dictionary
  ~ FC Command
  ~ Generalized Owner
  ~ Icompress File Attribute
  ~ Left_Margin Option
  ~ Page_Count Option
- NonStop SQL/MP Programming Manual For C (427071-001) “Explicit Program Compilation”
- NonStop SQL/MP Reference Manual (429320-001)
  ~ Cancel Command
  ~ Data Dictionary
  ~ FC Command
  ~ Icompress File Attribute
  ~ Left_Margin Option
  ~ Page_Count Option
- NonStop (TM) CORBA 2.3 (see Independent Product User Documentation in TIM)
  ~ CORBA 2.3 Architecture
- NonStop TMF Application Programmers Guide (136586) “TMF Programming Environment”
- NonStop TMF Reference Manual (137445) “NonStop TMF Limits”
- NonStop TS/MP PathsEnd and Server Programming Manual (132500-001)
  ~ Intro to Pathway Application Programming
  ~ Designing Your Application
~ Writing Pathsend Requesters
~ Writing Pathway Servers
• NonStop TS/MP System Management Manual (135027)
  ~ Overview of PATHCOM
  ~ PATHCOM Operation Commands
  ~ PATHMON Environment Control Commands
  ~ Server Commands
• NonStop TUXEDO System Application Development Guide (125218) “Application Development Environment Overview”
• NonStop Virtual Hometerm Subsystem (VHS) Manual (140607)
  ~ Introduction to VHS
  ~ VHS Limits
• Object Monitoring Facility OMF Manual (422666-001)
• Open System Services Management and Operations Guide (425683-001)
• Open System Services Porting Guide (425278-001) “Porting UNIX Applications to the OSS Environment”
• Open System Services Programmer's Guide (128186)
  ~ Managing Files
  ~ Overview of the OSS Programming Environment
  ~ UNIX common knowledge
• Open System Services User's Guide (420292-001)
  ~ Intro to Open System Services
  ~ Running the OSS Shell
• Operator Messages Manual (427190-001)
• OSF DCE Application Development Guide (124246) “Introduction to DCE Application Programming”
• Pathmaker Programming Guide (067868)
• Pathway SCUP Reference Manual (109425) “Introduction to SCUP”
• Pathway/TS SCREEN COBOL Utility Program (SCUP) Reference Manual (139453)
  ~ Introduction to SCREEN COBOL
  ~ Procedure Division
• Pathway/TS System Management Manual (120040)
• Pathway/TS TCP and Terminal Programming Guide (121308)
  ~ Programming for Specific Terminals
  ~ Introduction to TCP and Terminal
• Pathway/XM System Management Manual (426761-001)
  ~ Configuring servers
  ~ Pathway/XM Benefits and Features
• Pathway/iTS Web Client Programming Manual (426746-001) “Introduction to Pathway/iTS Web Clients”
• Pathway/iTS SCUP Reference Manual (426747-001)
• RDF/MP and IMPX System Management, (424123-001)
  ~ Introducing RDF
~ RDF Command Summary
- Security Management Guide (118610)
- Software Release Document T8628D40 (427169-001)
- TACL Reference Manual (109462)
  ~ Built-In Functions and Variables
  ~ UTILS: TACL Commands and Functions
- Tandem Capacity Model (TCM) Manual (424093-001)
- Tandem Performance Data Collector (TPDC) Manual (425647-001)
- TM/MP Application Programmer's Guide (136586)
  ~ TMF Programming Environment
  ~ Procedure Call Syntax
- TNS/R Native Application Migration Guide (136525)
  ~ Introduction to Native Mode
  ~ Developing a Migration Strategy
- TS/MP Pathsend and Server Programming Manual (132500)
  ~ Glossary
  ~ Designing your Application
  ~ Writing Pathsend Requesters
- TS/MP System Management Manual (135027)
  ~ Overview of PATHCOM
  ~ Managing the Pathsend Environment
  ~ Configuring Objects in a PATHMON Environment
  ~ SERVER Commands
- ViewPoint Manual using ViewPoint (426801-001)

Other References
- White paper: "Evolution in High-End Parallel Computing: SMP, Clusters, and MPP Revisited" by Jean Papadopoulo, Bull Systems
- http://java.sun.com/docs/books/tutorial/
- http://search.java.sun.com/search/java/?qt=Your+First+Cup+of+Java
- www.itug.org/sigs/index.cfm