Purpose of the Exam Preparation Guide

The intent of this guide is to set expectations about the content and the context of the exam and to help candidates prepare for the exam. In this guide, you will find recommended HP training courses, reference and study material to help you achieve a successful passing score.

Studies conducted by HP and Prometric show that a combination of course attendance and self-study maximizes the likelihood of passing the exam on the first attempt.

Audience

This exam is targeted for the following audience, with a minimum of three to five years’ experience on the NonStop S-Series platforms running the G-Series NonStop Kernel Operating System. Examples of job roles:

- Professional Services personnel who assist NonStop customers.
- 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 and NonStop applications and serve as support for both field support technicians and customers.
- Analyst SEs or Pre-Sales Technical Support (PSTS) personnel, who perform pre-sales consulting and technical account support.
- NonStop Technical Consultants (both internal and external), System Integrators and Consultant Partners, Authorized Service Channel Partners and Distributors, Customers authorized to service their own equipment.


Certification Requirements

The NonStop Structured Query Language (SQL) Exam HP0-780 is an elective for certification as an Accredited System Engineer (ASE) in the HP NonStop S-series Systems track. It is also an elective for the HP NonStop Kernel Certified Systems Engineer (CSE) in the HP Operating System certification.
Prerequisites

Successful completion of the Accredited Integration Specialist (AIS) - Level 1 is required for the Accredited System Engineer (ASE) - Level 2 certification. One mandatory exam and three electives, totaling four exams, are required for ASE certification. For NonStop Systems track requirements, visit the website at http://education.nonstop.compaq.com/us/cert/certtrak.pdf or http://www.hp.com/go/certification

The NonStop Level 2 mandatory exam is:

- NonStop Kernel Advanced Exam HP0-760

The Level 2 electives are based on the participant’s certification goals.
Note that three to five years' experience or more is highly recommended for ASE certification. "Hands on" experience with the NonStop S-series system is essential.

**Exam Details**

The NonStop Structured Query Language (SQL) is a live exam. You will receive a score report with your results after testing is complete. You can use the report to identify areas of strength and learn about areas to improve, if necessary.

If you do not pass this exam, refer to your percentages for each core competency shown on your score sheet. Use these results to guide you in areas where you need to study or review more than other competencies.

**Test Information**

- **Number of test items:** 78
- **Item type:** multiple choice
- **Exam time:** 105 minutes
- **Passing score:** 55%
- **Reference material:** No online or hard copy reference material will be allowed at the testing site.
Exam Content

The following outline represents the specific areas of content covered in the exam. Use this outline to guide your study and to check your readiness for the exam. The exam measures your understanding of these areas. The approximate percentage of exam questions dedicated to each major content area is included in parenthesis.

1) NonStop SQL and Relational Database Concepts (23%)

1.1 Describe database objects

- Tables
- Views
- Indexes
- Catalogs
- Collations
- Comments
- Constraints

1.2 Describe NonStop SQL architectural components

- Describe NonStop SQL processes
  - SQLCI
  - SQLCI2
  - SQLCAT
  - SQLUTIL
  - SQUESP
  - SQLCOMP
  - SORTPROG
  - DP2
- Describe NonStop SQL functions
  - Optimizer
  - Executor
  - SQLFS2
  - Master executor
- Describe related SQL objects

1.3 Describe embedded versus nonembedded SQL

- ODBC
- JDBC
- Languages supported

1.4 Demonstrate knowledge of normalization
• Define normalization
• Describe the methods of normalization
• Describe what denormalization is

1.5 Demonstrate knowledge of referential integrity
• Describe the need for referential integrity
• Describe the impact of a lack of referential integrity
• Define the use of foreign keys

1.6 Describe joins
• Describe the join types
• Describe a Cartesian product
• Describe the join methods

1.7 Describe the use of secondary indexes
• Performance
• Random access
• Implications
• Uniqueness

1.8 Define primary key
• Single column
• Composite key
• Clustering key
• Syskey

1.9 Demonstrate knowledge of data access strategies
• Single record by key
• Table scans
• Multi-dimension access method
• Index
• Index-only

1.10 Describe file organization
• Key-sequenced
• Entry-sequenced
• Relative

1.11 Describe data types
• Datetime
• Character
• Numeric
1.12 Describe scalability

- Hot spots
- Partitioning
- Database distribution
- Parallel processing hardware and software
- Linear expansion
- Online configuration

1.13 Describe database integrity

- A.C.I.D.
- Transactions
- Mirrored disks
- TMF
  - Audit trail logs
  - Online dump

1.14 Describe availability

- NonStop availability
- Basic fault-tolerant hardware and software
- Linear expansion
- Online database reorganization/configuration

2) Describe catalogs (17%)

2.1 Describe catalogs

- Contrast user catalogs and system catalog
- Describe the use of the CATALOGS table
- Describe how to find the system catalog
- Describe how to find the user catalogs
- Describe factors that influence the location of catalogs
- Describe the effects of upgrading and downgrading catalog versions
- Explain the uses of a licensed SQLCI2
- Describe the set of catalog tables and their use
- Discuss security issues regarding catalog tables
- Explain catalog usage limitations

2.2 Describe data types

- Describe the different datetime data types
- Describe the different character data types
- Describe how to determine the sort order of the data in a column
• Explain data type usage limitations

2.3 Describe columns
• Describe the factors limiting the size of a column
• Describe the limits of the UPSHIFT function
• Explain the use of collations and national character sets
• Explain column usage limitations
• Explain the implications of adding columns
• Describe the use of the column value default

2.4 Describe keys
• Describe the need for clustering keys
• Describe the use of primary keys
• Describe the implications of using SYSKEY
• Explain the use of composite keys
• Describe the purpose of index keys
• Explain the limitations of the various types of keys
• Explain the implications of column order in multi-column keys
• Explain the implications of column order in multi-column keys
• Explain the use of locklength

2.5 Describe tables
• Identify the storage order
• Explain table usage limitations
  o Number of partitions
  o Table placement
  o Audited volume
  o Row length
  o Partition size
  o Number of columns per row
• Explain the potential consequences of SQL object versioning
• Describe the use of constraints

2.6 Describe physical attributes
• Contrast Format 1 to Format 2 partitions
• Discuss the different file organizations
• Describe how to register objects
• Describe the use of the partition array attribute
• Describe the purpose of the physvol attribute
• Describe the sizing attributes

2.7 Describe partitioning
• Discuss why tables and/or indexes are partitioned
• Discuss how tables and/or indexes are partitioned
• Describe how to specify partition boundaries
• Describe the syntax to alter the partition boundary
• Explain why a table might be partitioned across Expand nodes
• Describe how to partition a table whose primary key is a SYSKEY
• Describe how to partition a table whose primary key is a composite (multi-column) key
• Describe the attributes necessary to mix Format 1 and Format 2 partitions in the same table
• State the conditions affecting the maximum number of partitions
• Describe the factors that limit the maximum number of index partitions
• Describe partitioning of entry-sequenced and relative tables

2.8 Describe protection and shorthand views
• Describe the limitations on the location of a protection view
• Describe the limitations on text size of a shorthand view
• Describe when a shorthand view becomes invalid
• Describe what columns can be omitted from a protection view
• Describe how one view can reference another view
• Describe how protection views can limit the data which can be inserted in the base table
• Explain the limit to the number of tables which can be referenced in a single view
• Describe the limit of the number of protection views that can be defined for a single table

2.9 Describe utilities
• Describe the use(s) of
  o LOAD
  o LOG
  o FILEINFO
  o COPY
2.10 Describe SQL documentation usage

- Identify documentation/information that describes the creation of SQL objects
- Describe how to interpret SQL errors and warnings using documentation/information
- Explain how to get examples from SQLCI Help subsystem

2.11 Describe the CREATE command

- Describe the limitations of the LIKE modifier in the CREATE command
- Describe how to create a constraint

3) Operations and Management (22%)

3.1 Demonstrate knowledge of capacity management

- Identify tools used in database capacity management
- Identify solutions to database capacity issues
- Describe database capacity management issues

3.2 Demonstrate knowledge needed to plan for database growth

- Identify tools used in growth management
- Describe growth management issues
- Explain the impact of database growth
- Explain the differences between Format 1 and Format 2 tables

3.3 Demonstrate knowledge of database backup and recovery

- Describe recovery strategies
- Demonstrate ability to develop and test a recovery strategy
- Identify the tools used in database production management

3.4 Demonstrate the ability to manage the physical database structure

- Describe considerations for creating an index
  - Describe the implications of using the WITH SHARED ACCESS clause for an index create
- Describe the use of the COMMIT clause when used with the SHARED ACCESS clause
- Describe how to create an index in parallel
• Describe the use of a CONFIG file in the parallel creation of an index
• Describe considerations for managing partitions

3.5 Explain issues involved in change management
• Describe the potential impact of changes to the operating system software
• Describe the potential impact of changes to the application software
• Describe the issues related to database changes
• Explain the testing recommended prior to performing the database change(s) to a production system
• Describe fallback or regression strategies
• Describe issues related to DDL changes

3.6 Demonstrate knowledge of performance management
• Describe compilation strategies software
• Describe the importance of database statistics
• Identify tools to move production data statistics to a test environment
• Explain why you would move production statistics to a test environment
• Identify tools used in performance monitoring
  Measure
  Peek
  ViewSys
  FUP
  SQLCI

3.7 Demonstrate knowledge of database security issues
• Describe security issues associated with SQL catalogs
• Describe the difference between Guardian and Safeguard database security
• Describe the security vectors necessary for a multi-node database

4) Application Development (20%)

4.1 Demonstrate knowledge of host language interfaces
• Describe how host variables are used
  Declared
  ~ Invoke
  Used in DML
  ~ Select
  ~ Insert
Update
Null indicators
Character stings C vs COBOL
varchars
datetime

4.2 Explain the various methods of programmatic error handling

SQLCODE
WHENEVER
8204 Error (lost open)

4.3 Demonstrate knowledge of the SQL interface areas

- Describe the content of the SQL interface areas
  SQLCA
  SQLDA
  SQLSA
  SQLCODE

- Describe the usage of the SQL interface areas
  SQLCA
  SQLDA
  SQLSA
  SQLCODE
  DESCRIBE

- Describe the content of the SQL interface areas
  SQLCA
  SQLDA
  SQLSA
  SQLCODE
  DESCRIBE

- Explain the use of INCLUDE structures
  Version
  Prerequisite entities

4.4 Demonstrate knowledge of dynamic SQL

- Demonstrate knowledge of dynamic SQL verbs
  Explain the use of PREPARE
  Explain the use of EXECUTE
  Explain the use of DESCRIBE

- Discuss static SQL vs dynamic SQL

4.5 Demonstrate knowledge of the effect of CONTROL statements

- Describe their use in static SQL
- Describe their use in dynamic SQL
  Control executor
  Control table
4.6 Demonstrate knowledge of concurrency

- Describe BROWSE access
- Describe STABLE access
- Describe REPEATABLE access
- Describe the different locking modes
  - shared/exclusive
  - lock duration
- Describe the effects of locking granularity
- Explain lock escalation
- Describe the effects of FREE RESOURCES

4.7 Demonstrate knowledge of the SQL compilation process

- Explain the typical compilation steps for an SQL program
- Describe the SQLCOMP options
  - CHECK
  - RECOMPILE
  - REGISTER

4.8 Describe compiler options

- Demonstrate knowledge of the language compiler directives
  - OSS
  - EXEC SQL DECLARE

4.9 Describe the use of DEFINES

- Demonstrate knowledge of mapping DEFINES
- Demonstrate knowledge of control DEFINES

4.10 Describe the use of the SQL data manipulation language (DML) statements

- Describe SELECT
  - Selection options:
    - SIMPLE SELECT
    - SUBSELECT
    - JOIN
    - UNION
    - GROUPING
    - WHERE
    - AGGREGATES, ETC

- Describe INSERT
  - Selection options:
- SELECT FROM
- VALUES
- Describe UPDATE
  Selection options:
  - VALUES CLAUSE
  - WHERE

4.11 Describe the use of cursors
- Explain the implications of opening a cursor
- Explain the use of FETCH
- Explain the limitations of an updateable cursor
- Explain the use of WHERE CURRENT OF
- Explain actions that invalidate a cursor
- Explain the use of foreign cursors

4.12 Describe transaction control
- BEGIN WORK
- BEGINTRANSACTION (Guardian)
- COMMIT WORK
- ROLLBACK WORK
- ENTRANSACTION (Guardian)

5) Performance (12%)

5.1 Demonstrate knowledge of physical database attributes
- Describe the impact of partitioning
  Local partitions
  Distributed database
- Identify the impact of cache settings
- Describe the impact of process priorities (mixed workload environment)
- Describe the impact of indexes
- Describe the impact of file creation attributes
  verified writes
  blocksizes
  buffered
  audited
  locklength

5.2 Describe conditions affecting performance
- Describe the effect of parallel execution
• Explain the impact of UPDATE STATISTICS
• Explain the impact of compiler settings
• Explain the impact of DEFINES
• Describe the use of CONTROL statements
• Explain the impact of locking strategies
  Deadlock
  Intent locking
  Lock escalation
  Locking granularity
  Browse access

5.3 Demonstrate knowledge of tools related to performance analysis
• Demonstrate knowledge of Measure
  FILE entity
  SQLSTMT entity
  Structured file output
  Section location table (SLT) index
• Demonstrate use of Explain plans
• Demonstrate knowledge of Tandem Reload Analyzer (TRA)
• Demonstrate knowledge of SQLCI commands
  VERIFY
  DISPLAY USE OF
  DISPLAY STATISTICS
  FILEINFO, STAT
  INVOKE
• Demonstrate knowledge of FUP commands
  LISTLOCKS
  LISTOPENS

5.4 Demonstrate knowledge of database reorganization affecting performance
• Contrast SQLCI LOAD vs FUP RELOAD vs SQLCI COPY
• Explain the benefits of Dataloader/MP

6) Problem Management (6%)
6.1 Describe problem prevention
• Demonstrate knowledge of the causes of problems
• Demonstrate knowledge of typical procedures for problem prevention

6.2 Demonstrate knowledge of problem identification
• Describe how to monitor the database
• Describe how to monitor the database
• Describe how to determine if a suspected problem is really a problem
• Demonstrate the ability to track a problem from the symptom(s) to the actual cause

6.3 Demonstrate knowledge of the tools required to identify and isolate problems
• Describe the tools that can assist in isolating performance problems
• Describe the tools that can assist in identifying locking problems
• Demonstrate ability to predict the consequences of a problem
• Demonstrate knowledge of identifying database problems

6.4 Explain requirements for problem resolution and escalation
• Demonstrate ability to gather relevant information
• Describe the tools that could be used to resolve the problem
• Describe the impact of the problem resolution
• Demonstrate the ability to test the solution
• Demonstrate the ability to implement the solution
• Describe the information required to escalate to GCSC
Recommended Training and Study References

This section lists training courses and documents that can help you acquire a majority of the knowledge and skills needed to pass the exam. You must also gain the practical experience outlined in this guide.

You are not required to take the courses listed in this section. However, HP **strongly recommends** that you attend the classes, participate in class labs, and thoroughly review all course material and documents before taking the exam, even if you believe you have sufficient on-the-job experience.

**Instructor-Led Training**

Use the information in this guide and the practical experience you have gained to determine your need for the HP instructor-led training.

The HP Certified Professional Program (Level 2) includes references to a variety of materials that provide information included on this certification exam. Completion of these HP courses and review of materials is recommended, but not required, for success on this exam.

Note that soon you will be able to participate in NonStop courses in a virtual classroom environment (RAIL). Refer to the [http://www.hp.com/education/sections/nonstop.html](http://www.hp.com/education/sections/nonstop.html).

**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>NonStop SQL/MP Database Management</td>
<td>U4180S</td>
<td>ILT</td>
<td>5 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 Physical Database Design Workshop</td>
<td>U5082S</td>
<td>ILT</td>
<td>2 days</td>
</tr>
<tr>
<td>NonStop SQL/MP Programming</td>
<td>U4182S</td>
<td>ILT</td>
<td>4 days</td>
</tr>
<tr>
<td>NonStop SQL/MP Query Design for Performance</td>
<td>U4183S</td>
<td>ILT</td>
<td>4 days</td>
</tr>
</tbody>
</table>

ILT = Instructor-Led Training
ISP = Independent Study Program

**Other Level 2 Recommended Resources**

For all Level 2 NonStop ASE exams, it is highly recommended that the certification candidates be familiar with the contents of the book (not available on NTL, but can be ordered through hp publishing):

**Courses Descriptions**

Check web site course descriptions for prerequisites at: [http://www.hp.com/education/sections/nonstop.html](http://www.hp.com/education/sections/nonstop.html)

To register in HP NonStop courses, go to: [http://www.hp.com/cgi-bin/education/regform.cgi](http://www.hp.com/cgi-bin/education/regform.cgi)

You can also call 1 (800) 472-5277 in North America, to speak with an education consultant or register for courses. If you are in Canada, call 1 (800) 563-5089 for information, or contact
your local education and training resource. For other locations, refer to the HP certification web page for your geography and your regional or local contacts.  
http://www.hp.com/go/certification

Or, you can send an email to nonstop.training@hp.com

Additional Recommended Reference Materials for This Exam

References for exam questions are found in the web-based HP NonStop Technical Library (NTL). Technical documentation previously found on TIM (Total Information Manager) collections now resides on NTL, which is now the single interface to all NonStop documentation and support information. The NTL can be accessed from these URLs:

Internal: http://techlibrary.cac.cpqcorp.net/ntl/.

External: www.hp.com/go/ntl

Note that this exam preparation guide typically references the latest documentation release available.
Documentation

The information in this exam preparation guide is current as of release G06.20. However, you may find the information in earlier or later versions of the HP NonStop Technical Library (NTL) documentation as well. Page numbers of specific references are provided below.

- ASAP Server Manual (422770-001) G06.20, 1-4
- Availability Guide for Application Design (525637-002) Mod 1-5, 12, Mod 3-4,
- Availability Guide for Problem Management (125509) Mod 5-9
- Dataloader/MP Reference Manual (424148-003) Mod 6-1
- Enscribe Programmers Guide (520369-002) Mod 6-2
- File Utility Program (FUP) Reference Manual (523323-002) Mod 2-11, 17, 84, 110, 136/140 Mod 3-12
- GCSC Data Collection Guide (Support Note S01005A) Page 52
- Guardian Disk and Tape Utilities (523325-002) Mod 3-9/10
- Inspect Manual (118810) Mod 4-11/12
- Introduction to NonStop SQL/MP (113425) Mod 3-7, 9
- Measure Reference Manual (523324-001) Mod 3-(All) 65/66, 68/69, 76/77, 193, 191/193 Mod 7-14, 16
- NonStop SQL/MP Database Management Course, (522520-001) Mod 2-22 Mod 3-12
- NonStop SQL/MP Installation and Management Guide (523353-001) Mod 2-4 Mod 3-8, 12 Mod 4-5/6, 8/9, 12, 13, 16 Mod 5-10, 14 Mod 7-8, 21, 32 Mod 8-3 Mod 10-2, 7/8, 31, 38 Mod 11-1, 2, 6, 25 Mod 12-3/4 Mod 13-All Mod 14-7/19, 21
- NonStop/MP Report Writer Guide (527213-001) Mod 4-16
- NonStop SQL/MP Version Management Guide (429833-001) Mod 1-4 Mod 5-12, 15
- NonStop TUXEDO System Application Development Guide (125218) Glossary-12
- Operator Messages Manual (522687-007) Mod B-3
- RDF IMP and IMPX System Management (524388-001) Mod 6-5
- SCF Reference Manual for the Storage Subsystem (423408-001) Mod 14-17
- Scout for NonStop Systems (429237-002) Mod 6 Introduction
- Softdocs (T9193) Page All
- Software Installation and Upgrade Guide (526295-002) Mod 1-10
- SQL/MP Database Management Environment (523353-001) Mod 1 –13 Mod 3-8 Mod 5-21 Mod 7-8, 30 Mod 10-10, 16 Mod C-All
- SQL/MP Messages Manual (427720-001), Page v Mod 10-27 Mod I-13
• SQL/MP Programming for COBOL85 (429326-002) Mod 2-2 Mod #-2 Mod 3-1 Mod 4-16 Mod 5-17 Mod 6-28, 41 Mod 8-2/4 Mod 9-9 Mod A-1
• SQL/MP Programming for TAL (050115) Mod 1.1 Mode E-2
• SQL/MP Programming Manual for C (429847-001) Mod 2-3 Mod 3-2 Mod 4-2, 11, 24 Mod 6-28
• SQL/MP Query Guide (524488-001) Mod 2-3 Mod 3-8, 12, 24,25,48,54, 60 Mod 4-4,6,7,9,10, 17 Mod 6-49 Mod D-1 Mod F-12
• SQL/MP Reference Manual, NTL (523352-001) Page 6, 17, 19 Mod 1-32 Mod 2-136 Mod 3-10, 24,25 Mod 12-2 Mod A-8, 9, 16/17, 29, 40, 42 Mod C-13, 14, 25, 46/47, 68/69, 70, 72, 77, 78/79, 89, 108, 126, 129, 130, 131, 133, 139, 142, 145/159, 162, 166 Mod D-1, 2, 5, 9, 12, 14, 22, 24, 27, 39/40, 50/55, 58, 77 Mod E-4, 13 Mod F-4, 10, 15, 31 Mod G-1, 6 Mod H-2 Mod I-4, 6, 11, 15, 17, 25/26, 46 Mod J-1 Mod L-7/10, 12, 13, 17, 31, 32, 43, 46/47, 49, 50, 52 Mod M-4/10, 22 Mod N-7, 12 Mod P-26, 29 Mod S-17/18, 56, 67, 87, 89 Mod T-6 Mod U-3, 8/9, 16 Mod V-10 W-5 Mod Z-10 Convert & Load commands
• Tandem Reload Analyzer Manual, (129830) Mod 1-1 Mod 2-13
• Tandem Capacity Model (TCM) Manual (522695-003) Mod 1-1
• Tandem Performance Data Loader (TPDC) Manual (526357-001) Mod 2-36 Mod 5-5 Mod 6-1

Other References

These references are located on the World Wide Web.

• R. E. Wyllys The University of Texas at Austin, Database-Management Principles and Applications, http://www.gslis.utexas.edu/~l384k11w/normover.html

These references refer to manuals available as part of courses taught by NonStop Education.

• NonStop SQL/MP Query Design for Performance (U41835), Mod 5-30
• NonStop SQL/MP Programming (U4182S) Mod 3-26, 3-35
• NonStop SQL/MP Database Management (U4180S), Mod 1-11 Mod 7-32
• NonStop SQL/MP Physical Database Design (523569-001) 8-4, 6
• NonStop SQL/MP Essentials (U4181S) Mod 1-5 Mod 2-12

Conclusion

HP wishes you success in the HP Certified Professional Program and in passing the exam for which you are preparing.
Samples:

The following examples represent the types of items and question formats that you could see on the exam. These are generic samples are do not reflect the content being tested.

1. Which planet is closest to the Earth?
   A. Mars
   B. Pluto
   C. Venus
   D. Saturn

2. Which planets are “inner planets” — planets found within the asteroid belt? Select TWO.
   A. Pluto
   B. Earth
   C. Neptune
   D. Mercury
   E. Venus

3. Click the Exhibit button.
   What is this constellation called?
   A. Leo
   B. Aries
   C. Orion
   D. Taurus
   E. Gemini
   F. Pleiades
   G. Ursa Minor
   H. Ursa Major
   I. Andromeda
4. Click the Task button.

Place the planets in order of closest to farthest from the planet Earth.

5. Click the Task button.

Review the picture of the planets and click on Saturn.