Higher National Unit specification

General information for centres

Unit title: Manage Database Systems Using SQL

Unit code: F1VY 34

Unit purpose: This Unit is designed to develop an understanding of, and practical experience in the two key fundamental areas involved in using a Structured Query Language (SQL) to manage a database system. Firstly, it is designed to develop an understanding of the fundamentals behind the efficient and effective organisation of data and data relationships. Secondly, it is designed to develop, by means of practical examples, the skills involved in using the SQL to create a database system and also how to manage and interrogate the information contained within the system.

The Unit forms part of an HN Group Award programme, and is intended for candidates in the computing and IT sector. It may be used, however, in a wide range of other areas where skills in managing a database are involved using the SQL language. The Unit is also capable of being delivered on its own and will be of interest to candidates with appropriate work and IT experience, who wish to broaden their knowledge and/or skills in this area.

On completion of the Unit the candidate should be able to:

1 Explain the fundamentals of database design.
2 Create a database structure using SQL commands.
3 Develop SQL commands to manage database information.

Credit points and level: 1 HN credit at SCQF level 7: (8 SCQF credit points at SCQF level 7*)

**SCQF credit points are used to allocate credit to qualifications in the Scottish Credit and Qualifications Framework (SCQF). Each qualification in the Framework is allocated a number of SCQF credit points at an SCQF level. There are 12 SCQF levels, ranging from Access 1 to Doctorates.*

Recommended prior knowledge and skills: Access to this Unit will be at the discretion of the centre.

Core Skills: There may be opportunities to develop elements of the Core Skill of Problem Solving in this Unit, although there is no automatic certification of Core Skills or Core Skills components.

Context for delivery: If this Unit is delivered as part of a Group Award, it is recommended that it should be taught and assessed within the subject area of the Group Award to which it contributes.

General information for centres (cont)

Assessment: Evidence is required to show that the candidate has achieved all of the Outcomes and Knowledge and/or Skills.

This will be demonstrated by the submission of written and/or oral recorded evidence which demonstrates that the candidate has achieved the requirements of all of the Outcomes and Knowledge and/or Skills within each to show that s/he has appropriate knowledge and understanding of the contents of this Unit.

It is recommended that Outcome is assessed by means of a written and/or oral recorded test under supervised conditions.

Outcomes 2 and 3 involve the practical application of SQL, so it is recommended the assessments take the form of a series of practical tasks covering the Knowledge and/or Skills items listed in the Outcome. These Outcomes can be assessed together in one assessment, however, an assessor must ensure that a candidate has achieved each Outcome.

Assessors should ensure themselves of the authenticity of the candidate's evidence.

The Assessment Exemplar Pack for this Unit provides sample assessment materials including assessor checklists, practical tasks and an instrument of assessment for the knowledge. Centres wishing to develop their own assessments should refer to the Assessment Exemplar Pack to ensure a comparable standard.

Higher National Unit specification: statement of standards

Unit title: Manage Database Systems Using SQL

Unit code: F1VY 34

The sections of the Unit stating the Outcomes, Knowledge and/or Skills, and Evidence Requirements are mandatory.

Where evidence for Outcomes is assessed on a sample basis, the whole of the content listed in the Knowledge and/or Skills section must be taught and available for assessment. Candidates should not know in advance the items on which they will be assessed and different items should be sampled on each assessment occasion.

Outcome 1

Explain the fundamentals of database design

Knowledge and/or Skills

- Concepts and terminology of the entity-relationship model
- Primary and foreign keys
- The process of normalisation

Evidence Requirements

Evidence of all the Knowledge and/or Skills in this Outcome will be assessed using a representative sample covering the bullet points below showing that a candidate demonstrates an understanding of:

- Concepts and terminology of the entity-relationship model
  - Definitions: entity, relationship, attribute, domain
  - Associations: 1:1, 1:M, M:N
  - Table, column, row, field
  - Rules for relational data model, eg unique identifier (atomic), etc
- Primary and foreign keys
  - Purpose
  - Uniqueness
- The process of normalisation
  - Purpose
  - Description of each stage (UNF, 1NF, 2NF and 3NF)
  - Purpose of each stage

Evidence for all Knowledge and Skills in this Outcome will be assessed using a representative sample of twenty written and/or oral recorded questions. The instrument of assessment must provide opportunities for the Outcome to be fulfilled by means of sampling across the range of the content of Outcome 1. This assessment must change on each assessment occasion. Achievement can be decided by use of a 60% cut-off score.

The questions presented must change on **each** assessment occasion.

Higher National Unit specification: statement of standards

Unit title: Manage Database Systems Using SQL

The assessment will be supervised, controlled and under closed-book conditions and should last no more than 1 hour.

Outcome 2

Create a database structure using SQL commands

Knowledge and/or Skills

- Creating, renaming, modifying and dropping tables
- Selecting a range of suitable data types
- Primary and foreign keys
- Integrity constraints
- Inserting, deleting and updating data records
- Creating copies of tables and table subsets

Evidence Requirements

Candidates will need to provide evidence to demonstrate their Knowledge and/or Skills in the use of using SQL commands to carry out all the Knowledge and/or Skills.

Outcome 2 will be assessed by either a series of continuous practical assignments where the candidate will build a structured portfolio or e-portfolio. This deliverables from this Outcome will form the basis of the work in Outcome 3.

The assessment for Outcome 2 is open-book. Assessors should assure themselves of the authenticity of the individual candidate's submission.

Outcome 3

Develop SQL commands to manage database information

Knowledge and/or Skills

- Building basic queries
- Using expressions in a Select clause
- Retrieving specific rows from tables
- Grouping data records
- Sorting data records
- Joining data in related tables

Higher National Unit specification: statement of standards (cont)

Unit title: Manage Database Systems Using SQL

Evidence Requirements

Candidates will need to provide evidence to demonstrate their Knowledge and/or Skills in the use of using SQL commands to carry out all the Knowledge and/or Skills.

The deliverables from Outcome 2 will form the basis of the work to build on in Outcome 3. This Outcome will be assessed by either a series of continuous practical assignments where the candidate will build a structured portfolio, or e-portfolio, by adding to the output of work generated in Outcome 2.

The assessments for Outcome 2 and Outcome 3 are open-book. Assessors should assure themselves of the authenticity of the individual candidate's submission.

Candidates will need to provide evidence to demonstrate their Knowledge and/or Skills in the development of SQL commands. This will be achieved by showing that they can demonstrate the use of:

- Building basic queries:
  - retrieving all columns and rows
  - retrieving specific columns
  - specifying a column alias
- Using expressions in a Select clause
  - using arithmetic operators
  - using functions
  - working with Nulls
- Retrieving specific rows from tables
  - relational operators
  - compound conditions and logical operators
  - using subqueries
- Grouping data records
  - applying functions to groups
- Sorting data records
  - ascending, descending
- Joining data in related tables could include:
  - inner and outer joins

Administrative Information

Unit code: F1VY 34

Unit title: Manage Database Systems Using SQL

Superclass category: CD

Original date of publication: August 2007

Version: 02 (June 2011)

History of changes:

Version	Description of change	Date
02	Removal of Outcome 4 as candidates are required to produce error free SQL commands and troubleshooting may naturally occur in producing these over Outcomes 1-3 without the need for additional assessments.	09/06/11

Source: SQA

SQA acknowledges the valuable contribution that Scotland's colleges have made to the development of Higher National qualifications.

Additional copies of this Unit specification can be purchased from the Scottish Qualifications Authority. Please contact the Customer Contact Centre for further details, telephone 0845 279 1000.

Higher National Unit specification: support notes

Unit title: Manage Database Systems Using SQL

This part of the Unit specification is offered as guidance. The support notes are not mandatory.

While the exact time allocated to this Unit is at the discretion of the centre, the notional design length is 40 hours.

Guidance on the content and context for this Unit

As the application of the Relational Database Systems model continues to expand with most new applications adopting the RDBMS model. Previous legacy flat-file systems, often based on old technology, being converted to the RDBMS model has resulted in a growing demand for employees skilled in using the SQL language to create RDBMS applications and manage the data contained within the database.

This Unit is intended therefore, as an introduction to the basic principles and procedures involved in developing reliable and efficient SQL commands to manage the information contained in such systems using the SQL programming language. Its aim is to enable the candidate to acquire competence in the design and development of efficient, effective and error-free SQL commands. The Unit will provide a solid and broad foundation in the SQL programming language.

It was designed to form part of the computing and IT areas and should be delivered, therefore, within the context of the appropriate Group Award. It can also be delivered as a standalone Unit to candidates wishing to acquire and develop their skills using SQL.

By the end of the Unit, the candidate should have achieved a good foundation in the skills required for developing reliable, efficient and effective SQL commands meeting user requirements and assisting to solve business problems.

Guidance on the delivery and assessment of this Unit

This Unit should take approximately 40 hours to complete. It is recommended that Outcome 1 should be delivered first and will be assessed in the form of written and/or oral recorded evidence testing the knowledge and/or skills of the candidates. Outcome 2 should be delivered next and should be introduced and assessed by a series of practical assignments as the knowledge and skills are taught. Outcome 3 which will build on Outcome 2 and be assessed by a series of practical assignments as the knowledge and skills are taught.

Outcome 1

This Outcome consists of the study of the fundamentals of database design which will underpin the candidate's knowledge of the rationale and importance behind the development and management of relational database systems and the key features which support such systems. It will introduce the candidate to topics such as the advantages of the relational database model, the features of data normalisation. entity-relationship modelling, rows and attributes/columns, primary and foreign keys.

Outcome 2

In this Outcome, candidates will be introduced to the commands required to create robust and reliable data tables within a database model. This will also include the use of various datatypes, primary and foreign keys, integrity constraints, modifying the structure of a table and the datatypes, inserting data records into tables, creating *copy* tables and subset *copy* tables, renaming tables, dropping tables, updating and deleting data records.

Outcome 3

In this Outcome, the candidate will learn how to develop the SQL commands necessary to interrogate a database structure including the following: building basic queries, incorporating expressions in a Select clause, retrieving specific rows from tables with conditional statements and use of subqueries, grouping data records, applying functions to groups, sorting data records and joining data in related tables.

Opportunities for developing Core Skills

There may be opportunities to develop elements of the Core Skill of Problem Solving in this Unit, although there is no automatic certification of Core Skills or Core Skill components.

Open learning

If this Unit is delivered by open or distance learning methods, additional planning and resources may be required for candidate support, assessment and quality assurance.

A combination of new and traditional authentication tools may have to be devised for assessment and re-assessment purposes. For further information and advice, please see *Assessment and Quality Assurance for Open and Distance Learning* (SQA, February 2001 — publication code A1030).

Candidates with disabilities and/or additional support needs

The additional support needs of individual candidates should be taken into account when planning learning experiences, selecting assessment instruments, or considering alternative Outcomes for Units. Further advice can be found in the SQA document *Guidance on Assessment Arrangements for Candidates with Disabilities and/or Additional Support Needs* **(www.sqa.org.uk)**.

General information for candidates

Unit title: Manage Database Systems Using SQL

This Unit is designed to give an introductory understanding and a foundation in the application and use of SQL in managing the data contained within a relational database management system (RDBMS).

It covers the main areas relevant to the application of a relational database management system.

Firstly, you will consider the fundamental principles concerning RDBMS design and the advantages such a system offers an organisation where data has to be stored and managed. You will learn about such things as:

- The entity-relationship model, the basic rationale on which all relational databases are built
- The relational data model, the rules and elements which make up the physical tables of data in such a system
- Primary and foreign keys, the features which enable the data held within tables not only to be 'related' but also to be indexed and searched at high speed
- The process of normalisation, the common process of determining the basic table sets required within a database system

Secondly, you will learn how to create the database structure by implementing data tables and make use of these fundamental principles in your creation, such as primary and foreign keys, relationship modelling and the rows and columns which make up the data tables.

Finally, you will learn about what is perhaps the most important feature of SQL, and its primary purpose which is how to create the command scripts which will be used to interrogate relational databases, including:

- How to extract data
- How to organise, group and sort data
- How to perform arithmetic operations and apply functions to data
- How to create and use views and synonyms

On completion of this Unit, you should be able to:

- Explain the fundamentals of database design
- Create a database structure using SQL commands
- Develop SQL commands to manage database information