Higher National Unit specification: general information

Unit title: Relational Database Management Systems

Unit code: H16W 35

Superclass:	CB
Publication date:	March 2012
Source:	Scottish Qualifications Authority
Version:	01

Unit purpose

This Unit is designed to introduce candidates to the design and creation of a Relational Database Management System (RDBMS). It also introduces candidates to the terminology and key concepts used in the designing and building of a RDBMS and the process of creating a relational database. The candidate needs to demonstrate understanding of these key concepts, and the need for good design.

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

1   Identify and use the processes and terminology used in designing a RDBMS.
2   Design an RDBMS from a given scenario
3   Map the design model to the physical model
4   Create and run SQL statements/queries on a RDBMS.

Recommended prior knowledge and skills

Access to this Unit will be at the discretion of the Centre, however it would be beneficial if the candidate already possessed good written communication, critical thinking and analytical skills, either through workplace experience or training at an appropriate level. Successful completion of DV6E 34: *Database Design Fundamentals* would be beneficial.

Credit points and level

2 Higher National Unit credits at SCQF level 8: (16 SCQF credit points at SCQF level 8*)

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.

General information (cont)

Core Skills

Opportunities to develop aspects of Core Skills are highlighted in the Support Notes of this Unit specification.

There is no automatic certification of Core Skills or Core Skill components in this Unit.

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.

The Assessment Support Pack (ASP) for this unit provides assessment and marking guidelines that exemplify the national standard for achievement. It is a valid, reliable and practicable assessment. Centres wishing to develop their own assessments should refer to the ASP to ensure a comparable standard. A list of existing ASPs is available to download from SQA's website **(http://www.sqa.org.uk/sqa/46233.2769.html)**.

Higher National Unit specification: statement of standards

Unit title: Relational Database Management Systems

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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

Identify and use the processes and terminology used in designing a RDBMS.

Knowledge and/or Skills

♦   Common terminology used in designing an RDBMS.
♦   Processes used in creating an Entity-Relationship Diagram (ERD).
♦   Steps to normalise data to 3rd Normal form (3NF).

Outcome 2

Design an RDBMS from a given scenario.

Knowledge and/or Skills

♦   Use normalisation techniques to remove redundant data and create new tables.
♦   ERD design using appropriate design rules.
♦   Operational and functional Business Rules.
♦   Specific assumptions needed to complete the design.

Higher National Unit specification: statement of standards (cont)

Unit title: Relational Database Management Systems

Outcome 3

Map the design model to the physical model.

Knowledge and/or Skills

♦ Create physical tables corresponding to a set design.
♦ Map design attributes to the physical model.
♦ Populate the tables with test data.

Outcome 4

Create and run SQL statements/ queries on a RDBMS.

Knowledge and/or Skills

♦ Create basic Select queries.
♦ Use expressions within the Select clause.
♦ Group data records.
♦ Sort data records.
♦ Create Joins.

Evidence Requirements for the Unit

The Evidence Requirements for the Unit will consist of two assessments.

Assessment 1 — Closed-Book Assessment

Candidates will need to provide evidence to demonstrate their knowledge of the concepts involved in designing a Relational Database Management System. The assessment must use a representative sample of key concepts and terminology used in Outcome 1. The assessment must be undertaken in supervised conditions and is closed-book.

Assessment 2 — Open-Book Assessment

Candidates will need to provide evidence of their knowledge and skills by demonstrating they can design, create and interrogate a Relational Database Management System. The assessment must cover a representative sample of the key points involved in Outcomes 2, 3 and 4. Due to the complexities involved in designing and creating a Relational Database Management System it is strongly suggested that this assessment should be undertaken as a group project.

As an alternative to traditional assessment methods (eg paper-based), candidates may provide a digital record of evidence to demonstrate the Knowledge and/or Skills items. Suggested approaches are outlined in the Support Notes, Guidance on the Assessment of this Unit.

Higher National Unit specification: support notes

Unit title: Relational Database Management Systems

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 80 hours.

Guidance on the content and context for this Unit

This Unit has been designed as an introduction to the design and creation of a relational database system. It is envisaged that successful completion of the Unit should give students a solid understanding of the complexities involved in the RDBMS development process.

The Unit can also be used as a standalone Unit for candidates with an interest in developing the skills needed to create a relational database. It could be used as an optional Unit in a number of HN Frameworks.

Outcome 1: Identify and use the processes and terminology used in designing a RDBMS

Common Terminology:

♦ relational database systems,
♦ entity and relationships,
♦ normalisation,
♦ unique identifiers, etc.

Different Processes:

♦ identifying entities,
♦ degrees of relationship (1:1, 1:M M:M)
♦ recursive, mandatory and optional, composite and atomic UIDs

Normalisation Theory:

♦ identify each step used to normalise data from an un-normalised state (UNF), through to 3rd normal form (3NF).

Higher National Unit specification: support notes (cont)

Unit title: Relational Database Management Systems

Outcome 2: Design an RDBMS from a given scenario

Normalisation Practice:

♦ use normalisation techniques to remove redundant data
♦ identify new tables that should be used in the RDBMS

ERD Diagram:

♦ identify UID for each table and name each table appropriate to design rules for an Entity-Relationship Diagram (ERD)
♦ link tables together by using appropriate relationships and cardinality
♦ use of mandatory and option should be identified and used appropriately

Business Rules:

♦ identify appropriate business rules to accompany ERD design
♦ demonstrate understanding of the importance of both operational and functional business rules and the differences between them.

Assumptions:

♦ Identify and describe assumptions made in the creation of the RDBMS design.

Outcome 3: Map the design model to the physical model

Create Tables:

♦ create
♦ rename
♦ modify or drop tables that correspond to your RDBMS design

Attributes:

♦ select suitable data types
♦ create both primary and foreign keys
♦ use appropriate integrity constraints dependant on design rules

Populate Data:

♦ insert
♦ delete
♦ update data sufficient for testing purposes.

Higher National Unit specification: support notes (cont)

Unit title: Relational Database Management Systems

Outcome 4: Create and run queries on a RDBMS

SQL Examples:

♦ retrieving all columns and rows
♦ retrieving specific columns
♦ specifying a column alias
♦ using arithmetic operators
♦ using functions
♦ working with Nulls
♦ retrieving specific rows from tables
♦ applying functions to groups
♦ sorting data records (ascending or descending)
♦ creating simple joins on tables

Guidance on the delivery of this Unit

This Unit has been designed to allow centres total flexibility in the RDBMS used for delivery.

Given that the first Outcome is theoretical in nature, it might be possible to deliver it concurrently with the practical activities needed for the later Outcomes. This may well lead to a more rewarding and successful learning experience for the candidates.

Outcome 1

This Outcome is theoretical in nature and introduces candidates to the terminology and key concepts used in the designing and building of a RDBMS. Before moving onto the process of creating a relational database the candidate needs to demonstrate understanding of these key concepts, and the need for good design.

Outcomes 2, 3 and 4

It would make sense to deliver these three Outcomes using a holistic approach whereby the candidates work together through the development of an RDBMS from a given set scenario. There are, of course, a number of approaches that could be used but there is an opportunity for the candidates to complete their assessment, as a group, to make the learning experience more exciting and rewarding. The nature of the Unit means that each member of the group has an opportunity to contribute, and that activities such as brain storming could be used to assist in the design and development process. This is also common practice within the software development industry.

Guidance on the assessment of this Unit

Both of the assessments for this Unit could be undertaken using e-assessment. The closed-book assessment lends itself to a standard online objective assessment. The open-book assessment could be undertaken using an e-portfolio with links to completed applications and links to online surveys used for usability tests.

Unit title: Relational Database Management Systems

Assessment Guidelines

Closed-book Assessment — Outcome 1

Evidence for all the Knowledge and/or Skills should be assessed using a representative sample of 20 multiple-choice questions. The sample should cover the main points outlined for Outcome 1

The questions presented must change on each assessment occasion.

The assessment should be undertaken in supervised conditions and is closed-book. A candidate should complete this assessment within one hour. Candidates may not bring to the assessment event any notes, textbooks, handouts or other material.

Candidates must answer at least 60% of the questions correctly.

Open-book Assessment — Outcomes 2, 3 and 4

Evidence for designing and creating a RDBMS could be achieved by building up a portfolio of evidence throughout the delivery of this Unit. The complex nature involved in this process means that candidates should work in teams if possible using techniques such as brain storming to assist in the design and creation of a system. The evidence should be in the form of a report covering Outcomes 2, 3 and 4 and the candidates should all contribute to this document. The candidates could also present their work as a team presentation which would allow each team member to contribute to the project.

Online and Distance Learning

It would be feasible to develop a range of blended learning material to deliver this Unit by online means. Support for distance learners could be provided by both synchronous and asynchronous communication technologies. Care would need to be taken to ensure the authenticity of assessments undertaken by distance learners.

Opportunities for developing Core Skills

Although there is no automatic certification of Core Skills or Core Skill components in this Unit, there are opportunities for developing *Information and Communication Technology (ICT)* and *Problem Solving* Core Skills at SCQF Level 6 throughout the Unit.

Disabled candidates and/or those with additional support needs

The additional support needs of individual candidates should be taken into account when planning learning experiences, selecting assessment instruments, or considering whether any reasonable adjustments may be required. Further advice can be found on our website **www.sqa.org.uk/assessmentarrangements**

History of changes to Unit

Version	Description of change	Date

General information for candidates

Unit title: Relational Database Management Systems

This Unit is designed to introduce you to the design and creation of a Relational Database Management System (RDBMS).

RDBMS remain crucially important within software development and skills within this part of the industry are constantly in high demand. This Unit is intended to give you an insight into the design and development of these systems. It also gives you an opportunity to work in a software development team to achieve set tasks and goals.

There are two assessments for the Unit, a 20 multiple-choice question closed-book assessment covering Outcome 1 and an open-book practical assessment covering Outcomes 2, 3 and 4.

On successful completion of the Unit you should be able to:

1   Identify and use the processes and terminology used in designing a RDBMS.
2   Design an RDBMS from a given scenario.
3   Map the design model to the physical model.
4   Create and run SQL statements/ queries on a RDBMS.