



## Higher National Unit Specification

### General information

**Unit title:** Database Server Administration (SCQF level 8)

**Unit code:** HT9F 35

**Superclass:** CB

**Publication date:** November 2017

**Source:** Scottish Qualifications Authority

**Version:** 02

### Unit purpose

The purpose of this unit is to introduce learners to the issues involved in managing, monitoring and troubleshooting a database server. It is a specialist unit, intended for learners undertaking a Higher National qualification in Computing or a related area who require a detailed understanding of the concepts and practices underpinning database servers.

The unit covers the principal features of database server administration, including the installation and configuration of a database server, managing and maintaining databases and database servers and extracting and transforming data. While the unit makes reference to computer science topics, it does not address the computer science aspects of the field in any depth.

The unit explores the installation, upgrading of database servers, database creation and amendment and schema modification. It also looks at the optimisation of performance and data storage, disaster recovery, integrity checking, transactions and locking, user creation and management and security management and considers the extraction and transformation of data, including data import and export and data type conversion. Finally, it examines managing a database server, including job creation and management, configuration of alerts and operators and the optimisation of hardware resource usage and system activity.

The unit relates this to learner's vocational interests by examining how database systems underpin areas they are familiar with, such as college admin systems, retail and banking systems and social software.

## Higher National Unit Specification: General information (cont)

**Unit title:** Database Server Administration (SCQF level 8)

### Outcomes

On successful completion of the unit the learner will be able to:

- 1 Install and configure a database server.
- 2 Manage and maintain databases.
- 3 Extract and transform data.
- 4 Manage a database server.

### Credit points and level

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

### Recommended entry to the unit

Learners should possess some knowledge and ability in using computers before commencing this unit. This may be evidenced by possession of the Core Skill in *Information and Communication Technology* at SCQF level 6 (or equivalent).

### Core Skills

Achievement of this Unit gives automatic certification of the following:

Complete Core Skill                      Information and Communication Technology at SCQF level 6

Core Skill component                      Critical Thinking at SCQF level 6

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

### 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.

### Equality and inclusion

This unit specification has been designed to ensure that there are no unnecessary barriers to learning or assessment. The individual needs of learners should be taken into account when planning learning experiences, selecting assessment methods or considering alternative evidence.

Further advice can be found on our website [www.sqa.org.uk/assessmentarrangements](http://www.sqa.org.uk/assessmentarrangements)

# Higher National Unit Specification: Statement of standards

**Unit title:** Database Server Administration (SCQF level 8)

Acceptable performance in this unit will be the satisfactory achievement of the standards set out in this part of the unit specification. All sections of the statement of standards are mandatory and cannot be altered without reference to SQA.

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. Learners 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

Install and configure a database server.

### Knowledge and/or skills

- ◆ Installation
- ◆ Upgrading
- ◆ Troubleshooting
- ◆ Database creation
- ◆ Database amendment
- ◆ Schema modification

## Outcome 2

Manage and maintain databases.

### Knowledge and/or skills

- ◆ Performance and data storage optimisation
- ◆ Disaster recovery
- ◆ Integrity checking
- ◆ Transactions and locking
- ◆ User creation and management
- ◆ Security management

## Outcome 3

Extract and transform data.

### Knowledge and/or skills

- ◆ Data import and export
- ◆ Data transformation
- ◆ Data type conversion

## Higher National Unit Specification: Statement of standards (cont)

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### Outcome 4

Manage a database server.

#### Knowledge and/or skills

- ◆ Job creation, management and troubleshooting
- ◆ Configuration of alerts and operators
- ◆ Hardware resource usage optimisation
- ◆ System activity optimisation

#### Evidence requirements for this unit

Learners will need to provide evidence to demonstrate their knowledge and/or skills across all outcomes by showing that they can produce:

- ◆ product evidence

There is an opportunity to take a more holistic approach to assessment by integrating Outcomes 1, 2, 3 and 4. The evidence for this unit will take the form of a practical task on administering a database server, which must be described or recorded. The amount of evidence should be the minimum consistent with the defined knowledge and skills.

Evidence is normally required for all of the knowledge and skills in every outcome. This means that every knowledge and skills statement should be evidenced.

The SCQF level of this unit provides additional context on the nature of the required evidence and the associated standards. The following level descriptors are particularly relevant to the evidence:

- ◆ Specialist knowledge in some areas
- ◆ A discerning understanding of a defined range of core theories, concepts, principles and terminology
- ◆ Use a range of professional skills, techniques, practices and/or materials, a few of which are advanced and/or complex
- ◆ Carry out routine lines of enquiry, development or investigation into professional level problems and issues
- ◆ Use a range of approaches to formulate and critically evaluate evidence-based solutions/responses to defined and/or routine problems and issues
- ◆ Use a range of standard ICT applications to process and obtain data
- ◆ Exercise autonomy and initiative in some activities at a professional level in practice

These level descriptors should be used (explicitly or implicitly) when making judgements about the evidence.

Evidence may be wholly or partly produced under controlled conditions. When evidence is produced in uncontrolled or loosely controlled conditions it must be authenticated. The *Guide to Assessment* provides further advice on methods of authentication.

There are no time limitations on the production of evidence. The evidence may be produced at any time during the life of the unit. Learners may use reference materials when undertaking assessment.



## Higher National Unit support notes

**Unit title:** Database Server Administration (SCQF level 8)

Unit support notes are offered as guidance and 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 is a specialist unit, intended for learners who require a detailed understanding of the concepts and practices underpinning database server administration. It is particularly appropriate for learners undertaking an HNC/HND in Computing, Computer Networking or a related area.

The aim of the unit is to explore the principal features of database server administration, including the installation and configuration of a database server, managing, monitoring and troubleshooting databases and database servers and extracting and transforming data.

Please note that this section is not a teaching syllabus and does not seek to explain each knowledge/skills statement. This section seeks to clarify the statement of standards (within this unit specification) where it is potentially ambiguous. It also focuses on non-apparent teaching and learning issues that may be over-looked, or not emphasised, during unit delivery. As such, it is not representative of the actual time spent teaching or learning specific competences or the relative importance of each competence.

#### Outcome 1

- ◆ Install and configure a database server.

Learners should be able to install a new database server and upgrade an existing database server, in accordance with the vendor's instructions, troubleshooting any problems that may arise. Upgrades may include installation of a newer version, application of vendor security updates or enhancement facilities, for example: increasing number of users or databases allowed. No particular hardware or software platform is specified. Suitable databases include, but are not restricted to, Microsoft SQL Server, MySQL and Oracle.

Learners should be able to create databases on a server and amend them by adding, deleting and amending records. They should also be able to make changes to the underlying structure of the database by modifying its database schema.

#### Outcome 2

- ◆ Manage and maintain databases.

Learners should be able to take steps to optimise the performance of a database and minimise the amount of storage used. They should also be able to implement disaster recovery by keeping regular backups and restoring from these if required.

## Higher National Unit support notes (cont)

**Unit title:** Database Server Administration (SCQF level 8)

Learners should be able to carry out integrity checking to ensure that the integrity of the database has not been compromised in any way and they should also be able to control simultaneous access to the database by means of file and record locking.

They should be able to create and manage database users and manage security by restricting access on the basis of identity, permissions, location, time and other factors.

### Outcome 3

- ◆ Extract and transform data.

Learners should be able to import and export data in a range of formats (eg spreadsheet, CSV), transform data and carry out data transformations and convert between data types as required.

### Outcome 4

- ◆ Manage a database server.

Learners should be able to create, manage and troubleshoot jobs and configure alerts and operators. They should be able to optimise the utilisation of hardware resources such as CPU, memory and network utilisation, and system activity.

## Guidance on approaches to delivery of this unit

Although this unit contains a significant body of knowledge, it is recommended that it is delivered in a practical context through exemplification installation and management of database servers.

It is recommended that the unit is delivered in the sequence of the outcomes, since each outcome requires the underpinning knowledge and skills of earlier outcomes. A suggested distribution of time, across the outcomes, is:

Outcome 1	24 hours
Outcome 2	24 hours
Outcome 3	8 hours
Outcome 4	24 hours

Summative assessment should be carried out towards the end of the unit, although learners could begin to generate the evidence at an earlier stage. However, if a report is used, it should not be assessed until it is complete and the learner is satisfied with it.

There are opportunities to carry out formative assessment at various stages in the life of the unit. For example, formative assessment could be carried out upon the completion of each outcome to ensure that learners have grasped the knowledge and skills contained within each outcome. This would provide assessors with an opportunity to diagnose misconceptions and intervene to remedy them before progressing to the next outcome.

## Higher National Unit support notes (cont)

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### Guidance on approaches to assessment of this unit

Evidence can be generated using different types of assessment. The following are suggestions only. There may be other methods that would be more suitable to learners.

Centres are reminded that prior verification of centre-devised assessments would help to ensure that the national standard is being met. Where learners experience a range of assessment methods, this helps them to develop different skills that should be transferable to work or further and higher education.

This will, most likely, comprise a single assessment activity. The instrument of assessment could be a practical task covering all outcomes. Annotated checklists could be used to ensure coverage of all knowledge and skills items.

The task may be carried out under loosely controlled conditions. For example, parts of it may not be done under the supervision of the assessor. In this scenario, authentication would be required, which could take the form of oral questioning.

The resulting checklists should be assessed against defined criteria and these criteria should be known to the learner before they submit their evidence. The criteria should be based on the characteristics defined in the evidence requirements section of this unit specification.

A more contemporary approach to assessment would involve the use of a web log (blog) to record learning (and the associated activities) throughout the life of the unit. The blog would provide evidence for underpinning knowledge (in the descriptions and explanations contained within the posts) and product evidence (the blog posts relating to how they administer a database server). The blog could include a variety of media (text, audio and video) to improve its quality.

The blog should be assessed using defined criteria to permit a correct judgement about the quality of the digital evidence. In this scenario, every knowledge and skill must be evidenced; sampling would not be appropriate.

### Opportunities for e-assessment

E-assessment may be appropriate for some assessments in this unit. By e-assessment we mean assessment which is supported by Information and Communication Technology (ICT), such as e-testing or the use of e-portfolios or social software. Centres which wish to use e-assessment must ensure that the national standard is applied to all learner evidence and that conditions of assessment as specified in the evidence requirements are met, regardless of the mode of gathering evidence. The most up-to-date guidance on the use of e-assessment to support SQA's qualifications is available at [www.sqa.org.uk/e-assessment](http://www.sqa.org.uk/e-assessment).

## **Higher National Unit support notes (cont)**

**Unit title: Database Server Administration (SCQF level 8)**

### **Opportunities for developing Core and other essential skills**

This Unit has the Core Skill of Information and Communication Technology embedded in it. This means that when learners achieve the Unit, their Core Skills profile will also be updated to show they have achieved Information and Communication Technology at SCQF level 6.

This Unit has the Critical Thinking component of Problem Solving embedded in it. This means that when learners achieve the Unit, their Core Skills profile will also be updated to show they have achieved Critical Thinking at SCQF level 6.

## History of changes to unit

Version	Description of change	Date
02	Core Skill of Information and Communication Technology at SCQF level 6 embedded.  Core Skill component Critical Thinking at SCQF level 6 embedded.	24/11/2017

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## General information for learners

### Unit title: Database Server Administration (SCQF level 8)

This section will help you decide whether this is the unit for you by explaining what the unit is about, what you should know or be able to do before you start, what you will need to do during the unit and opportunities for further learning and employment.

This unit relates to the knowledge and skills involved in managing, monitoring and troubleshooting a database server. It is a specialist unit, intended for learners undertaking a Higher National qualification in Computing or a related area who require a detailed understanding of the concepts and practices underpinning database servers. On completion of the unit you will be able to progress to more advanced studies relating to database systems and their management.

The unit covers the principal features of database server administration, including the installation and configuration of a database server, managing and maintaining databases and database servers and extracting and transforming data.

The unit explores the installation, upgrading of database servers, database creation and amendment and schema modification. It also looks at the optimisation of performance and data storage, disaster recovery, integrity checking, transactions and locking, user creation and management and security management and considers the extraction and transformation of data, including data import and export and data type conversion. Finally, it examines managing a database server, including job creation and management, configuration of alerts and operators and the optimisation of hardware resource usage and system activity.

The unit relates this to learners' vocational interests by examining how database systems underpin areas they are familiar with, such as college admin systems, retail and banking systems and social software.

The unit may be assessed by means of a practical task covering all outcomes.

This Unit has the Core Skill of Information and Communication Technology embedded in it. This means that when you achieve the Unit, your Core Skills profile will also be updated to show you have achieved Information and Communication Technology at SCQF level 6.

This Unit has the Critical Thinking component of Problem Solving embedded in it. This means that when you achieve the Unit, your Core Skills profile will also be updated to show you have achieved Critical Thinking at SCQF level 6.