

SQA Advanced Unit Specification

General information

Unit title: IT in Business: Advanced Databases (SCQF level 8)

Unit code: HP0G 48

Superclass: CD

Publication date: August 2017

Source: Scottish Qualifications Authority

Version: 01 August 2017)

Unit purpose

This unit is designed to allow learners to develop an understanding of database design and the use of advanced features to provide information that is specific or summarised to enhance decision-making. The unit is primarily intended for learners moving into managerial positions where the storage, management and reliability of information is increasingly important. Acquiring an appreciation of database management systems, creation of forms, and sophisticated queries will help any manager make the most of relational databases to support their decision-making.

Outcomes

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

- 1 Apply advanced design principles to improve the performance and integrity of a database.
- 2 Create a relational database that ensures data is consistent, secure and correct.
- 3 Create and use complex queries to manipulate data to aid decision-making.

Credit points and level

1 SQA Credit at SCQF level 8: (8 SCQF credit points at SCQF level 8)

Recommended entry to the unit

Access to this unit is at the discretion of the centre. However, it would be beneficial if learners have some competence in databases. This may be demonstrated by possession of *IT in Business: Databases* (HP6C 47) or equivalent or recent relevant work experience.

Core Skills

The achievement of this unit gives automatic certification of the following:

The Core Skill *Information and Communication Technology* at SCQF level 6

There are also further opportunities to develop aspects of the Written Communication (Writing) component of the Core Skill *Communication* at SCQF level 6, and the Critical Thinking component of the Core Skill *Problem Solving* at SCQF level 6, and these are highlighted in the support notes of 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.

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>).

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.

Unit Specification: statement of standards

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

Apply advanced design principles to improve the performance and integrity of a database.

Knowledge and/or Skills

- ◆ Flat-file database
- ◆ Relational database design principles
- ◆ Data integrity facilities
- ◆ Database management facilities

Outcome 2

Create a relational database that ensures data is consistent, secure and correct.

Knowledge and/or Skills

- ◆ Importing data
- ◆ Links to external data sources
- ◆ Multi-tiered switchboard
- ◆ Multi-table form
- ◆ Calculated field
- ◆ Command button
- ◆ Combo-box

Outcome 3

Create and use complex queries to manipulate data to aid decision-making.

Knowledge and/or Skills

- ◆ Parameter query
- ◆ Totals query
- ◆ Make-table query
- ◆ Calculated fields in queries

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:

Outcome 1

- ◆ Analyse an existing flat-file database
- ◆ Identify any two potential data integrity problems in an existing flat-file database from: insertion, deletion, update and duplication anomalies
 - Explain how each of the two problems occur and the impact each will have on data integrity
 - Design a new database structure using the entity relational model that resolves each data integrity problem. The structure should include one occurrence of each of the following table field properties: lookup field, input mask, validation rule and accompanying validation text
- ◆ Design an entity relationship model demonstrating appropriate relationships between tables
- ◆ Design two relationships and annotate to justify chosen referential integrity
- ◆ Apply standard database notation to define table name (entity), fields (attributes), primary key and foreign key for three tables
- ◆ Explain how the database utilities of 'convert database' and 'compact and repair database files' support data integrity

Outcome 2

Create a relational database of three tables that meet the requirements of a particular business scenario.

- ◆ Import an existing database from an external data file
- ◆ Apply different data types to five fields which include one occurrence of a look up field and an appropriate field type to store images.
- ◆ Set or change a primary key field data type or size for each table
- ◆ Apply one validation rule and related validation text
- ◆ Apply two input masks
- ◆ Create two relationships using appropriate referential integrity rules
- ◆ Create two switchboard forms to help users navigate around the redesigned database
- ◆ Create one multiple-table form that includes at least one calculated control, one command button and one combo-box

Outcome 3

- ◆ Create and use one parameter query to aid business decision-making
- ◆ Create and use one totals query to aid business decision-making
- ◆ Create one new table using make-table query to extract specific information to aid business decision-making
- ◆ Use one calculated field in the construction of a query

Outcomes 1, 2 and 3 may be assessed holistically. Outcome 3 may use the database designed in Outcomes 1 and 2 or the learner may be presented with a different database to use for the creation of the above queries.

Unit specification: support notes

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 40 hours.

Guidance on the content and context for this unit

This unit is designed to allow learners to develop an understanding of database design and the use of advanced features to provide information that is specific or summarised to enhance decision-making. It may form part of a group award or be completed as a free-standing unit.

The unit is primarily intended for learners moving into managerial positions where the storage, management and reliability of information is increasingly important. Many organisations use databases to store and collate data they will then use to help them make managerial decisions. These databases may be relatively straightforward or complex; however, similarities between the two exist. One of the main similarities is the fact that the designer of the system is very often not the user; the designer is rarely the person who keys in the data to be stored in the database. This unit takes the learner through the design process prior to creating a database and then make good use of the software features such as table formatting, referential integrity to restrict user input error; the learner will design switchboard forms and sub forms to control the users' movements through the database. The learner will then create a number of complex queries to provide managers with information to aid their decision-making. Small organisations are moving to relational databases and need to use 'off the shelf' applications and this unit will help learners to develop confidence in designing relational databases.

Guidance on approaches to delivery of this unit

The unit should be delivered in a way that enables learners to appreciate its relevance to the occupational area concerned. Wherever possible, links should be drawn with situations which the learner will understand, eg administrative support in retail, education and council organisations. A range of databases should be examined in terms of their structure, their users and potential problems. One possible approach to develop analytical skills re database development may be to work in groups when examining a range of case studies, applying the learner's knowledge to the situation, identifying the problems, creating a design and reporting back to the class their suggested solution. Different groups could have different scenarios to consider.

Outcome 1

Outcome 1 examines the problems of flat-file databases to enhance the learners understanding of relational databases to ensure the integrity of data. Ideally, a relational database table would be designed in such a way as to exclude the possibility of update, insertion, and deletion anomalies.

- ◆ Update anomaly: ie where details of a supplier may change and where there may be more than one occurrence of that supplier in the flat-file database
- ◆ Insertion anomaly: ie where the user might want to add details of a supplier who has not yet started to trade with them (assuming the database is 'parts' focused)
- ◆ Deletion anomaly: ie where the organisation may no longer use a particular part but removal of the details of that part also removes the full details of the supplier (that might still need to be retained)

Analysis of these problems helps to identify the benefits of arranging data into tables as well as the importance of locating data in the appropriate table, reducing the risk of duplicating data thereby ensuring effective use of computer memory.

Having identified the benefits of the general design, the learner could then be encouraged to consider the various ways the same data may be entered into a database. A range of errors may develop because the individual keying in the information does not have to use the information and therefore may not appreciate the relevance of presenting data in a particular way. The learner could be given opportunities to use the built-in options available to improve the keying in of information — validation rules and text, input masks, look up tables — and demonstrate a clear understanding of how and why they are used. The learner may be introduced to a range of examples to help build on their acquired knowledge and identify appropriate uses for the various field properties.

Outcome 2

The learner may be given opportunities to apply their suggested solutions to existing databases. In the process the learner will develop a new awareness of the flexibility of a relational database system and how external data may be incorporated — thus continuing the theme of protecting the accuracy/integrity of data. If files can be imported from complementary packages again errors of keying in are reduced.

The focus is very much a management one — the database is designed for others with limited experience to use. Outcome 2 looks at the design of and data input to complex forms; complex in that the resultant form enters data into more than one table. The user does not need to know how the data is stored, but simply complete the form as it is presented. Switchboards are used to control movement through the database and should be clear for inexperienced users to follow.

Outcome 3

The learner will prepare a range of complex queries and consider their use in a business environment.

- ◆ **Parameter queries** are established and when run a dialog box prompts the user to enter a parameter value which it enters into the appropriate criteria cell so that with minimal training inexperienced users may extract relevant information.
- ◆ **Totals queries** may be set up for managers to monitor targets and target achievements — totals queries are there to statistically collate the data and reduce it to an understandable format for managers to use. The learner could be encouraged to consider that detail may conceal a problem whereas statistical manipulation of data will allow managers to see with relative ease if there is a problem developing and if so where further investigation may need to be made.
- ◆ **Make-table queries** can be used to demonstrate how data may be extracted and placed in a separate table to examine the impact of, eg promotional focus weeks; analysis of customers with unpaid bills and sets taken to reduce the problem, etc. The data can be stored separately for ease of use by particular individuals rather than have them wade through the entire database — discussion of the benefits of using this type of query would be advantageous, eg able to add extra fields to gather further data for the specific investigation.
- ◆ Using **calculated fields** in a query allows the user to manipulate existing data to forecast trends, apply price changes, calculate when debts are due etc. A calculated field in a query takes information from one or more other fields and performs mathematical operations to provide new information. The new information can simply be displayed as part of a query (or report) or can be used to create an entirely new field that is part of the query (or report) but not part of the data table. The learner may consider the role that calculated fields play in the rules of good database design, ie a table should contain as few fields as possible. Discussion of benefits using a calculated field might include:
 - the smaller the table the faster it loads
 - the less disk space it occupies
 - the easier it is to document and maintain

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 unit may be assessed holistically. Outcome 1 requires evidence of analysis, this may be as a report with Outcomes 2 and 3 the related evidence for the report. All this evidence may be presented electronically.

The learner may be presented with an existing flat-file database (eg from a spreadsheet) which can be used as the basis for the database they will design in Outcome 1 and create in Outcome 2. The database may then be used as the basis for Outcome 3.

Assessments can be uploaded to centre VLE platforms which will allow authentication of the work submitted.

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.

Opportunities for developing Core and other essential skills

The achievement of this unit gives automatic certification of the following:

The Core Skill *Information and Communication Technology* at SCQF level 6

There are also further opportunities to develop the component Written Communication (Writing) of the Core Skill Communication at SCQF level 6, and the Critical Thinking component of the Core Skill Problem Solving at SCQF level 6.

The Written Communication (Writing) component of the Core Skill *Communication* at SCQF level 6.

In Outcome 1 the learners are required to analyse an existing database, present arguments about the problems inherent in a flat-file database and provide solutions. If this task is completed in a written format, eg a business report, then learners could be encouraged to seek certification of this Core Skill component.

The Critical Thinking component of the Core Skill *Problem Solving* at SCQF level 6

Equally learners who are completing this unit are required to analyse a flat-file database, define the problems and offer a solution. In outcome 1 they will be evaluating a situation, draw conclusion, identify how to construct the same data using a relational database and the advantages this offers. Depending on how the information is presented, it may be appropriate for learners to seek accreditation of this Core Skill independently. Centres will want to consider how this might be best managed.

The Accessing Information component of the Core Skill *Information and Communication Technology* at SCQF level 6

Learners will create a relational database, applying data security features such as validation rules, input masks, look up tables and switchboards to keep data secure and well managed. Within the database management system there are two database utilities, convert database and compact and repair database files, these functions are designed to protect the integrity of the data held. Learners, whilst they are not necessarily required to use these functions, are expected to explain how they are useful. In Outcome 3 learners are required to produce a number of queries such as parameter, totals, make-table and using calculated fields.

History of changes to unit

Version	Description of change	Date

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SQA acknowledges the valuable contribution that Scotland's colleges have made to the development of SQA Advanced Qualifications.

FURTHER INFORMATION: Call SQA's Customer Contact Centre on 44 (0) 141 500 5030 or 0345 279 1000. Alternatively, complete our [Centre Feedback Form](#).

General information for learners

Unit title: IT in Business: Advanced Databases (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.

Many organisations use databases to store data that is then manipulated to make managerial decisions.

This unit is designed to prepare you for creating and using databases within a business environment. If you are already using databases it will enhance your understanding of them and allow you to identify simple problems and suggest potential solutions. The focus of this unit is on maintaining and enhancing the accuracy and integrity of data held electronically. This unit will be appropriate if you intend to progress to higher education courses that offer Managing Information as an element of the course.

In Outcome 1, you will examine the problems inherent in a simple flat-file database and how relational databases if designed well will remove these problems. In addition, you will learn about the facilities within a database management system to help reduce keying in errors and so maintain an effective database for your organisation.

In Outcome 2 you will apply your designs to an existing database and create a new improved version that encompasses a range of design principles to prevent incorrect entry of data. You will also learn how to design organisational specific switchboards (also known as option tables) to enable inexperienced users to move through the database with ease.

In Outcome 3 you will learn to create complex queries that may be used with ease by individuals with minimal training. The complexity is in the design not the use.

The achievement of this unit gives automatic certification of the following:

The Core Skill *Information and Communication Technology* at SCQF level 6

You may also have further opportunities to develop aspects of the Written Communication (Writing) component of the Core Skill *Communication* at SCQF level 6, and the Critical Thinking component of the Core Skill *Problem Solving* at SCQF level 6.