Higher National Unit specification

General information for centres

Unit title: IT in Business: Databases

Unit code: F84X 34

Unit purpose: This Unit introduces the fundamental principles of database design and the use of database management software to aid decision-making in business. It is be relevant to candidates moving into positions which have a responsibility for information management with focus on analysis of and presentation of data.

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

1 Design a relational database structure from source documents.
2 Modify and store data using a relational database.
3 Query and present information to aid decision-making.

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 is at the discretion of the centre. However, it would be beneficial if candidates have achieved the HN Unit *IT in Business – Word Processing, Spreadsheets and Databases: An Introduction* (DE24 33) or NQ Unit, *Information Technology for Administrators* (DM3R 11) or equivalent or have relevant employment experience.

Core Skills: The achievement of this Unit gives automatic certification of the following:

♦ *Problem Solving* at SCQF level 6
♦ *Information and Communication Technology* at SCQF level 6

General information for centres (cont)

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.

Assessment: All Outcomes may be assessed together holistically, or discretely, under open-book conditions.

An Assessment Exemplar has been produced to indicate the national standard of achievement required at SCQF level 7.

Higher National Unit specification: statement of standards

Unit title: IT in Business: Databases

Unit code: F84X 34

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

Outcome 1

Design a relational database structure from source documents

Knowledge and/or Skills

- Information needs
- Source documents
- Database design principles
- Database structure and terminology
- Referential integrity
- Hardware/Software components
- Table object design
- Database documenter

Evidence Requirements

Candidates will need to provide evidence to demonstrate their Knowledge and/or Skills by showing that they can:

- extract key information needs from source documents and produce design notes detailing relevant data to be stored in a relational database. Design notes will include:
    — Entity Relational Modelling approach to demonstrate relationships between appropriate tables/entities
    — use of database notation to define table/entity content including primary and foreign keys
    — set referential integrity between tables and justification of cascade update and cascade delete

The resulting relational database should comprise three tables

Create an electronic database following design notes. The tables should include:

- valid data field names
- data types of one occurrence of date/time, number, text and currency
- customised field sizes appropriate to field content
- primary and foreign keys
- referential integrity rules applied

Higher National Unit specification: statement of standards (cont)

Unit title: IT in Business: Databases

Produce an object definition for each table in the database structure. Ensure appropriate options are set for printing as follows:

♦   table — properties and relationships
♦   field names — data types, sizes and properties, index names
♦   fields and properties

Candidates must produce a reflective log identifying usage of hardware and software components, two problems encountered and how each problem was resolved. Should errors not occur naturally throughout the duration of the Unit the assessor may simulate common errors.

Assessment Guidelines

Assessment for this Outcome may be a case study where a business problem has to be analysed and a solution provided. If using a case study, candidates will be presented with background information relating to the purpose of the database and the users and the types of management information required by the organisation. There may be opportunities to assess this Outcome using VLE.

A single instrument of assessment could be used to assess Outcomes 1 and 2 holistically under open-book conditions.

Outcome 2

Modify and store data using a relational database

Knowledge and/or Skills

♦   Data Modification
♦   Sort and filter records
♦   Form object design
♦   Search for and replace information
♦   Management and secure storage of data

Evidence Requirements

Candidates will need to provide evidence to demonstrate their Knowledge and/or Skills by showing that they can:

♦   open an existing database file and enter data into three data tables
♦   sort records stored within one table on more than one criterion in the same sort
♦   edit one or more tables by using:
    —   add, move and delete two fields
    —   add, amend and delete two records
♦   set filter values for multiple fields
♦   design and produce a data entry form based on one table
♦   adjust the position and/or layout of the data labels and field names in the form to display all data in the fields of an individual record clearly and use five format properties provided by the database application software to enhance the display of data within the form

Unit title: IT in Business: Databases

- search, using the form, to find one record which matches the criteria of a data entry field
- produce, either electronically or in paper form, a copy of the form which contains data of the individual record found
- add one new record to a data entry form
- amend the contents of one field in a data entry form

Assessment Guidelines

There may be opportunities to assess this Outcome using VLE. Where candidates are completing the task via a VLE, in addition to the database file, candidates may copy and paste completed tables into a word processing document to show the original and amended tables and forms. Equally, a screen dump may be pasted into a word document to demonstrate selection of a stated record using the online form

Assessment may be undertaken in open-book conditions

Outcome 3

Query and present information to aid decision-making

Knowledge and/or Skills

- Problem analysis
- Search strategy
- Query object design
- Report object design

Evidence Requirements

Candidates will need to provide evidence to demonstrate their Knowledge and/or Skills by showing that they can:

- analyse and resolve two business problems
- plan out a search strategy for each business problem on paper before the electronic search is carried out. Each plan must include an appropriate database source, search criteria and the anticipated result
- produce two queries, one which contains five fields selected from two tables to assist the solving of the identified business problem
- apply two of the following logical operators with a comparison operator to a query, sorting appropriately — AND, OR, NOT, BETWEEN AND
- produce two database reports based on the query information ensuring that data is presented clearly and with all information necessary to aid decision making. Three of the following features should be used within the reports: different styles of report layouts, subheadings and page/group footers; sorting and grouping of records; report statistics; calculated field
- on the basis of the search results, provide a brief statement advising proposed solution to each business problem
- evaluate the effectiveness of the search strategy in terms of time taken to perform and provide suggestions for alternative strategies where appropriate

Higher National Unit specification: statement of standards (cont)

Unit title: IT in Business: Databases

Assessment Guidelines

Candidates could be presented with an electronic folder in which they will find a sufficient number of databases from which to choose an appropriate data source to solve a given business problem. The candidate could be advised that the business problem may refer to any of these databases or to the one they have created for Outcomes 1 and 2. Again, the database results for query and report may be saved within the database and this may then be assessed via a VLE. Alternatively the candidate may choose to submit results via a word processing document.

Assessment may be undertaken in open-book conditions.

Administrative Information

Unit code: F84X 34

Unit title: IT in Business: Databases

Superclass category: CD

Original date of publication: August 2010

Version: 01

History of changes:

Version	Description of change	Date

Source: SQA

Higher National Unit specification: support notes

Unit title: IT in Business: Databases

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

This Unit is designed to provide candidates with the knowledge and skills for further study or employment in an administrative or IT environment. This is a mandatory Unit within the HNC/HND *Administration and Information Technology* (G9M7 15 and G9M8 16) but is also included within other HN Group Awards and can be taken as a stand-alone Unit.

Outcome 1

The first step in any data collection scenario is to assess information needs from source documents to determine the purpose of the database and who will use it. The idea is to have a well developed mission statement that can be referred to throughout the design process. This statement could help the candidate focus on the goals when decisions need to be made. It is important to emphasise this step to candidates as the reason some database projects fail can usually be traced back to ill-defined goals from the beginning of the project.

Use of Entity Relationship (ER) Modelling and database notation allows the candidate to consider the structure of the database before approaching the specific database software application. The benefits of this approach would include the candidate applying database rules within the database design process to develop an appreciation of the way data is stored in objects and how objects relate to one and other.

Introduction to the concept of Entity Relationship (ER) Modelling to demonstrate relationships between tables and database notation to designate table name, field names, primary key field and foreign key field would be appropriate here.

Outcome 2

The candidate should be able to use sub datasheets to view, enter and modify related data in a table or form. Candidates should understand the function of each object in relation to data input. The table object is the mechanism for storing records of data and is in essence provides the master data for the form object. The form object is a mechanism for inputting data into an individual record. Typically the table object can be for viewing multiple records whilst the form object can be for viewing individual record detail.

Candidates should be able to add, delete, amend and sort records on more than one criterion and be aware of when to use filter and when to create a select query for the location of specific records.

Higher National Unit specification: support notes (cont)

Unit title: IT in Business: Databases

The Find and Replace dialog box should be used by candidates to search for and optionally replace small amounts of data, The dialog box resembles the Find tools that exist in other programs, but contains some features that make it more useful for searching relational databases. For example, candidates may search on a format applied to data, and choose to match part or all of the data in a field. Candidates should be aware that the dialog box treats each search string as a pattern and returns all records that match the pattern.

Candidates may use wildcard characters in find and find-and-replace operations, examples of use should be provided in teaching and learning. The differences between finding, sorting, and filtering should be understood by candidates as finding is not the same process as sorting or filtering. *Finding* is the process of locating one or more records in database tables, queries, and forms. *Sorting* is the process of organising a set of records in a particular order. *Filtering* is the process of displaying records that meet a given condition.

The form is a database object that candidates can use to enter, edit, or display data from a table or a query. Forms can be used to control access to data, such as which fields or rows of data can be viewed from a particular table or query. An effective form can speed up the use of the database. A visually attractive form makes working with the database more pleasant and more efficient, and it can also help prevent incorrect data from being entered.

The form wizard may be used to create a form object or candidates may start with a blank form. Candidates will be expected to edit the design view to ensure a professional layout. When amending the design of the form, candidates may choose from all of the format properties available in design view. Some examples may include — resizing, moving, amending fonts, amending size of fonts, applying a template to the form, using fill/colour. The resulting form must display all data for an individual record clearly.

Database security entails allowing or disallowing user actions on the database and the objects within it. In addition, candidates should be aware of the importance of storing information in terms of regular backup copies and use of passwords for the security of access to data.

Outcome 3

The focus in Outcome 3 is on problem solving strategies to aid decision making. Searching is a problem-solving technique that systematically explores successive and alternative stages in the problem-solving process.

Candidates should be able to use Boolean operators with comparison operators when defining the criterion for a query. In addition, the miscellaneous operator BETWEEN AND can prove useful to determine whether an object is within a specific range of values. Candidates should be conversant with the syntax and symbols used in the query object, be able to discuss the difference in search results between Boolean operators AND and OR and use multiple criterion.

The results of a query should be sorted in ascending or descending order and candidates should be aware that sorting occurs in field direction left to right. There may be a requirement to add a total row using $\sum$ to a select query to group data for the preparation of summary information. Access doesn't offer an obvious way of including a grand total within a query and in most circumstances it is better to do this by displaying data in a form or a report.

Higher National Unit specification: support notes (cont)

Unit title: IT in Business: Databases

Candidates should be able to group records in reports and use report summaries to identify possible trends using aggregate functions (sum, average, max, min). The business problems to be solved should lend themselves to comparison data, for example the cost of sales/profits across different products; analysis of sales trends over months/branches — and how these comparisons can highlight trends to aid managers' decision making.

The candidate should evaluate the chosen search strategy in terms of time taken to perform, benefit of conclusion to organisation and provide suggestion of alternative strategies. The practical skills in this Unit are important but should not overshadow the need to develop the analytical and application skills of the candidate.

Guidance on the delivery and assessment of this Unit

This Unit embeds part of the underpinning knowledge required for Graded Unit 1 (F84W 34) in the HNC *Administration and Information Technology* (G9M7 15) Group Award. Candidates should consider when and why they would use database features and identify relevant business examples to support revision for Graded Unit 1.

Accepting that the database facility is particularly different to the other applications likely to be encountered by candidates, it may be more appropriate to introduce the candidate to existing databases first of all, and have them learn about the query and report facilities first. Then, having gained an understanding through using a database, it would be appropriate to demonstrate the steps required to create databases and tables. Covering these areas, will give the candidate knowledge of creating and using databases. Finally, the candidate will examine the steps required to analyse a business problem and produce a database structure that is appropriate.

Practice in the design, creation and use of tables, forms, queries and reports is required, using as wide a range of problems as possible to build confidence, without spending too much time on data input.

While it is recommended that the Unit be assessed holistically, Outcome 3 may be assessed independently, if required.

Higher National Unit specification: support notes (cont)

Unit title: IT in Business: Databases

Outcome 1

Candidates should be encouraged to spend time at the design stage and to start to consider the implications of their designs in terms of generating reliable answers. Candidates should examine the problems of flat file database to enhance their understanding of the role of relational databases. They should demonstrate familiarity of relevant terminology — tables, fields (primary/foreign key fields), records, relationships, referential integrity — and make use of these in the initial database design.

Once the purpose of the database has been determined candidates may be encouraged to adopt a series of steps to assist them in the design process of the database structure.

♦ **Find and organise the information required** — gather information from source documents to be stored in the database and organise the data in a list, such as product name and order number.

♦ **Divide the information into tables** — group data items into major entities or subjects, such as Products or Orders. Each subject then becomes a table.

♦ **Turn information items into columns** — decide what information to store in each table. Each item becomes a field, and is displayed as a column in the table. For example, an Employees table might include fields such as Last Name and Hire Date

♦ **Specify primary keys** — choose a primary key field for each table. If there is an appropriate field already, use it, and if not create one. The primary key is a column that is used to uniquely identify each row. An example might be Product ID or Order ID.

♦ **Set up the table relationships** — examine each table and decide how the data in one table is related to the data in other tables. Add fields to tables or create new tables to clarify the relationships, as necessary. At this stage keep simple one-to-many relationships between the tables, once the relationship is known, the foreign key can be added to the appropriate table.

♦ **Establish referential integrity** — referential integrity is a fundamental principle of database theory and arises from the notion that a database should not only store data, but should actively seek to ensure its quality. Consider referential integrity between tables and explain how rules can be overridden in terms of cascade update and cascade delete.

The candidate must be able to demonstrate the process of the initial database design in written form. They should also be able to record the overall task and objectives for collecting data as succinctly as possible using ER models. Database notation will force candidates to think critically about information needs and could help refine the purpose of the database.

Some candidates may prefer to write notes firstly whereas others may wish to create the structure using relevant application software. The order of approach is not prescribed and often a mixture of both approaches is required to achieve the ultimate database structure.

The addition of sample data may result in data entry errors. The candidate should be able to resolve errors with assistance using a range of resources such as ICT technical support, in person, by email, chat or telephone; using on-screen help and/or user manuals or other similar aids.

Higher National Unit specification: support notes (cont)

Unit title: IT in Business: Databases

The purpose of a reflective log is for candidates to identify whether a fault/error is caused by hardware or software components and using appropriate terminology update the reflective log with the cause of each error and how and when the error was rectified. Should errors not occur naturally throughout the duration of the Unit the assessor may simulate common errors

At the end of a design process the candidate should be encouraged to refine the design, make amendments where necessary to written notes and update the reflective log.

Outcome 2

If Outcome 1 and Outcome 2 are assessed holistically the candidate may use the database structure created in Outcome 1. Alternatively the candidate may be presented with an existing relational database file comprising of three tables. If this approach is adopted the relationships and referential integrity should be pre-set. Candidates should therefore use both datasheet and design views to become familiar with the structure and content of the database.

In either case the operating system can be used to locate the aforementioned database file in a folder and awareness of security issues can be demonstrated as the candidate saves the modified database in a trusted and appropriate location

Before data is entered into an electronic database the candidate should be encouraged to check the following points: Is repetition of data eliminated? Is a primary key set for each table? Is each field functionally dependent on the primary key? Can a change be made to a single field, without impacting on other fields?

The answer to some of the questions outlined above might best be found by adding a few records of sample data into each table. This can be a good early indication of the resulting information that can be retrieved from the table objects. The resulting table must display all data for an individual record clearly. If results are not as expected the candidate should make adjustment to the database structure as necessary.

Outcome 3

This Outcome may be assessed holistically along with Outcome 1 and Outcome 2, however may also be assessed discretely if required. If assessed discretely, candidates could be provided with an existing relational database file comprising of three tables. All relationships and referential integrity rules should be pre-set to ensure the integrity of the data. The source data for Outcome 3 should be of significant scope to allow the candidate to perform a query with more than one search criteria across multiple tables, and should allow for grouping levels and use of summary options.

Candidates should adopt a search strategy which demonstrates the thought processes in resolving each problem rather than adopting a haphazard approach. Candidates should demonstrate their knowledge and understanding through the production of search strategies, to identify in which database/table the information is stored, select information to appear in the query result so that a possible solution is relevant and meaningful, select fields upon which the criteria is posed, (these may differ from the information to be listed) and finally present the plan in a written form.

Higher National Unit specification: support notes (cont)

Unit title: IT in Business: Databases

Each plan should include an appropriate database source (database file name and table name/s, search strategy (the purpose of the query outlined — explanation of which field names to retrieve and record detail of all search criterion to be met) and the anticipated result (could include number of records found and consider how the information is to be displayed).

Candidates could create a select query to gather desired data and then examine the query results. Using the query facility, the candidate will begin to appreciate the purpose of the relationship between the tables — writing queries using more than one table will allow the candidate to use all the related data to help answer a question. If no relationship has been created then the result will be nonsensical — sometimes it is helpful to actually show the difference while teaching, so that the students are aware of the cause of the problem. Learning by error can be extremely useful in databases.

Candidates should use the report facility, understanding that its purpose is to add the level of information to the query result/table required for the user to understand what he/she is actually reading. The candidate should start with using simple reports making no amendments initially, and then make simple modifications to report controls. For example; to ensure all information in a particular field is readable it may be necessary to move, resize and provide simple formatting of the controls. Additional report controls may be added. These may include text boxes, titles, logos, date and time, and page numbers. The resulting report should present information accurately and ensure a consistent and professional layout throughout.

Opportunities for developing Core Skills

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

The Core Skills of *Problem Solving* and *Information and Communication Technology* at SCQF level 6.

This Unit should develop evaluative skills as the candidate determines information needs from source business records essential to the design of a database management system. Candidates should apply critical thinking and analysis skills for the management and secure storage of data using database software as a tool to find efficient and effective solutions to business problems.

Candidates should be competent in methods of problem solving and be able to select and manage appropriate data sources to produce meaningful results. Candidates should be able to explain the implementation of a search strategy to arrive at a particular solution. Candidates should be able to prepare reports to generate information in support of managerial decision-making.

Higher National Unit specification: support notes (cont)

Unit title: IT in Business: Databases

Problem Solving at SCQF level 6

The requirements of assessment for Outcome 1 specify that the candidate will design and create a relational database structure from source documents. The general skill for the 'Critical Thinking' component is the 'Analysis of a situation or issue'. The candidate will analyse data in situations to assess; what and where data is relevant, break down the data into component factors data fields (attributes), and then consider the implications of formulated entity relationship diagrams prior to constructing tables (entities) using a Database Management System. The candidate will be expected to demonstrate how data modelling could be applied to the given case study evidenced by ER diagrams, use of standard database notation and the database documenter.

The second general skill for the 'Planning and Organising' component is 'Plan, organise and complete a task'. In summative assessment the candidate must develop a written plan which will include Entity Relationship diagrams and use of standard database notation to inform the design of the database. Candidates will firstly identify the activities involved in the creation of a relational database and then consider the order in which these activities may be carried out. The result of the Outcomes 1 and 2 will be the design and creation of a relational database structure which incorporates relevant data from the source documents in the case study. In Outcome 3 the candidate must record a plan of action, identify the resources necessary and then carry out the plan.

The final general skill for the 'Reviewing and Evaluating component is to 'Review and evaluate a problem solving activity'. In Outcome 3, candidates will create queries and present results as information in reports to aid decision making. On the basis of these reports the candidate must provide a brief statement advising a proposed solution to each business problem. In addition, the candidate will evaluate the effectiveness of the search strategy, for example in terms of time taken to perform the search, the benefit of the conclusion to the organisation in the case study followed by a suggestion of possible alternate strategies.

Information and Communication Technology at SCQF level 6

The general skill for the 'Accessing Information' components is 'Use ICT independently to carry out complex searches across a range of tasks'.

Candidates will demonstrate the security, protection and integrity of data as the following operations are performed to keep data secure - logon using a user name and password, resolution of common data entry errors as data is modified, explanation of justification of referential integrity when linking data tables.

The requirements of the assessment for Outcome 1 specify that the candidate will use database application software to enter and edit data in the creation of three linked tables, within one database file. Outcome 2 and Outcome 3 provides opportunity for the candidate to locate a database file from an electronic folder. A number of database files must be available for assessment within this folder – these will not be known to the candidate prior to the assessment. From these, the candidate will choose the one which contains the most relevant information for the business case study. Candidates will then create queries, selecting appropriate criteria. The candidate will then create reports to ensure that the resulting data is clearly presented for the information user. Finally, the candidate will evaluate the effectiveness of the search strategy.

Higher National Unit specification: support notes (cont)

Unit title: IT in Business: Databases

The general skill for the 'Providing/Creating Information 'component is 'Use ICT independently to carry out a range of processing tasks'. ICT activities are carried out throughout assessment for Outcomes 1 to 3. The candidate will be responsible for effective use of hardware devices, operating system software and database application software in the creation of a number of queries and reports. Candidates will keep a log of any hardware/software faults or errors and consider other users as they work through formative and summative activities. They will also record steps they take to resolve any of the issues, using a range of resources such as ICT Technical support, in person, by email, chat or telephone; using on-screen help and/or user manuals or other similar aids.

Open learning

If this Unit is delivered by open or distance learning methods, additional resources will be required for candidate support, assessment and quality assurance. It would require planning by the centre to ensure the sufficiency and authenticity of candidates' evidence.

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**

General information for candidates

Unit title: IT in Business: Databases

Today's society is often described as 'the Information Society' in which information is expected to be timely and accurate with emphasis on professional presentation. Individuals in the workplace now have access to and are responsible for, the management and secure storage of large amounts of information. The purpose of this Unit is to introduce the Database as a tool to help store, process and produce information in such a way as to be relevant to a manager and thus assist with management decision-making.

Initially, this Unit will focus on the analysis of a business problem, then the design and use of a database to collate data and turn it into information.

In Outcome 1 you will learn how to analyse a business problem, identify the data you need to process and how best to order that data. Then you will be introduced to the relevant terminology as well as the basic concepts of database design. You will create a database structure using a relational database.

In Outcome 2 you will also learn how to input data, using tables. You will also design forms and demonstrate how to use these forms for both managing data and searching for specific records. Finally having created a database you will be introduced to the importance of storing information securely.

In Outcome 3 you will use the database facilities to help you solve a range of business problems. You will also use the database facilities to help you present the results in a format that is clear to the reader. You will also look at the range of statistical functions available within the report object. Having produced the appropriate information you will then be able to recommend a course of action to a business problem.

The achievement of this Unit gives automatic certification of the Core Skill of *Problem Solving* at SCQF level 6 and the Core Skill of *Information and Communication Technology* at SCQF level 6