Higher National Unit Specification

General information for centres

Unit title: SQL: Introduction

Unit code: DH3J 34

Unit purpose: This Unit is designed to develop a broad knowledge of the concepts, principles, boundaries and scope of relational databases using a query language. These will be reinforced by developing the practical skills required in using the structures and features of a query language in order to maintain and interrogate a relational database management system. The SQL constructs used adhere to the current standards, so will be applicable in all SQL-based platforms. It forms part of an HN group award programme, although it can also be used as a stand-alone Unit by candidates wishing to acquire and develop skills using a query language.

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

1.   Create and maintain a data storage system.
2.   Manipulate data stored within a table structure.
3.   Produce formatted reports.

Credit value: 1 HN Credits 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; however it is recommended that candidates should have basic practical PC skills, and an understanding of the role and application of databases. This can be evidenced by having achieved Units such as HN Unit DH33 34: *Computer Operating Systems 1*, HN Unit DH3F 34: *Systems Development: Introduction* and also HN Unit D75X 34: *Information Technology: Applications Software 1*. Alternatively, the Unit can be delivered on a stand-alone basis to candidates interested in learning and using a query language. In these cases, candidates should have practical work experience and some appreciation of the role and application of relational database management systems.

Core skills: There may be opportunities to gather evidence towards core skills in this Unit, although there is no automatic certification of core skills or core skills components.

General information for centres (cont)

Context for delivery:
This Unit is included in the framework of a number of HNC and HND group awards. It is recommended that it should be taught and assessed within the context of the particular group award to which it contributes.

Assessment:
It is recommended that a single case study covering the Outcomes involved in this Unit be used for assessment purposes. Three key stages can be easily identified within the Unit, each corresponding to the three Outcomes, and it is also recommended therefore that three separate assessments should be prepared corresponding to each Outcome. This will also facilitate monitoring of the candidate's progress.

Stage 1   Outcome 1 should be assessed by means of the candidate creating tables of data and subsequently modifying a table structure, to meet the requirements of a supplied problem specification.

Stage 2   Outcome 2 should be assessed by means of the candidate creating a series of queries and updates on the tables created in Assessment 1.

Stage 3   Outcome 3 should be assessed by the generation and production of at least two reports based on the contents of the tables created in Assessment 1

Higher National Unit specification: statement of standards

Unit title: SQL: Introduction

Unit code: DH3J 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

Create and maintain a data storage system

Knowledge and/or skills

♦ Data types available within a RDBMS
♦ Creating and dropping data tables in a RDBMS
♦ Inserting data records into data tables
♦ Modifying the structures of data tables
♦ Assigning primary keys to tables

Evidence requirements

Assessment for this outcome will be in the form of practical assignments. Candidates must produce evidence to demonstrate their knowledge and/or skills by showing that they can:

Use SQL to -
♦ Create a set of data tables using suitable data field types to meet specified requirements
♦ Insert data records into data tables
♦ Modify a data table structure to meet specified requirements

Evidence for this Outcome will consist of the production of printouts listing the table structures and the table contents to meet the requirements of a specification.

The assessment should ensure that a range of data types is used, and includes at least **one** example of **each** of the most common types of character, numeric and date.

This assessment is open book but must be undertaken in supervised conditions. Assessors should assure themselves of the authenticity of each candidate's submission.

It will **not** be acceptable to use a generator for this assessment.

Higher National Unit specification: statement of standards (cont)

Unit title: SQL: Introduction

Assessment guidelines

To be meaningful and realistic, the database scenario should contain at least 3 tables. Since this Outcome involves a degree of repetition, it is also acceptable that some tables are issued to the student in the form of prepared scripts for the candidate to run. To assess the candidate's competency, however, the candidate should create at least two tables.   The assessor should ensure that the data types contained in these two created tables include at least one example of the most common data types listed above.

Centres should be cautious about asking the candidate to use the 'Drop' command in case the assessment requires to be resubmitted. Two possible ways around this are:

Ask the candidate simply to write down the command which would be used to eliminate the relevant table from the database, without physically removing it; or

If table(s) are being supplied to the candidate, then include a further table, relevant but not essential for the database, and ask the candidate to eliminate this table from the database since it is no longer required.

This last point may be easily evidenced by taking a printout of the screen display showing the command used and the RDBMS response.

Outcome 2

Manipulate data stored within a table structure

Knowledge and/or skills

♦ Using an SQL to create queries to meet user requirements
♦ Extracting data records to meet user requirements
♦ Establishing relationships between multiple tables
♦ Sorting, updating and deleting data records as per user requirements
♦ Extracting columns and rows as per user requirements
♦ Using calculations to meet user requirements
♦ Applying functions and as per user requirements
♦ Formatting column headings to meet user requirements

Evidence requirements

Evidence for this Outcome will take the form of printouts produced by the candidate listing queries created by the candidate and also the resulting output of the queries. The queries should be applied to the tables created in Assessment 1.

Higher National Unit specification: statement of standards (cont)

Unit title: SQL: Introduction

The assessment must ensure that all of the above Knowledge and Skills topics are included at least once. A typical assessment paper will include at least 12 user queries, written in English. The candidate will be required to create and execute a query script for each in SQL. It is also acceptable that the assessment paper includes, for each query, a sample of what the resulting output should look like, using the tables from Assessment 1 as a guide. This will allow for the fact that most queries will work and give a response, but not necessarily the correct, required, response. Having a sample response included will guide the candidate as to whether their response is the correct response or not, thus avoiding the need for multiple assessment attempts for minor corrections. The Assessor and the Assessment paper should stress that this is only a guide to what the expected display/printout will look like. Candidates should not be penalized for irregularity in input data if the query script is syntactically correct.

This assessment must be undertaken in supervised conditions and is open book. Assessors should assure themselves of the authenticity of each candidate's submission.

It will **not** be acceptable to use a generator for this assessment.

Outcome 3

Produce formatted reports

Knowledge and/or skills

♦ Applying header and footer details to reports
♦ Applying date and page numbers to reports
♦ Assigning meaningful column headings
♦ Adjusting column widths to meet data contents and printout requirements
♦ Grouping data records to meet user requirements
♦ Applying group sub-totals and report summative totals

Evidence requirements

Evidence for this Outcome will take the form of printouts produced by the candidate listing both the command file used to generate each of the reports, and also the resulting output of the commands – the report itself.

A minimum of two reports based on the tables created at Assessment 1 should be generated.

All of the above Knowledge and Skills items should be used at least once in the course of this Assessment. Please note that this does not mean all items are required to be used in **both** reports.

This assessment must be undertaken in supervised conditions and is open book. Assessors should assure themselves of the authenticity of each candidate's submission.

Higher National Unit specification: statement of standards (cont)

Unit title: SQL: Introduction

Assessment guidelines

Most RDBMS packages nowadays come with built-in tools such as report generators, or these are available to purchase separately as 'add-ons'. Such tools will also be used in the related HN Units DH3D 35 *Software Development: Relational Database Systems* and HN Unit
D765 35 *Software Development: Fourth Generation Environment*. In the workplace, it is also more than likely that HN graduates will make use of such tools to generate reports. In this unit therefore it will be acceptable for a candidate to make use of such a tool to complete this Assessment. The candidate is still expected however to produce the printed evidence as required in the Evidence Requirements above.

Administrative Information

Unit code: DH3J 34

Unit title: SQL: Introduction

Superclass category: CD

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Higher National Unit specification: support notes

Unit title: SQL: Introduction

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 intended as an introduction to the basic principles and procedures involved in developing robust, reliable and efficient database queries using a SQL. Its aim is to acquire competence in the design and development of such queries. The concepts of good practice should be stressed throughout. The Unit should provide a foundation in the basics of a SQL, on which more advanced Units such as - HN Unit DH3D 35 *Software Development: Relational Database Systems,* HN Unit *D765 35 Software Development: Fourth Generation Environment,* and HN Unit DH32 35 *Software Development: Developing for the WWW* can be based.

It forms part of an HN Computing group award programme and should be delivered within the context of the group award. It can also be delivered as a stand-alone Unit by candidates wishing to acquire, and develop skills using a SQL.

As this is an introductory Unit in a query programming language in an HN group award, the context and examples used should be both relatively simple and within the context of the candidate's vocational experience. This would permit the candidate to concentrate more on the techniques involved, rather than trying to understand the initial problem.

By the end of the Unit, the candidate should have achieved a good foundation in the skills required for developing reliable and efficient SQL queries which solve business problems and meet user requirements.

The Unit may be delivered at any stage within an HN Computing group award, as meets the locally prepared course maps.

Guidance on the delivery and assessment of this Unit

The Unit is capable of being delivered on its own, but could also be delivered in conjunction with either the Software Development: Relational Database Systems unit, or the Software Development: Fourth Generation Environment unit. In these cases, it may either precede either of these Units, or be delivered in parallel with it.

For assessment purposes, the candidate should be issued with design specifications for a database scenario to implement.

Higher National Unit specification: support notes (cont)

Unit title: SQL: Introduction

After consideration of the design specifications, the tutor should introduce the basic syntax of the language to permit the candidate to create data tables, insert data records, amend table structures, and drop data tables. This may be preceded by sample 'Select' query commands on ready-made table(s) to introduce the candidate to the basic structure and syntax of a query.

After introducing the steps involved in developing SQL queries, candidates should be presented with ample practical exercises to illustrate the use of the query.

Regardless of delivery mode, a single and coherent case study approach is recommended for assessment, with the model broken down into the 3 identifiable and assessable stages allowing the tutor the opportunity for regular monitoring of the candidate's progress and allowing time for intermittent remediation.

In order to participate in the Unit, the candidate will require individual access to a personal computer or workstation with suitable RDBMS software.

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).

Special needs

This Unit specification is intended to ensure that there are no artificial barriers to learning or assessment. Special needs of individual candidates should be taken into account when planning learning experiences, selecting assessment instruments or considering special alternative Outcomes for Units. For information on these, please refer to the SQA document *Guidance on Special Assessment Arrangements* (SQA, 2001).

General information for candidates

Unit title: SQL: Introduction

In this Unit, you will acquire the knowledge and learn the skills necessary to enable you to create programming scripts using a SQL.

To achieve this, you will require access to a workstation and also to a suitable SQL-based Relational Database Management System applications package.

This will involve two major areas of learning.

Firstly, breaking down the problem into identifiable and manageable steps from which you will develop the required query script.

Secondly, you will learn the syntax, functions and structures of SQL scripts, with which you will implement the solutions.

Your understanding and grasp of these skills and techniques will be reinforced throughout with practical exercises.

Using a bank of test data, you will test your scripts to ensure their correct working to meet the user's needs. You will be required to amend any errors in your solutions in order to achieve robust, reliable and efficient scripts.

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

1.   Create and maintain a data storage system

2.   Manipulate data stored within a table structure

3.   Produce formatted reports