e-Quals Unit Syllabus

Level 3 Develop software using SQL (Structured Query Language)

7266/7267-310

www.cityandguilds.com/e-quals07
August 2008
Version 2.0

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Unit 310 Develop software using SQL (Structured Query Language)

Rationale

The aim of this unit is to enable candidates to develop the skills required to create queries, provide reports, manipulate data and document test results in a Relational Database Management System (RDMS).

Learning outcomes

There are **six** outcomes to this unit. The candidate will be able to:

Query and display data from a single table
Query and display data from multiple tables
Manipulate data in tables
Create and manage tables, views and indexes
Control user access
Record the results of tests

Guided learning hours

It is recommended that 60 hours should be allocated for this unit. This may be on a full time or part time basis.

Connections with other qualifications

This unit contributes towards the knowledge and understanding required for the following qualifications:

Outcome	This award contributes to the knowledge and understanding of the following Areas of Occupational Competence in the City & Guilds NVQ for IT Professionals (4324)
1,2	326 Database software 3
3,4,5,6	319 Testing ICT systems 3

Key Skills

This unit contributes towards the Key Skills in the following areas:

Communication	C3.2, C3.3
Application of Number	N1.1
Information technology	None
Working with others	None
Improving own learning	LP3.1, LP3.2, LP3.3
Problem solving	PS3.1, PS3.2, PS3.3

Assessment and grading

Assessment will be by means of a **set assignment** covering both practical activities and underpinning knowledge.

Unit 310 Develop software using SQL (Structured Query Language)

Outcome 1 Query and display data from a single table

Practical skills

The candidate will be able to:

1 create a query to
   - a select all columns or specific columns
   - b use column heading defaults
   - c use arithmetic expressions with arithmetic operators and NULL values
   - d use the concatenation operator
   - e use literal character strings
   - f eliminate duplicate rows
   - g use character and date functions
   - h use conversion functions to convert column data types
   - i use nested functions
   - j format data and numbers for display purposes
   - k use number functions to perform calculations on data: ROUND, TRUNC, MOD

2 limit the rows retrieved by a query by use of
   - a WHERE clause
   - b character strings and dates
   - c relational operators: **=, <, >, <=, >=, not equal**
   - d logical operators: AND, OR, NOT
   - e BETWEEN condition
   - f IN condition
   - g LIKE condition
   - h NULL conditions
   - i DISTINCT keyword

3 sort the rows retrieved by a query in ascending or descending order and by single and/or multiple columns by use of the ORDER BY clause.

Underpinning knowledge

The candidate will be able to:

1 state that SQL is an interactive query language and a database programming language

2 describe how SQL can be embedded in a programming language

3 explain the difference between a logical view and the physical storage of data

4 explain the syntax of a SELECT statement

5 state that a primary key uniquely identifies a record in a table and can consist of more than one column (compound)

6 describe the order of precedence of operators (arithmetic and logical) and how parenthesis can be used to alter the order in which operators are executed

7 describe **character, number** and **date** functions

8 explain the use of wildcards in character strings for retrieval of data

9 explain the need for conversion of data: **implicit** and **explicit**

10 describe the data types available.

Unit 310 Develop software using SQL (Structured Query Language)

Outcome 2 Query and display data from multiple tables

Practical skills

The candidate will be able to:

1 interpret an Entity Relationship Diagram (ERD)

2 resolve ambiguous column names in a query by use of qualifiers

3 retrieve data from multiple tables using
   - a equijoins
   - b nonequijoins
   - c outer joins
   - d self joins

4 create a query using joins to retrieve records with the
   - a USING clause
   - b ON clause

5 create a query using the GROUP BY clause to group data in
   - a one column
   - b multiple columns

6 create a query using built-in functions for
   - a AVG
   - b COUNT
   - c MIN
   - d MAX
   - e SUM

7 use nested built-in functions in a query

8 limit the columns or rows retrieved by a query by use of the HAVING clause

9 create a query containing a subquery
   - a with a single row
   - b multiple rows
      - i using the ANY operator
      - ii using the ALL operator.

Underpinning knowledge

The candidate will be able to:

1 explain the purpose of a foreign key

2 explain the terms used in a Relational Database Management System: entities, relationships (1:1,1:M, M:1) domains, data integrity, enforced referential integrity, data redundancy

3 describe the different types of joins which can be used for queries on multiple tables

4 explain the use of subqueries.

Unit 310 Develop software using SQL (Structured Query Language)

Outcome 3 Manipulate data in tables

Practical skills

The candidate will be able to:

1 b use the INSERT statement to
  a insert new rows to a table including
    i null values
    ii special values
    iii specific date values
  b copy rows from another table
2 use the UPDATE statement to
  a update rows in a table
  b update rows based on another table
3 use the DELETE statement to
  a delete rows from a table
  b delete rows based on another table
4 create and write scripts.

Underpinning knowledge

The candidate will be able to:

1 explain the purpose of a data manipulation language (DML)
2 explain how referential integrity is used to maintain data consistency
3 describe the types of error that can occur if a DML statement attempts to breach referential integrity
4 state that a collection of DML statements form a logical unit called a transaction
5 explain the purpose of COMMIT and ROLLBACK when transactions are processed against a database
6 explain how records in a database are locked to maintain data integrity.

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Outcome 4 Create and manage tables, views and indexes

Practical skills

The candidate will be able to:

1 create a
   - a table
   - b view

2 alter a view definition

3 drop a
   - a table
   - b view

4 rename and truncate a table

5 insert, update and delete data using a view

6 create and maintain constraints

7 retrieve data using a view

8 create and maintain an index.

Underpinning knowledge

The candidate will be able to:

1 describe the naming rules for tables, views and indexes

2 explain the purpose of an index

3 describe the need for integrity constraints

4 describe the contents and purpose of a Data Dictionary.

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Outcome 5 Control user access

Practical skills

The candidate will be able to:

1 identify the commands used to control user access.

Underpinning knowledge

The candidate will be able to:

1 describe the function of a database administrator (DBA)

2 explain the need for restricted access for maintaining the structure of a database

3 describe the security features used to protect data integrity eg password and privileges

4 describe how users can be created and privileges granted and revoked

5 explain how database links can be created and accessed

6 describe how a table and table definition can be modified.

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Outcome 6 Record the results of tests

Practical skills

The candidate will be able to:

1 create test data

2 use a test plan to carry out a series of tests

3 record the results in a test log

4 provide evidence of testing eg printed output, screen prints.

Underpinning knowledge

The candidate will be able to:

1 describe the essential features of a test log

   a test number

   b date

   c actual results

   d record of discrepancies between actual results and expected results

2 explain how the test number provides a cross reference between a test plan its corresponding test log and test output.

Unit record sheet

Use this form to track your progress through this unit.

Tick the boxes when you have covered each outcome. When they are all ticked, you are ready to be assessed.

Outcome	✓	Date
1 **Query and display data from a single table**	☐	
2 **Query and display data from multiple tables**	☐	
3 **Manipulate data in tables**	☐	
4 **Create and manage tables, views and indexes**	☐	
5 **Control user access**	☐	
6 **Record the results of tests**	☐	

Candidate Signature ..... **Date** .....

City & Guilds Registration Number ....

Centre Name ..... **Centre Number** .....

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