e-Quals Unit Syllabus

Level 3 Designing and creating relational databases

7266 - 047

www.cityandguilds.com/e-quals07
March 2007
Version 1.0

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City & Guilds
1 Giltspur Street
London EC1A 9DD
T +44 (0)20 7294 2800
F +44 (0)20 7294 2400
www.cityandguilds.com
enquiry@cityandguilds.com

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Unit 047 Designing and creating relational databases

Syllabus overview

Rationale

The aim of this unit is to provide candidates with an advanced level of skills and knowledge to competently prepare for, perform or supervise the performance of others in a variety of *database tasks* using Information and Communication Technologies (ICT). Candidates will develop a more in depth understanding of databases and database applications and the operating system in everyday usage and the ability to work in a supervisory role performing advanced tasks with a high degree of competence, using 'problem solving' skills and giving direction to others.

Learning outcomes

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

- Identify client requirements for a database
- Undertake analysis and design
- Implement the database design to create tables and forms for data entry
- Undertake information retrieval
- Develop reports for output
- Undertake testing and produce documentation

Guided learning hours

It is recommended that 90 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:

- N/SVQ in Customer Service, units
  - 201, 202, 203, 204
- ICS Customer Service Technical Certificate, units
  - 1.1, 1.2, 1.3, 1.4, 1.5, 1.6
  - 2.1, 2.4, 2.5, 2.7
  - 3.3, 3.4, 3.5

Assessment and grading

This unit will be assessed by an assignment covering practical skills and underpinning knowledge.

Unit 047 Designing and creating relational databases

Outcome 1 Identify client requirements for a database

Practical skills

The candidate will be able to:

1 use suitable methods to identify client requirements

2 create a brief and simple description of the purpose of a given data processing system

3 produce a brief description (plans should be included) of an existing data processing activity which is being considered for computerisation

4 produce an outline description of a proposed database to meet client requirements

5 list the advantages and limitations for the existing and proposed data processing systems.

Underpinning knowledge

The candidate will be able to:

1 describe what is meant by the term Relational Database System

2 Explain the differences between the following types of database:

- a flat file
- b Relational

3 explain the potential need for restricting access to a database or information system, including the implementation of a hierarchical system of passwords

4 describe the advantages and limitations of a computer based database compared to a paper based system.

Unit 047 Designing and creating relational databases

Outcome 2 Undertake analysis and design

Practical skills

The candidate will be able to:

1 compile a list to identify
   a input data
   b output data
   c internally generated data
   d import data
2 use meaningful names for consistency in design
3 identify entities in a database or information and use test data systems eg primary keys
4 identify the attributes of an entity including validation
5 identify design relationships
6 refine the data model using normalisation procedures
7 design and plan user interface screens
8 design and plan screen/form layouts
9 design and plan report layouts identifying query criteria
10 design and plan an Entity-relationship (E-R) model
11 design and plan a data dictionary
12 use filenames - using version control methods.

Underpinning knowledge

The candidate will be able to:

1 explain methods of identifying data items (data elements), in a given data processing system (e.g. document analysis, operator interviews, transaction definitions, internally generated data)
2 explain the purpose of fields for time, date and calculations
3 define the terms:
   a entity
   b attribute
4 describe the purpose of and differences between primary, foreign and alternate keys
5 define the term relationship and give examples of 1:1, 1:M, M:1, and M:M relationships
6 identify and explain normalisation form (NF) in the process of normalisation:
   a 1NF no repeating sets
   b 2NF attributes depend on the whole primary key
   c 3NF no sets of mutually dependant non-key attributes

Underpinning knowledge continued

7 explain that a user interface screen should have clearly labelled user options, supported by automated sequences which give easy access to specified functions, reports and forms

8 define the term 'validation' giving examples of how this may be applied in a database or information system

9 explain that a data dictionary defines for each table

- a table name
- b key (primary, foreign, alternate)
- c index(es)
- d field names
- e data types (numeric, character, date, logical)
- f format (currency, day/month/year)
- g description of the field
- h field length
- i validation of field(s).

Unit 047 Designing and creating relational databases

Outcome 3 Implement the database design to create tables and forms for data entry

Practical skills

The candidate will be able to:

1 use the data dictionary to create the table structure(s)

2 use the E-R model to create the relationship(s)

3 create any indexes

4 create forms and subforms for input using screen layout/form(s)

5 generate useful descriptive error messages to support entry validation

6 provide controls to link input forms.

Underpinning knowledge

The candidate will be able to:

1 explain the following terms when they are applied to a database or information system:

- a data integrity
- b data consistency
- c data redundancy
- d referential integrity.

Unit 047 Designing and creating relational databases
Outcome 4 Undertake information retrieval

Practical skills

The candidate will be able to:

1 create queries from design criteria

2 select records from:

- a a single table
- b two or more tables.

Underpinning knowledge

The candidate will be able to:

1 explain that queries can be used to:

- a append data to an existing database table whilst maintaining the integrity of all related tables
- b append data to a new database table either within the current database or to a table within an alternative database whilst maintaining the integrity of all related tables
- c update either a single record or multiple records in a database automatically
- d select records for display purposes from one or more tables
- e update existing records
- f generate forms and reports

2 describe the options available to specify search criteria when implementing/designing queries

- a logical operators e.g. AND, OR, NOT
- b relational operators e.g. =, >, <, >=, <=
- c use of wildcards
- d query by example (QBE)

3 explain the use of sort criteria (i.e. ascending, descending)

4 explain the use of SQL Select statements (e.g. group by, order by, where).

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Outcome 5 Develop reports for output

Practical skills

The candidate will be able to:

1 develop reports using
   - a Headings
   - b Subheadings
   - c Calculations
   - d Footers
   - e Pagination
   - f data grouping
   - g mailing labels

2 direct report output to:
   - a the screen
   - b the printer

3 provide controls to enable automatic output.

Unit 047 Designing and creating relational databases
Outcome 6 Undertake testing and produce documentation

Practical skills
The candidate will be able to:

1 design and complete a test plan

2 verify that the database conforms to the design specification

3 test the database according to a prepared test plan

4 compare the expected outcome to the actual outcome, and decide if the database is working correctly

5 clearly identify any discrepancies, and any amendments made to correct errors

6 produce technical documentation; to include

- a log of testing
- b explanation of normalisation (1NF, 2NF, 3NF)
- c table structures
- d data dictionary
- e illustrated relationship diagram (including relationship types)
- f screen/form layouts
- g report layouts
- h query designs
- i illustration and description of menu interface
- j contents and index
- k results of testing

7 create user documentation; to include

- a clear operating instructions for the complete database
- b explanations for any error messages.

Underpinning knowledge
The candidate will be able to:

1 describe the purpose of test data including

- a normal
- b boundary
- c exception

2 identify the need for technical and user documentation.

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 **Identify client requirements for a database**	☐	
2 **Undertake analysis and design**	☐	
3 **Implement the database design to create tables and forms for data entry**	☐	
4 **Undertake information retrieval**	☐	
5 **Develop reports for output**	☐	
6 **Undertake testing and produce documentation**	☐	

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

City & Guilds Registration Number .....

Quality nominee (if sampled) ..... **Date** .....

Assessor Signature ..... **Date** .....

External Verifier Signature (if sampled) ..... **Date** .....

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

Published by City & Guilds
1 Giltspur Street
London
EC1A 9DD
T +44 (0)20 7294 2468
F +44 (0)20 7294 2400
www.cityandguilds.com
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