Systems and Principles
Unit Syllabus

Level 3 Software development fundamentals
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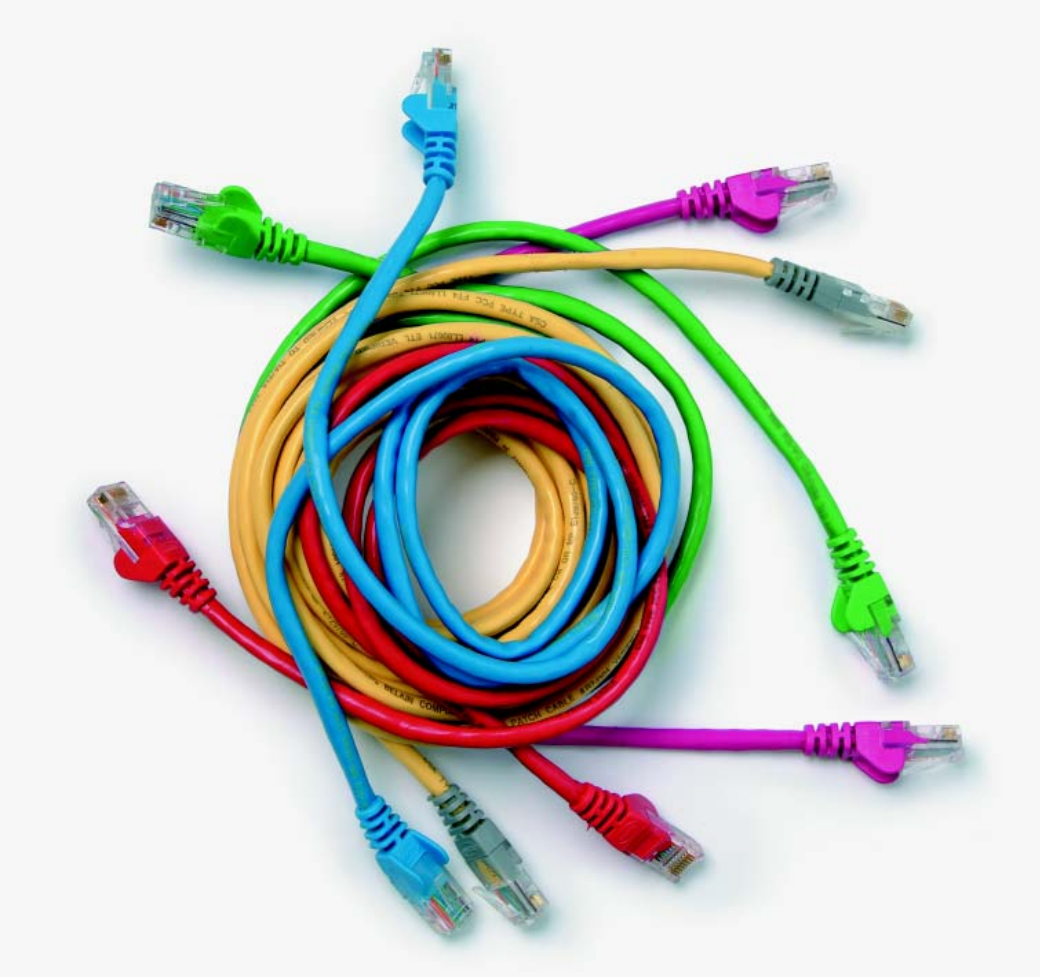

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Contents

Unit 033 Software development fundamentals

Syllabus Overview		2
Outcome 1	Understand the principles of software design	3
Outcome 2	Apply the techniques of software design	4
Unit record sheet		5

Unit 033 Software development fundamentals

Syllabus Overview

Unit accreditation number L/601/3184

Credit value 12

Rationale

This unit covers the principles of software design and the application of the techniques used in software design to represent software solutions.

Learning outcomes

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

1 Understand the principles of software design

2 Apply the techniques of software design

Guided learning hours

It is recommended that **90** guided learning 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 learning outcomes and assessment criteria required for the level 3 Diploma in ICT Professional Competence.

Assessment and grading

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

Unit 033 Software development fundamentals

Outcome 1 Understand the principles of software design

Underpinning knowledge

The learner will be able to

1 Describe the role of software design and computer programming in the IT Systems Development Life Cycle (SDLC)

2 Describe the application and limits of programming paradigms procedural, object oriented and event driven and the available supporting tools and environments (eg CASE tools, IDEs)
   - a explain why procedural programs should have high cohesion and low coupling between modules
   - b explain that in object oriented programming languages an object contains both data (attributes) and code (methods) encapsulated within the object
   - c state that encapsulation prevents access to data within an object directly but allows access through the object's interfaces
   - d explain how CASE (Computer Aided System Engineering) tools are typically used to support the whole SDLC
   - e describe how event driven programs respond to events initiated by the user
   - f describe how an IDE (Integrated Development Environment) assists the software developer with the development of software and typically includes a debugger

3 Explain sequence, selection and iteration as used in computer programming
   - a explain that program instructions executed in sequence are executed in order one after the other
   - b describe the control structures used for selection eg if, if … else, switch/Select Case/EVALUATE and how they are used to alter the flow of execution
   - c explain how iteration means that defined program instructions can be repeatedly executed
   - d describe and distinguish between various types of iteration: definite, indefinite, pre-condition, post-condition

4 Explain abstraction of data and code and the use of predefined data and code in computer programming
   - a state how programming languages contain predefined code eg functions, classes/objects which save a developer writing their own
   - b state how a programming language typically contains predefined constants

5 Explain the importance of the readability and understandability of code and how these can be improved by naming, comments and layout

6 Describe how the following factors contribute to the quality of code: efficiency, reliability, robustness, usability, portability and maintainability

Unit 033 Software development fundamentals

Outcome 2 Apply the techniques of software design

Practical activities

The learner will be able to

1 develop algorithms to represent problems
2 identify and define data and file storage requirements including predefined data items
3 identify and define program structures including predefined code items
4 identify and represent required inputs and outputs.
5 use tools (eg pseudocode) to express software designs

Underpinning knowledge

The learner will be able to

1 describe algorithms eg input, output, sorting, searching, validation
2 describe the basic data types eg integer, floating point, character, string, boolean
3 describe one-dimensional and two-dimensional arrays and the use of subscripts
4 explain the meaning of the terms file, record and field and describe the relationships between them
5 state the types of error that can occur when accessing a file eg file does not exist, record does not exist, read past end of file, hardware fault
6 explain how a data structure can be used to create the following: table, stack, queue, tree, linked list
7 explain the advantages of using pre-written library routines or objects eg built-in, in-house, third party
8 explain the types of diagrammatical representations used to show the program structure:
   a an Event/Action chart used to represent the links between events and code for an event driven program
   b a structure chart used to represent the links between modules in a procedural program
   c an object model used to show the links between objects for an object oriented program
9 describe the process of defining screen and print layouts
10 describe the types of validation check that may be performed eg range, type (alphabetic, numeric), check digit, date
11 explain that pseudocode or structured English may be used as a program design language

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	**Understand the principles of software design**	☐	
2	**Apply the techniques of software design**	☐	

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

City & Guilds Registration Number .....

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

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

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

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