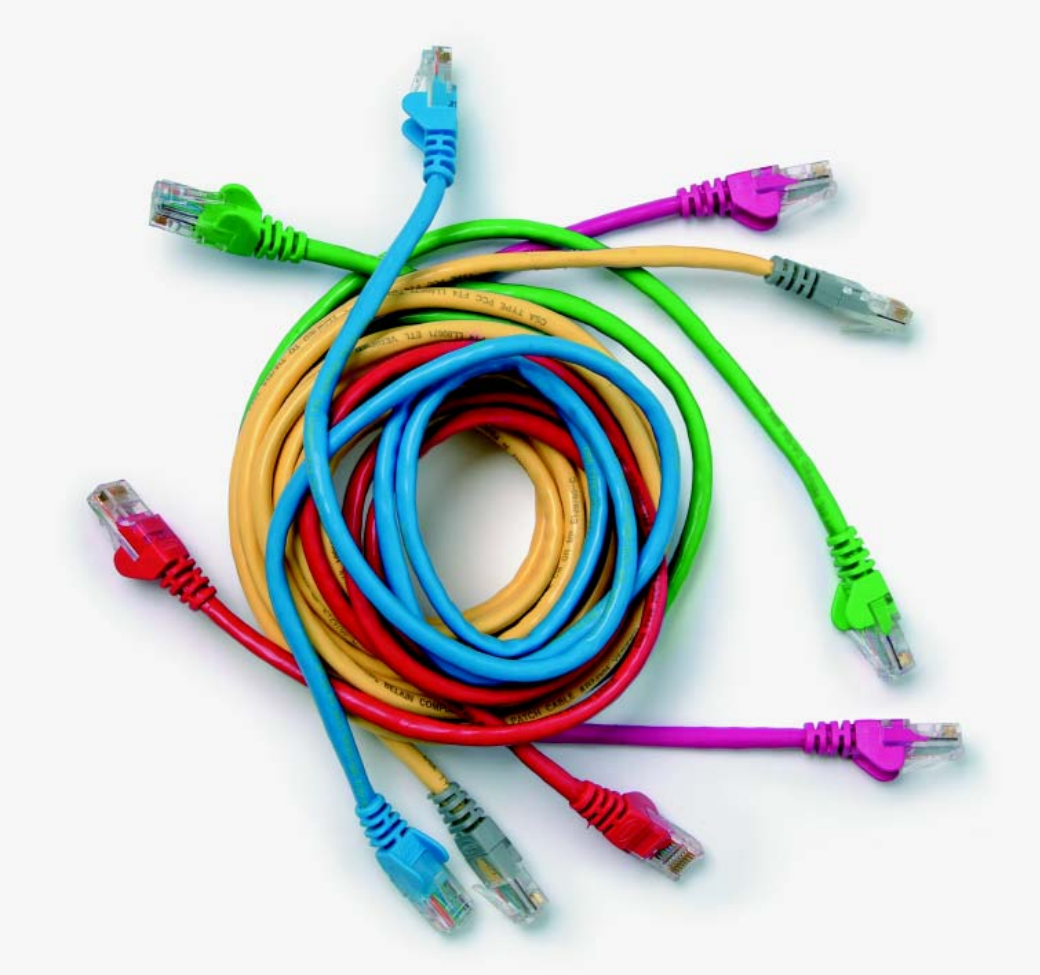
Systems and Principles Unit Syllabus

Level 3 Systems architecture

7540-041

www.cityandguilds.com
December 2010
Version 2.0



About City & Guilds
City & Guilds is the UK's leading provider of vocational qualifications, offering over 500 awards across a wide range of industries, and progressing from entry level to the highest levels of professional achievement. With over 8500 centres in 100 countries, City & Guilds is recognised by employers worldwide for providing qualifications that offer proof of the skills they need to get the job done.

City & Guilds Group
The City & Guilds Group includes City & Guilds, City & Guilds Institute, ILM (the Institute of Leadership & Management) which provides management qualifications, learning materials and membership services, NPTC which offers land-based qualifications and membership services, and HAB (the Hospitality Awarding Body). City & Guilds also manages the Engineering Council Examinations on behalf of the Engineering Council.

Equal opportunities
City & Guilds fully supports the principle of equal opportunities and we are committed to satisfying this principle in all our activities and published material. A copy of our equal opportunities policy statement is available on the City & Guilds website.

Copyright
The content of this document is, unless otherwise indicated, © The City and Guilds of London Institute 2010 and may not be copied, reproduced or distributed without prior written consent.

However, approved City & Guilds centres and candidates studying for City & Guilds qualifications may photocopy this document free of charge and/or include a locked PDF version of it on centre intranets on the following conditions:

- centre staff may copy the material only for the purpose of teaching candidates working towards a City & Guilds qualification, or for internal administration purposes
- candidates may copy the material only for their own use when working towards a City & Guilds qualification

The *Standard Copying Conditions* on the City & Guilds website also apply.

Please note: National Occupational Standards are not © The City and Guilds of London Institute. Please check the conditions upon which they may be copied with the relevant Sector Skills Council.

Publications
City & Guilds publications are available on the City & Guilds website or from our Publications Sales department at the address below or by telephoning +44 (0)20 7294 2850 or faxing +44 (0)20 7294 3387.

Every effort has been made to ensure that the information contained in this publication is true and correct at the time of going to press. However, City & Guilds' products and services are subject to continuous development and improvement and the right is reserved to change products and services from time to time. City & Guilds cannot accept liability for loss or damage arising from the use of information in this publication.

City & Guilds
1 Giltspur Street
London EC1A 9DD
T +44 (0)844 543 0000 (Centres)
T +44 (0)844 543 0033 (Learners)
F +44 (0)20 7294 2413
www.cityandguilds.com
learnersupport@cityandguilds.com

Contents

Unit 041 Systems architecture

Syllabus Overview		2
Outcome 1	Understand the representation of information within a computer and the way it is processed	3
Outcome 2	Make effective use of the operating environment of current computer systems	4
Outcome 3	Know the communication process in distributed operating systems and computer networks	5
Outcome 4	Know distributed applications and transaction processing in mainframe systems	6
Unit record sheet		7

Unit 041 Systems architecture

Syllabus Overview

Unit accreditation number **T/601/3504**

Credit value **10**

Rationale

This unit covers how information is represented and processed in a computer, communication processes in networks and distributed systems and distributed applications and transaction processing. It also involves knowledge and use of an operating environment.

Learning outcomes

There are **four** outcomes to this unit. The candidate will:

- Understand the representation of information within a computer and the way it is processed
- Make effective use of the operating environment of current computer systems
- Know the communication process in distributed operating systems and computer networks
- Know distributed applications and transaction processing in mainframe systems

Guided learning hours

It is recommended that **80** 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 041 Systems architecture

Outcome 1 Understand the representation of information within a computer and the way it is processed

Underpinning knowledge

The learner will be able to

1 describe how number systems and data representation are used to store information in a computer:
   a binary
   b hexadecimal
   c ASCII
   d EBCDIC

2 describe the role of input, output and storage devices:
   a keyboard
   b scanner
   c monitor
   d printer
   e disk drive
   f CD-ROM drive
   g CD-RW drive
   h DVD drive

3 describe the characteristics of Central Processing Unit (CPU) components (Arithmetic and Logic Unit (ALU), Control Unit and Registers) and the operation of the Fetch Execute Cycle

4 describe the operation of a peripheral device using correct technical terminology:
   a keyboard
   b scanner
   c monitor
   d printer (laser, ink-jet)
   e disk drive.

Unit 041 Systems architecture

Outcome 2 Make effective use of the operating environment of current computer systems

Practical activities

The learner will be able to

1 use and configure operating system interfaces and functions eg
- a text editor
- b file/directory management (copy, delete, rename)
- c system tools eg backup, restore, defragmenter
- d user interface eg command language, graphical user interface (GUI).

Underpinning knowledge

The learner will be able to

1 explain the role of process management and concurrent processes in computer operating systems
- a multiprogramming/multitasking
  - i resources allocation and scheduling
  - ii memory management techniques
  - iii file management (directory structure, file structure, file access control, methods of storage)
  - iv input and output control
  - v storage protection methods
  - vi deadlock

2 describe how operating system features can contribute to data and system security eg passwords, access rights, firewall.

Unit 041 Systems architecture

Outcome 3 Know the communication process in distributed operating systems and computer networks

Underpinning knowledge

The learner will be able to

1 outline the function and operation of distributed operating systems
   a control of multiple sites
   b user access of multiple sites
   c connection of PC, Unix, mainframe and other systems
   d client/server model
   e use and format of Structured Query Language (SQL)

2 outline the functions of data communications systems in enabling network and distributed systems eg high performance, reliable, robust, secure, scaleability
   a TCP/IP
   b separate communications server.

Unit 041 Systems architecture

Outcome 4 Know distributed applications and transaction processing in mainframe systems

Underpinning knowledge

The candidate will be able to

1 outline the operation and functions of mainframe systems eg speed, processing power, storage capacity and transaction processing including COMMIT or ROLLBACK

2 outline the evolution of and characteristics of distributed applications

3 outline data and process distribution eg
- a data replication
- b propagation to all replicas
- c data fragmentation
- d local processing of local, replicated or downloaded data
- e overheads of locking for concurrent access
- f query optimisation.

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 representation of information within a computer and the way it is processed	☐	
2 Make effective use of the operating environment of current computer systems	☐	
3 Know the communication process in distributed operating systems and computer networks	☐	
4 Know distributed applications and transaction processing in mainframe systems	☐	

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)844 543 0000 (Centres)
T +44 (0)844 543 0033 (Learners)
F +44 (0)20 7294 2400
www.cityandguilds.com

City & Guilds is a registered charity established to promote education and training