

Unit 2: Computer Systems

Unit code: L/601/0446

QCF Level 4: BTEC Higher National

Credit value: 15

● Aim

To enable learners to understand computer systems and apply theoretical knowledge to practical application when building, configuring and maintaining computer systems.

● Unit abstract

Most IT professionals will at some stage have to set up, use, customise and maintain computer systems. In order to do so effectively they will need to understand how computer systems work. Learners will understand the theoretical aspects of computer systems, and how information is processed. This unit explores the hardware, software and peripheral components that make up a computer system.

There are many different manufacturers of computer systems and each manufacturer will produce a wide range of models with different specifications. Deciding which particular model is appropriate for a given situation depends on a variety of factors. Custom-built computer systems are also an advantage when meeting specialised requirements, whilst maintaining performance and keeping costs low. These aspects are explored in this unit so that learners can make informed choices when designing a computer system for a given purpose.

Learners will be able to apply their theoretical knowledge to practical application by building, configuring and testing a functional computer system which will meet a given specification.

Computer users also need the skills required to set up and carry out routine maintenance of computer systems. Although this unit does not extensively cover fault finding and repair, it includes the basic maintenance skills that would normally be expected of most computer users.

● Learning outcomes

On successful completion of this unit a learner will:

- 1 Understand the function of computer systems
- 2 Be able to design computer systems
- 3 Be able to build and configure computer systems
- 4 Be able to undertake routine maintenance on computer systems.

Unit content

1 Understand the function of computer systems

Computer systems: microcomputers eg personal computers; mobile computers; minicomputers eg mid-range servers, workstations; mainframes eg large scale network systems; supercomputers eg high performance systems; models; multiprocessing

Environments: home, business, computer gaming, networking, real-time, communication

Function: main components (Arithmetic Logic Unit (ALU), control unit, memory and input/output devices), connection eg busses; Central Processing Unit (CPU) (control unit, arithmetic logic unit, registers, input/output); memory (Random Access Memory (RAM), Read Only Memory (ROM), registers, programmable, cache), auxiliary storage; computer architecture

Hardware: central processing unit; motherboard, power supply unit, cooling units, backing storage eg hard disc drive; controllers, ports, main memory, memory types, battery, specialised cards eg Peripheral Component Interconnect (PCI), Accelerated Graphics Port (AGP), network, graphics, modem, sound, optical drives; performance factors

Software: systems software eg operating systems, utility programs, library programs, translator programs; applications software eg special purpose software, be-spoke software; performance factors

Peripherals: printers, plotters, cameras, scanners; keyboard and mouse; monitors, display adapters; multimedia devices; storage media; networking; portable drives; plug and play components; performance factors

2 Be able to design computer systems

Needs analysis: client and system requirements, problems/limitations with current/new system, functionality, costs, timescales, resources, investigation/analytical techniques eg interviews, questionnaires

Selection: costs, client requirements, maintenance contracts, outputs required, compatibility; system integration eg home entertainment; storage capacity; accessibility; performance eg speed, time, power, efficiency, effectiveness, usability, alternative solutions

System specification: client requirements, system requirements, system components, configuration, time, tools and resources, alternatives eg processor types, backup options; security measures; documentation

3 Be able to build and configure computer systems

Health and safety: health and safety practices; electrostatic precautions eg antistatic mats, antistatic wrist straps

System installation: hardware: assemble and disassemble a computer system; install motherboard, processor, heat-sink and fan, memory, power supply unit and connect to internal components; install hard disc drive, optical drive; install specialised cards eg graphics, network, modem, audio; install and configure software eg operating system, application software, utility software; install peripheral devices eg printer, scanner, camera; install communication devices eg modem, router

System configuration: configure Basic Input Output System (BIOS) eg date/time, power management, security; install latest antivirus/security updates; update user profiles; configure desktop, icon size, font size, colour, background, customise menu; file management, files and folders, setting file/folder sharing permissions; peripheral devices, printer, scanner, camera; communication devices

System testing: fault detection, Power On Self Test (POST), diagnostic faults, troubleshoot devices; technical support documentation eg reference manuals, online manufacturer support; test hardware eg input/output devices, peripheral devices; test software; documentation eg test plan

4 Be able to undertake routine maintenance on computer systems

Software maintenance: upgrade software eg virus definition files; patches/updates; scheduling maintenance tasks; utility software eg defragmentation, clean-up, back-up, system profilers; other third party utility software eg compression utilities, spyware/malware removal

Hardware maintenance: upgrade hardware; install and configure new peripherals eg printers, scanners; install and configure additional or replacement devices eg hard drive, memory, graphics, sound, optical media, network; cleaning equipment

File management: manage files/folders; back-up procedures

Learning outcomes and assessment criteria

Learning outcomes On successful completion of this unit a learner will:	Assessment criteria for pass The learner can:
LO1 Understand the function of computer systems	1.1 explain the role of computer systems in different environments 1.2 explain the hardware, software and peripheral components of a computer system 1.3 compare different types of computer systems
LO2 Be able to design computer systems	2.1 produce a system design specification to meet a client's needs 2.2 evaluate the suitability of a system design specification
LO3 Be able to build and configure computer systems	3.1 build and configure a computer system to meet a design specification 3.2 test and document a computer system
LO4 Be able to undertake routine maintenance on computer systems	4.1 perform routine maintenance tasks on a computer system 4.2 upgrade the hardware and software on a computer system.

Guidance

Links to National Occupational Standards, other BTEC units, other BTEC qualifications and other relevant units and qualifications

The learning outcomes associated with this unit are closely linked with:

Level 3	Level 4	Level 5
Unit 2: Computer Systems	Unit 24: Networking Technologies	Unit 47: IT Virtualisation
Unit 5: Managing Networks	Unit 28: IT Support for End Users	Unit 48: IT Security Management
Unit 9: Computer Networks		
Unit 12: IT Technical Support		
Unit 13: IT Systems Troubleshooting and Repair		
Unit 25: Maintaining Computer Systems		
Unit 29: Installing and Upgrading Software		

This unit has links to the Level 4 and Level 5 National Occupational Standards for IT and Telecoms Professionals, particularly the areas of competence of:

- Systems Architecture
- Systems Design
- IT/Technology Infrastructure Design and Planning
- Systems Development
- IT/Technology Solution Testing
- IT/Technology Service Operations and Event Management
- IT Application Management/Support
- IT/Technology Management and Support
- Technical Evaluation.

Essential requirements

Learners must have access to computer systems that they can disassemble, assemble and configure. They will also need a range of components and peripherals that they can install and configure.

Learners must understand the functions of computer systems before they can begin the practical aspects of this unit. It is important that the underpinning knowledge of computer systems supports the practical approach to building and configuring computer systems.

Centres must begin this unit by giving an overview of the topics that will be covered, and what benefits the unit will bring to those who aspire to get involved with IT support and networking. Centres must give a brief history of computer systems, and how they have evolved. The different generations of computer systems will be useful at this point. There are different types of computer systems, and this must be covered in detail in terms of their functionality, performance and where they are typically used (environments). The benefits and drawbacks of computer systems must also be discussed, particularly IT security. Centres must keep abreast of modern developments in computer systems, and must also present mobile computing technologies as well. The future of computer systems must also be covered in respect of emerging technologies.

Learners must explore the full range of hardware, software and peripheral components. Centres must demonstrate and explain the role of common components, including the central processing unit, memory, motherboard, power supply unit, optical drives, storage devices and specialised cards.

Centres must present a range of typical client and system requirements, and discuss the range of components needed to fulfil those requirements. The range of hardware, software and peripheral components covered in this unit is at the centre's discretion. However, these components must be available for practical activities to ensure that fully functional computer systems can be built.

Centres must cover health and safety guidelines before commencing any practical work, and ensure that the working environment is safe and hazard free. Learners must also practice using electrostatic equipment to prevent any damage to components. Centres must demonstrate (in stages) the processes involved with building, configuring and testing a functional computer system.

Computer systems at some stage will need to be monitored and maintained to ensure consistency, reliability and performance. Learners must be equipped with the skills to maintain computer systems and follow a recommended schedule of activities. Learners must also be able to upgrade a computer system.

Resources

Books

Anfinsin, D – *IT Essentials: PC Hardware and Software Companion Guide* (Cisco Press, 2010)
ISBN 158713263X

Dick, D – *The PC Support Handbook: The Configuration and Systems Guide* (Dumbreck Publishing, 2009) ISBN 9780954171131

MacRae K – *The Computer Manual: The Step-by-step Guide to Upgrading and Repairing a PC* (Haynes Group, 2002) ISBN 1859608884

MacRae K and Marshall G – *Computer Troubleshooting: The Complete Step-by-step Guide to Diagnosing and Fixing Common PC Problems, Second Edition* (Haynes Group, 2008)
ISBN 1844255174

White R and Downs T – *How Computers Work* (Que, 2003) ISBN 0789730332

Journals

Computer Weekly

Which? Computer

Websites

www.bized.co.uk

www.computerweekly.com

Employer engagement and vocational contexts

Working with a live system will present many risks, that the centre, employer and learner must be aware of using a current vocational context to deploy an additional or alternate solution will enhance the learners experience and enable understanding of wider technical application.

