National Unit specification: general information

Unit title: Computer Systems Architecture (SCQF level 6)

Unit code: FW03 12

Superclass: CB

Publication date: September 2011

Source: Scottish Qualifications Authority

Version: 01

Summary

The purpose of this Unit is to extend candidates' knowledge of the workings of a computer system. It will allow the candidate to gain a basic understanding of how the processor works and of how data is processed in a computer system. The candidate will examine the uses of various peripheral devices and different types of interfaces. On completion the candidate will be able to recognise different measures of computer performance and provide and justify a Personal Computer (PC) specification to a given brief.

This is a mandatory Unit in the NC Computing: Technical Support (SCQF level 6). It is also available as a standalone Unit.

This Unit is suitable for candidates with basic skills and/or knowledge of computer systems and who wish to extend them further.

Outcomes

1 Demonstrate an understanding of the low level components of computer systems and their operation.
2 Describe the functions and features of peripheral devices and interfaces.
3 Produce a computer system specification from a given brief.

Recommended entry

While entry is at the discretion of the centre, candidates would normally be expected to have attained one of the following, or equivalent:

- *Computer Systems Architecture* (SCQF level 5)

General information (cont)

Unit title: Computer Systems Architecture (SCQF level 6)

Credit points and level

1 National Unit credit at SCQF level 6: (6 SCQF credit points at SCQF level 6*)

**SCQF credit points are used to allocate credit to qualifications in the Scottish Credit and Qualifications Framework (SCQF). Each qualification in the Framework is allocated a number of SCQF credit points at an SCQF level. There are 12 SCQF levels, ranging from Access 1 to Doctorates.*

Core Skills

Opportunities to develop aspects of Core Skills are highlighted in the Support Notes of this Unit specification.

There is no automatic certification of Core Skills or Core Skill components in this Unit.

National Unit specification: statement of standards

Unit Computer Systems Architecture (SCQF level 6)

Acceptable performance in this Unit will be the satisfactory achievement of the standards set out in this part of the Unit Specification. All sections of the statement of standards are mandatory and cannot be altered without reference to SQA.

Outcome 1

Demonstrate an understanding of the low level components of computer systems and their operation.

Performance Criteria

(a) Describe the purpose of the Arithmetic Logic Unit, control Unit and registers.
(b) Describe the function of the data bus, the address bus and the control bus.
(c) Describe different types of memory in a computer system.
(d) Identify different ways of measuring system performance.

Outcome 2

Describe the functions and features of peripheral devices and interfaces.

Performance Criteria

(a) Describe the functions of various peripheral devices.
(b) Describe the functions of interfaces.

Outcome 3

Produce a computer system specification from a given brief.

Performance Criteria

(a) Produce a costed specification to a given brief.
(b) Produce a report justifying the specification.

National Unit specification: statement of standards (cont)

Unit Computer Systems Architecture (SCQF level 6)

Evidence Requirements for this Unit

Evidence is required to demonstrate that candidates have achieved all Outcomes and Performance Criteria. Evidence should be produced in open-book conditions.

For Outcome 1 — written and/or oral recorded evidence is required which includes:

- a description of the purpose of the Arithmetic Control Unit, Control Unit and registers
- a description of the function of the address bus and the data bus
- a description of the read, write and timing functions of the control bus
- a description of the interrupt and reset functions of the control bus
- a description of and the different distinguishing features of registers, cache and virtual memory, main memory and backing storage
- a description of the different measurements of performance including clock speed MIPS and FLOPS

For Outcome 2 written and/or oral recorded evidence is required which includes:

- a description of the function of at least four types of peripheral devices
- a description of parallel and serial interfaces
- a description of the functions of an interface including buffering, data format conversion, protocol handling and status signals
- a description of a minimum of two advantages of buffering and spooling
- a description of the properties of USB and Firewire interface

The evidence for Outcomes 1 and 2 should be obtained under controlled, supervised conditions. The assessment will be open-book, with candidates having access to notes and reference sources but not the Internet.

Evidence for Outcome 3 will be obtained by individual candidate's production of two PC specifications, detailing all components and the operating system required, to fulfil two client briefs. These will be accompanied by a report which justifies the specifications and which must reference all of the following:

- RAM and processors, including cache
- storage
- motherboard considerations
- expansion cards.
- operating system requirements
- cost

National Unit specification: support notes

Unit Computer Systems Architecture (SCQF level 6)

This part of the Unit Specification is offered as guidance. The support notes are not mandatory.

While the exact time allocated to this Unit is at the discretion of the centre, the notional design length is 40 hours.

Guidance on the content and context for this Unit

This Unit aligns to the following National Occupational Standards (NOS) from eskills UK Unit IT/Technology infrastructure design and planning, competence (4.8.J.1.) point (f)

The overall aim of this Unit is to extend the candidates understanding of the workings of a computer system and to enable the candidate to produce a specification for a PC. The candidate should ideally be studying this Unit in conjunction with *Computing: Hardware and Systems* (level 6).

Though there are several usages of the term Computer Architecture, this Unit focuses on the following: a description of the requirements (especially speeds and interconnection requirements) or design implementation for the various parts of a computer. (Such as memory, motherboard, electronic peripherals, and the CPU.)

Emphasis should be on current specification of components and the Internet used extensively for researching these. Candidates should be encouraged to read appropriate articles on contemporary computing issues and developments.

Guidance on learning and teaching approaches for this Unit

Through delivery of this Unit, candidates should develop an appropriate technical vocabulary and show confidence in reading and understanding PC specifications. Exposure should be given to as many different specifications of PCs as possible and PC auditing software should be used where possible.

For Outcome 1 use could be made of videos and simulation software which illustrate the workings of the CPU.

For Outcomes 2 and 3 extensive use of the Internet should be made with emphasis on current components and trends.

Guidance on approaches to assessment for this Unit

The assessment for Outcomes 1 and 2 could take the form of a set of restricted response questions covering the Evidence Requirements. These Outcomes should be an in-class open-book assessment in which candidates are allowed to use notes they have prepared in advance but should not have access to the Internet.

For Outcome 3 candidates are given a brief in which two clients are requesting computer systems to be built for different purposes (eg gaming and video editing). Candidates must produce a detailed specification for both with an accompanying report justifying all hardware and peripherals, including Operating System and costing with reference to the brief. The report must address all points in the Evidence Requirements.

With reference to motherboard considerations, examples would include, should separate processor be purchased, type of RAM supported, onboard ports, etc.

Opportunities for the use of e-assessment

E-assessment may be appropriate for some assessments in this Unit. By e-assessment we mean assessment which is supported by Information and Communication Technology (ICT), such as e-testing or the use of e-portfolios or e-checklists. Centres which wish to use e-assessment must ensure that the national standard is applied to all candidate evidence and that conditions of assessment as specified in the Evidence Requirements are met, regardless of the mode of gathering evidence. Further advice is available in *SQA Guidelines on Online Assessment for Further Education (AA1641, March 2003), SQA Guidelines on e-assessment for Schools (BD2625, June 2005)*.

Opportunities for developing Core Skills

In this Unit candidates will develop skills in providing and justifying a PC specification to a given brief using up to date components.

Candidates will:

- identify components, functions and features of computer systems
- research and keep up to date with current trends
- identify hardware, including peripherals most suited to meet the requirements of a client brief
- justify selection for promoting to client
- cost proposed solution

As candidates are doing this Unit they will be developing aspects of the Core Skills of *Problem Solving, Communication* and *Numeracy*.

Disabled candidates and/or those with additional support needs

The additional support needs of individual candidates should be taken into account when planning learning experiences, selecting assessment instruments, or considering whether any reasonable adjustments may be required. Further advice can be found on our website **www.sqa.org.uk/assessmentarrangements**

History of changes to Unit

Version	Description of change	Date