

## SQA Advanced Unit specification: general information

**Unit title:** Client Operating Systems

**Unit code:** HP27 47

**Superclass:** CD

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**Version:** 01

### Unit purpose

This unit is designed to introduce candidates to the issues involved in installing and administering a client operating system. It is intended for candidates undertaking an SQA Advanced Certificate/Diploma in Computing, or a related area, who require a broad knowledge of client operating systems.

On completion of the unit candidates should be able to:

- 1 install a client operating system.
- 2 administer resources.
- 3 implement, manage and troubleshoot hardware devices and drivers.
- 4 monitor and optimise system performance and reliability.
- 5 configure and troubleshoot the desktop environment.
- 6 implement network protocols and services.
- 7 implement, monitor and troubleshoot security.

### Recommended prior knowledge and skills

Access to this unit will be at the discretion of the centre. There are no specific requirements but candidates would benefit from knowledge of computer hardware and software. This may be demonstrated by the possession of SQA Advanced units such as HT0F 46 *Hardware Concepts* and HT0F 46 *Operating System Concepts*.

### Credit points and level

2 SQA credits at SCQF level 7: (16 SCQF credit points at SCQF level 7\*)

*\*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 National 1 to Doctorates.*

## **SQA Advanced Unit Specification**

### **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.

### **Context for delivery**

If this unit is delivered as part of a group award, it is recommended that it should be taught and assessed within the subject area of the group award to which it contributes.

### Unit specification: statement of standards

#### Unit title: Client Operating Systems

Please refer to *Knowledge and/or skills for the unit and evidence requirements for the unit* after the outcomes.

Where evidence for outcomes is assessed on a sample basis, the whole of the content listed in the Knowledge and/or Skills section must be taught and available for assessment. Candidates should not know in advance the items on which they will be assessed and different items should be sampled on each assessment occasion.

#### Outcome 1

Install a client operating system.

##### Knowledge and/or Skills

- ◆ Perform manual installation
- ◆ Perform automated installation
- ◆ Upgrade from an older version
- ◆ Apply post-installation updates
- ◆ Troubleshoot installation problems

#### Outcome 2

Administer resources.

##### Knowledge and/or Skills

- ◆ Monitor, manage, and troubleshoot access to files and folders
- ◆ Manage and troubleshoot access to shared folders
- ◆ Connect to local or network print devices
- ◆ Configure and manage file systems

#### Outcome 3

Implement, manage and troubleshoot hardware devices and drivers.

##### Knowledge and/or Skills

- ◆ Implement, manage, and troubleshoot disk devices
- ◆ Implement, manage, and troubleshoot display devices
- ◆ Implement, manage, and troubleshoot input and output devices
- ◆ Update drivers

#### Outcome 4

Monitor and optimise system performance and reliability.

##### Knowledge and/or Skills

- ◆ Monitor, and optimise system performance
- ◆ Troubleshoot system performance
- ◆ Manage and troubleshoot the use of offline files
- ◆ Recover system and user data

## **SQA Advanced Unit Specification**

### **Outcome 5**

Configure and troubleshoot the desktop environment.

#### **Knowledge and/or Skills**

- ◆ Configure and manage user profiles
- ◆ Manage applications by using automatic installation software
- ◆ Configure and troubleshoot desktop settings
- ◆ Configure and troubleshoot accessibility services

### **Outcome 6**

Implement network protocols and services.

#### **Knowledge and/or Skills**

- ◆ Configure and troubleshoot the TCP/IP protocol
- ◆ Connect to resources using a web browser
- ◆ Configure, manage and troubleshoot a firewall

### **Outcome 7**

Implement, monitor and troubleshoot security.

#### **Knowledge and/or Skills**

- ◆ Configure, manage and troubleshoot file encryption
- ◆ Configure, manage and troubleshoot a security configuration and local security policy
- ◆ Configure, manage and troubleshoot local user and group accounts

### Evidence requirements for the unit

#### Multiple-Choice Test — Outcomes 1–7

The Knowledge and Skills component of all outcomes must be assessed by 30 multiple-choice questions, derived from all 27 items listed in the Knowledge and/or Skills in outcomes 1–7 in an end-of-unit test.

#### Practical work

##### Outcome 1

- 1 Perform manual installation.
- 2 Perform automated installation.
- 3 Upgrade from an older version.
- 4 Apply post-installation updates.
- 5 Troubleshoot installation problems.

The practical work for Outcome 1 must record successful completion by the candidate of **at least three** of the five tasks listed in the above Knowledge and/or Skills, **including at least one of the first two tasks**.

##### Outcome 2

- 1 Monitor, manage, and troubleshoot access to files and folders.
- 2 Manage and troubleshoot access to shared folders.
- 3 Connect to local or network print devices.
- 4 Configure and manage file systems.

The practical work for Outcome 2 must record successful completion by the candidate of **at least two** of the four tasks listed in the above Knowledge and/or Skills, **including at least one of the first two tasks**.

##### Outcome 3

- 1 Implement, manage, and troubleshoot disk devices.
- 2 Implement, manage, and troubleshoot display devices.
- 3 Implement, manage, and troubleshoot input and output devices.
- 4 Update drivers.

The practical work for Outcome 3 must record successful completion by the candidate of **at least two** of the four tasks listed in the above Knowledge and/or Skills.

##### Outcome 4

1. Monitor, and optimise system performance.
2. Troubleshoot system performance.
3. Manage and troubleshoot the use of offline files.
4. Recover system and user data.

The practical work for Outcome 4 must record successful completion by the candidate of **at least two** of the four tasks listed in the Knowledge and/or Skills.

## SQA Advanced Unit Specification

### Outcome 5

- 1 Configure and manage user profiles.
- 2 Manage applications by using automatic installation software.
- 3 Configure and troubleshoot desktop settings.
- 4 Configure and troubleshoot accessibility services.

The practical work for Outcome 5 must record successful completion by the candidate of **at least two** of the four tasks listed in the Knowledge and/or Skills.

### Outcome 6

- 1 Configure and troubleshoot the TCP/IP protocol.
- 2 Connect to resources using a web browser.
- 3 Configure, manage and troubleshoot a firewall.

The practical work for Outcome 6 must record successful completion by the candidate of **at least two** of the three tasks listed in the Knowledge and/or Skills.

### Outcome 7

- 1 Configure, manage and troubleshoot file encryption.
- 2 Configure, manage and troubleshoot a security configuration and local security policy.
- 3 Configure, manage and troubleshoot local user and group accounts.

The practical work for Outcome 7 must record successful completion by the candidate of **at least two** of the three tasks listed in the Knowledge and/or Skills.

### Unit specification: support notes

#### Unit title: Client Operating Systems

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 80 hours.

#### Guidance on the content and context for this unit

During the delivery of this unit it is important that every opportunity is taken to introduce real-world examples, opportunities for whole class and group discussion and practical demonstrations wherever possible. Concepts and terminology should be presented in context throughout the unit. Video presentations should be used where appropriate for providing an alternative explanation of a difficult topic, or as a focus for class discussion or group work.

Given the theoretical nature of this unit, it is intended that a significant amount of time will be made available as a central part of the course for revision, tutorials and formative assessment exercises. Candidates should be strongly encouraged to undertake further reading, and opportunities for individual or group research should be provided.

The most important overall emphasis should be on the relevance and currency of content in such a rapidly-evolving field.

The following notes assume that the unit will be delivered using a Microsoft operating system. However, no restriction is placed on the operating system to be used and centres are free to choose alternative operating systems such as Linux/Unix, although this may require significant changes in terminology.

This unit may assist candidates in partially preparing for vendor certifications.

The content of this unit may be delivered using vendor-supplied materials. As these materials are under continuous development, centres should check carefully to ensure that such materials meet all the requirements for the unit. If vendor materials are used, some of the practical tasks involved may contribute towards the practical assessments required for the unit.

There is a close link between this unit and unit HT0E 46 *Operating Systems Concepts*. The major difference is that *Operating Systems Concepts* is a level 6 unit, which gives a broad coverage of the features of a range of client operating systems, whereas this is a level 7 unit which looks at a single client operating system in much greater detail. However, there is significant overlap between the units and substantial savings could be made in both delivery and assessment time by teaching them together.

# Guidance on the delivery of this unit

## Outcome 1

### 1 Perform manual installation

Candidates should be aware of the stages in a setup process:

- ◆ **Preparation** — prepares hard drive and copies files, etc.
- ◆ **Information Provision** — requests additional information such as product key, passwords, regional information, etc.
- ◆ **Networking Installation** — detects adapter cards, sets up networking components, installs TCP/IP, joins workgroup or domain.
- ◆ **Post-installation** — create user accounts, etc.

Candidates should be able to install the operating system using an appropriate methodology covering local and remote techniques. They should be familiar with the various parameters that can be applied to modify a setup.

### 2 Perform automated installation

Candidates should be familiar with the use of answer files to provide information during setup and should be able to create them. They should be familiar with the use of automated deployment techniques, processes and software.

### 3 Upgrade from an older version

Candidates should know the upgrade paths available for the operating system version being installed. They should be able to distinguish between express and custom upgrades and be able to roll back an unsuccessful upgrade.

### 4 Apply post-installation updates

Candidates should be familiar with the application of service packs and hot fixes. In a Windows environment they should also know about dynamic updates.

### 5 Troubleshoot installation problems

Candidates should be aware of common errors and their possible causes, eg inability to contact domain controller, error loading OS, failure of a service to start, lack of disk space, media errors, incompatible optical-drive, etc. They should also be familiar with the log files created during installation and their use in troubleshooting.

## **SQA Advanced Unit Specification**

### **Outcome 2**

#### **1 Monitor, manage, and troubleshoot access to files and folders**

Candidates should understand standard and advanced file system permissions. They should also know that permissions are cumulative.

#### **2 Manage and troubleshoot access to shared folders**

Candidates should know how to create, remove and access shared folders.

#### **3 Connect to local and network print devices**

Candidates should know how to manage printers and print jobs, control printer access and connect to local and network printers, including internet printers. They should also know about printer pooling and print priority.

#### **4 Configure and manage file systems**

Candidates should be familiar with current file systems and their properties. They should know how to convert between file systems and be able to identify a default file system. They should know about file quotas, file compression and encryption and be familiar with available disk storage types for the operating system.

### **Outcome 3**

#### **1 Implement, manage, and troubleshoot disk devices**

Candidates should be able to use system tools to create, delete and format partitions, defragment volumes, change volume labels, reassign drive letters, check disks for errors and backup drives. They should also be able to install, configure and manage optical devices and removable media.

#### **2 Implement, manage, and troubleshoot display devices**

Candidates should be able to manage display properties, install, remove and manage display adapters and monitors (including multiple monitors).

#### **3 Implement, manage, and troubleshoot input and output devices**

Candidates should be able to implement, manage, and troubleshoot I/O devices such as printers, scanners, multimedia devices, mouse, keyboard and smart card reader. They should also be able to install, configure and manage modems, Infrared Data Association (IrDA) devices, wireless devices, USB devices, handheld devices, biometric devices and network adapters.

#### **4 Update drivers**

Candidates should know how to configure driver signing and use rollback to revert to an older version of a driver when an upgrade is unsuccessful. They should also be aware that most hardware conflicts can be avoided by automatically assigning resources such as IRQs.

## **SQA Advanced Unit Specification**

### **Outcome 4**

#### **1 Monitor and optimise system performance**

Candidates should be able to monitor and optimise memory performance, processor utilisation, disk performance and application performance. They should also be able to automate events such as batch files, scripts and system backups and be able to set security for tasks by group or user.

#### **2 Troubleshoot system performance**

Candidates should be able to troubleshoot memory performance, processor utilisation, disk performance and application performance using available system tools.

#### **3 Manage and troubleshoot the use of offline files**

Candidates should be able to set caching to manual (documents only) or automatic (documents and programs) and specify which items are synchronised, using which network connection and when synchronisation occurs.

#### **4 Recover system and user data**

Candidates should understand the importance of system and user data backups and be able to carry these out. Candidates should understand the dangers of system and user data restoration. They should also know the different backup and restore rights of appropriate users within the system. Candidates should understand the differences between data copy, backups and created machine images.

### **Outcome 5**

#### **1 Configure and manage user profiles**

Candidates should know how user profiles and system policies affect desktop customisation.

#### **2 Manage applications by using automatic installation software:**

Candidates should understand automated software deployment and configuration. Candidates should be able to customise, deploy, configure and troubleshoot applications.

#### **3 Configure and troubleshoot desktop settings:**

Candidates should know about display properties. They should be able to use system tools to configure and troubleshoot a user desktop environment.

#### **4 Configure and troubleshoot accessibility services**

Candidates should know how to use and configure accessibility capabilities within the operating system.

## **SQA Advanced Unit Specification**

### **Outcome 6**

#### **1 Configure and troubleshoot the TCP/IP protocol**

Candidates should be aware that IP addresses can be provided automatically (via DHCP) or entered manually. They should know that DNS is used to resolve hostnames to IP addresses and NBNS will resolve NetBIOS names. They should also know about subnet masks, default gateway, Automatic Private IP Addressing (APIPA), Alternate TCP/IP configurations and current IP versions.

#### **2 Connect to resources using a web browser**

Candidates should know the features and facilities of a current version such as the, default cipher strength, the support for Java, Toolbars, privacy features (P3P). Candidates should be able to use a browser to connect to available resources.

#### **3 Configure, manage and troubleshoot a firewall**

Candidates should be able to use a firewall to secure a single computer against internet threats.

### **Outcome 7**

#### **1 Configure, manage and troubleshoot file encryption**

Candidates should be able to configure, manage and troubleshoot encryption within a file system and know the effects of moving and copying encrypted files. They should also know that lost keys can be recovered and that some files cannot be encrypted. Candidates should understand the difference between file encryption and device encryption, the requirements and usage of each methodology.

#### **2 Configure, manage and troubleshoot a security configuration and local security policy**

Candidates should be able to configure or analyse security using appropriate tools. They should also be able to configure local security policy.

#### **3 Configure, manage and troubleshoot local user and group accounts**

Candidates should be aware that local user accounts reside only on the computer where the account was created and be familiar with the built-in user accounts. They should also be familiar with the built-in local groups and system groups.

### Guidance on the assessment of this unit

This unit is likely to form part of a group award which is primarily designed to provide candidates with technical or professional knowledge and skills related to a specific occupational area. It is highly technical in content and should not be adopted by group awards in other areas or delivered as a stand-alone unit without careful consideration of its appropriateness.

It is a unit which candidates are likely to find accessible at an introductory level; it is suggested that it be delivered only as part of an SQA Advanced Certificate/Diploma in Computing or a related area. It should be delivered in tandem with other Computing units and opportunities for teaching and assessment integration explored.

To minimise assessment overhead, one or more sets of closed-book multiple-choice questions, totalling 30 questions in all, should be used to provide evidence of candidates' knowledge for all outcomes. It is suggested that multiple-choice questions should be used as the preferred assessment method — as well as reducing the time required for assessment and marking, these reduce the need for candidates to memorise details and encourage understanding. Candidates must answer 60% of the questions correctly. Pass mark is 18.

If an outcome has a practical task, this must be assessed by having the candidate use a logbook or video to record the practical tasks successfully completed. The logbook can be in paper or electronic form and must be authenticated by the tutor or mentor. For some outcomes only a sample of the practical tasks needs to be completed and recorded for assessment purposes, eg three out of five.

### Assessment guidelines

#### Outcomes 1–7

Evidence for the Knowledge and/or Skills for the entire unit must be produced using a set of 30 multiple-choice questions to assess candidates' knowledge and understanding. This will be administered as a single end-of-unit test.

Testing must take place in a closed-book environment where candidates have no access to books, hand-outs, notes or other learning material. Testing can be done in either a machine-based or paper-based format and must be invigilated by a tutor or mentor. There must be no communication between candidates and communication with the invigilator must be restricted to matters relating to the administration of the test.

If a candidate requires to be reassessed, a different selection of questions must be used.

#### Restricted response test

The knowledge and skills component of all outcomes must be examined by 30 questions, derived from the 27 items listed in the Knowledge and/or Skills in an end-of-unit test of 30 questions.

#### Practical work

The practical work for all outcomes must record successful completion by the candidate of a **sample** of the tasks listed in the Knowledge and/or Skills.

#### Online and distance learning

If this unit is delivered by open or distance-learning methods, additional planning and resources may be required for candidate support, assessment and quality assurance.

A combination of new and traditional authentication tools may have to be devised for assessment and re-assessment purposes.

#### Opportunities for developing Core Skills

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

#### Equality and inclusion

This unit specification has been designed to ensure that there are no unnecessary barriers to learning or assessment. The individual needs of learners should be taken into account when planning learning experiences, selecting assessment methods or considering alternative evidence.

Further advice can be found on our website [www.sqa.org.uk/assessmentarrangements](http://www.sqa.org.uk/assessmentarrangements).

## History of changes

Version	Description of change	Date

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SQA acknowledges the valuable contribution that Scotland's colleges have made to the development of SQA Advanced Qualifications.

**FURTHER INFORMATION:** Call SQA's Customer Contact Centre on 44 (0) 141 500 5030 or 0345 279 1000. Alternatively, complete our [Centre Feedback Form](#).

### General information for candidates

#### Unit title: Client Operating Systems

This is a 2 SQA Credit SQA Advanced Unit at SCQF level 7 intended for candidates undertaking a Computing qualification who require an understanding of client operating systems. It is designed to develop an understanding of the issues involved in installing and administering a client operating system. On completion of the unit you should be able to:

- 1 install a client operating system.
- 2 administer resources.
- 3 implement, manage and troubleshoot hardware devices and drivers.
- 4 monitor and optimise system performance and reliability.
- 5 configure and troubleshoot the desktop environment.
- 6 implement network protocols and services.
- 7 implement, monitor and troubleshoot security.

In the first part of the course, you will study manual and automated installation of client operating systems, upgrading from older versions, applying post-installation upgrades and troubleshooting installation problems.

The second section covers implementing and administering resources, including monitoring, managing, and troubleshooting access to files and folders (including shared folders), connecting to local and network print devices and configuring and managing file systems.

The third section covers implementing, managing and troubleshooting hardware devices and drivers. This includes disk devices, display devices, input and output (I/O) devices, updating drivers and monitoring and configuring multiple processing units.

The fourth section covers monitoring and optimising system performance and reliability, including monitoring, optimising and troubleshooting system performance, managing and troubleshooting the use of offline files and recovering system and user data.

The fifth section covers configuring and managing user profiles, managing applications by using automatic installation software, configuring and troubleshooting desktop settings and configuring and troubleshoot accessibility services.

The sixth section covers implement network protocols and services including, configuring and troubleshooting the TCP/IP protocol, connecting to computers by using a web browser and configuring, managing and troubleshooting a firewall.

The final section covers implementing, monitoring and troubleshooting security, including configuring, managing and troubleshooting file encryption, security configuration, local security policy, local user and group accounts and web browser security settings.