

## Higher National Unit Specification

### General information for centres

**Unit title:** Internet: Web Server Management

**Unit code:** DG06 35

**Unit purpose:** This unit is designed to introduce candidates to the topics required for successful installation and maintenance of a Web Server. This unit is primarily targeted at candidates who expect to work in a Support role. The unit is, however, relevant to candidates who will work in a web development role, as it should provide them a better understanding and appreciation of the complexities of a web server. The candidate will develop hands on skills in installing, configuring and maintaining a web server and will gain knowledge about the theory of web server management.

On completion of this unit the candidate should be able to:

1. Analyse and evaluate the requirements for setting up a new Web Site.
2. Install and configure Web server software implementing performance and security issues.
3. Organise and maintain a Web site.

**Credit value:** 2 HN Credits at Level 8 (16 SCQF points at level 8)

*\*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.*

**Recommended prior knowledge and skills:** Access to this unit is at the discretion of the Centre, however is recommended that the candidate has achieved any of the following Higher National Units: *Computer Networks: Administering Network Systems, Computer Networks: Network Technology and Data Communications*, or has equivalent practical or work experience.

**Core skills:** There may be opportunities to gather evidence towards core skills in this Unit, although there is no automatic certification of core skills or core skills components.

**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.

## Higher National Unit specification: General information for centres (cont)

**Unit title:** Internet: Web Server Management

**Assessment:** This unit will be assessed by a written report of approximately 500 words for Outcome 1. Outcomes 2 and 3 will be assessed by practical exercises that test the candidate's knowledge and skills in installing, configuring, organising and maintaining a web site. It should be possible to use one assessment similar to the example given in 'Guidance on Delivery and Assessment' that would cover the entire Unit but centres would have to ensure that the evidence requirements relating to each individual outcome were met.

Alternatively, Outcome 1 may be assessed by means of a restricted-response test consisting of 25 questions. Candidates must answer at least 70% of the questions correctly in order to obtain a pass.

Testing must take place in a closed-book environment where candidates have no access to books, handouts, 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. At least half the questions in the reassessment must be different from those used in the original test.

## **Higher National Unit specification: statement of standards**

**Unit title:** Internet: Web Server Management

**Unit code:** DG06 35

The sections of the unit stating the outcomes, knowledge and or skills, and evidence required are mandatory.

Where evidence for an outcome is assessed on a sample basis, the whole of the content in the knowledge and/or skills section must be taught and available for assessment. Candidates should not have prior indication of items that will be assessed and different items should be sampled on each assessment occasion.

### **Outcome 1**

Analyse and evaluate the requirements for setting up a new Web Site.

#### **Knowledge and/or skills**

- ◆ Hardware requirements of server software.
- ◆ Operating system in use.
- ◆ Features available in the Web server.
- ◆ Configuration options
- ◆ Multiple user domains.
- ◆ Security issues
- ◆ Performance issues

#### **Evidence requirements**

Outcome 1 must be assessed by **either** a report **or** a restricted response test.

#### **Report**

Evidence for outcome 1 will be in the form of a report of approximately 500 words. The candidate is required to analyse and evaluate at least 4 main factors involved in both security and performance issues when setting up a new web site in approximately 300 words of the 500 word report. The candidate must also analyse and evaluate at least 2 items from 2 out of 5 of the remaining topics in the knowledge and/or skills section of Outcome 1 in approximately 100 words per topic. A different sample must be used on each assessment occasion. Candidates must not have prior indication of items that will be assessed in the sample or in the two areas of security and performance issues. Candidates must attain 60% of the available marks in order to pass the assessment.

#### **Restricted response test**

Outcome 1 must be examined by twenty-five restricted response questions, four being derived from four of the items listed below and three from each of the remaining three items. Each question must be derived from a different item.

## **Higher National Unit specification: statement of standards (cont)**

## **Unit title: Internet: Web Server Management**

1. Hardware requirements of server software.
2. Operating system in use.
3. Features available in the Web server.
4. Configuration options
5. Multiple user domains.
6. Security issues
7. Performance issues

### **Assessment guidelines**

Examples of appropriate items from the Knowledge and Skills section are shown below.

The main emphasis in assessment should be directed to security and performance issues.

Hardware requirements of server software include: processor, RAM, hard disk size, connection speed including DSL, ISDN, and TI.

Features available in the Web server include: support for multiple sites with one IP, support for latest Internet standards and programming environments supported.

Configuration options include: remote administration and Web-based administration.

Security issues include: Web server logging, access to Web server restricted based on, domain name, IP address, user name and password, encryption, protecting sensitive credit card data using Secure Sockets Layer (SSL), proxy server, firewall, digest authentication, protecting against denial of service attacks, use of operating system file system permissions, limiting the number of users connected to the Web server, protecting against IP spoofing, digital certificates (creating, managing and trusting), an appreciation of third part security tools.

Performance issues include: determining performance by real world, real-time study (basing the performance on how the server performs during a snapshot of time), using benchmarks generated by benchmark software, upgrade/replace existing hardware, load balancing by using multiple servers for distributed content, mirrored sites, caching proxy servers. Disable reverse DNS lookups (security implications.), increase TCP listen intervals, disable TCP slow start, increase TCP retransmission delay, remove any unnecessary services, compiled scripts versus interpreted scripts.

### **Outcome 2**

Install and configure Web server software implementing performance and security issues

## **Higher National Unit specification: statement of standards (cont)**

**Unit title:** Internet: Web Server Management

### **Knowledge and/or skills**

- ◆ Install the Web server software.
- ◆ Configure the Web server software including: server root directory, document root directory, script root directory, and port address.
- ◆ Implement performance issues including: performance monitoring, TCP/IP configuration, timeouts, maximum connections and DNS Server.
- ◆ Implement security issues including: Web server logging, setting file system permissions, enable SSL, digital certificates, restrict access to web server, encryption, firewall, third party security tools.

### **Evidence requirements**

For Outcome 2 evidence must be produced to show that the candidate has: installed Web server software; implemented five performance issues which must include performance monitoring and TCP/IP configuration; implemented five security issues which must include setting file system permissions and access restriction to the web server. The evidence for Outcome 2 will be produced in the form of an observation checklist and listings/printouts/screenshots of any changes made as appropriate.

### **Assessment guidelines**

The observation checklist should cover: installation of web server software, five different performance issues including performance monitoring and TCP/IP configuration and five different security issues including setting file system permissions and access restriction to the web server. The five different performance and security issues covered should be selected from those given in the Assessment Guidelines for Outcome 1. It is suggested that a practical exercise should be used to assess this outcome. Please see the section on 'Guidance on Delivery and Assessment' for an example of the type of practical exercise that may be used for assessment purposes.

## **Outcome 3**

Organise and maintain a Web site

### **Knowledge and/or skills**

- ◆ Devise and organise the Document Tree Structure.
- ◆ Maintain the Web Server.
- ◆ Backup the Web server.
- ◆ Customise log file format.
- ◆ Use performance-monitoring tools.
- ◆ Tune the server based on performance and usage statistics.

## **Higher National Unit specification: statement of standards (cont)**

**Unit title:** Internet: Web Server Management

### **Evidence requirements**

For Outcome 3 the candidate must produce evidence that will be used to show that:

- The document tree structure has been created and organised appropriately;
- Web server maintenance has been carried out effectively. The candidate must produce evidence that 3 out of 5 of the following knowledge and/or skills items have been carried out: redirecting URLs, allowing/denying access to all or some of the directories to web bots, allowing for virtual web sites using IP alaising, adding virtual directories, monitoring file size;
- The web server has been backed up at frequent intervals;
- Customisation of the log file format has been carried out on at least one occasion;
- Three different performance monitoring tools have been used;
- The server has been tuned relative to performance and usage statistics using 2 from 3 of the following: increase/decrease TCP listen intervals, disable TCP slow start, increase/decrease TCP retransmission delay;
- An indication of the changes made to the server is given along with a brief explanation for making the changes;
- Multiple web sites and virtual web sites have been implemented on at least one occasion.

The evidence for Outcome 3 will be produced in the form of an observation checklist and listings/printouts/screenshots of any changes made as appropriate.

### **Assessment guidelines**

It is suggested that a practical exercise should be used to assess this outcome. Please see the section on 'Guidance on Delivery and Assessment' for an example of the type of practical exercise that may be used for assessment purposes.

## Administrative Information

**Unit code:** DG06 35

**Unit title:** Internet: Web Server Management

**Superclass category:** CE

**Date of publication:** May 2004

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### History of Changes:

Version	Description of change	Date
2	Statement added to 'Support Notes' to identify Outcome(s) that can be assessed using the SQA electronic assessment system.	15/05/06

**Source:** SQA

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## Higher National Unit specification: support notes

**Unit title:** Internet: Web Server Management

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

This unit has been devised with the aim of making the candidate aware of the issues that surround installing, configuring, organising and maintaining a Web Server. The idea of the unit is to instil into the candidate that there are many choices and decisions to be made before embarking down the road of running a web server. The first outcome should make the candidate aware that there is a plethora of web server software available covering the various different OS platforms. Although most web servers today vary very little there are some key issues, which the web server software should accommodate.

The first outcome also raises concerns about Web security. This section of the outcome should bring to the attention of the candidate many of the key issues in security such as authentication of users, the access these users are afforded, digital certification, encryption, Secure Sockets Layer in an e-commerce environment for the protection of sensitive data i.e. credit card details, the various threats that a web server must endure and the security tools that are available from third parties in a bid to combat such security breaches.

Performance issues are also covered by this first outcome. Performance issues that should be raised include: the replacement or upgrading of the web servers physical hardware, load balancing, the tuning of TCP and the methods used to establish performance usage and statistics.

Web sites that maybe of use to candidates for research purposes are:

- [Serverwatch.internet.com](http://Serverwatch.internet.com)
- [Webcompare.internet.com](http://Webcompare.internet.com)
- [Webservercompare.internet.com](http://Webservercompare.internet.com)

Outcomes 2 and 3 are practical based outcomes. Outcome 2 requires the candidate to install and configure server software. Having done this the candidate will then face the challenge of implementing some of the security features and issues previously discussed in Outcome 1. This should hopefully serve to reinforce certain aspects of the theory.

Performance of a web server is fundamental to the overall image portrayed to the user. The user expects to have a flawless and responsive journey through a web site therefore it is important that the web server is tuned to meet the expectations of an ever-demanding public. The practical issues involved in tuning the performance of the server should become apparent to the candidate through the use of performance monitoring software.

Outcome 3 introduces the need for on going maintenance, showing that the web site / server must be constantly monitored to provide the level of performance and service required of today's major web sites. It is important that the web site be backed up and this ethos must be transferred to the candidate. Web sites are so much more than just a collection of web pages these days, they are now used to sell products of all sorts therefore it is important that crucial data relating to orders etc. is saved.

## **Higher National Unit specification: support notes (cont)**

### **Unit title:** Internet: Web Server Management

The candidate should be in no doubt about the importance of performance monitoring and the continued need to monitor traffic on the web server, adjusting the server accordingly.

Monitoring the server is not just a performance issue but also a security issue and continued monitoring will lead to the early detection of security breaches. Security is of great importance as breaches could be catastrophic. It is not desirable for any company to discover that due to poor security or security loopholes in the server software that their server has been attacked with sensitive data being either erased or altered.

Web servers will potentially host multiple sites therefore it is important that a sensible and robust document tree structure is devised and implemented. The structure must be capable of growing with the needs of the server as well as being easy to maintain. There are many aspects of a web site that need to be considered, such as where will all the graphics files be stored? Or where will the script files reside?

It is very important that folders and directories residing on the server are themselves properly secured through the use of file permissions. This has repercussions for the structure of the document tree. Depending on the operating system, file permissions operate on an inheritance basis; so careful planning is required before implementing.

### **Guidance on the delivery and assessment of this unit**

It is envisaged that Learning Outcome 1 will be carried out first, giving the candidate a solid foundation to work from before tackling the practical assessments for learning Outcomes 2 and 3. It is intended that the candidate uses Outcome 1 to research the software, hardware, security and performance issues involved when setting up a web server. The lecturer should direct the candidate to research various areas but with the minimum of intervention. The material should provide plenty of scope for group or classroom discussion. This outcome can be assessed by means of a report of approximately 500 words.

For Outcomes 2 and 3 it would be desirable for the candidate to get an extended run of time in which to monitor the performance of their web server.

Three individual assessments could be used to assess this unit, however, careful planning could facilitate the production of one assessment similar to the example given below that would cover the entire unit. This may be based around a scenario whereby the candidate takes on a consultancy role for a company wishing to set up a web server and a number of sites for their various subsidiaries. This would involve using outcome 1 as a consultation document that would be used to explain to the company by answering the sampled topics, the various issues involved in setting up such a venture. Outcomes 2 and 3 would be a natural progression to the implementation and maintenance stages.

*Diverse Media Group (DMG) wish to have a presence on the web. They require a web site for the parent company DMG and two further web sites for their subsidiary companies. Local Rag, that specialise in the production of local newspapers, and Rewind, who specialise in the production and resale of videos. The sites will be hosted on the same server but accessed by the use of different URL's.*

## Higher National Unit specification: support notes (cont)

### Unit title: Internet: Web Server Management

*At present DMG have the hardware but have not yet installed the server software. As a knowledgeable individual in this field you have been hired to perform the following tasks:*

- *Install the web server software, configuring the software as appropriate.*
- *Secure the server as appropriate from the risk of attack, accidental damage and human error.*

*You have been retained for x number of months, until their staff are familiar with the server software, to perform regular maintenance of the server. Your tasks will include:*

- *Backup the server and maintain a backlog.*
- *Devise and implement the document tree structure based on the parent company and its two subsidiaries*

This partial example is given to illustrate the type of assessment that may be conducted and is offered only as an example not as an exemplar.

If a centre is delivering this unit they can deliver the number of questions identified for each outcome listed in each column by using the SQA electronic assessment system.

Unit No	Unit Name	O1	O2	O3
DG06 35	Internet: Web Server Management	25		

\* The shaded outcomes column will be assessed in line with the method in the unit specification as previously published

Some of the evidence requirements may be produced using e-assessment. If you wish to use e-assessment using the SQA online assessment system for this purpose, there is no requirement for you to seek prior approval so long as the normal standards for validity and reliability are observed.

Please see the following SQA publications for further information on e-assessment:

- (1) 'SQA Guidelines on Online Assessment for Further Education' (March 2003)
- (2) 'Assessment & Quality Assurance in Open & Distance Learning' (Feb 2001).

If a centre is presenting this Unit involving the use of short answer or restricted response question types, these may be delivered within the SQA on-line assessment system using the following assessment methods, where appropriate:

- Multiple choice
- Drag and drop

## Higher National Unit specification: support notes (cont)

**Unit title:** Internet: Web Server Management

- Multiple response
- Mix and match
- Gap fill
- Re-order
- Hot spots

The complete assessment could be made up of any combination of the above. It is expected that the questions will be one of the available types defined in the SQA on-line assessment system.

The Assessment must be undertaken in supervised conditions and is closed book. A candidate should complete this assessment within one hour. Candidates may not bring to the assessment event any notes, textbooks, handouts or other material. Candidates must answer at 60% of the questions correctly.

### Open 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.

For further information and advice, please see *Assessment and Quality Assurance for Open and Distance Learning* (SQA, February 2001 — publication code A1030).

### Special needs

This unit specification is intended to ensure that there are no artificial barriers to learning or assessment. Special needs of individual candidates should be taken into account when planning learning experiences, selecting assessment instruments or considering special alternative outcomes for units. For example, some candidates may require a longer period for the single assessment or may require that it be split into more than one event.

For information on these, please refer to the SQA document *Guidance on Special Assessment and Certification Arrangements for Candidates with Special Needs and Candidates for whom English is an additional language* (SQA, 2000).

## **General information for candidates**

**Unit title:** Internet: Web Server Management

**Unit Code:** 18

This unit is primarily targeted at those of you who expect to work in a Support role, but it is also relevant to those who will work in a web development role. This unit should provide you with an understanding and appreciation of the complexities of a web server/site. You will develop hands on skills in installing, configuring, organising and maintaining a web server and will gain knowledge about the theory of web server management.

During the unit you will learn how to specify and identify the equipment and resources required for setting up and maintaining a web server/site. You should also be provided with a good grounding in how to analyse the requirements of a customer and subsequently, how to install the hardware and software required to meet the customers' needs.

On completion of the unit you should be able to:

1. Analyse and evaluate the requirements for setting up a new Web Site.
2. Install and configure Web server software implementing performance and security issues.
3. Organise and maintain a Web Site.

Outcome 1 of the unit covers the information required for you to make an informed selection based on the elements of security, performance and availability. You will, for example, evaluate hardware and software options, investigate web server/site features and deal with configuration, performance and security issues. To meet requirements of Outcome 1 you will conduct your own research into the topics involved.

Outcomes 2 and 3 will introduce you to the skills required for installing, configuring, organising and maintaining the web server software. You will also learn how to maintain the web server site based on the needs of the user, security issues and performance issues. You will learn how to increase the performance of the web server software through continual monitoring of the system logs. You will have to make decisions based on the results of the performance logs and implement the necessary changes. You will also be encouraged to continue to conduct your own research onto the topics involved in Outcomes 2 and 3.

To meet the assessment requirements of this unit you will write a short report for Outcome 1 and produce evidence from printouts, listings and screenshots for Outcomes 2 and 3. Your tutor/lecturer will also produce an observation checklist to show that you have completed the required elements of Outcomes 2 and 3.