SQA Advanced Unit specification

General information

Unit title: Managing a Web Server

Unit code: HP2V 48

Superclass:	CB
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Version:	01

Unit purpose

This Unit is intended to provide candidates with the knowledge and skills that are required to install, configure and maintain a Web Server as well as the additional elements required for web servers to provide dynamic capabilities. This Unit is primarily aimed at those working in a technical support role, however would also be suitable for those in a technical web development role that require a better understanding and appreciation of the complexities associated with web servers. Candidates will gain knowledge of the theoretical aspects of web servers as well as acquiring hands on skills in installing, configuring and maintaining a web server.

On completion of the Unit the candidate should be able to:

1   Analyse and evaluate the requirements for running a web server.
2   Install and configure a web server.
3   Perform web server maintenance.
4   Implement web server security.

Recommended prior knowledge and skills

Access to this Unit is at the discretion of the centre. However it is recommended that the candidate has some exposure to manipulating files and directories, using the command line interface, basic web page creation and basic IP addressing skills.

Credit points and level

2 SQA Credits at SCQF level 8: (16 SCQF credit points at SCQF 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 National 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.

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: Managing a Web Server

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The sections of the Unit stating the Outcomes, Knowledge and/or Skills, and Evidence Requirements are mandatory.

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

Analyse and evaluate the requirements for running a web server.

Knowledge and/or Skills

♦   Identify hardware requirements
♦   Determine Operating System requirements
♦   Identify Configuration options
♦   Identify database integration options
♦   Identify appropriate scripting languages
♦   Identify additional features
♦   Determine multiple site hosting capabilities
♦   Identify security issues

Evidence Requirements

Candidates will need to provide evidence to demonstrate their Knowledge and/or Skills by showing that they can:

Produce a report of approximately 500 words. The candidate is required to analyse and evaluate: Operating system requirements, additional features and security issues, using approximately 100 words for each (300 in total). The candidate must analyse and evaluate another two of the remaining topics of their choice in Knowledge and/or Skills using approximately 100 words for each.

Outcome 2

Install and configure a web server.

Knowledge and/or Skills

♦ Install a web server
♦ Manipulate core configuration files
♦ Identify Document and Server root locations
♦ Implement additional server features

Evidence Requirements

Candidates will need to provide evidence to demonstrate their Knowledge and/or Skills by showing that they can:

♦ install a web server using a suitable methodology
♦ configure the web server, taking care to identify particular locations within the server environment as well being able to identify and manipulate core configuration files
♦ incorporate additional features within the server to allow web database functionality, server side scripting and the incorporation of per-user web directory functionality for system users

Practical methods should be used to assess this Outcome. The evidence for Outcome 2 should be produced in the form of an observation checklist/pro forma as well as screenshots and printouts/log sheets/configuration files generated during server installation, configuration and testing. Please see the section in the Support Notes of the Unit on 'Guidance on Delivery and Assessment' for an example of the type of practical exercise that may be used for assessment purposes.

Outcome 3

Perform web server maintenance.

Knowledge and/or Skills

♦ Identify and manipulate server log files
♦ Analyse server information and statistics
♦ Maintain directory structures
♦ Implement name based Virtual Hosting
♦ Perform server backups

Evidence Requirements

Candidates will need to provide evidence to demonstrate their Knowledge and/or Skills by showing that they can:

♦ successfully identify the location of server log files
♦ interpret log files, server information and statistics in order to manage the server effectively
♦ maintain appropriate web directory structures in the document root as well as for per-user web directories
♦ implement name based virtual hosting techniques, taking care to identify name to IP mappings, server aliasing, manipulate server directives and port information
♦ use appropriate tools in order to effectively back up the server and web sites

Practical methods should be used to assess this Outcome. The evidence for Outcome 3 should be produced in the form of an observation checklist/pro forma as well as screenshots and printouts/log sheets/configuration files generated during maintenance and configuration procedures. Please see the section in the Support Notes of the Unit on 'Guidance on Delivery and Assessment' for an example of the type of practical exercise that may be used for assessment purposes.

Outcome 4

Implement web server security.

Knowledge and/or Skills

♦ Apply appropriate file and folder permissions
♦ Password protect directories
♦ Generate server certificates
♦ Enable SSL
♦ Implement HTTPS

Evidence Requirements

Candidates will need to provide evidence to demonstrate their Knowledge and/or Skills by showing that they can:

♦ apply appropriate permissions using a variety of means to files and folders contained within the server environment
♦ use server side scripting/database technologies as well as additional server features in order to password protect directories and particular locations within the server
♦ secure web page transfers by implementing server certificates, SSL and HTTPS technologies

Practical methods should be used to assess this Outcome. The evidence for Outcome 4 should be produced in the form of an observation checklist/pro forma as well as screenshots and printouts/log sheets/configuration files generated during application and configuration of security procedures. Please see the section in the Support Notes of the Unit on 'Guidance on Delivery and Assessment' for an example of the type of practical exercise that may be used for assessment purposes.

Unit specification: Support Notes

Unit title: Managing a Web Server

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

The content of this Unit is aimed at providing the candidate with a broad knowledge base in how to prepare for, install, maintain and secure a web server platform along with the conceptual understanding of how web servers function.

Outcome 1 introduces candidates to the factors that have to be taken into consideration when preparing for the installation of a web server and focuses upon operating system considerations, the features that are available to web servers and security considerations when running a web server.

Outcomes 2, 3 and 4 focus upon the practical aspects of installing and configuring a web server, including implementing additional features, server maintenance and security.

This Unit has been developed with vendor neutrality and is expressed in generic terms. This Unit would be best suited to be delivered in a Microsoft context using Internet Information Server (IIS) or Apache under a UNIX/Linux context, with candidates implementing a Linux, Apache, MySQL and PHP (LAMP) environment, this type of environment currently being the most popular and secure web server application platform.

Guidance on the delivery of this Unit

The order for delivery of this Unit should be as follows:

♦ Outcome 1 should be delivered first, introducing candidates to the theoretical aspects associated with installing a web server.
♦ Outcomes 2, 3 and 4 should ideally be delivered in order, starting with installation, then progressing to configuration of the server, implementing additional features, server management then finishing with the addition of security features. By that stage, candidates should have a fully functional, scalable and secure web server application platform.

Guidance on the assessment of this Unit

Outcome 1 of this Unit will be assessed by a written report of approximately 500 words. Outcomes 2, 3 and 4 will be assessed by practical means that will require the candidate to demonstrate knowledge and skills in installing, configuring and maintaining a dynamic web server environment as well as implementing additional features.

Ideally, this should be assessed by using one assessment combined into a single case study; however could be done using separate assessments.

Each of the Outcomes for this Unit are designed to be standalone and can be assessed as such, however it is advised that each of the Outcomes be combined into a single assessment case study. This may be based around a scenario, an example of which is detailed below, 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, 3 and 4 would be a natural progression to the installation, configuration, maintenance and security stages.

You are an administrator for a small to medium sized Information Technology Company called Futuresys. Lately the company has started to focus upon web design and development, with a view to hosting websites for themselves and for other businesses.

Originally when Futuresys started designing websites they relied on domain name registration companies to provide hosting facilities for websites. The demand has now become so high, coupled with the fact that companies are now asking for custom server features the web hosting company could not provide, or was too expensive, that Futuresys has decided to add web hosting package deals along with their websites.

It has been established that piloting is to take place and the server is to be implemented from the ground up and must include the following features:

♦ *The server must host the public company website and a private intranet site. A Content Management System must be installed and used as the public website.*
♦ *Junior web designers must be able to upload sites to their own user folders for test purposes.*
♦ *Access to the intranet should be made available through HTTPS. Staff must also log in through a form which should be authenticated by database. Inside the intranet a folder for sensitive managerial documentation should be created and password protected.*
♦ *For administration and maintenance purposes server statistics and web usage should be made available.*
♦ *A dynamic 'page last modified on...' and date timestamp should be displayed on all pages.*
♦ *Appropriate permissions should be used throughout, all sites and server files should be backed up accordingly.*

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.

Assessment Guidelines

Outcome 1

Candidates are asked to analyse and evaluate the requirements for setting up a web site. This Outcome should consist of approximately 500 words, 300 of which should be based on:

♦ Operating system requirements
♦ Additional server features
♦ Security issues

The remaining 200 words can be chosen from the remaining topics of their choice in the Knowledge/Skills section of this Outcome.

By end of Outcome 1, candidates should be familiar with the theoretical aspects of installing, maintaining and securing a web server and have a good grounding for the practical elements to follow.

Outcome 2

Outcome 2 involves candidates installing and configuring the web server and implementing additional features:

Candidates should install the server using pre-packaged binary (executable) files or downloading and installing directly from the internet (if using a Debian/Ubuntu or Fedora Linux based operating system).

Candidates should become familiar with the location of web directories (document root) and configuration files in order to maintain the server effectively. The following additional features should be implemented during this Outcome: integration with an appropriate database and scripting language, in order to provide dynamic web page features and per- user web directory features in order for system users to serve web pages from their own profile (/home) directories.

Outcome 3

In order to maintain the server, candidates have to become familiar with the location and format of server log files and the role that they play in the generation of server statistics. Candidates should become familiar with the layout of web directories within the document root locations and per-user web directories in order to effectively maintain websites and/or Content Management Systems.

Name based virtual hosting should be implemented during this Outcome so that candidates become familiar with hosting multiple websites using one IP address. This involves candidates becoming familiar with the format of server directives and mapping names to IP addresses using local name resolution methods (hosts file).

Candidate should also identify means to back up server files and directories.

Outcome 4

The final Outcome involves candidates adding security features to the server:

Appropriate file and folder permissions should be applied throughout the server. Although default file and folder permissions are suitable, there may be occasions where candidates have to use custom permissions. Candidates should become familiar with changing permissions and the different methods used for doing so, for example, using the command line and GUI.

Candidates should become familiar during this Outcome with installing and utilising methods that can be used for password protecting directories, for example *.htaccess.*

Candidates should learn how to implement SSL on the server, generate server (self-signed) certificates and use HTTPS to server web pages.

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 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 social software. 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).*

Opportunities for developing Core Skills

Although there is no automatic certification of Core Skills or Core Skill components in this Unit, there are opportunities for developing *ICT* and *Problem Solving* Core Skills throughout the 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.

History of changes to Unit

Version	Description of change	Date

General information for candidates

Unit title: Managing a Web Server

The aim of this Unit is to introduce you to the complexities of setting up and maintaining an HTTP Web Server. This Unit is suited to those in a technical support role, however would suit those in a technical web development role.

Outcome 1 aims to introduce you to the theoretical aspects that have to be considered when preparing to investigate and install a web server, including hardware considerations, operating system considerations and additional server features, among others.

Outcome 2 deals with the installation and configuration of the server itself and is aimed at providing you with the hands on skills in aspects such as differing installation methods, important locations to be found within the server hierarchy as well as core configuration files and the additional features that can be added to the server in order to provide a scalable HTTP web application server capable of handling dynamic technology.

Outcome 3 aims to introduce you to the aspects involved in maintaining the server. This includes identifying the location of server log files, how to interpret them and the part they play in how statistics are generated.

During this Outcome you will also become familiar with how to serve multiple websites using virtual hosting techniques and how to manipulate virtual host configuration files along with name resolution methods, as well as using suitable server backup techniques.

Outcome 4 deals with security issues that have to be considered once the server has been implemented and focuses upon the use of SSL and HTTPS, as well as how to generate self signed certificates and secure files and folders with appropriate permissions.

By the end of this Unit you should be able to identify and install suitable server software, perform appropriate configuration and maintenance procedures, install additional server software and secure the server.