ASSESSMENT BRIEF

Module Title:	Advanced OS I
Module Code:	KF5004
Academic Year / Semester:	2023-2024 / Semester 1
Module Tutor / Email (all queries):	M. Fatih Tuysuz fatih.tuysuz@northumbria.ac.uk
% Weighting (to overall module):	100%
Assessment Title:	Implementation of a DNS Infrastructure and Web Server Farm Facility for a large-scale organisation
Date of Handout to Students:	2nd November 2023
Mechanism for Handout:	Module Blackboard Site & Lecture in Week 5
Deadline for Attempt Submission by Students:	18th January 2024 16.59pm GMT
Mechanism for Submission:	Document upload to Module Blackboard Site
Submission Format / Word Count	Please upload your written report as a single Word or PDF document. Your report should not exceed 2,500 words in length.
Date by which Work, Feedback and Marks will be returned:	14th February 2024
Mechanism for return of Feedback and Marks:	Mark and individual written feedback sheet will be uploaded to the Module Site on Blackboard. For further queries please email module tutor.

KF5004

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Assignment

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Implementation of a DNS infrastructure (BIND9) and Web Server Farm facility for a large scale organisation. (Apache, PHP, NFS, and MySQL)

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Dr. M. Fatih Tuysuz

September 2023

Contents

1 Introduction

The assignment is based upon the business case that you are building as part of the module.

The scenario and a sample configuration are available on blackboard.

The assignment is designed to enable you (the student) to demonstrate your understanding of how a DNS and web architecture can be designed and built to fulfill a company's requirements.

The report component of this assignment is an individual piece of work; the research/build component of the business case is to be conducted as an individual.

> **IMPORTANT:**
>
> The assessment is an individual piece of work. You **must not** assist each other in the development of the reports.

2 Learning Outcomes

1. **Knowledge & Understanding:**
   (a) Select appropriate features of an operating system for computer network implementation.
2. **Intellectual / Professional skills & abilities:**
   (a) Justify the integration of network services at the Intranet and Internet level for a commercial organisation.
   (b) Configure networking functions such as, web servers, DNS, file sharing and databases.
3. **Personal Values Attributes (Global / Cultural awareness, Ethics, Curiosity) (PVA):**
   (a) Configure networking functions such as, web servers, DNS, file sharing and databases.
   (b) Appreciate the impact of network services for both local and global implementations.

3 Plagiarism

3.1 Regulations

Students are expected to observe University regulations, which define and proscribe cheating, plagiarism and other forms of academic misconduct. They are also required to take reasonable precautions to guard against unauthorised access by others to their work.

Details of Northumbria University's Academic Regulations for Taught Awards (ARTA) can be found on the University's website in the Quality and Teaching Excellence Assessment area - ARTA - Guidance for Students.

3.2 Referencing Standard

All referencing for this assignment must be in Harvard format. A guide for Northumbria University's Harvard referencing style can be obtained from the library as a physical copy or online in theskills plus site - Cite Them Right.

> **IMPORTANT:**
>
> The assessment is an individual piece of work. You **must not** assist each other in the development of the reports.

4 Assignment Submission

The report must be submitted via *'TurnItIn'*. A link is provided in the **assessments** area of the **blackboard** module. The date and time of the submission is highlighted on the front coversheet.

> **IMPORTANT:**
>
> **Only electronic submissions will be accepted**.
> The submission must be in word format (**doc, docx**) or portable document format (**pdf**)

5 Business Case Workload

A breakdown of the 'effort' required to build each component of the business case is detailed in Table 1.

Task	Description	Effort (%)
1	DNS Core Configuration. SOA Record setup. Other record setup. e.g. CNAME, A, MX DNS Core Operations. (Security setup etc.)	20%
2	Apache (Intranet) Configuration Intranet site including scripting and database connectivity. Personal web storage. – FTP facilities. – Static sites. – Dynamic site.	20%
3	Database (Intranet) Configuration. Intranet site. Management console. Localized security.	10%
4	Apache (Internet) Configuration including Load Balancing. Individual server access. Load-balanced server access. Internet site including scripting and database connectivity. Localised scripting.	20%
5	Content Storage Configuration (for web server farm) NFS configuration. rDNS Security.	20%
6	Database (Internet) Configuration (for web server farm) Management Console. (PHPMyAdmin) Database creation with user accounts. Remote access security.	10%

Table 1: Activity Schedule

6 Word Limits

This report *should not* exceed **2000 words** (Please consult the ARTA guidelines for penalties etc.). Diagrams and configuration listings are **excluded** from the word count. All configuration listings should be in a Mono Space font 10pt. Large listings should be presented as an appendix (not part of the word count) and referenced from the main body.

e.g.

```
http    IN  CNAME www
mail    IN  A     192.0.2.3
mail2   IN  A     192.0.2.4
mail3   IN  A     192.0.2.5
```

7 Report Format & Requirements

You are required to write a report covering the subject areas highlighted in the section 8 below.

> **NOTE:**
>
> Answers should use/reference the provided business case and design document, where possible, when discussing concepts and configurations.

The report should structured as follows:

A **Cover sheet,** which should include as a minimum:
    Name
    User Id
    Course
    Module code
    Module title
    Submission Date
    Word Count

4 **Sections**, one for each subject area:
    Section 1: DNS Deployment
    Section 2: HTTP Deployment
    Section 3: NFS Deployment
    Section 4: MySQL Deployment

> **NOTE:**
>
> Where possible, you should use (*your own*) diagrams and extracts of configuration files to highlight and enhance your discussion.

8   Subject Areas

Each section has a mark indicating the value of the section as a whole and the sub-sections show the mark for individual components.

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IMPORTANT:

Please make sure every section has appropriate references e.g. RFC documents, research papers and white papers, etc. For referencing standards for this assignment please see section 3.2.

REMEMBER: NO WIKIPEDIA!

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8.1   DNS **Deployment (40 Marks)**

NOTE:

There are 2 questions to be answered in this section. Make sure you highlight them appropriately in your report.

1. DNS setup and configuration

(Total: 20 Marks)

   (a) Discuss setup and configuration of DNS servers step by step required for the company described in the company brief report [5 Marks]. In general, discuss zone distribution among primary and secondary servers and subdomains [5 Marks]. Provide example configurations as part of the discussion to highlight your points [5 Marks].

(5+5+5 = 15 Marks)

   (b) Discuss the consequences of not limiting zone transfers between primary and secondary servers. (Make sure you discuss the DNS packet types involved - *research required!*).

(5 Marks)

2. SOA (Start of Authority) record and $ORIGIN directive.

(Total: 20 Marks)

   (a) Discuss components of an SOA record and how the options affect the communications between servers, and servers and clients [7 Marks]. Provide an example configuration of SoA record and discuss how caching, waiting times and updating frequencies are set on your example configuration [8 Marks].

(7 + 8 = 15 Marks)

   (b) Discuss how the $ORIGIN directive simplifies the creation of zone files and how it can be used in creating a sub-domain.   (5 Marks)
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8.2 HTTP **Deployment (20 Marks)**

1. Web server setup and configuration

(Total: 20 Marks)

(a) Setup and configure a web server on Linux using any tool other than Apache. Provide screenshots of your configuration and discuss advantages and disadvantages of this server configuration to the Apache web server configuration.

(15 Marks)

(b) In the context of running Apache in a load-balanced environment discuss the concept of virtual websites and how they function in detail. (5 Marks)

8.3 NFS **Deployment (20 Marks)**

1. NFS setup and configuration.

(Total: 20 Marks)

(a) Discuss setup and configuration of NFS servers step by step required for the company described in the company brief report [7 Marks]. Discuss how rDNS can be used (configured and employed) as a security mechanism to limit access the shared content repository [8 Marks].

(7 + 8 = 15 Marks)

(b) Discuss the rDNS validation process when using a regex defined domain name export [5 Marks].

(5 Marks)

8.4 MySQL **Deployment (20 Marks)**

1. MySQL setup and configuration.

(Total: 20 Marks)

(a) What accounts and security settings are required to install a MySQL database with a PHPMyAdmin interface in a secure manner? (15 Marks)

(b) What is the most appropriate way to create/configure a database and user account for a system and why? (5 Marks)

9   Feedback

Formative (non assessed) feedback will be provided on your progress throughout the workshops as you develop your business case solution. *Summative* (assessed) feedback will be provided three weeks after submission.

END