**ASSIGNMENT 1 FRONT SHEET**

|  |  |  |  |
| --- | --- | --- | --- |
| **Qualification** | **BTEC Level 5 HND Diploma in Computing** | | |
| **Unit number and title** | 10: Website Design & Development | | |
| **Submission date** |  | **Date Received 1st submission** |  |
| **Re-submission Date** |  | **Date Received 2nd submission** |  |
| **Student Name** | Ly Thanh Hao | **Student ID** | GCC210232 |
| **Class** | GCC1001 | **Assessor name** | Tran Thi Kim Khanh |
| **Student declaration**  I certify that the assignment submission is entirely my own work and I fully understand the consequences of plagiarism. I understand that making a false declaration is a form of malpractice. | | | |
|  |  | **Student’s signature** |  |

**Grading grid**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| P1 | P2 | P3 | P4 | M1 | M2 | M3 | D1 |
|  |  |  |  |  |  |  |  |

|  |  |  |
| --- | --- | --- |
| **❒ Summative Feedback: ❒ Resubmission Feedback:** | | |
| **Grade:** | **Assessor Signature:** | **Date:** |
| **Signature & Date:** | | |

|  |
| --- |
| **Submission Format:** |
| *Format: The submission is in the form of two documents/files*   * A ten-minute Microsoft® PowerPoint® style presentation which can be shared with your colleagues for feedback. The presentation can include links to performance data with additional speaker notes and a bibliography using the Harvard referencing system. The presentation slides for the findings should be submitted with speaker notes as one copy. * An extended guidebook or detailed report that provides more thorough, evaluated or critically reviewed technical information on all of the topics covered in the presentation.   *Submission*   * Students are compulsory to submit the assignment in due date and in a way requested by the Tutor. * The form of submission will be a soft copy posted on [http://cms.greenwich.edu.vn/.](http://cms.greenwich.edu.vn/) * Remember to convert the word file into PDF file before the submission on CMS.   *Note:*   * The individual Assignment *must* be your own work, and not copied by or from another student. * If you use ideas, quotes or data (such as diagrams) from books, journals or other sources, you must reference your sources, using the Harvard style. * Make sure that you understand and follow the guidelines to avoid plagiarism. Failure to comply this requirement will result in a failed assignment. |

|  |
| --- |
| **Unit Learning Outcomes:** |
| **LO1** Explain server technologies and management services associated with hosting and managing websites.  **LO2** Categorise website technologies, tools and software used to develop websites. |
| **Assignment Brief and Guidance:** |
| You currently work for a software training company that produces courses and topic presentations to established companies and, importantly, to new start-ups. MWS wishes to pursue a bespoke web-based e-commerce solution. As part of your role, you have been asked to create an engaging presentation to help inform and train staff members on the tools and techniques associated with front- and back-end development together with the technologies and services required to set up, host and manage a typical commercial website. You will find more information in the file *MWS-CaseStudy.docx*.  In addition to your presentation, you will also provide an extended guidebook containing further information for staff members or a detailed report containing a technical review of the topics covered in the presentation.  Your presentation should include:   1. Server technologies and the management services associated with hosting and managing websites. 2. A review of different website technologies supported with the tools and software used to develop websites (including the differences between online website creation tools and custom-built sites).   Your extended guidebook or detailed report should include a summary of your presentation as well as additional, evaluated or critically reviewed technical notes on all of the expected topics. |

|  |  |  |  |
| --- | --- | --- | --- |
| **Learning Outcomes and Assessment Criteria (Assignment 1):** | | | |
| Learning Outcome | Pass | Merit | Distinction |
| LO1 | **P1** Identify the purpose and types of DNS, including explanations on how domain names are organised and managed. | **M1** Evaluate the impact of common web development technologies and frameworks with regards to website design, functionality and management. | **D1** Justify the tools and techniques chosen to realize a custom built website. |
|  | **P2** Explain the purpose and relationships between communication protocols, server hardware, operating systems and web server software with regards to designing, publishing and accessing a website. | **M2** Review the influence of search engines on website performance and provide evidence- based support for  improving a site’s index value and rank through search engine optimisation. |  |
| LO2 | **P3** Discuss the capabilities and relationships between front-end and back- end website technologies and explain how these relate to presentation and application layers. | **M3** Evaluate a range of tools and techniques available to design and develop a custom built website. |  |
|  | **P4** Discuss the differences between online website creation tools and custom built sites with regards to design flexibility, performance, functionality, User Experience (UX) and User Interface (UI). |  |  |

# DOMAIN NAME SYSTEM – DNS (P1)

## Explain the concept of DNS

DNS is a hostname for IP address translation service. DNS is a distributed database implemented in a hierarchy of name servers. It is an application layer protocol for message exchange between clients and servers.  **(GeeksforGeeks, 2022)**

* **Type of network communication protocol**

1. **TCP**

The Transmission Control Protocol (TCP) is a standard that defines how to establish  
and maintain a network connection through which application programs can exchange  
data. It is used on the top of IP to provide reliable transmission of packets.

TCP is a connection-oriented reliable protocol. Two devices need to establish a  
connection before start using TCP and sending the data. It also provides an  
acknowledgment to the sender device regarding the status of the data being sent.

**(Datta, 2021)**

1. **IP**

Standardized by IEEE in 1974, this protocol is responsible for addressing and [fragmenting](https://en.wikipedia.org/wiki/Fragmentation_(computing)) data packets in digital networks. Its goal is to ensure the successful delivery of packets from source to destination. For this purpose, the IP specifies a format that defines the type of description of data packets called IP datagrams.

The first major version of IP is IPv4, and it was first deployed on [SATNET](https://en.wikipedia.org/wiki/SATNET) in 1982. It uses a 32-bit address space. The latest version of the internet protocol, IPv6, uses 128-bit address space to create unique TCP/IP address identifiers. **(Datta, 2021)**

* Let’s see the header format for IPv4 and IPv6:

Table

Description automatically generated

Table

Description automatically generated

**(Datta, 2021)**

1. **HTTP**

The Hypertext Transfer Protocol (HTTP) is an application-level protocol for distributed, collaborative, hypermedia information systems. This is the foundation for data communication for the World Wide Web (i.e. internet) since 1990. HTTP is a generic and stateless protocol which can be used for other purposes as well using extensions of its request methods, error codes, and headers. **(Tutorialspoint, 2022)**

A picture containing text

Description automatically generated

**(Datta, 2021)**

1. **DNS**

IP addresses are of numerical format and hence they are not easily readable or remember-able to humans. DNS is a hierarchical system that converts these IP addresses into a human-readable hostname. The most common vulnerability in DNS is cache poisoning. Here the attacker replaces the legitimate IP address to send the target audience to malicious websites. DNS amplification can also be exploited on a DNS server which permits recursive lookups and uses recursion to amplify the magnitude of the attack. **(Goyal, 2021)**

1. **Ethernet**

Ethernet is a protocol made for [Local Area Networks (LAN)](https://en.wikipedia.org/wiki/Local_area_network). It was first standardized in 1983 as [IEEE 802.3](https://standards.ieee.org/standard/802_3-2018.html) and used with thick single coaxial cable 10BASE-5.

The Ethernet 802.3 protocol defines [the physical layer](https://www.baeldung.com/cs/osi-model) in wired networking models, as well as the [medium access control (MAC)](https://en.wikipedia.org/wiki/Medium_access_control) sub-layer of the [data link layer](https://www.baeldung.com/cs/osi-model).

There are several versions of the IEEE 802.3 protocol, e.g., 802.3a, 802.3i, 802.3j. Each version is designed to work on different types of cables. **(Datta, 2021)**

* Let’s see the frame format of Ethernet 802.3 and Ethernet 802.11 protocols:

Chart

Description automatically generated

Chart, bar chart

Description automatically generated

**(Datta, 2021)**

1. **DHCP**

The DHCP stands for **Dynamic Host Configuration Protocol**. It is a network management protocol used on IP networks. A DHCP server is used to assign an IP address and other configurations to the connected devices on the network to communicate with others. **(JavaTpoint, 2021)**

1. **ICMP**

The ICMP stands for Internet Control Message Protocol. It is a network layer protocol. It is used for error handling in the network layer, and it is primarily used on network devices such as routers. As different types of errors can exist in the network layer, so ICMP can be used to report these errors and to debug those errors.

**(JavaTpoint, 2021)**

1. **ARP**

Address Resolution Protocol (ARP) is a communication protocol used to find the MAC (Media Access Control) address of a device from its IP address. This protocol is used when a device wants to communicate with another device on a Local Area Network or Ethernet. **(JavaTpoint, 2021)**

1. **UDP**

The UDP stands for **User Datagram Protocol**. Its working is similar to the TCP as it is also used for sending and receiving the message. The main difference is that UDP is a connectionless protocol. Here, connectionless means that no connection establishes prior to communication. It also does not guarantee the delivery of data packets. It does not even care whether the data has been received on the receiver's end or not, so it is also known as the "fire-and-forget" protocol. It is also known as the **"fire-and-forget"** protocol as it sends the data and does not care whether the data is received or not. UDP is faster than TCP as it does not provide the assurance for the delivery of the packets. **(JavaTpoint, 2021)**

1. **FTP**

The File Transfer Protocol (FTP) is a standard network protocol provided by TCP/IP, and it is used to transfer files from one server to another. It is responsible for the reliably and efficient transfer of files.

Transferring a file from one server to another is simple, but several problems may arise. The sender system and the receiver server may have different file conventions or different ways to represent data. In some cases, the directory structures of two systems may differ from each other. FTP resolves all of these issues. **(Datta, 2021)**

## Purpose of DNS

(thiếu)

## Type of DNS Server

All DNS servers fall into one of four categories: Recursive resolvers, root nameservers, TLD nameservers, and authoritative nameservers. In a typical DNS lookup (when there is no caching in play), these four DNS servers work together in harmony to complete the task of delivering the IP address for a specified domain to the client (the client is usually a stub resolver - a simple resolver built into an operating system).

* **DNS recursive resolver.** A recursive resolver (also known as a DNS recursor) is the first stop in a DNS query. The recursive resolver acts as a middleman between a client and a DNS nameserver. After receiving a DNS query from a web client, a recursive resolver will either respond with cached data, or send a request to a root nameserver, followed by another request to a TLD nameserver, and then one last request to an authoritative nameserver. After receiving a response from the authoritative nameserver containing the requested IP address, the recursive resolver then sends a response to the client.

**(Cloudflare, 2022)**

* **TLD Name Server.** A TLD nameserver maintains information for all the domain names that share a common domain extension, such as .com, .net, or whatever comes after the last dot in a url. For example, a .com TLD nameserver contains information for every website that ends in ‘.com’. If a user was searching for google.com, after receiving a response from a root nameserver, the recursive resolver would then send a query to a .com TLD nameserver, which would respond by pointing to the authoritative nameserver (see below) for that domain. **(Cloudflare, 2022)**
* **Root name server.** This server is the first place the recursive server sends a query if it doesn't have the answer cached. The root name server is an index of all the servers that will have the information being queried. These servers are overseen by the Internet Corporation for Assigned Names and Numbers, specifically a branch of ICANN called the Internet Assigned Numbers Authority. **(Lutkevich, 2021)**
* **Authoritative name server.** The authoritative name server is the final checkpoint for the DNS query. These servers know everything about a given domain and deal with the subdomain part of the domain name. These servers contain DNS resource records with specific information about a domain, such as the A record. They return the necessary record to the recursive server to send back to the client and cache it closer to the client for future lookups. **(Lutkevich, 2021)**

## How domain names are organized

Domain names are organized via subdomains which are subordinate levels of the Domain Name System root domain. Top-level domains (TLDs) are the first-level set of domain names, and include generic top-level domains (gTLDs) such as .com, .net and .org as well as country code top-level domains (ccTLDs). **(DomainTools, 2022)**

* For example, in the URL [www.google.com](http://www.google.com), “google” is a subdomain of “.com”, and "www." is a subdomain of “google.com”.