

ASSIGNMENT 1 FRONT SHEET

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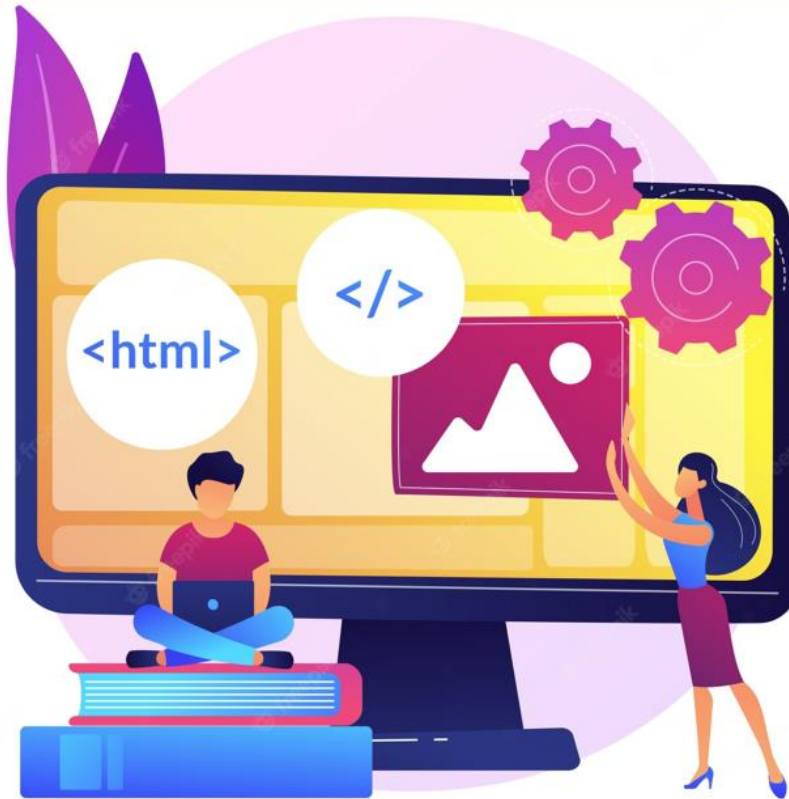
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Website Design and Development



Assignment 1:

Website Design & Development.

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Chapter 1: The purpose and types of DNS, including explanations on how domain names are organised and managed

1. Domain Name System (DNS)

The Domain Name System (DNS) is a hierarchical and decentralized naming system that is used to identify machines that may be reached over the Internet or other Internet Protocol (IP) networks. A domain name is a text string that corresponds to a numeric IP address and is used to visit a website from client software. These domain names, such as google.com, are far simpler for users to remember on the Internet than the numeric IP address for this server, 172.217.24.110, at the time of writing. Users may utilize DNS to input human-friendly domain names and be directed to the websites they want. This is referred to as a DNS lookup.

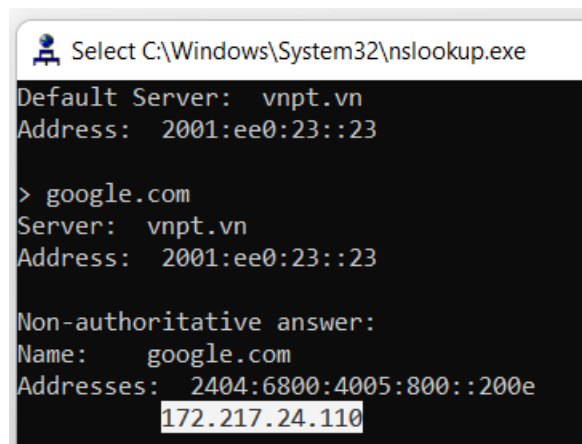


Figure 1: C1.1_DNS_Check IP address from a website

If someone types google.com into a web browser, a server behind the scenes will map that name to the corresponding IP address, something similar in structure to 172.217.24.110.

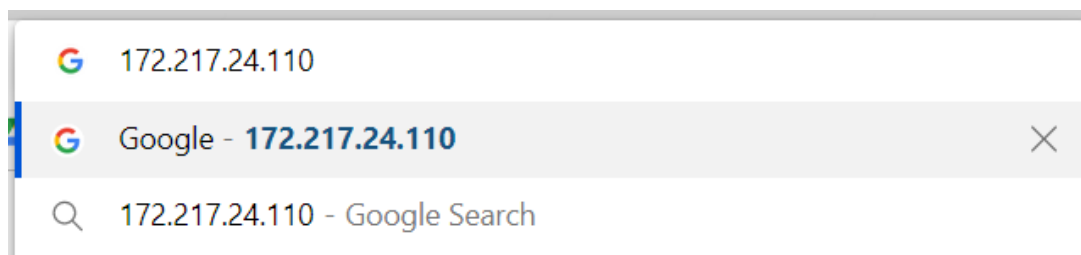


Figure 2: C1.1_DNS_Connect website by IP address

The top-level domains that were used on the Internet were:

- .com - Commercial organizations
- .edu - Universities and other educational institutions
- .gov - Governmental agencies
- .net - Major network support centers

Furthermore, each country's domain is distinct; each country has its own domain:

- vn - Viet Nam
- .kr - Korea
- .us - United States
- .uk - United Kingdom

Furthermore, domain management may be delegated to sub-domains in order to provide a unique name to a certain department, function, or service associated to the corporation.

For example: The FPT education domain is `fpt.edu.vn` and there are some sub-domains like: `ap.fpt.edu.vn` or `career.fpt.edu.vn`.

2. Purpose and types of Domain Name System

An IP address is assigned to the device when it connects to the Internet. The IP address of each device is unique, and it may be used to easily determine the path to another device. As a result, IP addresses are difficult for people to remember. Because of the aforementioned logic, the DNS system was designed with the objective of supporting users in transforming a difficult-to-remember IP address (used by computers) into a name that is easier for people to remember, as well as making the Internet system easier to remember and more expansive. DNS is a critical component of the Internet. It is able to transform all inquiries into IP addresses and, as a result, identify various network-connected devices.

Management is eased since the DNS system uses a distributed database system and a tree structure, making it easier to convert IP numbers to domain names and vice versa. DNS servers reduce the need for people to learn IP addresses like 172.217.24.110 (in IPv4) or more advanced contemporary alphanumeric IP addresses like 2404:6800:4005:800::200e (in IPv6) to create domain names like "google.com." It converts domain names to IP addresses, allowing browsers to access Internet resources and allows users to choose which server to visit anytime they enter a domain name into their browser.



Figure 3: C1.2_Illustration _The translation of domain name "google.com" to IP address 172.217.24.110

In the DNS system, there are three sorts of queries:

- **Recursive Query:**

A DNS client presents a hostname in a recursive query, and the DNS Resolver "shall" respond with either an appropriate resource record or an error message if it cannot be located. The resolver initiates a recursive query process, beginning with the DNS Root Server and progressing until it finds the Authoritative Name Server (for more information on Authoritative Name Servers, see DNS Server Types below) that contains the IP address and other information for the requested hostname.

- **Iterative Query:**

A DNS client provides a hostname in an iterative query, and the DNS Resolver offers the best answer it can. The DNS resolver returns the appropriate DNS entries if they are in its cache. If this is not the case, it directs the DNS client to the Root Server or another Authoritative Name Server that is closest to the appropriate DNS zone. The DNS client must then retry the query against the DNS server to which it was routed.

- **Non-Recursive Query:**

A non-recursive query is one for which the DNS Resolver knows the response. It either delivers a DNS record quickly because it already has it in the local cache, or it requests a DNS Name Server that is authoritative for the record, indicating that it absolutely has the proper IP for that hostname. There is no need for extra rounds of inquiries in any situation (like in recursive or iterative queries). Rather, the client receives a quick response.

The following are the most common DNS server types used to resolve hostnames into IP addresses:

- **DNS Resolver:**

A DNS resolver (recursive resolver) is intended to handle DNS requests that include a human-readable hostname, such as "www.google.com," and is in charge of tracking the IP address associated with that hostname.

- **DNS Root Server:**

The root server is the initial stage in the process of going from a hostname to an IP address. The Top-Level Domain (TLD) is extracted from the user's query by the DNS Root Server.

For example: www.google.com — and provides details for the .com TLD Name Server. In turn, that server will provide details for domains with the .com DNS zone, including "google.com".

- **Authoritative DNS Server:**

Higher-level DNS servers determine which DNS server is the "authoritative" name server for a certain hostname, which means it has the most up-to-date information for that hostname.

Each DNS Server has a database of domain names and IP addresses, as well as a cache that stores a record of all previous queries. A DNS record is created by DNS servers to convey crucial information about a domain or hostname, namely its current IP address. The following are the most frequent DNS record types:

Table 1: C1.2_Illustration _Table of records type in oracle example

Record Type	Purpose
Address Mapping record (A Record)	Known as a DNS host record, stores a host name and its corresponding IPv4 address.
IP Version 6 Address record (AAAA Record)	Stores a hostname and its corresponding IPv6 address.
Canonical Name record (CNAME Record)	Can be used to alias a hostname to another hostname. When a DNS client requests a record that contains a CNAME, which points to another hostname, the DNS resolution process is repeated with the new hostname
Mail exchanger record (MX Record)	Specifies an SMTP email server for the domain, used to route outgoing emails to an email server.
Name Server records (NS Record)	Specifies that a DNS Zone, such as “example.com” is delegated to a specific Authoritative Name Server, and provides the address of the name server.
Reverse-lookup Pointer records (PTR Record)	Allows a DNS resolver to provide an IP address and receive a hostname (reverse DNS lookup).
Certificate record (CERT Record)	Stores encryption certificates—PKIX, SPKI, PGP, and so on
Service Location (SRV Record)	A service location record, like MX but for other communication protocols.
Text Record (TXT Record)	Typically carries machine-readable data such as opportunistic encryption, sender policy framework, DKIM, DMARC, ...
Start of Authority (SOA Record)	This record appears at the beginning of a DNS zone file, and indicates the Authoritative Name Server for the current DNS zone, contact details for the domain administrator, domain serial number, and information on how frequently DNS information for this zone should be refreshed.

3. The way Domain Names are organized

Subdomains are lower tiers of the Domain Name System parent domain that arrange domain names. TLDs are the first-level collection 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). Domain names are organized using subordinate tiers (subdomains) of the DNS root domain, which is nameless. End-users that want to connect local area

networks to the Internet, establish other publicly available Internet services, or host web pages frequently register for second- and third-level domain names in the DNS hierarchy.

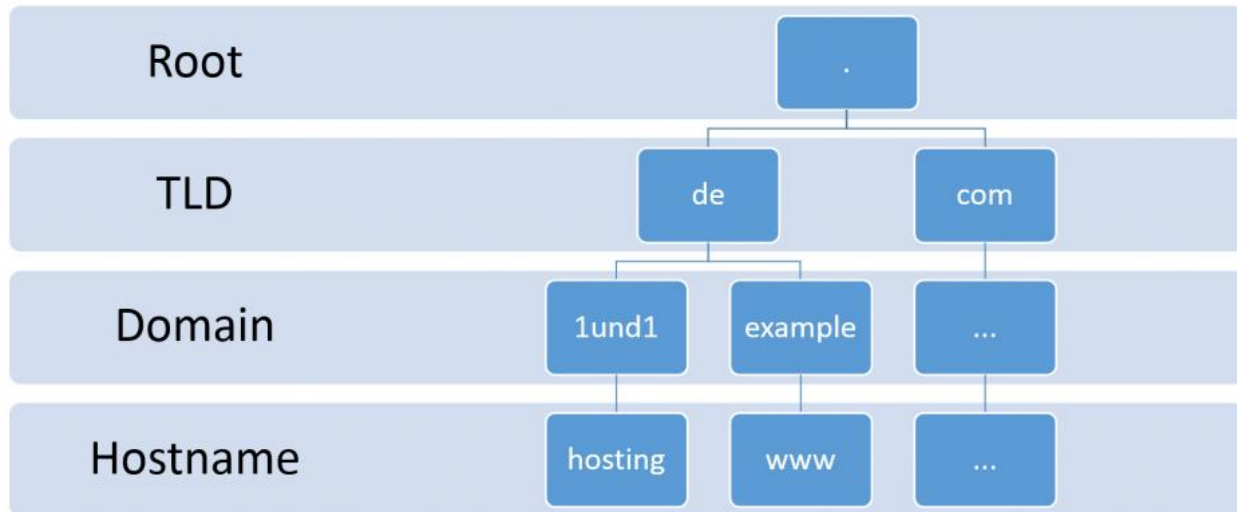


Figure 4: C1.3_Illustration_The hierarchy of labels in a fully qualified domain name

The criteria define a valid domain name:

- Periods (.) are used to divide a domain name into labels.
- A domain name can be three to sixty-three characters long, omitting the address specifier (www) and the suffix (.com). The character limit is determined by the TLD extension necessary.
- There can only be alphanumeric characters and hyphens. A hyphen cannot begin or finish the name.
- Language-specific characters, letters, numerals, and hyphens (-) are permitted in domain name labels, but not at the beginning or end.
- Character limit:
 - COZA domain names – 63 characters (minimum – 2 characters)
 - International domain names (e.g. .com, .net, .org) – 63 characters (minimum – 3 characters)

A domain name can be compartmentalized into four levels below based on its structure:

- **Top-Level Domains:**

Top-Level Domains are the acronym used for top-level domains. It's the last segment of a domain name after the final dot. Instances of top-level domains include .com, .net, .org, .vn, ...

- **Second-Level Domains:**

A Second Level Domain (SLD) is the part of the domain name that is located right before a Top-Level Domain (TLD). They are subdomains of top-level domain names including google.com, ...

- **Third-Level Domains:**

A Third-Level Domain is the next highest level following the Second-Level Domain in the domain name hierarchy. It is the segment that is found directly to the left of the second-level domain. The third-level domain is often called a "subdomain" and includes a Third Domain section to the URL.

- **Next-Level Domain Names:**

Next-Level Domain Names, such as pc15.tek.omnisecu.com, are similarly expanded by prefixing the previous-level domain names.

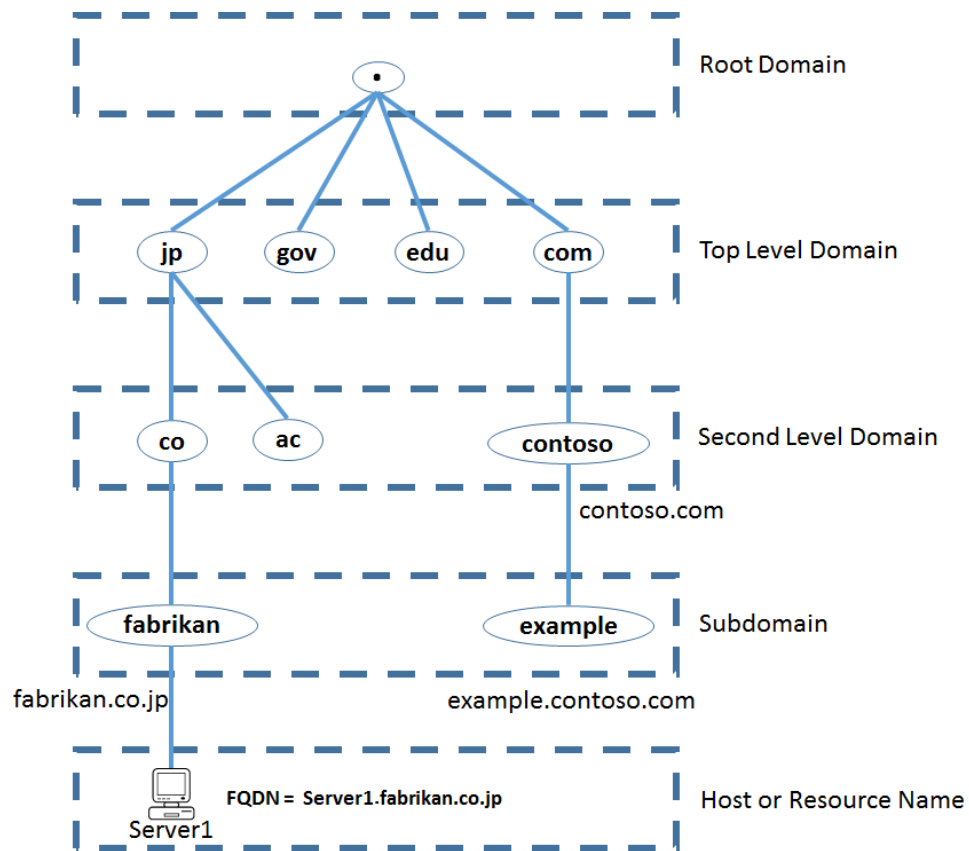


Figure 5: C1.3_Illustration_The DNS Namespace Hierarchy

Chapter 2: The purpose and relationships between communication protocols, server hardware, operating systems and websites server software

1. Communication protocols

Definition

A communication protocol is a set of rules that allows two or more entities in a communications system to transmit messages using any physical quantity variation. The protocol specifies the communication rules, syntax, semantics, and synchronization, as well as various error recovery mechanisms. Protocols can be implemented using either hardware or software, or a mix of the two.

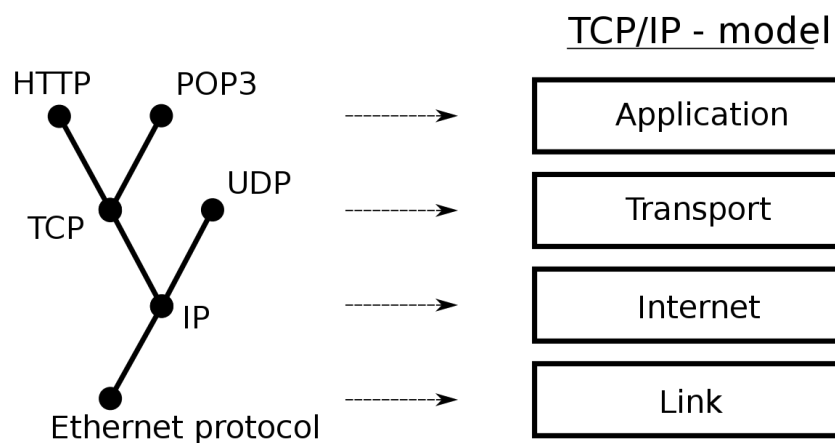


Figure 6: C2.1_Illustration_The TCP/IP model or Internet layering scheme and its relation to some common protocols

The protocol software modules are interfaced with a framework developed on the machine's operating system to build a networking protocol. This framework implements the operating system's networking features. Protocol software may be made operating system independent when protocol methods are represented in a portable programming language. The TCP/IP model and the OSI model are the most well-known frameworks.

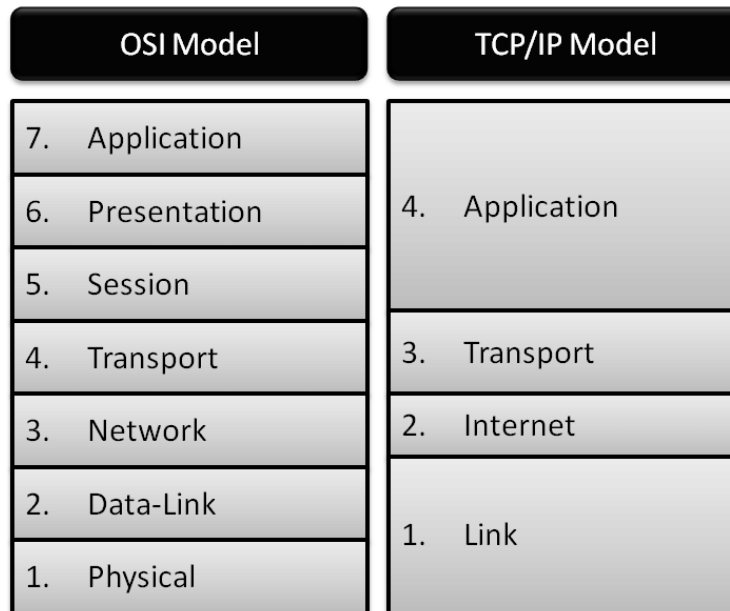


Figure 7: C2.1_Illustration_TCP/IP and OSI Model

Layer and purpose

A network is divided into seven tiers according to the OSI reference model (a protocol stack). These layers specify how networking hardware and software should handle and transmit data across a network. TCP/IP does not precisely correlate to this concept. TCP/IP either merges numerous OSI levels into a single layer or ignores certain layers entirely. The levels of the Solaris TCP/IP implementation are shown in the table below. The layers are listed in the table from the uppermost (application) to the lowest (physical network).

Table 2: C2.1_ Illustration_ TCP/IP Protocol Stack

OSI Ref. Layer No.	OSI Layer Equivalent	TCP/IP Layer	TCP/IP Protocol Examples
5,6,7	Application, session, presentation	Application	NFS, NIS+, DNS, telnet, ftp, rlogin, rsh, rcp, RIP, RDISC, SNMP, and others
4	Transport	Transport	TCP, UDP
3	Network	Internet	IP, ARP, ICMP
2	Data link	Data link	PPP, IEEE 802.2
1	Physical	Physical network	Ethernet (IEEE 802.3) Token Ring, RS-232, others

- **Physical Network Layer**

The physical network layer defines the properties of the network's hardware. The physical network layer, for example, provides the physical features of the communications channel. TCP/IP's layer provides hardware standards such as IEEE 802.3, which specifies Ethernet network media, and RS-232, which specifies standard pin connections.

- **Data-Link Layer**

The network protocol type of the packet, in this case TCP/IP, is identified by the data-link layer. The data-link layer also includes error control and "framing," such as Ethernet IEEE 802.2 framing and Point-to-Point Protocol (PPP) framing.

- **Internet Layer**

This layer, commonly known as the network layer, accepts and sends network packets. This layer contains the highly effective Internet Protocol (IP), the Address Resolution Protocol (ARP), and the Internet Control Message Protocol (ICMP).

- **IP Protocol**

The IP protocol and its accompanying routing protocols are the most important of the TCP/IP suite. IP is in charge of the following:

- **IP address:**

IPv4 refers to the fourth version of the Internet Protocol. It is the underlying technology that allows us to connect our gadgets to the internet. When a device connects to the Internet, it is allocated a numerical IP address. To transport data from one computer to another through the internet, a data packet including both machines' IP addresses must be exchanged across the network.

IPv6 is the next-generation Internet Protocol (IP) address system that will ultimately augment and replace IPv4, which is now used by many Internet services. In order to interact with other devices, every computer, mobile phone, home automation component, Internet of Things sensor, and other Internet-connected device needs a numerical IP address.

○ **ARP Protocol**

Between the data-link and Internet levels, the Address Resolution Protocol (ARP) exists theoretically. ARP helps IP direct datagrams to the correct receiving host by mapping Ethernet addresses (48 bits long) to recognized IP addresses (32 bits long).

○ **Internet Control Message Protocol**

The Internet Control Message Protocol (ICMP) monitors and reports network errors. The ICMP reports the following:

- Dropped packets - Packets that arrive too quickly to be processed.
- Connectivity failure - An inaccessible destination host).
- Redirection is the process of routing a transmitting host to another router.

More information on the operating system commands that employ ICMP for error detection may be found in the ping Command.

● **Transport Layer**

TCP/IP transport layer protocols ensure that packets arrive in sequence and without mistake by exchanging data receipt acknowledgements and retransmitting missing packets. This is referred to as "end-to-end" communication. Transmission Control Protocol (TCP) and User Datagram Protocol (UDP) are transport layer protocols at this level (UDP).

○ **TCP Protocol**

TCP/IP transport layer protocols ensure that packets arrive in sequence and without mistake by exchanging data receipt acknowledgments and retransmitting missing packets. This is referred to as "end-to-end" communication. Transmission Control Protocol (TCP) and User Datagram Protocol (UDP) are transport layer protocols at this level (UDP).

○ **UDP Protocol**

UDP, the other transport layer protocol, offers datagram delivery. UDP makes no attempt to validate connections between receiving and transmitting hosts.

Applications that transport little quantities of data utilize UDP rather than TCP because it reduces the processes of establishing and validating connections.

- **Application Layer**

The application layer defines universal Internet services and network applications. To send and receive data, these services collaborate with the transport layer. There are several application layers protocols.

- **Domain Name System (DNS):** The Domain Name System converts domain names into IP addresses (DNS). A TLD, a root server, and an authoritative server comprise the DNS hierarchy.
- **Hypertext Transport Protocol (HTTP):** Hypertext Transport Protocol is the data transfer protocol used by the World Wide Web (HTTP). Hypertext is text composed of nodes linked together via hyperlinks. HTTP is a request protocol for hypermedia communication topologies that are dispersed or mixed.
- **File Transfer Protocol (FTP):** File Transfer Protocol is a protocol that allows files to be sent from one device to another, with one acting as the server as long as both devices are connected to the Internet.
- **The SSH protocol (also known as Secure Shell)** allows two devices to communicate securely over the internet. It combines robust encryption with a variety of effective authentication approaches to ensure chat security and integrity.
- **The email protocol (POP/IMAP/SMTP)** is a common mechanism for sending data between email clients such as Thunderbird, Apple Mail, or Mailbird and email provider servers such as Gmail, Outlook, or Hotmail, as well as vice versa.

2. Server hardware

Definition

A computer or device that handles network resources on a network is referred to as server hardware. Servers are often dedicated, which means they only do server-related operations. However, employing multiprocessing operating systems, a single computer may run many programs at the same time. They are designed to wait for human or other computer orders before acting on them. Their primary function is to be available to us,

communicate data, and carry out activities in order to keep our workflow running smoothly and productivity high.

There are some types of server hardware:

- **Tower servers:**

Tower servers are upright, independent cabinets that resemble tower-style PCs. Because of their low component density, these servers give the benefit of easier cooling. They are also quite affordable, making them a viable solution for small firms with limited resources. Tower servers, on the other hand, require more room than other servers' kinds.



Figure 8: C2.2_Illustration_Server hardware_Tower servers

- **Rack servers:**

As the name implies, a rack server is intended to be installed on a server rack in a data center. Rack servers frequently function as all-purpose computer nodes in data centers, serving a wide range of applications. Rack servers and server racks are designed to meet similar sizing specifications, allowing servers from many suppliers to be stacked

together. Engineers can also easily install new servers or replace existing ones because to standardization.



Figure 9: C2.2_Illustration_Server hardware_Rack servers

- **Blade servers:**

A blade server is a small device that holds several thin, modular circuit boards known as server blades. Each blade houses a single server, which is usually dedicated to a single application. Because blade servers are usually dedicated, administrators have more control over how they are accessed and how data is transmitted between devices. Blade servers have more processor density than other server models, giving a possible price and performance benefit. Other advantages of blade servers include cooling (each blade is independently cooled by fans), minimum wiring, low-power consumption, and storage consolidation. Due to its hot-swappable, modular components, blade server systems are also easier to repair than rack servers.



Figure 10: C2.2_Illustration_Server hardware_Blade servers:

- **Hyper-Converged Infrastructure (HCI):**

Hyper-Converged Infrastructure systems strive to provide a simpler alternative to traditional IT infrastructure by combining computational power, storage, and hypervisor technologies in a single system. A mid-level data center engineer should be able to accomplish the duties of initial hardware configuration, hypervisor deployment, and software-defined storage implementation in roughly an hour with a typical hyper-convergence offering.

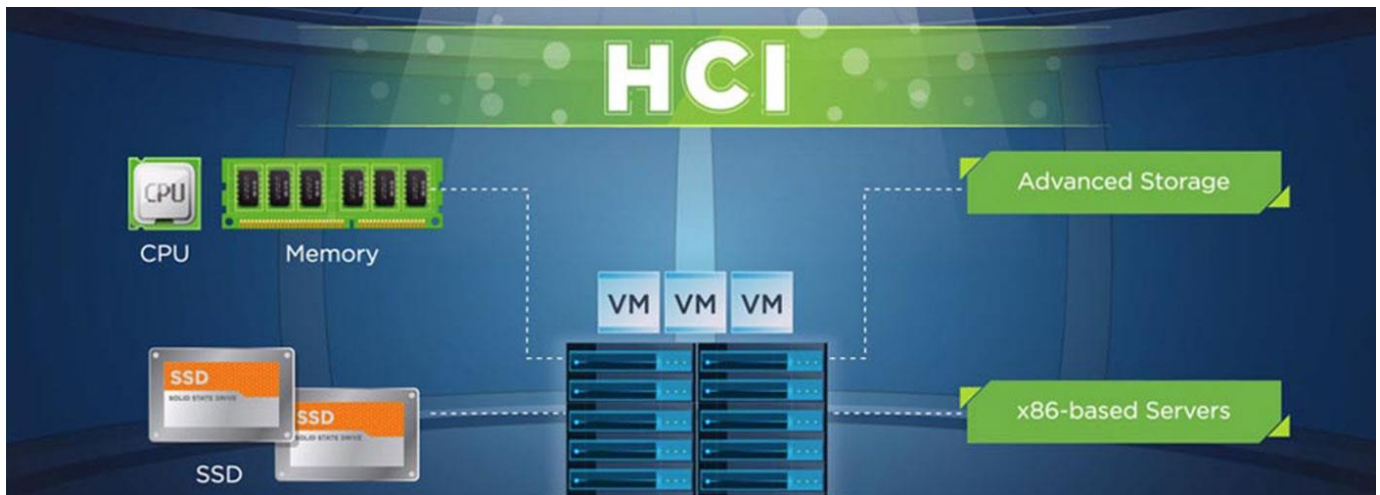


Figure 11: C2.2_Illustration_Server hardware_Hyper-Converged Infrastructure

- **Mainframes:**

The emergence of client-server architectures in the 1990s was predicted to decimate mainframes, yet those high-end servers remain. Today's mainframes can handle high numbers of concurrent transactions and severe I/O loads without sacrificing speed.



Figure 12: C2.2_Illustration_Server hardware_Mainframes

Server hardware architecture

The motherboard, CPU, random access memory (RAM), and storage are critical components of server hardware design:

- **Motherboard:**

The motherboard is located in the core of the server and serves as the primary nexus via which system components are connected and external devices are attached. The most common varieties of motherboards are Advanced Technology Extended and Low-Profile Extension, with Balance Technology Extended, Pico BTX, and Mini Information Technology Extended motherboards addressing the demands of smaller form factors.



Figure 13: C2.2_Illustration_Server hardware architecture_Asus Rog Motherboard

- **Central Processing Unit (CPU):**

The processor, often known as the Central Processing Unit (CPU), is located on the motherboard. The arithmetic logic unit, floating point unit, registers, and cache memory are all CPU components. A Graphics Processing Unit (GPU) on a server can enable applications like machine learning and simulations. Furthermore, the introduction of tensor processing units and neural processing units provides new degrees of processor specialization.



Figure 14: C2.2_Illustration_Server hardware architecture_The Central Processing Unit

- **Random-Access Memory (RAM):**

The Random-Access Memory microchips can also be plugged into the motherboard and serve as the system's main memory. RAM stores the operating system, programs, and data in use for quick access by the CPU. In terms of storage, a server may employ a hard disk drive, a Solid-State Drive (SSD), or a combination of the two.

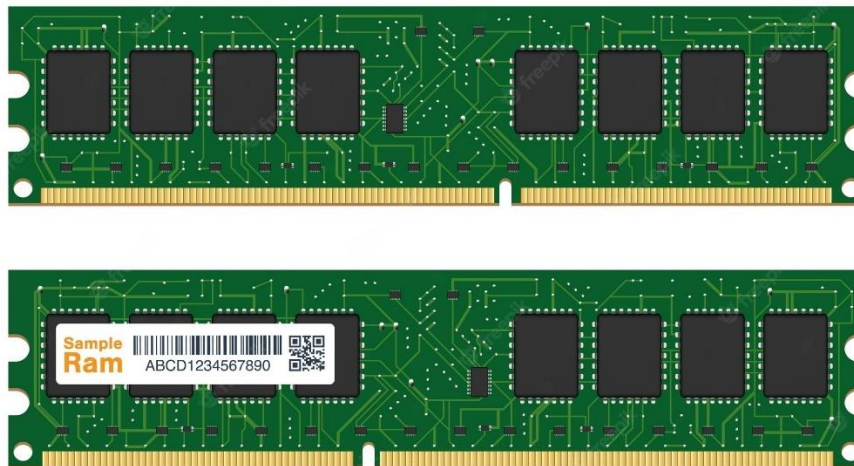


Figure 15: C2.2_Illustration_Server hardware architecture_The Random-Access Memory

STA Minimum Hardware Requirements

STA requires a dedicated server with the minimum configuration listed in the table below:

Table 3: C2.2_The STA Minimum Hardware Requirements table

Hardware	Configuration
Central Processing Unit (Processor)	Intel Xeon 5600 Series or equal AMD CPU
Memory	16 GB RAM
Operating System Disk	Dual HDD drives, 1 TB each
Connection	Gigabit Ethernet
Platform	All disk storage residing on single platform

- **Central Processing Unit (CPU):**

Because of its role in executing programs and processing data, the CPU is an important component to investigate. Some servers feature several CPUs, with one CPU per socket. Others provide multiprocessing by utilizing a single CPU with several cores. Given these alternatives, buyers should consider the number of cores available on a processor, CPU clock speed, available cache, and the number of sockets.

- **Memory:**

Getting the most out of a system requires a lot of server memory. The more memory available, the better an organization's workloads are likely to perform. Memory speed and quality are two more factors that affect performance. IT buyers should examine server attributes that promote reliability. Fault-tolerance and error-correction coding are two examples.

- **Operating System Disk (Storage):**

A server's storage requirements may vary based on the intended applications and workloads: a database server will have different needs than one running a web application. An IT buyer must study server technology to guarantee that it meets the storage requirements of the firm.

- **Connection:**

Network connection and interconnects, such as host bus adapters that connect servers to storage, are also important server problems. Buyers should first examine their connectivity requirements, then evaluate server specifications to verify those requirements are met. Variables to consider include the number and speed of Ethernet

connectors, the number and kind of USB ports, and compatibility with storage systems like as storage-area networks.

- **Other features include:**

Hot swapping capabilities and the degree of redundancy available for components like as hard drives, power supply units, and fans are further aspects to consider. Server administration and security services are also required.

Purpose of server hardware

Here are some instances of what server hardware is in charge of:

- Database servers
- File servers
- Mail servers
- Print servers
- Web servers
- Application servers

3. Operating systems (OS)

Definition

The Operating System (OS) is a group of software applications that manage computer hardware resources and offer common functions to computer programs. Web browsers, for example, often require an operating system to operate. Windows and Linux/Unix are the two most used operating systems for web servers. Each of them has some significant distinctions, but they all serve the same purpose: to create a safe and efficient server where data resources are properly secured and maintained. The web server software was implemented on the web server operating system.

Features of Operating System

- Protected and supervisor mode.
- Allows disk access and file systems Device drivers Networking Security.
- Program Execution.

- Memory management Virtual Memory Multitasking.
- Handling I/O operations.
- Manipulation of the file system.
- Error Detection and handling.
- Resource allocation.
- Information and Resource Protection.

Main types of operating systems and illustrations:

There are three types of operating systems. These three operating systems are most likely the ones that power your phone, computer, or other mobile devices like a tablet. Understanding the various sorts of applications and systems may help you manage security and user access, execute routine activities, and much more, whether you're a casual computer and phone user or wish to pursue a career in information technology.

- **Microsoft Windows Server:**

Microsoft Windows Server is a popular operating system that comes standard with the majority of new PCs. It provided administration, data storage, applications, and communication support at the corporate level. Previous versions of Windows Server emphasized stability, security, networking, and file system enhancements.



Figure 16: C2.3_Illustration_Operating System_Microsoft Windows Server

- **Apple macOS X Server:**

This is a group of server operating systems developed by Apple Inc. that are based on macOS and subsequent add-on software packages for the former. A mail transfer agent, AFP and SMB servers, an LDAP server, and a domain name server are among the network services provided by macOS Server, as are server applications such as a Web server, database server, and calendar server.

Users love macOS because of its rapid processing rates, simple desktop interface, and plethora of helpful services. Many consumers like the quick connection between their computers and mobile phone hardware, as well as the absence of bugs and hackers that is characteristic of Apple systems.



Figure 17: C2.3_Illustration_Operating System_Apple macOS X Server

- **Linux:**

Unlike Windows and Apple, Linux is a family of open source systems rather than a proprietary application. To put it another way, anybody may modify and share it. Linux is the least well-known choice on our list, but it's free and comes in a number of open-source varieties.

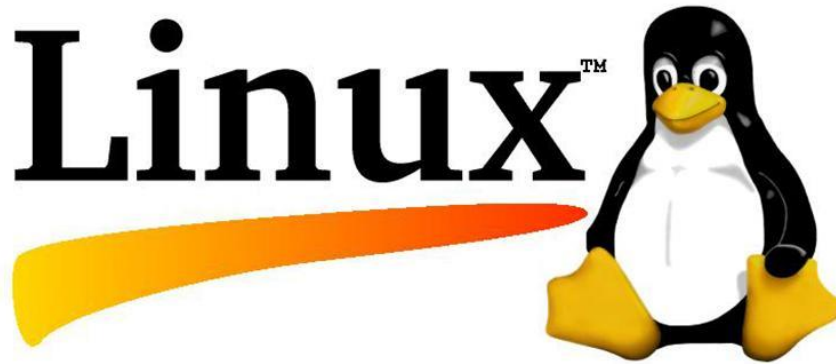


Figure 18: C2.3_Illustration_Operating System_Linux

4. Web server software

Definition

A web server is a piece of software or hardware that uses HTTP (Hypertext Transfer Protocol) and other protocols to respond to client requests over the World Wide Web. A web server is made up of numerous components that manage how web users access hosted content, the most basic of which is an HTTP server. An HTTP server is a program that understands URLs and HTTP.

Purpose

The web server's primary goal is to store, process, and distribute web pages to users. The Hypertext Transfer Protocol is used for this intercommunication (HTTP). These web pages generally include static material such as HTML documents, photos, style sheets, tests, and so on. A web server also supports the SMTP (Simple Mail Transmission Protocol) and FTP (File Transfer Protocol) protocols for emailing and file transfer and storage, in addition to HTTP.

The primary goal of a web server is to show website content. An "intranet server" is a web server that is only used within a company and is not available to the public. When a user enters a URL or web address into the address bar of a web browser, the browser sends a request to the Internet to access the corresponding web page for that address. This URL is converted to an IP Address, which is then used to locate a Web Server through the usage of a Domain Name Server (DNS).

The Web Server is instructed to display the website's content in the user's browser. Each website on the Internet has its own distinct identifier, which results in the establishment of an IP address. This IP address is used to connect between Internet servers.

Main types of web server software, illustrations and its pros and cons.

- **Apache HTTP Server:**

The Apache Software Foundation created the world's most popular web server. Apache is an open-source web server that can be installed on practically any operating system, including Linux, Unix, Windows, FreeBSD, Mac OS X, and others. The Apache Web Server is used by over 60% of web server computers. It is incredibly adaptable and configurable; functions may be easily turned on and off. Security, authentication, caching, URL rewriting, and more modules are available in Apache.

Apache HTTP Server enables custom server configurations through the .htaccess file. Apache also supports a diverse set of applications, such as CMS, ERP, web frameworks, programming languages, etc.



Figure 19: C2.4_Illustration_Web server software_Apache HTTP Server

Table 4: C2.4_Table of advantages and disadvantages of Apache HTTP Server

Advantages	Disadvantages
Anyone can access Apache's source code for free, and no license is necessary.	One of Apache's most notable characteristics is its flexibility to change its configuration. However, if not handled appropriately, this might pose a major threat to security.
Its flexibility to incorporate new features and modules makes it popular among	While developing tailored protocol, additional flaws will be introduced. As a

techies.	result, debuggers are required.
It is simple to obtain assistance for Apache web servers because technical support is easily available on several websites all around the world.	Unwanted services and modules are identified and disabled. Leaving them on may pose major risks.

- **Internet Information Services (IIS):**

Microsoft's Internet Information Server (IIS) is a high-performance Web Server. This web server is compatible with Windows NT/2000 and 2003. (and may be on upcoming new Windows version also). IIS is included with Windows NT/2000 and 2003; because IIS is strongly linked with the operating system, administration is quite simple.

IIS is loaded with functionality. IIS is typically used to host ASP.NET web apps and static webpages. It may also function as an FTP server, host WCF services, and host web applications written in other languages like as PHP.



Figure 20: C2.4_Illustration_Web server software_IIS

Table 5: C2.4_Table of advantages and disadvantages of IIS

Advantages	Disadvantages
The graphical user interface (GUI) assists new users. IIS is well integrated with Performance Monitor, allowing users simple access to detailed consumption information.	IIS is not resilient and may easily be caused to 'hang,' requiring the server to be restarted to recover. It is obviously unacceptable for an NT Service to fail in this manner.
Integration with Team Foundation Server	Remote administration and setup of IIS is

(TFS).	nearly difficult because it can only be done through a crippled web interface, which, of course, requires IIS to be operating and appropriately configured.
Keeping user sessions safe.	In many aspects, IIS is rigid. For example, there is essentially no method to customize how URLs are processed.

- **lighttpd:**

The lighttpd, pronounced lighty, is a free web server included with the FreeBSD operating system. This open-source web server is quick, secure, and uses very little CPU power. Lighttpd is appropriate for any server experiencing load challenges. It is free software licensed under the BSD license. It runs on official GNU/Linux and UNIX systems.



Figure 21: C2.4_Illustration_Web server software_lighttpd

Table 6: C2.4_Table of advantages and disadvantages of lighttpd

Advantages	Disadvantages
It makes use of as little CPU, RAM, and other resources as possible.	Because it only employs one CPU thread, performance is limited.
Asynchronously handles requests.	Many sophisticated functionalities are missing.
It's open-source and completely free to use.	Only suitable for tiny websites.

5. The relationship between technologies above with regards to designing, publishing and accessing a website

Communication protocols define communication standards, syntax, semantics, synchronization, and error recovery mechanisms. Server hardware, server software (especially operating systems and web servers), or a combination of the two can be used to implement protocols.

Server hardware refers to the components responsible for storing, facilitating, and transforming files and data through the use of server operating systems.

Server operating systems:

- Server operating systems are software systems that manage server hardware and software resources while also providing common functionality to server applications. The operating system acts as a bridge between applications (such as web server software) and server hardware for physical activities such as input and output, memory allocation, and so on.
- They are the software that runs on top of the hardware and provide an interface via which we may access the server hardware. Operating systems communicate with the kernel through device drivers, which transmit "commands" to the hardware so that it may perform the tasks we want it to.

Web server software: Another sort of software is web server software. They are installed and run on server hardware to serve as web servers, letting users to view information on the website from any device connected to the network (Internet, Intranet). Web servers can deliver web clients across the Internet or an intranet using the HTTP protocol. It works with web server applications.

The relationship

- Communication protocol: The protocol sets communication rules, syntax, semantics, and synchronization, as well as error recovery procedures. Protocols can be implemented using either hardware or software, or a mix of the two.
- Server Hardware: Hardware refers to all of the physical items that you can touch and see that are combined and constructed into a single entity known as a Personal Computer (PC). In this situation, it may be a laptop or even your smart gadget.

- **Operating System (OS):** The operating system (OS) runs on top of the hardware. The operating system (OS) is the software that provides the interface for communicating with the hardware. There's more to it than that. The operating system communicates with the kernel through device drivers, which deliver "commands" to the hardware to do the tasks that you specify.
- **Web server software:** Web server software is also just a piece of software. It is installed and operates on a computer - the server functions as a Web Server, and users can access the Web site information from another computer on the network (Internet, intranet). Web servers can send Web clients via the Internet (or Intranet) using the HTTP protocol.

Chapter 3: Discuss the capabilities and relationships between Front-end and Back-end websites technologies

1. The capabilities and relationships between front-end and back-end

Front-end development is a type of programming that focuses on the visual parts of a website or app with which a user would interact (the client side). Meanwhile, back-end development is concerned with the aspect of a website that visitors do not see (the server side). They collaborate to develop a dynamic website that allows users to make purchases, use contact forms, and engage in any other interactive activities while perusing a site.

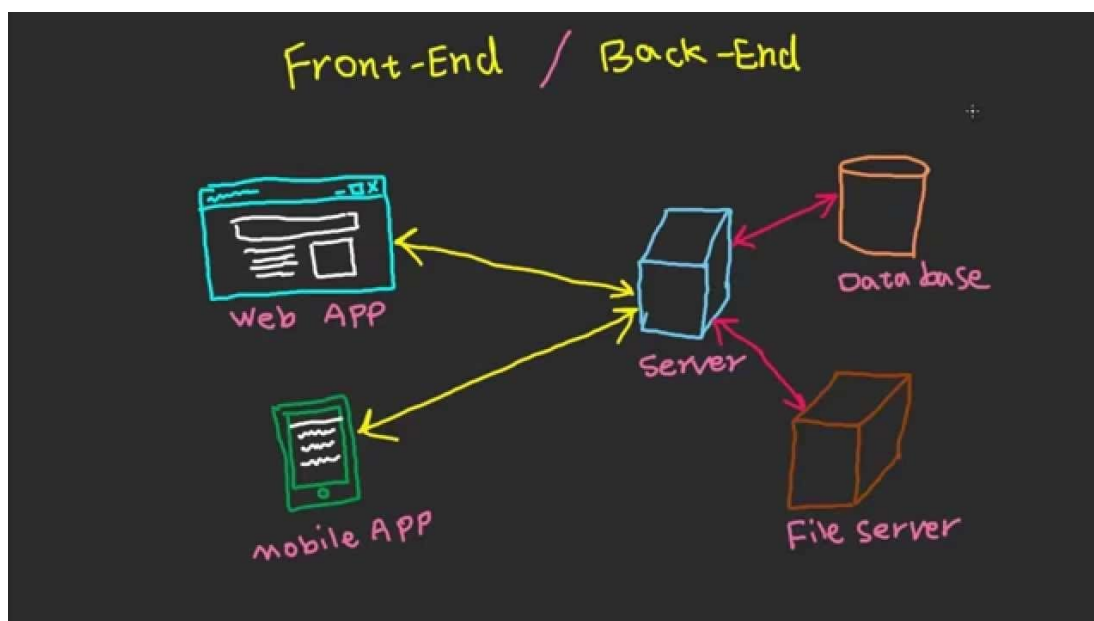


Figure 22: C3.1_Front-End and Back-End

They are terms often used to describe aspects of the web industry.

1.1.Front-end websites technologies

Definition

The front-end includes everything that the user sees, including design and certain languages such as HTML and CSS. Front-end website technology refers to the development of website pages and User Interfaces (UIs) for online applications. Front-end will decide the appearance of the website's presentation layer by implementing the structure, design, behavior, and animation of everything the user sees on the screen when they open their websites, webapps, or mobile apps.

The common front-end technologies

HyperText Markup Language (HTML)

HTML (HyperText Markup Language) is the most basic building block of the Web. It defines the meaning and structure of web content. Other technologies besides HTML are generally used to describe a web page's appearance/presentation (CSS) or functionality/behavior (JavaScript).

"Hypertext" refers to links that connect web pages to one another, either within a single website or between websites. Links are a fundamental aspect of the Web. By uploading content to the Internet and linking it to pages created by other people, you become an active participant in the World Wide Web.

HTML is the initial layer of every web page and generates the code version of the wireframe. These wireframes are available for CSS styles including all of the JavaScript bells and whistles.



Figure 23: C3.1_1_ Front-end websites technologies_HTML

Cascading Style Sheets (CSS)

CSS is intended to separate display from content, including layout, colors, and fonts. This separation can improve content accessibility; provide more flexibility and control in the specification of presentation characteristics; allow multiple web pages to share formatting by specifying the relevant CSS in a separate.css file, reducing complexity and repetition in structural content; and allow the.css file to be cached to improve page load speed between the pages that share the file and its formatting.

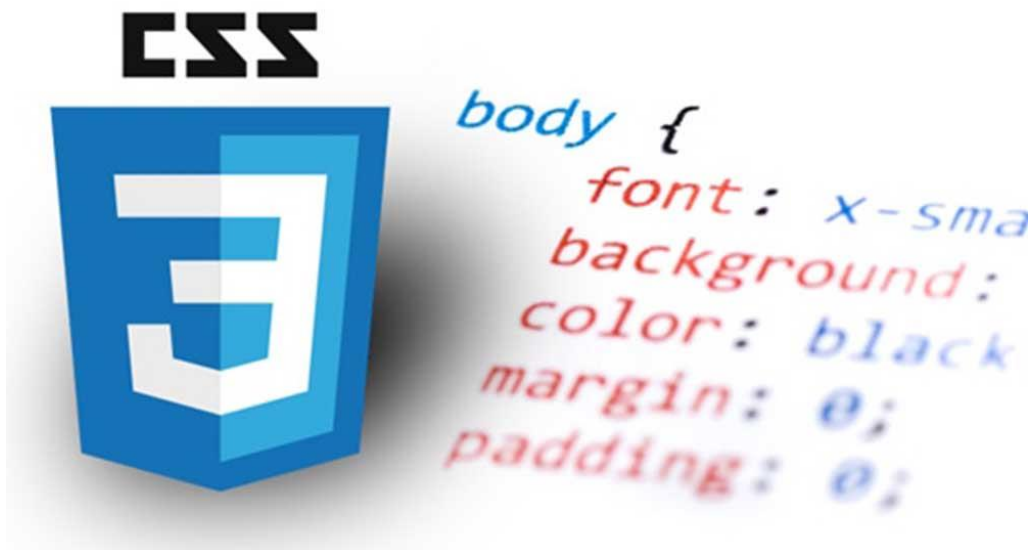


Figure 24: C3.1_1_ Front-end websites technologies_CSS

JavaScripts (JS)

JavaScript, abbreviated JS, is a computer language that, together with HTML and CSS, is one of the essential technologies of the World Wide Web. All major web browsers have a JavaScript engine that executes code on users' devices.

JavaScript is an ECMAScript-compliant high-level, typically just-in-time compiled language. It has first-class functions, dynamic typing, and prototype-based object orientation. It supports event-driven, functional, and imperative programming approaches and is multi-paradigm. It supports text, dates, regular expressions, standard data structures, and the Document Object Model via Application Programming Interfaces (APIs) (DOM).



Figure 25: C3.1.1_Front-end websites technologies_JS

1.2.Back-end websites technologies

Definition

The Back-End of a website consists of a server, an application, and a database. The Back-End of a website consists of a server, an application, and a database. It happens on the server and in the database. It stores and organizes data while also guaranteeing that everything on the website's client-side works properly. It is the area of the website that you cannot access or interact with. It is the component of the software that does not have any direct contact with the users.

A front-end program provides users with indirect access to the parts and characteristics produced by Back-End designers. Building APIs, producing libraries, and interfacing with system components without user interfaces or even scientific programming systems are all part of the Back-End.

The common back-end technologies

JavaScripts (JS)

JavaScript, abbreviated JS, is a computer language that, together with HTML and CSS, is one of the essential technologies of the World Wide Web. All major web browsers have a JavaScript engine that executes code on users' devices.

JavaScript is an ECMAScript-compliant high-level, typically just-in-time compiled language. It has first-class functions, dynamic typing, and prototype-based object orientation. It supports event-driven, functional, and imperative programming approaches and is multi-paradigm. It supports text, dates, regular expressions, standard data structures, and the Document Object Model via Application Programming Interfaces (APIs) (DOM).



Figure 26: C3.1_2_ Front-end websites technologies_JS

Hypertext Preprocessor (PHP)

PHP (Hypertext Preprocessor) is a server-side programming language largely used in web development. PHP may be used for a variety of programming tasks that are not related to the web, such as standalone graphical programs and robotic drone control. PHP code may also be run straight from the command line. For web development, this language is useful for a multitude of reasons, including cross-platform interoperability, OOPs capabilities, and simple interaction 31 with HTML, CSS, JavaScript, and other languages. Have a large community, more freedom and security, etc.



Figure 27: C3.1_2_ Front-end websites technologies_PHP

Node.js

Node.js is a back-end JavaScript runtime environment that runs on the V8 engine and executes JavaScript code outside of a web browser and was developed to construct scalable network applications. Node.js allows developers to utilize JavaScript to create command line tools and server-side scripting, which involves running scripts on the server to generate dynamic web page content before the page is transmitted to the user's web browser. As a result, Node.js symbolizes a "JavaScript everywhere" paradigm, bringing online application development together around a single programming language rather than separate languages for server-side and client-side scripts. Creating back-end services such as APIs, Web Apps, and Mobile Apps with Node.js. It is used in production by large firms like as Paypal, Uber, Netflix, and Walmart.



Figure 28: C3.1_2_ Front-end websites technologies _Node.js

2. Relationships between Front-end and Back-end

Basically, Front-End developers do everything created in your web browser or the client side. Back-end developers, on the other hand, create server-side systems that make everything at the built interface work.

The Front-End includes the user interface/client and any related code/tools, whereas the Back-End includes the server-side and any associated code/tools. The user interface code and tools that will be utilized to interact with the software include CSS, HTML, and JavaScript, as well as the countless tools and frameworks that operate with these technologies.

FRONT-END DEVELOPMENT

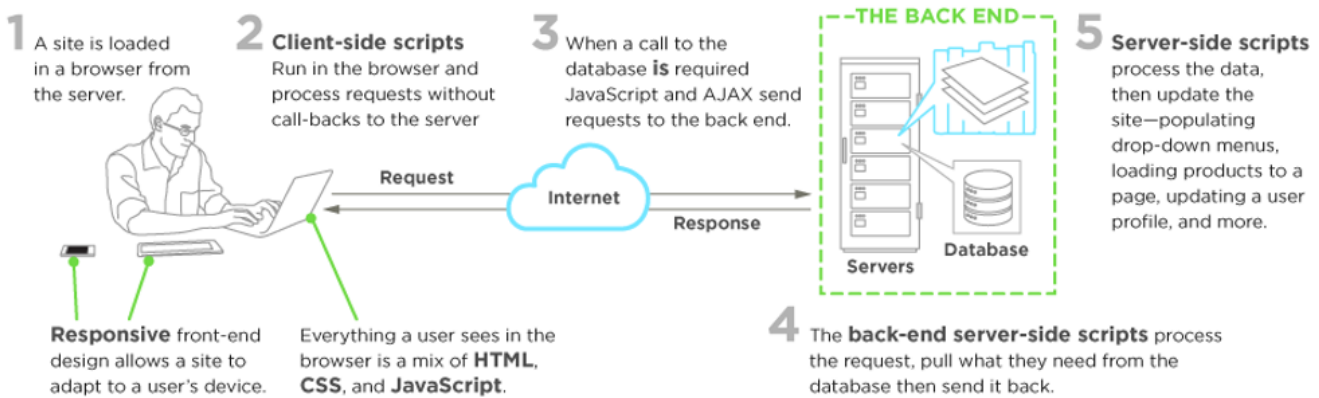


Figure 29: C3.2_Front-End

In response to inquiries, the Back-End/server will communicate across the internet via the "HTTP" protocol, which allows requests/responses to be sent as "packets" over a network or networks. The Back-End will include some coding logic (PHP, Python, Java, etc.) that will tell the server what to do... retrieve some data, produce new data, update some data, remove some data, and so on. Following that, the server will normally connect to some type of data storage, such as a database, to store and show data in an orderly fashion. Of course, there are several more procedures and technologies involved, but this is the fundamental link between Front-End and Back-End; it allows interactions between a human on a browser and a server/database somewhere on the internet.

BACK-END DEVELOPMENT & FRAMEWORKS IN SERVER SIDE SOFTWARE

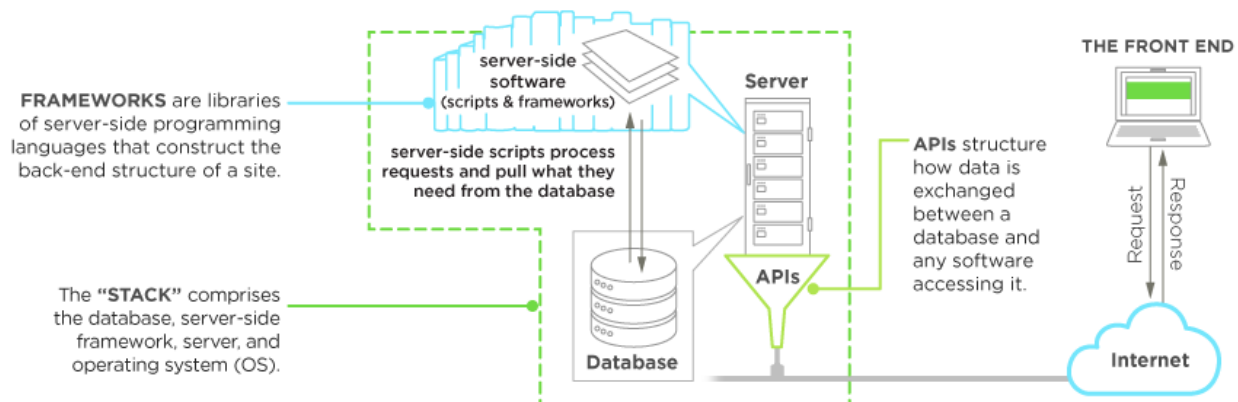


Figure 30: C3.2_Back-End

To put it another way, an HTTP request was used to communicate between the Front End and the Back End. HTTP requests are sent back and forth between the Front-End and the Back-End to communicate user-entered information or receive data from the database.

3. Explanation of how these technologies relate to presentation and application layers

Protocols for application-to-network communication are available at the application layer. Communication partners, resource availability, and communication synchronization are all determined by the application layer. It is typically characterized as containing encryption and other formats that help the application layer. The application layer, with a focus on end-user services, permits process-to-process communication through IP. It is mostly the duty of protocols that deal with IP traffic processing, such as FTP and Telnet. Application layer systems include web browsers, SNMP protocols, HTTP protocols, and HTTP's successor HTTPS.

The presentation layer is the sixth layer in the Open System Interconnection (OSI) model. This layer is also known as the Translation layer since it serves as a data translator for the network. This layer retrieves and processes data from the Application Layer so that it may be transferred across the network. The major job of this layer is to give or specify the data format and encryption. The presentation layer is also known as the Syntax layer because it is responsible for ensuring that the data it receives or provides to the other levels has the correct syntax.

The presentation layer is typically deployed to desktops, tablets, and phones through a web browser or a web-based application hosted on a web server, whereas the application layer is typically hosted in the cloud or on a dedicated workstation, depending on the application's complexity and processing power.

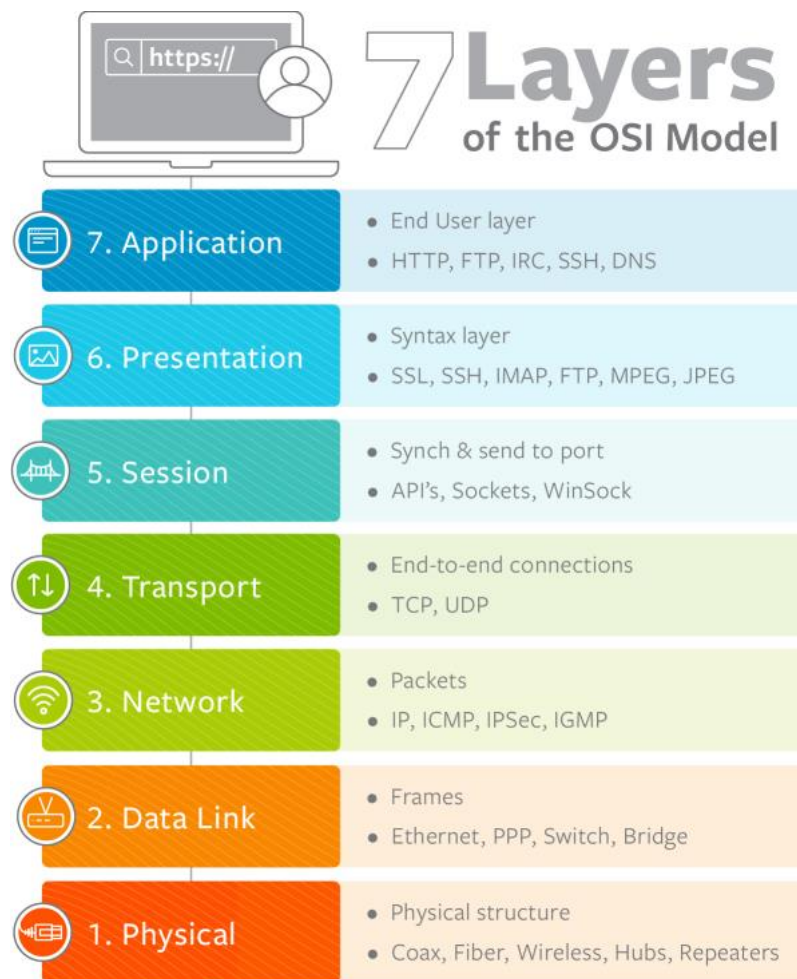


Figure 31: C3.3_Illustration_7 Layers of the OSI Model

The presentation layer, which is the sixth layer in the OSI model, performs numerous roles, which are outlined below:

- The presentation layer does data compression (the number of bits lowers during transmission), which improves data throughput.
- This layer guarantees that the data is delivered in such a way that the recipient comprehends it and can use it effectively and efficiently.
- This layer manages abstract data structures and enables for the construction or transfer of high-level data structures (for example, banking records).
- At the transmitter and receiver, this layer conducts encryption and decryption.
- Because different computers use different encoding methods, this layer is in charge of compatibility (the ability of computers to share and utilize information).

In a summary, the presentation layer manages encryption and formatting, whereas the application layer handles application functionality.

The server, the application, and the database are the three most important Back-End components. Users commonly engage with the user interface when they visit a website to buy anything, such as a book from an e-commerce site. When you complete the input procedure, the computer will save the information you entered into a server-based database.

In other statements, the front-end is handled by the presentation layer, while the back-end is handled by the application layer. The user interface of a website is the part that people see and interact with when surfing the Internet. The Back-End, which includes the server, application, and database, powers the presentation layer.

Chapter 4: The tools and software used to develop websites

1. The differences between online websites creation tools and custom-built websites

When it comes to the initial phase of developing a website, there are two options: construct a bespoke website from scratch or utilize a template website. Both solutions have advantages and disadvantages and serve various functions for different sorts of enterprises.

To assist people choose the best alternative, we will outline the five essential criteria that people should consider when deciding which one is ideal for creating a website:

- Finance
- Time
- The User Experience
- Long Term Scalability

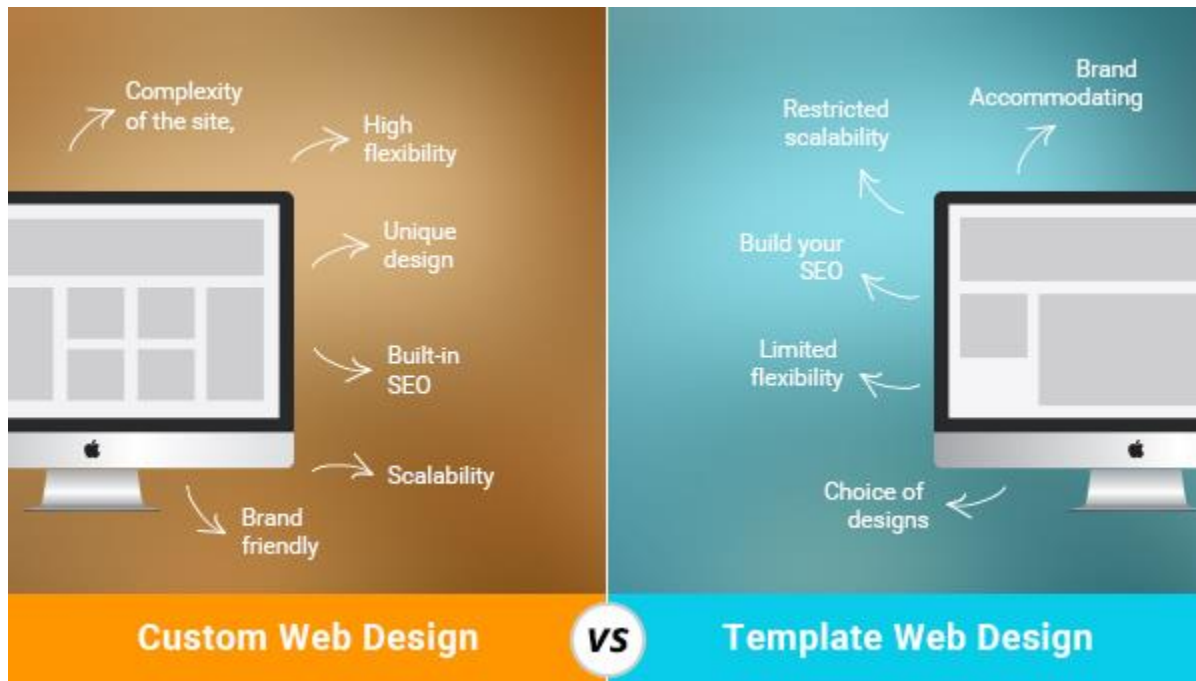


Figure 32: C4.1_Illustration_The difference between template website and the custom-built website.

2. Tools for creating online websites

Online website creation tools are applications that allow us to create websites without having to physically write code. They are online tools provided by web hosting companies that are widely used by individuals to create their own websites. A custom-built website is one that is created from the ground up. It is coded to meet the visual and functional requirements of your company.

Popular tools for creating online websites

WiX

WiX is a platform that allows users to create HTML5 websites and mobile sites through the use of online drag and drop tools.

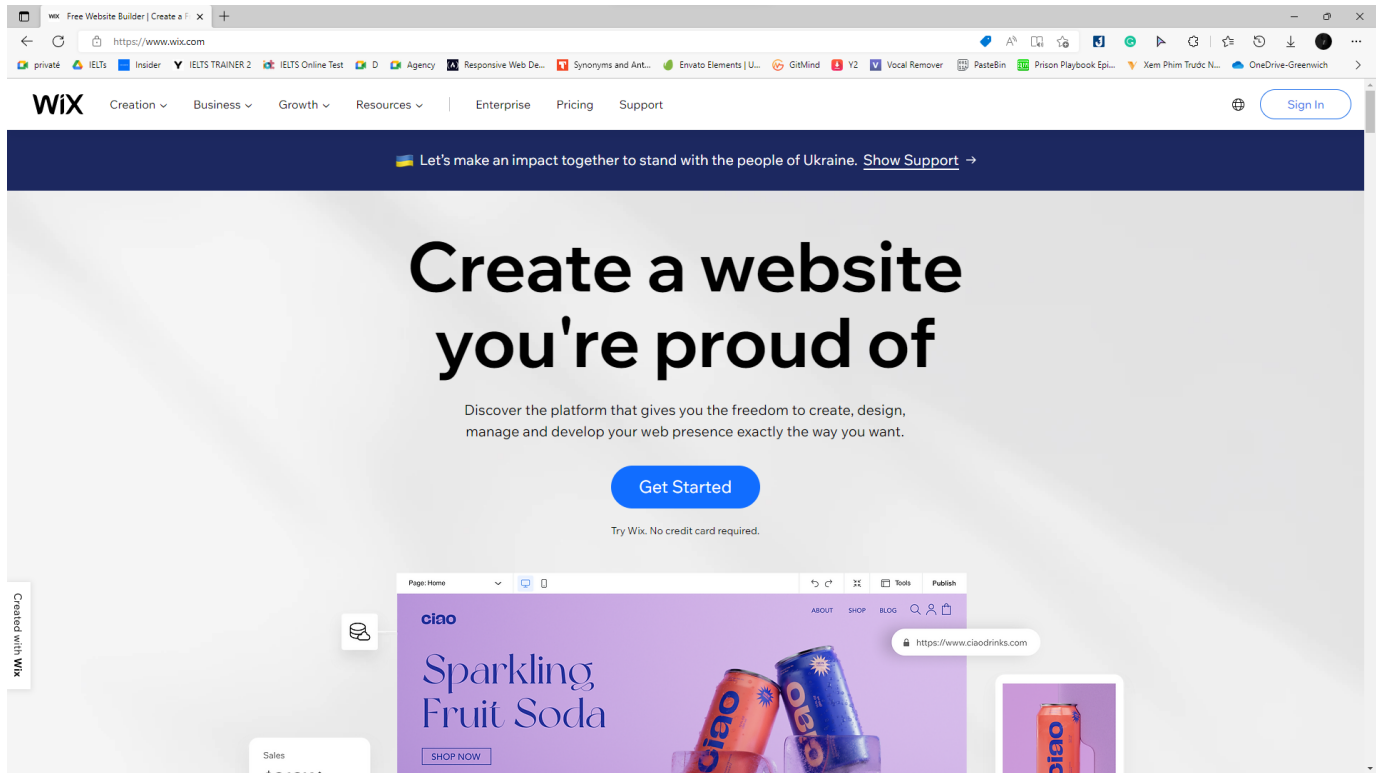


Figure 33: C4.2_Illustration_WiX_Homepage of WiX

WiX provides 2 options for building a website:

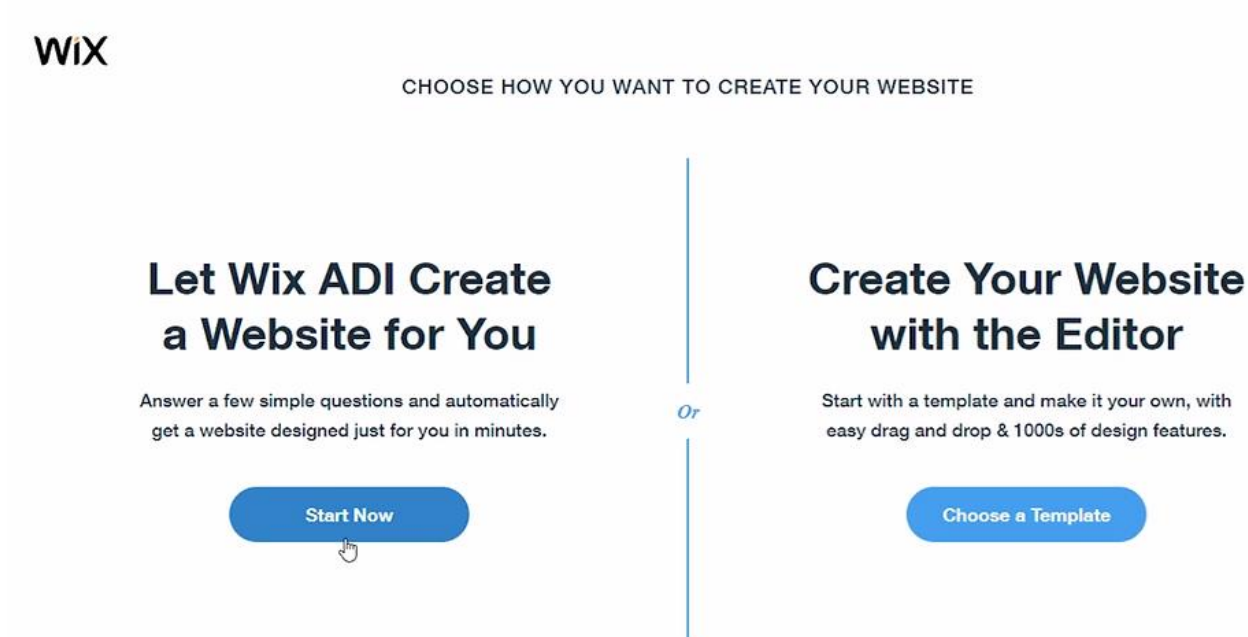


Figure 34: C4.2_Illustration_WiX_2 options for building a website

- **WiX Editor:**

The Wix Editor is the platform on which you create and modify your website. It is jam-packed with features that will assist you in creating a one-of-a-kind, professional website. You may personalize and develop your site in a variety of ways, such as by adding and altering elements and selecting a color and text theme.

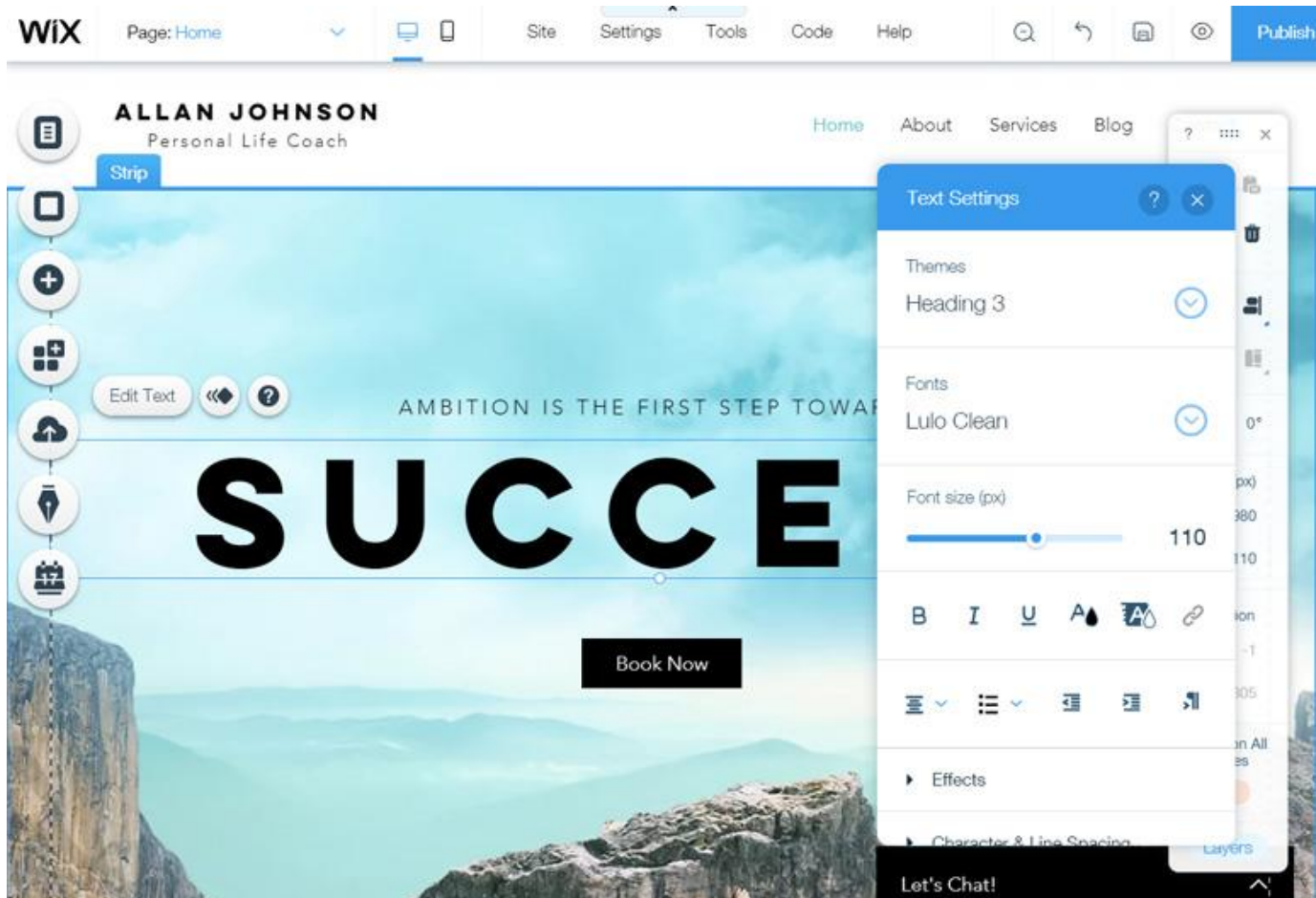


Figure 35: C4.2_Illustration_WiX_WiX Editor

- **WiX ADI:**

Wix Artificial Design Intelligence (ADI) is Wix's second option for customers looking to build their own website. This is also the top pick in the field of Artificial Design Intelligence. It uses advanced technologies to automatically produce beautiful webpages.

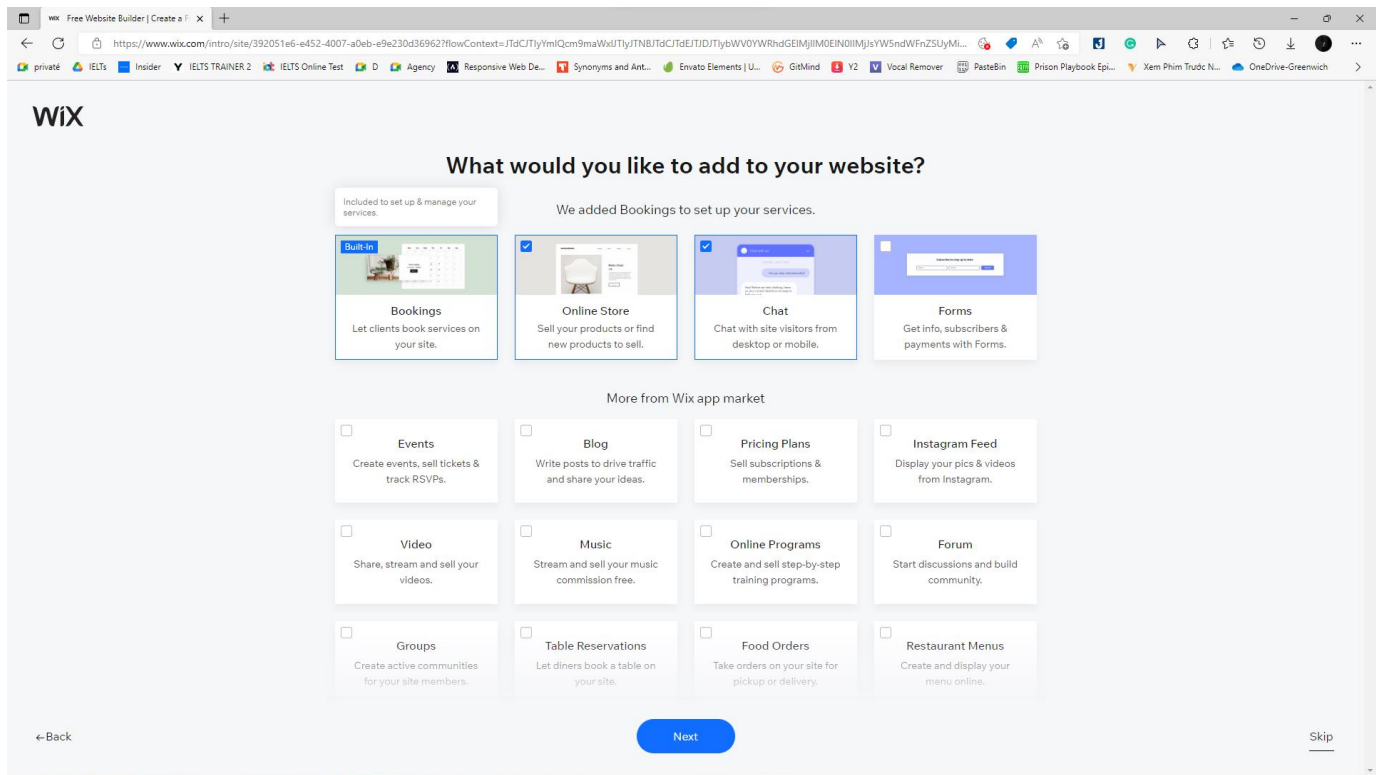


Figure 36: C4.2_Illustration_WiX_WiX ADI

SQUARESPACE

Squarespace is a website builder that was created to assist creative minds and website owners in creating outstanding sites. People do not need any coding experience to use Squarespace. It only takes a few minutes for them to have a gorgeous website, complete with built-in eCommerce checkout facilities, a custom domain name, and even SSL certificate protection.

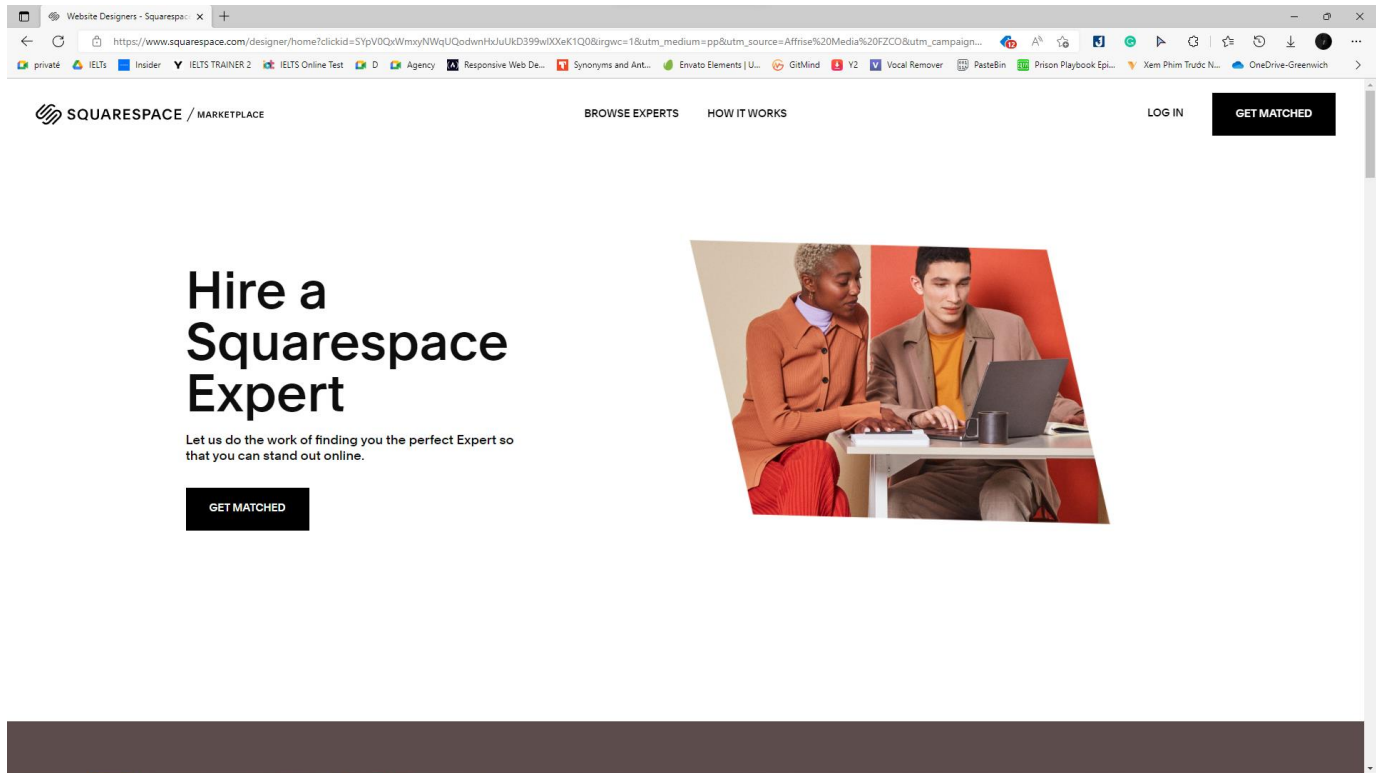


Figure 37: C4.2_Illustration_WiX_Homepage of SQUARESPACE

3. Custom-built websites

A custom-built website is created from the ground up. It is coded to meet your company's needs. There is no template that will limit your options. Custom-built websites are easy to maintain and will expand with your company. Personalized sites, as opposed to templated ones, are easier to alter.

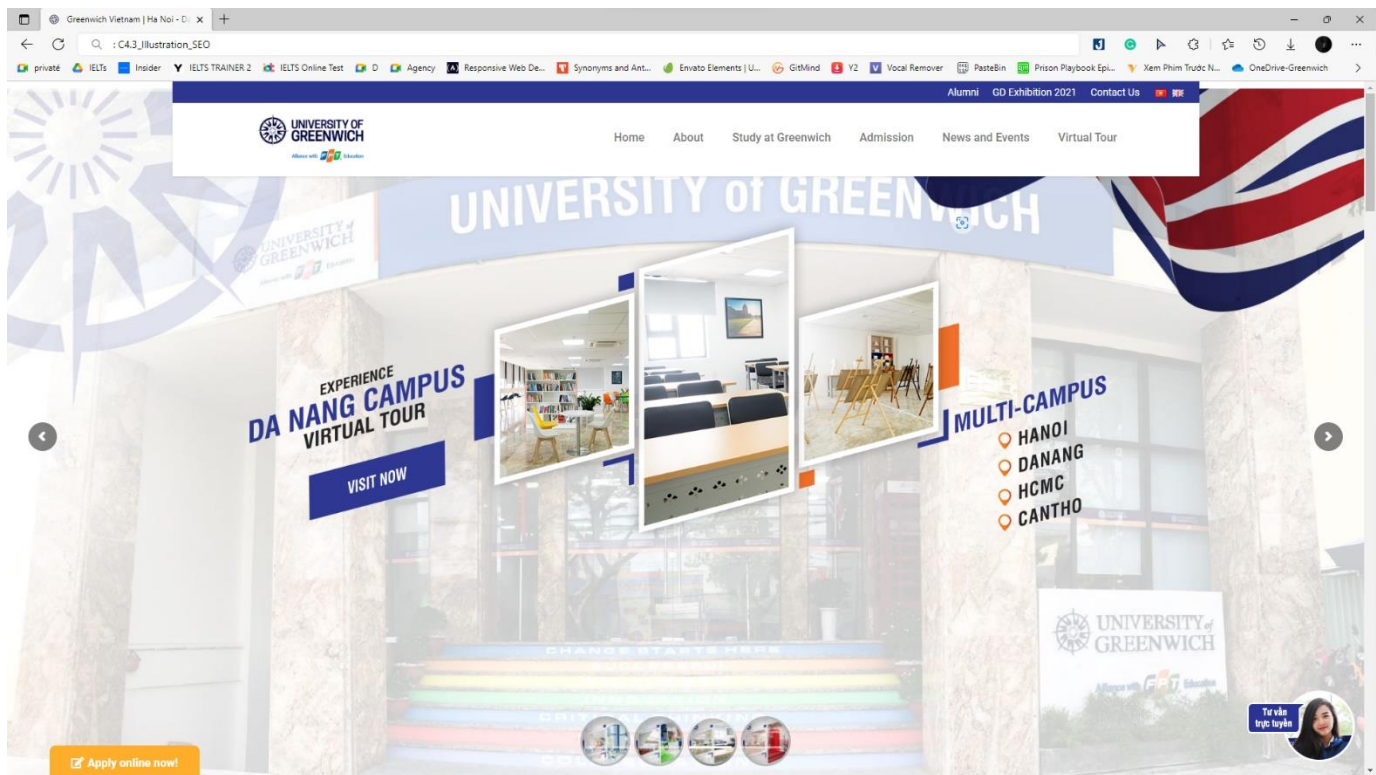


Figure 38: C4.3_Illustration_Custom-built websites

Custom-built websites take longer to construct than themes since everything is developed and catered to a certain business. It will save time in the long run since it is much easier to personalize the site when it is built from the ground up to ensure that the client site does exactly what they want it to do. However, in order to construct, publish, and submit their custom-built website designs, they either have coding abilities or pay someone who can make their website (which is costly).

SEO

SEO is essential for every website's success. There are requirements to follow while constructing a website, and not all themes are capable of meeting these criteria. This is why custom-built websites are superior; during construction, the developer may optimize the site to allow Google and other search engines to scan each page and offer the end-user with a more relevant search result, thus giving custom-built sites a higher place on the system. This goes beyond keyword research.



Figure 39: C4.3_Illustration_SEO

4. Compare Online websites and Custom-built websites

A template website is a viable solution if you have a limited budget and want a quick and basic website, particularly for new firms. However, if you have the means, want a complicated website that can be modified to your taste, and wants to go above and beyond to guarantee your business stands out from the crowd, then custom-built is the method to do it.

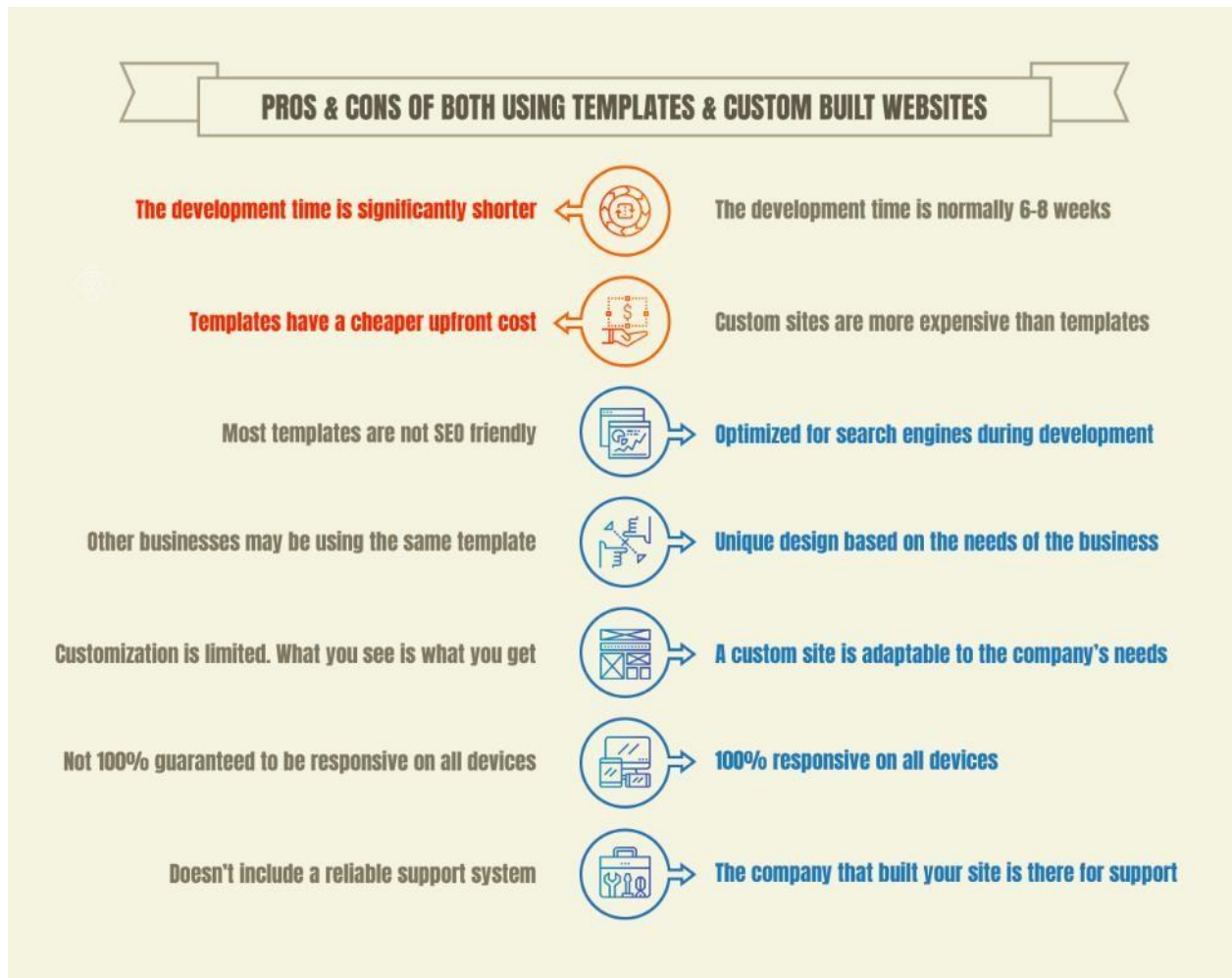


Figure 40: C4.4_Illustration_The advantages and disadvantages between using the template website and the custom-built website.

Table 7: C4.4_Comparison table of the difference between using the template website and the custom-built website.

	Online websites creation tools	Custom built websites
Performance	<p>The bandwidth of a website, which controls how fast it performs, is determined by the cost of the hosting option.</p> <p>No back-end intervention is provided.</p>	<ul style="list-style-type: none"> The bandwidth of the website is determined by the cost of the hosting service. Complete control and customization of back-end technologies to increase site performance.
Functionality	<p>Has a variety of built-in features and functionalities. Sometimes the desired function is not included.</p>	<ul style="list-style-type: none"> A web developer may optimize the site's features and

		functionalities to meet the needs.
	Too many built-in features may degrade the SEO Lack of control over UX in which bespoke or new technologies cannot be implemented as templates running on a structured system.	<ul style="list-style-type: none"> Improved search engine optimization with clearer code and site structure.
Design flexibility	Quick, simple, and effective by utilizing a Drag & Drop interface to shorten the period.	<ul style="list-style-type: none"> Require a timetable for both the creative and coding processes.
	Make available a variety of modifiable templates for customization. However, if all websites use the same template, they won't stand out as much.	<ul style="list-style-type: none"> Provide numerous front-end and back-end frameworks for customization. The ability to create a one-of-a-kind website
User Interface (UI)	Because each template has its own Customizable UI, developers may customize the sites by locating the template that best meets their needs.	<ul style="list-style-type: none"> Create a distinct user interface that not only meets the standards but also distinguishes the site from others.
	Sites may not be fully functional on all devices.	<ul style="list-style-type: none"> Sites are fully responsive on all devices.
User Experience (UX)	Each template has its own Customizable UI, developers can custom the sites by working to find the template that fits the requirements.	<ul style="list-style-type: none"> Adaptable in terms of customizing and optimizing the site's technology for capturing leads or selling things.

Chapter 5: The impact of common web development technologies and frameworks

1. Common web development technologies and frameworks

A web development framework is a collection of assets and instruments used by software engineers to create and maintain websites, online services, and web applications.

1.1.Front-end frameworks

The process of converting data to a graphical interface using CSS, HTML, and JavaScript for users to view and interact with is known as front-end web development.

The top front-end frameworks are listed below:

React Framework:

Facebook developed and produced the open-source framework React. React's primary purpose is to build interactive user interfaces using reusable components. It uses JSX (a syntactic extension to JavaScript) and a one-way data flow paradigm to populate components with data. React is used by companies such as Facebook, Netflix, and Airbnb, and it has a significant developer community.



Figure 41: C5.1_1_Illustration_React Framework

Features:

React is a front-end framework that stands out due to its virtual Document Object Model (DOM), which showcases its amazing capabilities. It is an ideal framework for people that anticipate considerable traffic and want a reliable platform to handle it.

Advantages and disadvantages:

Table 8: C5.1_1_Table of advantages and disadvantages of React Framework

Advantages	Disadvantages
<ul style="list-style-type: none"> • Saving time by reusing components. 	<ul style="list-style-type: none"> • Due to the rapid rate of development,

- | | |
|--|--|
| <ul style="list-style-type: none">• Virtual DOM improves both the user experience and the developer's labor.• An open-source library with several tools.• One direction provides the stable code. data transfer. | <p>there is a lack of documentation.</p> <ul style="list-style-type: none">• The rather steep learning curve.• The complexities of JSX are difficult for developers to grasp. |
|--|--|

Angular Framework:

Angular is Google's entry into the front-end framework market. This well-known Google framework is constantly evolving and offers developers a wealth of pre-built out-of-the-box options for quickly constructing the greatest web framework for business apps. What makes this framework so fantastic is its close association with Angular Material, a modern design guideline.



Figure 42: C5.1_1_Illustration_Angular Framework

Features:

In contrast to React, Angular is unique in its two-way data binding feature. It indicates that there is true temporal synchronization between view and model, where any change in the model is immediately replicated on view and vice versa.

Advantages and disadvantages:

Table 9: C5.1_1_Table of advantages and disadvantages of Angular Framework

Advantages	Disadvantages
<ul style="list-style-type: none"> • Its refactoring services and improved navigation make the development process easier. • The Angular sanctions component-based approach creates a user interface with single components. • A vast ecosystem. • Material Design interface manufacturing is reorganized by Angular Material. • High efficiency. 	<ul style="list-style-type: none"> • Complication due to angularity. • Relocating older AngularJS schemes to Angular. • The documentation for the CLI is not well specified. • The learning processes.

Vue.js Framework:

Vue is a front-end framework for creating user interfaces and single-page apps. It includes the Laravel framework and is used by companies such as Alibaba, Adobe, and Gitlab. Vue has the most comprehensive documentation of any framework on our list.



Figure 43: C5.1_1_Illustration_Vue.js Framework

Features:

The virtual DOM embedded into the framework makes it easy to update components and follow data changes in real-time, without the need for reloading or recompilation. Vue is recognized as one of the easiest frameworks to use, with excellent documentation. End-to-end testing tools, plugin installation systems, browser debugging tools, a server renderer, and other features are available from Vue.

Advantages and disadvantages:

Table 10: C5.1_1_Table of advantages and disadvantages of Vue.js Framework

Advantages	Disadvantages
<ul style="list-style-type: none"> • Documentation that is extensive and thorough. • Clarity and simplicity • Extensions for browser development tools. • Code reuse and ease of integration 	<ul style="list-style-type: none"> • The developer community has shrunk. • Code inconsistencies result from flexibility.

1.2.Back-end frameworks

Back-end frameworks are libraries of server-side computer languages that aid in the development of a website's backend structure. Back-end frameworks offer pre-built components for creating a dynamic online application. Using frameworks provides developers a leg up by reducing the need to create and configure everything from scratch.

The top back-end frameworks are listed below:

Django Framework:

Django is a popular open-source framework based in the Python programming language. Django, often known as the web framework for perfectionists with deadlines, is founded on the DRY (Don't Repeat Yourself) concept, which stresses reusing existing code and focusing on new sections, making the developer's job exceptionally fast. Because of its increased security, it is extensively used for constructing FinTech apps, booking engines, and e-commerce systems.



Figure 44: C5.1_2_Illustration_Django Framework

Features:

- **Open source:**

Django is an open-source framework for developing Python-based web applications. It is straightforward, simple to use, and dependable.

- **Naming system:**

Django includes its own naming system for all tools and functionality. In addition, unlike Yii and Lavarel, it offers an easy-to-use admin panel.

- Simple syntax, MVC core architecture, ORM (Object Relational Mapper), Middleware support, and HTTP libraries are some of Django's important features. Django also features its own web server, a framework for Python unit testing, and certain case-specific components.

Advantages and disadvantages:

Table 11: C5.1_2_Table of advantages and disadvantages of Django Framework

Advantages	Disadvantages
<ul style="list-style-type: none"> • Django takes pride in being a framework that includes all of the necessary batteries. That is, it includes a lot of stuff out of the box that you may or may not need depending on your application. Instead of writing your own code (the power), you just import the packages you wish to utilize. • When considering which framework to use, most developers consider the future. It enables you to take a variety of scalability options, such as operating separate servers for the database, media, and the application, or even using clustering or load-balancing to distribute the program across numerous servers. 	<ul style="list-style-type: none"> • Because Django is a high-level framework, it lends itself well to complex functionality. Conveniently, if you're seeking for a tool for smaller, easier projects with the ability to expand quickly, the micro-framework Flask is the one for web developers. If you want to learn more about it, we've published a complete beginner's introduction to the Flask microframework. • A coding convention is a set of guiding rules to follow while utilizing a web framework—sort of like a rulebook. Whereas Rails has "Convention over Configuration," Django does not, which might turn off certain programmers and lead to slower development at times.

Node.js Framework:

Node.js is a server-side platform built on Google Chrome's JavaScript Engine. It is the most well-known web development framework, and it serves as the foundation for numerous other well-known frameworks, like Angular and React. The current web development framework is extensively used and supported, making it one of the best frameworks available today for basic web programming.



Figure 45: C5.1_2_Illustration_Node.js Framework

Features:

- **Asynchronous and Event Driven:**

The Node.js library's APIs are all asynchronous, or non-blocking. It simply implies that a Node.js-based server will never have to wait for an API to return data. After accessing an API, the server goes on to the next one, and a Node.js notification mechanism assists the server in receiving a response from the previous API request.

- **Very Fast:**

Node.js is an extremely fast code execution library since it is built on Google Chrome's V8 JavaScript Engine.

- **Single Threaded but Highly Scalable:**

Node.js employs a single-threaded paradigm with event looping, however it is highly scalable. In contrast to typical servers, which establish restricted threads to process requests, the event mechanism allows the server to reply in a non-blocking manner and makes the server very scalable. Node.js use a single threaded program, meaning the same program can handle many more requests than conventional servers such as Apache HTTP Server.

- **No Buffering:**

There is no buffering in Node.js apps. These programs simply produce data in chunks.

- **License:**

Node.js is distributed under the MIT license.

Advantages and disadvantages:

Table 12: C5.1_2_Table of advantages and disadvantages of Node.js Framework

Advantages	Disadvantages
<ul style="list-style-type: none"> • Because Node.js backend apps are written in JavaScript, you can construct the backend using the extensive JavaScript knowledge that developers have. • Because of the combination of Google's V8 engine and an event-based architecture, this framework is exceptionally fast. • Additionally, doing hotfixes is straightforward. 	<ul style="list-style-type: none"> • The Node.js stack can be complicated. TypeScript and CoffeeScript make an attempt to address this issue by compiling a Swift-like language into JavaScript. You may have to deal with this depending on your stack because each tool provides a configuration file. • Node.js is really quick. Contrary to common assumption, it is not the quickest framework. Node.js programs, no matter how you look at it, are still scripts that must be interpreted.

Laravel Framework:

Laravel is an open-source PHP framework built on the MVC model. Laravel is an excellent backend framework for creating blog, news, and e-commerce websites. Laravel facilitates the building of safe and contemporary online apps by providing a simple interface, out-of-the-box API support, and rich libraries.



Figure 46: C5.1_2_Illustration_Lavarel Framework

Features:

- **Template Engine:**

The Laravel framework comes with lightweight built-in templates for creating layouts and seeding content. It also includes widgets that include JS and CSS code. Laravel templates are intended for the creation of simple and complicated sectioned layouts.

- **MVC Architecture Support:**

Laravel provides MVC architectural pattern support to properly segregate presentation and business logic layers. Laravel MVC provides various features, improves performance, and increases scalability and security.

- **Security:**

The Laravel framework provides strong web application security with the use of salted and hashed password methods. As a consequence, passwords are no longer kept in plain text in databases. Laravel also uses the Bcrypt Hashing Algorithm to generate encrypted passwords. To decrease the possibility of injection attacks, this programming framework employs prepared SQL statements.

- **Eloquent Object Relational Mapping (ORM):**

Eloquent Object Relational Mapping (ORM) may be used by Laravel users, including a basic PHP Active Record implementation. ORM allows application developers to create database queries using PHP syntax rather than SQL code. ORMs are often quicker than other PHP frameworks.

Advantages and disadvantages:

Table 13: C5.1_2_Table of advantages and disadvantages of Lavarel Framework

Advantages	Disadvantages
<ul style="list-style-type: none"> • Using Laravel can significantly shorten the development cycle because integrations are much faster; additionally, if you get stuck, there's a large Laravel-user community out there, so the chances of getting all the answers to your questions are pretty good, before even thinking about contacting the framework's dedicated support. • Remove tasks that are no longer relevant or essential and queue them to save user response time. 	<ul style="list-style-type: none"> • Due to its lightweight nature, Laravel offers minimal inherent support when compared to competing frameworks such as Ruby on Rails and Django. This problem, however, may be rectified with third-party technologies, and you can get back on track as soon as possible. • PHP systems in general have a few concerns with long-term support versions, and Laravel is frequently chastised for this. True, upgrades might cause small issues; however, with sufficient attention,

<ul style="list-style-type: none"> Because Laravel is an MVC framework, developers are no longer need to write whole PHP and PHP scripts in the same files. 	engineers can smooth out the process.
--	---------------------------------------

2. Evaluating the effects of employing web frameworks on website design, functionality, and maintenance

2.1. The advantages of using frameworks

- **Simple Debugging Process:**

Framework-based web application development focuses on enhancing code quality and readability for the benefit of developers. Frameworks offer easy debugging and software maintenance in addition to giving the most effective technique to create and construct web applications. Several web frameworks have built-in support for debugging and QA testing, allowing developers to run unit tests at the same time. Nonetheless, high-level software testing necessitates the use of QA experts who are adept at using technologies such as Selenium, JMeter, and Katalon Studio.

- **Improved Code Efficiency:**

The primary objective of web frameworks is to improve code readability and reusability, resulting in the quickest and most efficient approach to constructing self-sustaining online applications. Furthermore, developers benefit from a dynamic coding environment as well as sophisticated capabilities such as hot reload and live reload, which result in speedier web development.

- **Easy Code Reusability:**

Web frameworks eliminate the need for developers to construct sophisticated code structures involving hundreds of lines of code. Instead, they may leverage the pre-defined codebase and make minor changes to achieve smooth bootstrapping. Many well-known frameworks, such as Django and React.js allows for simple code reusability, allowing developers to create different web apps using the same codebase. Similarly, web frameworks aim to reduce development complexity by automating important activities such as caching, URL mapping, session management, and others.

- **Development has been accelerated:**

One of the primary benefits of utilizing web frameworks is that you do not need to write lengthy lines of code. Developers may avoid hours of arduous coding labor by using a pre-defined template and a simple coding interface. Furthermore, frameworks enable rapid prototyping, simple debugging, and real-time code modifications to add new functions.

- **Enhanced Security:**

The growing number of cyber-attacks has prompted severe security concerns about web development. The usage of frameworks for web application development, on the other hand, allows you to defend and safeguard your web app from typical assaults such as DDoS, SQL injection, and data tampering. It is due to the built-in security mechanisms that most web frameworks provide.

2.2. The disadvantages of using frameworks

- **Hampers website loading time:**

These libraries usually contain large files that have a severe impact on the speed and performance of the website's browser or mobile app development process, resulting in a much slower load time for developing an application.

- **Provides a stiff programming paradigm:**

The framework allows developers to create their own unique web apps, albeit the level of flexibility available is restricted. Developers are unable to fine-tune certain features. This makes substantial changes to the fundamental components of these systems extremely challenging.

- **It prevents people from learning the real language:**

The framework is a framework for developers that oversees the background execution of numerous functionalities. It removes the possibility of these programmers learning how to utilize the programming language more effectively. As a result, one's knowledge is limited to a few libraries that speak that language well.

2.3. Summary

- Using frameworks offers several benefits, including speeding up the development process, reducing code length, and making debugging and application maintenance

easier. This simplifies and accelerates web development for developers while also boosting the quality of the websites they produce.

- However, using frameworks has various disadvantages, like making the programming model rigid and restricting the website's uniqueness. As a consequence, customers may visit your website but mistake it for another or grow confused between two. Furthermore, speech causes website load times to be delayed and prevents people from learning actual programming languages.
- In summary, frameworks considerably aid developers in the creation of websites. Nonetheless, developers may readily create websites without using frameworks, and they can even construct websites suited to their own needs. They are serious in their goals and have a distinct personality.

Chapter 6: The influence of search engines on website performances

1. Search engine concept

A search engine is a service that allows Internet users to search for material on the World Wide Web (WWW). When a user enters keywords or key phrases into a search engine, they are provided with a list of Web content results that include websites, photographs, videos, and other online data that are semantically connected to the search query. Because search engines constantly scan the Internet and index every page they find, they can offer results quickly even when there are millions of pages available.



Figure 47: C6.1_Illustration_Search Engine

Search engines work through three primary functions:

- **Crawling:**
Scour the Internet for content, looking over the code/content for each URL they find.
- **Indexing:**
Store and organize the content found during the crawling process. Once a page is in the index, it's in the running to be displayed as a result to relevant queries.
- **Ranking:**
Provide the pieces of content that will best answer a searcher's query, which means that results are ordered by most relevant to least relevant.

2. SEO concept

SEO stands for Search Engine Optimization, and it is the process of optimizing a website's technical setup, content relevancy, and link popularity so that its pages are easier to locate, more relevant and popular to user search queries, and, as a result, search engines rank them higher.

By presenting material that meets user search demands, search engines advocate SEO activities that help both the user search experience and the page's rating. This involves, among other things, using relevant keywords in titles, meta descriptions, and headlines, using descriptive URLs with keywords rather than strings of numbers, and using schema markup to identify the page's content meaning.

The different types of SEO:

- **White-Hat SEO:** White-hat SEO refers to a set of permitted search engine optimization strategies used to boost a website's ranking on a search engine results page (SERP).
- **Black-Hat SEO:** Black-hat SEO refers to a set of tactics used to boost a site's or page's ranking in search engines by violating the search engines' terms of service.
- **Gray-Hat SEO:** Gray-Hat SEO is a search engine optimization method that mixes white hat and black hat SEO techniques to boost a website's search engine ranks and exposure.
- **On-Page SEO:** On-page SEO is concerned with the page itself and how to make it more user and search engine accessible.
- **Off-Page SEO:** Promotion is the focus of off-page SEO. While the preceding SEO kinds focused on website infrastructure and content, off-page SEO is concerned with tactics for promoting your website on the Internet.
- **Technical SEO:** Technical SEO is precisely what the name implies: technical elements that influence a website's visibility in search engines.
- **Local SEO:** Local SEO is a sort of SEO that is exclusively appropriate for local businesses.
- **eCommerce SEO:** eCommerce is a massive business. Optimizing an eCommerce website for search engine optimization is more difficult than optimizing a blog or business website.
- **Content SEO:** On-page SEO is a subset of content SEO. The quality of the content and how to improve it are important to content SEO.
- **Mobile SEO:** Mobile SEO is not a distinct kind in and of itself, but rather a subset of SEO tailored to mobile devices.

3. Technical solution to improve a website's index value based on SEO

Duplicate Content:

- Duplicate content is widely regarded as the most important technical issue that websites confront. The ranking of search engine results pages may be affected by content that is identical or highly similar.
- An easy technique to eliminate duplicate material is to keep an editorial calendar and a record of what has been written. It is okay to write on the same topic; just be sure to treat it in a new and fascinating style that will pique the readers' interest.

Difficult or Impossible Navigation:

- Difficulties with website navigation can drastically lower SEO value, so make sure all of the pages promise to provide are easy to browse and reach. If people are unable to access specific websites, neither search engines nor humans will be able to view the content.
- Maintaining an up-to-date and correct SEO sitemap, which is a list of pages available to users and search engines, will assist reduce navigation difficulties. Check the website for any regular flaws; a difficult-to-navigate website can annoy customers and ruin their experience with the company.

“Black-hat” Backlinks:

- Backlinks are a great technique for increasing the authority of your website. When other people connect to your work, search engines recognize you as having more authority on your selected subject. "Black-hat" refers to unethical techniques used to get backlinks without producing meaningful content.
- Paying someone to link to your website, keyword stuffing, spamming your visitors, or flooding other pages with connections to your site are all examples of "black-hat" practices. In general, focusing on providing helpful, intelligent material that will be useful to others will increase your chances of long-term development and higher Google ranks.

Improper or Missing Labels:

- Search engines do not have the ability to "see" webpages in the same way that users do; they just read the text on the page to decide what your subject is. Make sure your

headlines represent the material on your website and convey your topic matter effectively. Because search engines cannot see, any photos on your page will be ignored. Including alt tags that explain the picture helps search engines comprehend what you're trying to convey with your image.

- Focusing on user experience includes consistent messaging. It's infuriating to click on a website that appears to give assistance just to discover that it doesn't. Once you've identified every element on the page, double-check that you're delivering on your promises.

Page Speed:

- Page speed is the amount of time it takes for a website page to load. Slower page speeds may prevent the entire website from being indexed. Search engines are unaware of the presence of pages that are not indexed. They have little SEO value and may perform poorly in search engines.
- Websites that load faster are more enjoyable to use. People looking for solutions are frequently looking for rapid responses. Adults' attention span is currently thought to be eight seconds, which is shorter than that of a goldfish! Slow page performance might result in lost leads as users leave your website to find something faster.

Mobile Responsiveness:

- The majority of people's searches may be conducted via mobile devices. As a result of this significant shift in search, sophisticated search engines such as Google have prioritized web pages that have been adapted for mobile devices. If your website isn't mobile-friendly, you risk losing search engine ranks, irritating potential consumers, and losing visitors. Responsive design implies that your website detects the device used to view it and modifies the layout to make it more user-friendly for that device.

Chapter 7: Evaluate a range of tools and techniques available to design and develop a custom-built website

1. Evaluation on web development tools

Sublime Text

Table 14: C7.1_Table of advantages and disadvantages of Sublime Text

Advantages	Disadvantages
<ul style="list-style-type: none"> It is a cross-platform application that runs on Windows, Linux, and Mac. User-Friendly and Intuitive – It is a really easy and straightforward piece of software that doesn't take long to master. Customizable syntax-specific color schemes are used to display code. A plethora of options enable you to simply change or produce many instances of the same variable or value. 	<ul style="list-style-type: none"> It is free software, but there is an obnoxious pop-up asking you to purchase it. In addition to the ability to manually compare text files, Sublime has the ability to automatically compare files, albeit it is difficult to use and should be improved because it is a useful tool. Although Sublime Text has capabilities for recognizing many vendors' coding, many other vendors' coding, such as Cisco-IOS coding, is not detectable, which would be quite useful for building applications for Cisco devices.

Visual Studio Code

Table 15: C7.1_Table of advantages and disadvantages of Visual Studio Code

Advantages	Disadvantages
<ul style="list-style-type: none"> It supports a broad variety of programming languages, including C#, Typescript, and GO. Actively developed with the support of Microsoft. Official paperwork is maintained in good shape. It contains a feature called IntelliSense that may be utilized instead of searching for the problem on search engines. Actively developed with the support of Microsoft. Official paperwork is 	<ul style="list-style-type: none"> Long downloading times and complicated download procedure necessary; some users may experience difficulties downloading and installing. It has the potential to overheat the device and drain a large amount of the battery in a short period of time. Visual Studio Code used a significant amount of memory and battery power.

preserved in good condition.

NetBeans

Table 16: C7.1_Table of advantages and disadvantages of NetBeans

Advantages	Disadvantages
<ul style="list-style-type: none"> NetBeans may be more user-friendly than Eclipse for beginners. It features a more user-friendly UI. You may also get started without installing all of the plugins. NetBeans is more dependable. This is due in part to the fact that you do not need to install plugins, as you would with Eclipse. NetBeans supports HTML5, as well as other web technologies. NetBeans might be a fantastic alternative if your team is focused on web development. 	<ul style="list-style-type: none"> Because NetBeans is a resource-intensive IDE, it consumes a lot of RAM and runs slowly on PCs with i3 CPUs. Adding extensions to NetBeans may cause it to run slower. NetBeans provides scant official documentation on the internet. Because the application has a huge capacity, it requires a PC with sufficient RAM and CPU to execute.

Notepad++

Table 17: C7.1_Table of advantages and disadvantages of Notepad++

Advantages	Disadvantages
<ul style="list-style-type: none"> Auto saving is useful in development and note taking, and it works well even without a saved location. It supports more than 50 programming, scripting, and markup languages. Users can open several files, even if they are in different languages. The coding syntax is indicated when a file is saved in a specific file format, making it easy to alter. Encoding and newline characters are easily transformed. Word wrap and hidden characters can be disabled. 	<ul style="list-style-type: none"> It lacks debugging capabilities. The number of options available might be overwhelming at times, demanding a rapid search to locate a certain function. It would be wonderful if a technique existed to compare two files. Unless there's a secret function I'm not aware of or a plugin for it, I'll have to use another premium application for it. The user interface looks to be quite outdated.

2. Evaluation on web development techniques

Hyper Text Markup Language (HTML)

Table 18: C7.2_Table of advantages and disadvantages of Hyper Text Markup Language

Advantages	Disadvantages
<ul style="list-style-type: none"> HTML is a widely used programming language. All browsers support HTML Language. The usage of templates in HTML streamlines the process of developing a website. HTML has the advantage of being straightforward to write code in, even for new programmers. HTML provides a number of elements and attributes that may be utilized to reduce your code line. 	<ul style="list-style-type: none"> We must analyze the deprecated tags and guarantee that they are not utilized since another language that works with HTML has replaced the tag's original work, and so the opposing language must be learned and acquired. It took a long time to maintain the color palette of a page and to make lists, tables, and forms, so it was essential to write a lot of code only to create a simple webpage. HTML is useless for producing dynamic pages since it can only generate static and simple pages. The security features of HTML are limited.

Cascading Style Sheet (CSS)

Table 19: C7.2_Table of advantages and disadvantages of Cascading Style Sheet

Advantages	Disadvantages
<ul style="list-style-type: none"> CSS is really important. You just specify a repeating pattern for the element once and use it several times with CSS. Because changes to a single line of code affect the entire site and the maintenance period, CSS simplifies not only website design but also maintenance. The effort is substantially reduced since it is less tough. It helped shape the changes that were both spontaneous and consistent. CSS-friendly device has been modified. 	<ul style="list-style-type: none"> What works in one browser may not necessarily work in another. Web developers must evaluate the application's compatibility by running it in a variety of browsers. There is a severe lack of security. If compatibility exists after the changes, we must validate it. The update affects all browsers equally.

JavaScript

Table 20: C7.2_Table of advantages and disadvantages of JavaScript

Advantages	Disadvantages
<ul style="list-style-type: none"> Regardless of where JavaScript is hosted, it is always executed on the client side to save bandwidth and speed up the execution process. The ability to support all modern browsers and produce equal results is JavaScript's most significant benefit. It is simple to get started with JavaScript. As a result, many of us chose to start our careers in IT by learning this language. 	<ul style="list-style-type: none"> JavaScript is frequently interpreted differently by different browsers. This makes cross-browser programming difficult to understand and create. If a JavaScript error occurs, the entire website may be displayed. In browsers, JavaScript errors are tolerated. Although some HTML editors provide debugging capabilities, they are not as effective as other editors, such as C/C++ editors. As a consequence, the developer is unlikely to spot the problem.

Hypertext Preprocessor (PHP)

Table 21: C7.2_Table of advantages and disadvantages of Hypertext Preprocessor

Advantages	Disadvantages
<ul style="list-style-type: none"> The fact that PHP is open source and free is its most major benefit. It may be downloaded from anywhere and utilized in the event of online apps. The database connection components included into PHP make it simple to connect databases, saving time and effort when constructing web apps and content-based websites. PHP's versatility enables it to interface with a wide range of computer languages, allowing the software package to use the most effective technology for each feature. PHP-based apps linked to a database may be easily loaded. It is commonly used 	<ul style="list-style-type: none"> Because it is open source, everyone has access to the source code; if the source code contains errors, users can use it to uncover PHP's shortcomings. Large applications are not advised: It is tough to maintain since it is not modular. Converting underground may take the programmer off surprise and result in unintended consequences. PHP is frequently viewed as having poor error-handling quality. PHP lacks the debugging tools needed to detect errors and warnings. When compared to other programming languages, PHP offers less debugging options.

because it loads faster than other programming languages on slow internet connections.

3. Evaluate the Structured Query Language

Structured Query Language (SQL) is a query language. It's a programming language, or a collection of commands for communicating with a database. A relational database is used to store, change, and retrieve data. SQL is, in fact, the most widely used standard language for relational databases. SQL is the standard database language used by all relational database management systems (RDMS) such as MySQL, Oracle, SQL Server...

Table 22: C7.3_Table of advantages and disadvantages of Structured Query Language

Advantages	Disadvantages
<ul style="list-style-type: none"> SQL is a popular choice since it does not need extensive understanding of coding or program writing. SQL features several fundamental terms that may perform actions such as SELECT, INSERT INTO, UPDATE, and so forth. Syntactic rules are similarly basic and straightforward. SQL, as previously stated, is a standardized structured query language for relational databases that has been accepted by ISO and ANSI. Its extensive, thorough, and well-established documentation over the years is certainly a big benefit. It becomes an interactive language for its users since it offers easy instructions for various purposes. It is simple to grasp, and the commands are equally intelligible to non-programmers. 	<ul style="list-style-type: none"> SQL is a popular choice because it doesn't require any significant knowledge of coding and writing programs. SQL has some basic keywords such as, SELECT, INSERT INTO, UPDATE, etc that can carry out tasks. Syntactic rules are also simple and easy to follow. As already mentioned, SQL is a standardized structured query language approved by ISO and ANSI for relational databases. It's long, detailed and established documentation overs years also stand a strong plus point. As it has simple commands for all purposes, it becomes an interactive language for its users. It easy to understand and the commands are also understandable to the non-programmers.

Chapter 8: Justify the tools and techniques chosen to realize a custom-built website

1. The reasons for choosing specific tools

Visual Studio Code

First and foremost, I chose Visual Studio Code as the main tool for building my website because it is a free editor and the most famous worldwide thanks to its Intelli-sense method, a method that assists programmers in debugging. In addition, I chose Visual Studio Code for the following reasons:

- **Intelli-Sense:**

As I mentioned above, Intelli-Sense can detect any code that is syntactically spelled out. What's more, if the user forgot to declare the variable during the programming time, Intelli-Sense can automatically declare it for the user.

- **Repository:**

With the increasing need for code, secure and quick storage is necessary. It is connected to GitHub or any other repository for retrieving or storing instances.

- **Multiple programming languages are supported:**

Previously, programmers needed Web-Support: a new editor for each programming language, but it now has built-in multi-language support. This also implies that if there is a mistake or a cross-language reference, it will be easy to discover.

- **Cross-Platform Support:**

Coders have supported either Windows, Linux, or Mac systems. However, Visual Studio Code is a cross-platform application.

- **Hierarchy Structure:**

The code files are organized into files and directories in a hierarchical structure. Some files are included in the needed code files that may be required for other sophisticated projects. These files can be erased whenever it is convenient for me.

APACHE NetBeans IDE 14

Apache NetBeans is still my preferred IDE because it offers a large number of practical advantages. Here are some of the ones which really matter to me.

- **Productivity Features:**

NetBeans includes intelligent context-sensitive auto-completion. I just hit ctrl and space, and NetBeans provides me with alternatives such as building code templates and getters and setters. NetBeans also contains a comprehensive set of suggestions as well as interaction with FindBugs and PMD to help me test my code. It may also easily generate boilerplate code for tests.

- **Easy to customize:**

Because NetBeans is modular, it is very simple to tweak and remove functions that you do not want (or add additional plugins for extra functionality). You may also alter the color, text size, keyboard shortcuts, and navigation bar buttons, as well as share your profile with other people. NetBeans makes it incredibly simple to customize to precisely how you want to work.

- **Easy to use:**

NetBeans is designed for developers who wish to build applications quickly and intelligently by providing comprehensive code analyzers, editors, and converters that support the most recent Java technology. It enables developers to use sophisticated Java 8 language elements to update programs fast and efficiently.

- **Rich development features:**

NetBeans has static analysis capabilities that allow users to avoid the costs associated with problematic code. There is also a NetBeans Profiler function that may give developers with expert advice in improving application performance and memory utilization. It also assists users in developing dependable and adaptable Java SE, JavaFX, and Java EE applications.

2. The reasons for choosing specific techniques

Following a evaluate of the particular tools in **Chapter 8 - Section 1**, I will proceed to select the major specific techniques of HTML, CSS, and PHP to complete developing a custom-built website.

HyperText Markup Language (HTML)

The first technique I used to create a custom-built website was HyperText Markup Language. I use HTML to design the user interface for the site because:

- It is the language of the Web: HTML is the primary language used by browsers to communicate with the server. HTML is widely used on the internet and is the most well recognized language for web design. It is a well-known web browser that is

simple to recognize and understand. A browser would not be able to display text as elements or load pictures or other components if HTML was not present.

- HTML is a simple code to learn and write that aids in the creation of a website.
- It is simple to comprehend and use, resulting in faster download times and more consistent results. This is also appealing to search engines.

Cascading Style Sheet (CSS)

Second, because I only use HTML to design the primary frame and write the website's content, I utilize the Cascading Style Sheet because it allows me to set up rules that specify how HTML elements are displayed on the screen. I need to use CSS for the following reasons:

- HTML generates the structure of a web page, whereas CSS creates the visual layout of a web page on a variety of devices, such as a desktop, laptop, or mobile phone.
- I can use CSS to build rules, which I can then apply to other parts of the site. Because the content is totally distinct from the design, we may make such adjustments in your style sheet. CSS will make my modifications applicable in all scenarios and independent of any design feature.
- CSS can result in faster page downloads: CSS can result in lighter loads and improved site performance since the rules are only downloaded once by the browser, then saved to the cache and utilized for each page load. This helps to minimize server load and requirements, thus saving our clients money.
- CSS is useful for design and updating: With CSS, we can create rules and apply those rules to the various elements of the site. This technique offers various advantages when clients request that the entire site be altered. Because the text is completely separate from the design, we can make those changes in your style sheet and have them take effect in all situations.

JavaScript

Third, I use JavaScript as a programming language used to create interactive web pages because it is integrated and embedded in HTML.

JavaScript is a scripting language on the client side, meaning that the source code is interpreted by the web browser of the client, rather than the web server. This means

JavaScript functions will run without interacting with the server after a web page has been loaded up. Some outstanding features of JavaScript are outlined below:

- Client-side JavaScript is extremely quick since it may be executed directly within the client-side browser. Unless external resources are necessary, network requests to a backend server do not interfere with JavaScript.
- JavaScript is widely used on the internet.
- JavaScript is a reasonably straightforward language to learn and use.
- JavaScript works well with other languages and has a wide range of applications. The fact that it is client-side decreases the load on the website server.
- JavaScript allows you to design sophisticated interfaces.

Hypertext Preprocessor (PHP)

I chose PHP to build the Back-End of my website for the following reasons:

- **High security:**
PHP patches and products are released quite rapidly due to the large number of supporters. Nature's open-source community can help with the early detection of flaws in PHP source code so that it may be improved and corrected.
- **Less expensive software:**
When working with PHP, the bulk of the program's tools, such as WordPress, are free and open-source software. You may need to purchase additional tools to use ASP's software.
- **The database's flexibility:**
PHP's database connectivity capability. It can connect to many different databases, the most common of which being MySQL. MySQL is a free database. If they wish to utilize ASP, they must obtain MS-SQL, a Microsoft product.
- **Less costly storage:**
The ASP program must run on a Windows server that has IIS installed. For ASP operations, hosting companies must acquire both components, which might result in higher monthly hosting prices. In contrast, will just require a PHP running on a Linux server, which is provided for free by a hosting service provider.

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