## Learning Objectives:

* Describe the web developer job role.
* Distinguish between front-end, back-end, and full-stack developers.
* Explain how data moves through the internet.
* Describe the technologies that underpin the internet.

A front-end developer is someone that works on all parts of a website or web app that users will interact with. This can be anything from the style colours, buttons, menus or user interactions as they click swipe and interact with the site. JS is the most important technology used by front-end developers.

A back-end developer works on the parts of a website or web app that the end users don't see. These activities occur behind the scenes, particularly on the web server in the database or in constructing the architecture. Back-end developers are responsible for creating and maintaining functionality when users request information or when the website needs to communicate to another part of the web architecture.

A full stack developer is someone equally comfortable working with front end and back-end technologies. Full stack developers have skills and knowledge in all areas of the web development project cycle. For example, they have relevant expertise in the planning architecture, design, development, deployment and maintenance of the website or web.

# **Week 1**

## How the internet works

You open your favourite app on your device, and you're instantly connected to the world. This is all made possible because two devices connect and communicate via a wired or wireless connection, forming something called a network. You can connect multiple devices to this network.

*A network is made up of at least two devices that connect and communicate via a wired or wireless connection. One network switch can connect to another switch to link two networks.*

* *True*

## What is a web server and how does it work?

A server is a computer that runs applications and services ranging from websites to instant messaging. It's called a server because it provides a service to another computer and its user also known as the client.

A web server has many functions which includes website storage and administration, data storage, security and managing email. Another primary function is to handle something known as a web request. When you open a browser on your device and type the name of the website, it's the job of the web server to send you back to that website's content. This process is known as the request response cycle.

*A server is a computer that runs applications and services, ranging from websites to instant messaging. You have just learned about a web server which is a specific type of server. Which of the following statements are true? Choose all that apply.*

* *A web server can handle security.*
* *A web server can function as website storage and administration.*
* *Web servers can handle thousands of requests from clients per second.*

## What are websites and webpages?

A web page is a document that displays images, texts, videos, and other content in the web browser.

A website is a collection of webpages that link together.

When a copy of that webpage is sent from the web server to your browser, each line of code is processed in sequential order from first to last. As each line is interpreted, the browser creates the building blocks, which is the visual representation you see on the screen. This creation process is known as page rendering, the response from the web server must be a complete web page in order to fulfil the request, to show the page in the browser.

*Which of the following technologies is used to structure content on a webpage?*

* *HTML*

## What is a web browser and how does it work?

A web browser, or browser for short, is a software application that you use to browse the World Wide Web. It works by sending a request to a web server and then receives a response containing the content that is to be displayed on the screen of your device.

When you make a request using this URL, the browser and server communicate using a protocol known as the Hypertext Transfer Protocol or HTTP. Once the web browser receives the content, it displays it on the screen of your device. This exchange of information is made possible by something known as the request response cycle.

*True or false: A web browser is a software application that you use to browse the world wide web.*

* *True*

## Web hosting

Web hosting is a service where you place your website and files on the hosting companies web server. You're essentially renting the space in return for stable and secure storage.

First, let me share with you some of the different hosting options available. These can include shared hosting, virtual private hosting, dedicated hosting, and Cloud hosting.

The cheapest form of web hosting is known as shared hosting. You pay for a location on a web server containing many web hosting accounts with shared hosting. This means that you also share the service processing power, memory, and bandwidth with other websites that might slow your performance. This option is best for a small website with a small number of visitors.

Sites with more considerable demands use virtual private surface or VPS. A VPS is a virtual server with dedicated CPU, memory, and bandwidth resources. It will be running on a hardware server with other VPS instances but as the resources are fixed per VPS instance, your website is unlikely to be impacted by the performance of other VPS instances. A VPS instance will be more expensive than shared hosting.

The next option up is to use dedicated hosting. This will be a hardware server that is dedicated to you only. All hardware, CPU, memory, and bandwidth resources are yours to use. Generally, this option is more expensive than a VPS hosting.

The last type of web hosting is something you may have heard of. Cloud hosting and the Cloud has grown in popularity over the last decade and is often mentioned in various news and services you use. With Cloud hosting, your website is run in something called a Cloud environment, which spans across multiple physical and virtual servers. If a physical or virtual server fails, your website will run on a different server and stay online. The main advantage of Cloud hosting is that you can use as many resources as you need without hardware limitations.

*True or false: Cloud hosting uses a combination of physical and virtual servers?*

* *True*

## Introduction to Internet Protocols

Data sent across the internet is quite an important part of our everyday lives and it wouldn't be possible without Internet Protocol addresses or IP addresses.

When you send data between computers across the internet, a common way of understanding that data is needed by the computers and networks that the data travels across. What makes that possible is the Internet Protocol. Version four and version six are currently the two most widely used standards of internet protocol.

When you send data across a network, you send the data as a series of messages called IP packets. Also known as data grams at a high level, IP packets contain a header and a payload or the data.

The two most common protocols are the Transmission Control Protocol referred to as TCP and the User Datagram Protocol, also known as UDP. TCP can solve all three of the previously mentioned issues but at the cost of a small delay when sending the data. This protocol is used for sending the data that must arrive correctly and in order such as a text or image files. UDP solves the corrupt packet issue, but packets can still arrive out of order or not arrive at all. This protocol is used for sending data that can tolerate some data loss such as voice calls or live video streaming.

*Is the following statement true or false? The payload part of IP packets supports multiple protocols to make sure that information arrives as expected. Two of these are Transmission Control Protocol (TCP) and User Datagram Protocol (UDP). UDP is used to send data that must arrive correctly and in order.*

* *False*

## Introduction to HTTP

### Most popular HTTP methods:

A HTTP request consists of a method, path, version, and headers.

### Request Line

Every HTTP request begins with the request line. This consists of the HTTP method, the requested resource, and the HTTP protocol version. **GET /home.html HTTP/1.1**

In this example, GET is the HTTP method, /home.html is the resource requested and HTTP 1.1 is the protocol used.

### HTTP Request Headers

After the request line, the HTTP headers are followed by a line break.

There are various possibilities when including an HTTP header in the HTTP request. A header is a **case-insensitive** name followed by a: and then followed by a value.

Common headers are:

1. Host: example.com
2. User-Agent: Mozilla/5.0 (Macintosh; Intel Mac OS X 10.9; rv:50.0) Gecko/20100101 Firefox/50.0
3. Accept: \*/\*
4. Accept-Language: en
5. Content-type: text/json

|  |  |
| --- | --- |
| **Host** | The Host header specifies the host of the server and indicates where the resource is requested from. |
| **User-Agent** | The User-Agent header informs the web server of the application that is making the request. It often includes the operating system (Windows, Mac, Linux), version and application vendor. |
| **Accept** | The Accept header informs the web server what type of content the client will accept as the response. |
| **Accept-Language** | The Accept-Language header indicates the language and optionally the locale that the client prefers. |
| **Content-type** | The Content-type header indicates the type of content being transmitted in the request body. |

### HTTP Request Body

HTTP requests can optionally include a request body. A request body is often included when using the HTTP POST and PUT methods to transmit data.

### HTTP Responses

When the web server is finished processing the HTTP request, it will send back an HTTP response.

The first line of the response is the status line. This line shows the client if the request was successful or if an error occurred. **HTTP/1.1 200 OK**

The line begins with the HTTP protocol version, followed by the status code and a reason phrase. The reason phrase is a textual representation of the status code.

### HTTP Methods

|  |  |
| --- | --- |
| **GET** | Used to get retrieve information from the given server |
| **POST** | Used to send data to the server. |
| **PUT** | Updates whatever currently exists on the web server with something else. |
| **DELETE** | Removes the resource |

The path is the representation of where the resource is stored on the web server.

Headers contain additional information about the request and the client that is making the request. For certain requests methods, the request will also contain a body of content that the client is sending.

*Which of the following web resources can be transferred using HTTP? Select all that apply.*

* *HTML Documents*
* *Images*
* *Files*

### HTTP Status Codes

|  |  |
| --- | --- |
| **Informational** | **Grouped from 100 – 199**  Information responses are provisional responses sent by the server. These responses are interim before the actual response.  **100** – is the most common and indicates that the web client should continue to request or ignore the response if the request is already finished. |
| **Successful** | **Grouped from 200 – 299**  Successful responses indicate that the request was successfully processed by the web server, with the most common success response being **200** OK. |
| **Redirection** | **Grouped from 300 – 399**  **302** - indicates a temporary redirection (The resource has been temporarily moved) |
| **Client Error** | **Grouped from 400 – 499**  **400** – Most common, s used when the web browser or client submitted bad data to the web server  **401** – Indicates that the user must log into an account before the request can be processed  **403** – indicates the request was valid, but that the web server is refusing to process it. This is often used to indicate that a user does not have sufficient permissions to execute an action in a web application  **404** – indicate that the request resource was not found on the web server |
| **Server Error** | **Grouped from 500 – 599**  Server error responses indicate that a failure occurred on the web server while trying to process the request.  **500** - which is a generic error status indicating that the server failed to process the request |

### 200 OK

|  |  |
| --- | --- |
| GET | Found/included |
| POST | Successfully transmitted |
| PUT | Successfully transmitted |
| DELETE | Deleted |

**HTTPS** is the secure version of HTTP. It is used for secure communication between two computers so that nobody else can see the information being sent and received. It does this by using something called encryption.

## Introduction to HTML, CSS AND JAVASCRIPT

*In the first example of a digital clock, which type of file ensured that the display updated with the correct time?*

* *The JavaScript file*

# Other internet Protocols

|  |  |
| --- | --- |
| **Dynamic Host Configuration Protocol (DHCP)** | When your computer connects to a network, the Dynamic Host Configuration Protocol or DHCP as it is commonly known, is used to assign your computer an IP address.  Your computer communicates over User Datagram Protocol (UDP) using the protocol with a type of server called a DHCP server. |
| **Domain Name System Protocol (DNS)** | Your computer needs a way to know with which IP address to communicate when you visit a website in your web browser, for example, meta.com. The Domain Name System Protocol, commonly known as DNS, provides this function. Your computer then checks with the DNS server associated with the domain name and then returns the correct IP address. |
| **Internet Message Access Protocol (IMAP)** | Your device needs a way to download emails and manage your mailbox on the server storing your emails. This is the purpose of the Internet Message Access Protocol or IMAP. |
| **Simple Mail Transfer Protocol (SMTP)** | you need a way to send emails. The Simple Mail Transfer Protocol, or SMTP, is used. It allows email clients to submit emails for sending via an SMTP server. You can also use it to receive emails from an email client, but IMAP is more commonly used. |
| **Post Office Protocol (POP)** | The Post Office Protocol (POP) is an older protocol used to download emails to an email client. The main difference in using POP instead of IMAP is that POP will delete the emails on the server once they have been downloaded to your local device. Although it is no longer commonly used in email clients, developers often use it to implement email automation as it is a more straightforward protocol than IMAP. |
| **File Transfer Protocol (FTP)** | you'll need a way to transfer the files from your local computer to the server they'll run on. The standard protocol used for this is the File Transfer Protocol or FTP. FTP allows you to list, send, receive and delete files on a server. Your server must run an FTP Server and you will need an FTP Client on your local machine. |
| **Secure Shell Protocol (SSH)** | When you start working with servers, you'll also need a way to log in and interact with the computer remotely. The most common method of doing this is using the Secure Shell Protocol, commonly referred to as SSH. Using an SSH client allows you to connect to an SSH server running on a server to perform commands on the remote computer.  All data sent over SSH is encrypted |
| **SSH File Transfer Protocol (SFTP)** | The data is transmitted insecurely when using the File Transfer Protocol. This means that third parties may understand the data that you are sending. This is not right if you transmit company files such as software and databases. To solve this, the SSH File Transfer Protocol, alternatively called the Secure File Transfer Protocol, can be used to transfer files over the SSH protocol. This ensures that the data is transmitted securely. |

## Webpages, Websites and Web Apps

*Think of your favourite interactive map, social media site or video content site. What features and functionality do you think web applications provide to their users? Select all that apply.*

* *Personalized content.*
* *A high level of interactivity.*
* *Dynamically updated content.*

## Developer Tools

*As a developer, there are several web browser developer tools available to you. For example, there is a console tab that outputs JavaScript logs and errors from a web application. Which of the following statements are true? Choose all that apply.*

* *The Sources tab shows all content resolved for the current page.*
* *The Network tab allows you to inspect the timeline and details of HTTP requests and responses for a webpage.*
* *The Memory tab displays the parts of your code that are consuming the most resources.*

## Frameworks and libraries

Libraries are reusable pieces of code that can be used by your application. They are purpose-built to provide a specific functionality.

Frameworks on the other hand provide a structure for developers to build with.

Most frameworks use many libraries. The libraries that the framework uses can be used for your application.

*To reduce development time, developers use libraries in their application development. What’s the main feature of a library?*

* *Reusable pieces of code.*

## APIs and services

API is the acronym for application programming interface. An API is a set of functions and procedures for creating applications that access the features or data of an operating system, application, or other service.

Another critical type of API for web development is the RESTful or REST API. This kind of API provides data for popular web and mobile apps. These are also called web servers.

*You are building a website with a team of developers. The team lead refers to APIs as gateways. Is this a correct use of terminology?*

* *Yes*

## What is an IDE

*An integrated development environment, or IDE, is software for building applications. This kind of software application has many different features to help you as a developer. Which of the following statements are true? Choose all that apply.*

* *Special keywords of the programming language are highlighted in different colours to make the code easier to read.*
* *IDEs have a feature called Error Highlighting.*
* *IDEs have a feature that can detect variables and functions and offer them as suggestions during autocomplete.*