Term One Coder Academy Workbook

1. ## Components and concepts of web development and markup languages

   Web development is generally referred to as the tasks and associated operations with building and maintaining functional web sites. Web developers use markup languages to build pages and sites. Markup language is a codified language that explains and interprets text for manipulation by computer. Some important components include human readable annotations, descriptive tags, semantic tags and presentational tags. These tags help to define what an element is conceptually, where it should be placed and how styling should be applied for presentation (Kyrnin, 2021).

2. ## Features of technologies essential to the development of the internet

   Packets are small chunks of information reasonably sized for ease of transmission over the physical network. Each packet is responsible for carrying data of variable length. On top of this, each packet has a source and a destination in the form of a unique identifying address. Packets are used to break large pieces of data down into smaller separable blocks so it can be transmitted over different routes. Following on from this, packets are an integral part of being able to transmit data without having to prearrange a connection to the device intended to communicate with (Univeristy, 2022).

   IP addresses are used to distinctly identify devices connected to a network. An IP address is a string of numbers used to define the network and device locations for sending data. IP addresses are vital in communication over networks as they give a digital address for packets to be sent and received. Internet Protocol version 4 or IPv4 utilises 4 numbers separated by periods ranging from 0 to 255. As the number of devices connecting to the internet has exponentially increased since the inception of IP and IP addresses the need for more addresses has led to the creation of IPv6. IPv6 utilises 8 hexadecimal numbers allowing for a much larger sum of total addresses (Fox, 2020).

   Routers are pieces of hardware that receive and transmit packets between networks. When a router receives a packet, the IP address of the source and intended recipient are analysed before calculating the best route to its destination and forwarding. Routers calculate the best route by using routing tables which specifies a list of directions for transmitting data to a specific network (What is routing?, n.d.).

   Information online is generally accessed using domain names which is a unique string of human readable text that refers to a specific numerical IP address. Domain names are divided into three sections separated by a period. Each identifying section is a descendant of the domain to its right. Domain names are an integral component of URLs or uniform resource locators (What is DNS?, n.d.).

3. ## Features of technologies essential to the development of the internet

   TCP or transmission control protocol is a set of rules defining how data is transferred over a network. TCP is one of the most used protocols for sending data. TCP works by establishing a connection between the client and server. Following on from this, it ensures the connection remains open until transmission is initiated. Lastly, TCP breaks down large chunks of data into smaller packets whilst still maintaining data integrity in the process (Fox, n.d.).Once the connection is established, the client and server are required to send each other synchronisation and acknowledgment packets. The purpose of this is to engage both ends for communication and to negotiate the limits of the network connection at either end before any meaningful data is sent (Shalom, 2020).

   HTTP or Hypertext Transfer Protocol is the integral structure underpinning the delivery of data for the World Wide Web. HTTP is nested on top of TCP and has continued to evolve since its inception (MDN, n.d.). HTTP defines interactions between the client and web server by specifying permitted client requests and server response. The function of HTTP is to initiate a connection between the user's browser and the server for sending of html pages. When using HTTP, the connection between client and server is only maintained for the duration of each request/response. In addition to HTTP is HTTPS (Neeva, 2021). HTTPS or Hypertext Transfer Protocol Secure is an encrypted version of HTTP based on the sending and receiving of security certificates.This ensures users and clients identities are consistent and data remains secure (Cloudflare, n.d.).

   Web browsers are a foundational part of the World Wide Web. Browsers for short, let users access files on a local network or the web. A browser is an application designed to process and render HTML into human readable content. Most browsers contain common features such as browsing history, private-mode and bookmarks (Techterms, 2014).

4. ## Data structures in Ruby and their uses

   An array is a fundamental data structure of programming and is useful for performing operations on whole collections of elements rather than individual variables. An advantage of using an array is once they are declared they can be reused multiple times.

   A hash is a data structure that is generally like an array. A Hash differs from an array in that, instead of indexing by integer a hash allows the use of key/value pairs. This is useful for dealing with large or nested arrays and aids in fast access of elements if the key is known.

   A graph is a data structure composed of vertices or nodes and edges which join the nodes. Nodes are structures that consist of information. Graphs are used for representing data in terms of relationships between objects (Miralles, 2018).

5. ## Compilers & Interpreters

   Interpreters and compilers are programs that both translate source code into machine readable format. However, there is some key differences. One of these being, interpreters will translate a single statement at any given time. On the other hand, a compiler will scan the program in its entirety.

6. ## Benefits and drawbacks of Ruby & C

   Ruby is a popular programming language currently in use and its benefits include easily readable/writable syntax, open source with lots of easily accessible documentation and frameworks. One of the drawbacks of ruby is its scalability due to it being an interpreted language (McAllister, 2012).

   Java is another programming language currently in use today and is also popular. Like Ruby it uses English like syntax and is easy to write and compile. One of the disadvantages of using Java is the drop in performance that occurs when the code is interpreted during run time. For programs requiring data processing in real-time this is not ideal.

7. ## nil

8. ## Control Flow

   When a program is initiated, individual statements get executed line by line from the top down. Ruby has its own set of statements for breaking this flow and directing the course of events in the program.

9. ## Type Coercion

   Conversion of a data type or object into another. For example, changing a string into an integer

10. ## Data Types

    Data types represent different types of data based on classes. For example, numbers are a data type and can have different types of numbers such as integers and decimal numbers known as floating point values. A string is also a data type and is a collection of ordered characters that represents a word.

11. ## nil

12. **Code Error**

User input is a string and must be converted to a float before mathematical operations can be performed.

REFERENCES

Cloudflare.com. n.d. What is DNS?. [online] Available at: https://www.cloudflare.com/en-au/learning/dns/what-is-dns/ [Accessed 22 March 2022].

Cloudflare.com. n.d. What is HTTPS?. [online] Available at: https://www.cloudflare.com/en-au/learning/ssl/what-is-https/ [Accessed 22 March 2022].

Cloudflare.com. n.d. What is routing?. [online] Available at: https://www.cloudflare.com/en-gb/learning/network-layer/what-is-routing/ [Accessed 22 March 2022].

Developer.mozilla.org. n.d. An overview of HTTP - HTTP | MDN. [online] Available at: https://developer.mozilla.org/en-US/docs/Web/HTTP/Overview [Accessed 22 March 2022].

Fox, P., 2020. Khan Academy. [online] Khanacademy.org. Available at: https://www.khanacademy.org/computing/computers-and-internet/xcae6f4a7ff015e7d:the-internet/xcae6f4a7ff015e7d:addressing-the-internet/a/ip-v4-v6-addresses?modal=1 [Accessed 22 March 2022].

Fox, P., n.d. Transmission Control Protocol (TCP) (article) | Khan Academy. [online] Khan Academy. Available at: https://www.khanacademy.org/computing/computers-and-internet/xcae6f4a7ff015e7d:the-internet/xcae6f4a7ff015e7d:transporting-packets/a/transmission-control-protocol--tcp [Accessed 22 March 2022].

Kyrnin, J., 2022. What Are Markup Languages?. [online] ThoughtCo. Available at: https://www.thoughtco.com/what-are-markup-languages-3468655#:~:text=For%20web%20design%20and%20development,HTML%2C%20XML%2C%20and%20XHTML. [Accessed 22 March 2022].

McAllister, N., 2012. Twitter survives election after Ruby-to-Java move. [online] Theregister.com. Available at: https://www.theregister.com/2012/11/08/twitter_epic_traffic_saved_by_java/#:~:text=Micro%2Dblogging%20site%20Twitter%20experienced,Java%20for%20its%20backend%20software. [Accessed 22 March 2022].

Miralles, A., 2014. Mastering data structures in Ruby — Graphs. [online] Medium. Available at: https://medium.com/amiralles/mastering-data-structures-in-ruby-graphs-caa5892d50b1#:~:text=A%20graph%20is%20a%20data,this%20is%20vertex%2Fnode.) [Accessed 22 March 2022].

Neeva, T., 2021. What is HTTP? How It Works and Related Safety Concerns. [online] Neeva. Available at: https://neeva.com/learn/what-is-http [Accessed 22 March 2022].

Shalom, N., 2020. What is a Three-Way Handshake? - Definition from Techopedia. [online] Techopedia.com. Available at: https://www.techopedia.com/definition/10339/three-way-handshake [Accessed 22 March 2022].

Techterms.com. 2014. Web Browser Definition. [online] Available at: https://techterms.com/definition/web_browser [Accessed 22 March 2022].

University, I., 2022. What is a packet?. [online] Kb.iu.edu. Available at: https://kb.iu.edu/d/anyq#:~:text=Packets%20evolved%20due%20to%20the,end%20can%20transmit%20to%20another. [Accessed 22 March 2022].