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The Internet

Dive into the world of the internet and learn about its history and how it works!

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What is the Internet?

Stemming from a government project called ARPANET, the Internet is a nation-wide packet network. It is a system of networks that interconnects and allows for communication to other networks. The Internet is made up of many parts. A lot of the work is being done behind the scenes that Internet users do not get to see. There are a number of mechanisms and processes that work to help the Internet continually.

The History of the Internet

Go through the important events that led to the internet of today

Feb. 1958

Space exploration assigned to Advanced Research Projects Agency (ARPA) created by the U.S. government

July 1961

Leonard Kleinrock of MIT writes the first paper and proposes the idea on the packet switching theory

Aug. 1962

J.C.R. Licklider writes about his Intergalactic Network Concept of networked computers and becomes the first head of computer research at ARPA.

1966

The director of ARPA's computer research program, Robert Taylor officially begins the ARPANET projects, the foundation for today's internet.

Oct. 1969

The first data packets sent between networked computers between the two ARPANET sites at UCLA and Stanford Research Institute.

Oct. 1972

The first public demonstration of the ARPANET at the International Computer Communication Conference (ICCC) is conducted by Bob Kahn.

May 1974

Vint Cerf and Bob Kahn create "A Protocol for Packet Network Interconnection" which explains the design of a Transmission Control Protocol and coins the term "Internet" for the first time.

Nov. 1983

Jon Postel, Paul Mockapedis, and Craig Partridge design the Domain Name System (DNS).

More about DNS

1990-1991

Tim Berners-Lee creates the World Wide Web (WWW) at CERN, a European Physical Laboratory, and it is opened to the public.

More about WWW

1996

Microsoft and Netscape go head-to-head in what is known as the First Browser War, a competition for dominance in the usage share of web browsers.

More about Browser Wars

Internet Search

At the beginning of the internet, a huge number of websites were created and held tons of information, but finding it was time-consuming and difficult to navigate through. This problem was recognized by two Stanford students, Jerry Yang and David Filo, who were sneakily using the internet to win a fantasy basketball league. A directory was needed to search the internet for what users needed, thus "Jerry and David's Guide to the World Wide Web" was made in January of 1994. They would find websites and created and put them categories that users would look through to find links on the internet to what they needed. It quickly became Yahoo, the first of its kind, a simple search engine for internet users to use. But, with its success, problems were bound to arise.

Yahoo needed money to expand as a company and Yang and Filo were not making any revenue with it; no one was making money on the Internet. Advertising was the only way to commercialize the web and with the fear of losing loyal customers, in 1995 Yahoo took a risk and began taking in ads. Luckily, users and advertisers had multiplied, proving that making money online was possible. Within the next year, competitors of Yahoo emerged, like Excite, who used pure software to look for web pages. The competition brought out flashier add ons to their websites and ads that led to unneeded things took over. Yahoo and Excite started to forget why they started in the first place, the search aspect. A new way of searching the web was needed, signalling the start of Google.

Google was a search engine with its beginnings also starting at Stanford University. This infinite search engine was created by students Larry Page and Sergey Brin in 1998. It became so successful, but they needed support to continue running. After every search company turned down Google, even Excite, the creators were desperate, which is when investor, Andy Bechtolsheim, gave them $100,000 for Google and more investors saw this and continued to put in money. This money wasn't enough; Google needed ads to become a profitable company. Page and Brin found an advertising idea from Bill Gross' Overture, which used keywords and sponsored links to handle billions of microtransactions. Before using the idea, Google wanted to work together and blend ideas, but like most deals, it didn't work out. Soon after, Google released a new version with an idea too similar to Overture, that they were brought to court. Luckily, the two sides settled and all Google had to do was tweak their idea, which laid the foundation for internet advertising.

By the end of 1995, Microsoft released their own browser, Internet Explorer, which Gates made known that it was going to be used to destroy Netscape. Microsoft's team working with Internet explorer had many advantages with their financial resources and talented coders. This allowed for them to catch up to Netscape quickly. They tracked Netscape's every move and copied it, continued releasing new versions of Internet Explorer, and worked day and night to make sure that their browser would not lose. Gates even took it a step further and hired salesmen to sell the browser to every Microsoft customer, who used dark, hidden tactics to stop PC manufacturers from installing anything but Internet Explorer. Netscape struggled with profits and began going downhill. Due to Internet Explorer's growing popularity and Microsoft's billions of dollars in worth, the browser was made free with Windows, a power move by Microsoft.

By August 19, 2004, Google had gone public in stocks and what was once a company making zero dollars in revenue became a company worth 3 billion dollars. It seemed to have an unconventional way of doing business. But, Google had so much success in the end. They had hundreds of dollars in trades and were able to take over many things and branch out. Google holds so much more information than any other search engine out there to this day.

Browser Wars

Once the internet was opened up to the public in 1993, many became curious about what it was capable of. Marc Andreessen, a computer science graduate student from the University of Illinois, and his friends became curious about the World Wide Web. They were able to create the internet's first user-friendly, graphical web browser, MOSAIC, and put it online for everyone to download. Although it was quite successful, they needed money to make the browser global, which was when Jim Clark, owner of Silicon Graphics, stepped in and began working with MOSAIC's creators. By 1994, they were able to launch a software company, Netscape Communications. With the goal of building a new browser and making the internet the center of commerce and communication, Netscape quickly worked to launch their own web browser, Navigator, before any competitor launched their own before them, like the most powerful Microsoft.

Bill Gates and his company Microsoft were the lead in computer business at the time with their PCs and Windows software. They were aware of Netscape's release, but did not do anything about it until Navigator reached over a million downloads. It did not take long for Gates to realize the web was something Microsoft needed to take over as well, as Netscape was becoming a rising competitor. This realization marked the beginning of what was known as the Browser Wars.

As Navigator's success kept going, in 1995, Microsoft proposed an offer to Netscape to work together, which apparently ended in Netscape's decline and a heated debate. Netscape's revenue continued to skyrocket with a projected 60 to 80 million dollars and on the day of their initial public offer, their stock went through the roof; it was reaching the title of the fastest growing software company ever. Marc Andreesen felt as if Microsoft had been beaten and spoke very low of them. Gates and his team were completely insulted and lit a fire under them to dominate Netscape.

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By September 1997, Microsoft was back in top; Netscape had been making single figures and had to be acquired by AOL, ending their fight in the Browser Wars. But, Microsoft continued to fight with the government in an Antitrust lawsuit, started by their Netscape enemies. They were accused of using their monopoly to prevent consumers from using Netscape products, which contributed to the end of Netscape. It was brought to court and Gates was guilty. They initially wanted Microsoft to be broken up, which caused its value to plunge to 30 billion overnight. Seeing this happen the court retracted their idea, and Microsoft continued its success with new CEO Steve Ballmer.

DNS and ICANN

Domain Name System and Internet Corporation for Assigned Names and Numbers

A domain name is the address that a users types in that will direct them to any website. Some recognizable examples of domain names are google.com or amazon.com. A domain name can be any combination of letters and numbers followed by any extension, like .com, .net, and more. The DNS or also known as **Domain Name System** is responsible for associating domain names like www.google.com with their corresponding IP addresses. The computer uses the DNS to look up domain names and get the IP address, which is then used to connect it to its destination on the internet. One main DNS server is not enough, so they are connected in a distributed hierarchy divided into zones. The zones are split up and overlook major domains like .com, .org, and .net. Since the DNS was originally made to be an open public communication protocol, it is prone to cyber attacks, like spoofing.

Why are domain names and DNS important?

Without the domain name, IP addresses are the only other thing associated with websites. Because the IP addresses are a series of numbers, Internet users will have a hard time remembering these numbers. Domain names make it easier to identify things on the Internet instead of IP addresses. Each website has their own IP addresses that most Internet users never notice or disregard. Luckily, the DNS connects the domain names with the address. Without the DNS, users would have to memorize each unique IP addresses for each domain.

What is the ICANN?

ICANN is an abbreviation for the organization Internet Corporation for Assigned Names and Numbers. **ICANN** is an organized non-profit corporation that handles the upkeep and many procedures of dataspaces, both name and number, on the Internet. They do not control the Internet; their focus it so simple maintain the Internet Protocol and the DNS.

Why is the ICANN important?

Through everything they do, the ICANN provides Internet users a safe and secure connection to the network. They continually make sure that the network is stable and operational.

IP Addresses, Packets and Routing

Just like any phone and house has its designated number and address, respectively, any computer or computer network has there own version of this. This is known as an Internet Protocol address or **IP address** . An IP address is unique combination of numbers, which are separated into a hierarchy. The standard version of IP addresses is IPv4, where each address is 32 bits long, but with the growing Internet, there is a new standard IPv6, which will make them 128 bits long and allow for over 360 undecillion unique IP addresses.

When visiting a website, a computer asks another computer for information. That computer sends a message to another computer's IP address along with its own for responses, like putting a return address on mail. Sometimes the message that is returned is too much and must be sent using packets. **Packets** are smaller pieces of messages or information that travel from one place to another on the Internet. They can send information by taking different routes and amount of times, but will be assembled in order at the destination. Packets are able to move throughout with the help of routing. **Routing** is the process that manages packets to keep them moving through the network smoothly. Every router keeps track of multiple paths for send packets and chooses the *cheapest* available path for each piece of data, cheapest in terms of time, politics, or network relationships. This process is all due to TCP, or transmission control protocol, which overlooks the sending and receiving of data as packets, like guaranteed mail services.

HTTP and HTTPS Protocols

Protocols exist for every aspect of the Internet. They are a universal set of rules and standards that are used to communicate between machines. The language used to communicate between web browsers and servers is known as Hyper Text Transfer Protocol, or **HTTP**. It is made up of "get" and "pull" requests that are made for computers used to ask for and send documents. A protocol also exists to ensure the safety of these requests, known as Hyper Text Transfer Protocol Secure, or **HTTPS**. The HTTPS guarantees that any HTTP requests are secure and protected.

Why do we need HTTPS Protocol?

The HTTP request can hold private and personal information of users, and since the Internet is completely open, the request are more likely to be hacked. HTTPS contains secure sockets and transport layers to be layers of security around any communication to protect it.

W3C, HTML and CSS

These World Wide Web standards and protocols do not just appear out of nowhere; there has to be people that are responsible and work on them. The group that maintains the standards is called the World Wide Web Consortium, or **W3C** , who are a group that works to develop web standards. This group consists of people all other world, like organizations, the W3c staff, and the public. The W3C leads by their principle *Web for all and on everything*.

What are HTML and CSS?

Behind every website, there is all different kinds of code, each website always has HTML. **HTML** or Hyper Text Markup Language is the standard language for documents to be displayed on a web browsers. It is responsible for letting the web browser know how to look. With HTML, anyone can make a website. HTML is being used right now to display the text you are reading!

You can write code to display the text like this, using the Headings of HTML:

Hello! My name is Bob.

Not only does HTML work to make the look of the website, it has the help of other mechanisms, like a common one, CSS. Cascading Style Sheets or **CSS** is mechanism that adds style, like fonts, colors, and spacing, to the HTML documents. It can be used to make a website look more appealing to its users. In order for the websites to be uniform throughout, the creators would add a CSS styling sheet for each page.

Example of CSS:

You can add **style="color:Tomato;"** to the previous code to display the text like:

Hello! My name is Bob.