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Understanding the Historical and Foundational Technologies of the World Wide Web

The World Wide Web (WWW) was invented by Tim Berners-Lee in 1989 while working at the European Organization for Nuclear Research company *(Conseil Européen pour la Recherche Nucléaire)* CERN (Wikipedia contributors, 2024). This is believed to be the birth of the World Wide Web. Berners-Lee developed the idea to meet the explosive need for information-sharing between universities and institutes throughout the world. As the technologies of computers and data networks evolved, the idea of the WWW was to create an easy-to-use global information system by merging these evolving technologies. Berners-Lee wrote and presented his proposal for the WWW first in 1989 following it up with a second one in 1990. Together with Robert Cailliau, they finalized a management proposal in November 1990 outlining the principal concepts defining a project called "WorldWideWeb" which included a description about a web of "hypertext documents" that could be viewed using browsers. Berners-Lee had the first Web server and browser working on a NeXT computer to demonstrate his ideas by the end of 1990. He even had a hand-written label in red ink stating, "This machine is a server. DO NOT POWER IT DOWN" to prevent accidental shut down. The rest is history! (*A Short History of the Web*, 2024).

Even before all this, an important milestone that bears mentioning is the internet protocol TCP/IP. The Transmission Control Protocol (TCP) Internet Protocol (IP) was developed in the

1970s by Vint Cerf and Bob Kahn who are known as the fathers of the internet. After several revisions throughout the development, the internet protocol suite was introduced in 1983 and adopted by ARPANET. ARPANET was a research network that preceded the internet and ultimately evolved into the internet. TCP/IP standardized data communications making it possible for all different types of computers worldwide to communicate with each other. TCP/IP is like the highway for the World Wide Web providing a reliable data transport medium that is universal to all computers. The absence of TCP/IP would be like removing the Web from World Wide Web (Scos, 2020).

After the birth of the World Wide Web an explosion of key moments followed shaping the history of the internet today. It all began with Berners-Lee's creation of the first webpage transforming how information is accessed and shared leading to a new era in data communications. His creation of the Universal Resource Locator (URL), HyperText Markup Language (HTML) and HyperText Transfer Protocol (HTTP) established the framework that makes up the World Wide Web. Starting with Archie, the first search engine, launched in 1990, Yahoo soon followed in 1994. Yahoo's ability to organize the growing number of websites aided in its popularity paving the way for the evolution of search engines. This led to a leap in search engine technology with more advanced algorithms making it easier for users to search the growing websites accessible through the World Wide Web. AltaVista was launched in December 1995 and Google was introduced in August 1996. Google's popularity grew to becoming the dominant search engine due to its innovative PageRank algorithm providing more accurate and relevant search results (*Key Moments That Shaped the Internet's Evolution - Infographic Website*, 2024).

Focusing on search engine technology, how it affected the World Wide Web was profound. It drove the growth of the many internet services that soon followed. The explosion of social media platforms like Facebook, Twitter, and Instagram changed how people connect, share information and engage with content. It also led to the evolution of online commerce like eBay, PayPal, and Amazon. This led to the rise in Mobile devices like laptops, smartphones, smart tablets, and Wi-Fi. Prior to Wi-Fi, internet connectivity was primarily provided by wired connections limiting mobility and convenience. The explosion of streaming services and online entertainment like YouTube, Netflix, and Spotify changed how users consumed content in the entertainment industry. The growth of online education and e-learning, which was instrumental during the epidemic, soon became a norm and transformed the educational landscape providing more flexible, accessible and affordable methods of teaching (*Key Moments That Shaped the Internet's Evolution - Infographic Website*, 2024).

The impact that search engines had on the World Wide Web was colossal and provided an impetus to its growth. It became an essential tool for users across the globe and their quest for online activities. The advancements in the algorithms used in search engines drove the growth and development for ecommerce and online services. Search engine technology transformed the World Wide Web into a valuable and essential resource for everyone in the world today.

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