

A Journey of Human Comfort: Web 1.0 to Web 4.0

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Abstract— The World Wide Web has been passed through different development stages since its inception. Web 1.0 provided a vector for exposure, and removed the geographical restrictions associated with a brick-and-mortar business. Web 2.0 enabled users to interact with each other to contribute in content creation through a social media dialogue. A huge database of documents created by Web 1.0 and Web 2.0 were human readable only. The emergence of Web 3.0 added machine readability to the web documents. Web 4.0 is considered as the future phenomena where the web will be symbiotic and always on. This survey paper provides a comprehensive overview of the evolution of the World Wide Web from Web 1.0 to Web 4.0. It compares the features and technologies of these web generations.

Keywords— Semantic Web, Web 1.0, Web 2.0, Web 3.0, Web 4.0

I. INTRODUCTION

Web 1.0 was an early stage of the conceptual evolution of the World Wide Web which according to Berners-Lee, could be considered the read-only web. [1] The people went from offline to online to search and purchase products or services but they could not interact and contribute in the content creation.

Web 2.0 was focused on the ability for people to collaborate and share information online. This web era is also referred as “Social Web” because the people could interact and collaborate with each other in a social media dialogues through social networking sites, blogs, wikis, mashups, etc. [2]

Web 3.0 desires to decrease human’s tasks and decisions and leave them to machines by providing machine-readable contents on the web. [3] Web 3.0 is also called as “Semantic Web” because it adds semantics to the web of data.

Web 4.0 is still an underground idea in progress. It is termed as an era of ambient intelligence, WebOS and artificial intelligence. [4]

The goal of this survey paper is to present the historical journey of the World Wide Web generations. It compares these web generations according to the features, technologies used and application areas. The remainder of the paper is organized as follows: Section II provides an overview of Web 1.0, Section III provides an overview of Web 2.0, Section III provides an overview of Web 3.0, Section IV gives an introduction of Web 4.0, Section V describes the comparison

of Web 1.0, Web 2.0 and Web 3.0. At the last Section VI concludes the paper.

II. WEB 1.0

Web 1.0 was first coined by Tim Berners-Lee in 1989. It is treated as the first generation of World Wide Web. Socially people could only view the information provided by the web pages hence this era is also called as “Read-Only Web”.

The web pages developed in Web 1.0 generation were static and were not changing frequently. Producers and service providers started publishing of online catalogues for the advertisement of their products or services. The main goal of the websites was to publish the information for anyone at any time and establish an online presence. [5] The appearance of shopping carts encouraged people to purchase goods or services online rather than from the offline markets. The information dissemination to the customers was done through “Push Model” because customers could not interact or contribute in the content creation by giving their valuable feedback.

Web 1.0 pages were developed in HTML and basic communication protocol was HTTP.

III. WEB 2.0

The concept of Web 2.0 was coined by Dale Dougherty, web pioneer and O’Reilly VP in 2004 with a conference brainstorming session between O’Reilly and MediaLive International. [6] Web 2.0 is also called the wisdom Web, people-centric Web, participative Web, and read/write Web. [7]

With Web 2.0 we moved away from a traditional model of publishers making content available to consumers, to a much more dynamic participatory model where the majority of web page developers had the opportunity to update their own media-rich web sites as often as they liked. [8] Information began to flow in both directions between content providers and viewers. For example, hit counters roughly indicate Web sites’ relative popularity, while the volume of user comments provides a measure of user participation.

This was an era of user-generated content and huge social media interaction., blogging, video sharing, chatting, hosted services, web applications, voice over IP, emails, instant messages, social bookmarking, podcasting, picture sharing, weblogs, mashups and folksonomies, etc and all kinds of

V. WEB 4.0

Web 4.0 is still a revolutionary thought in process. As shown in Fig. 3, Web 4.0 will become reality in the year of 2020. According to Nils Muller, CEO of TrendOne, a German Microtrend analysis firm; Web 4.0 is as an "always-on" world where humans can "self-upgrade" through technology extensions. [15] Web 4.0 will be the time where the OS will reside in the cloud and web participation would be a necessity. We will have multiple choices for getting the data: desktops, laptops, net-books, mobile phones, tablets and even iTV. [16]

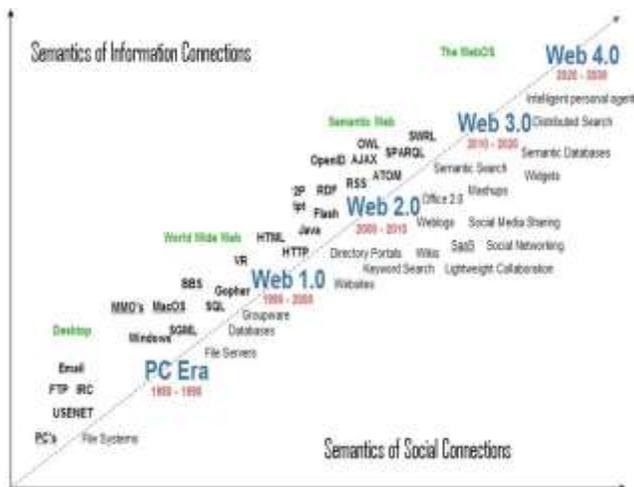


Fig. 3 World Wide Web Progress [17]

The web 4.0 is also known as the “Symbiotic Web”. The idea being the symbiotic web is that once the metadata are organized by web 3.0, human and machines can interact with mind controlled interfaces. [4] The machines would be clever on reading the contents of the web, and react in the form of executing and deciding what to execute first to load the websites fast with superior quality and performance and build more commanding interfaces. [18]

VI. COMPARISON OF WORLD WIDE WEB GENERATIONS

This section gives comparison of World Wide Web generations by different aspects as shown in the following table.

Criteria	Web 1.0	Web 2.0	Web 3.0
Inception Year	1994	2002	2006
Coined By	Tim Berners-Lee	Dale Dougherty	John Markoff
Generation	Cognition	Communication	Co-operation
Known As	“The Web” or “The Internet”	“Web of Documents”	“Web of Data”
Human Interaction	“Read-Only”	“Read-Write”	“Personalized”

Data Representation	HTML	HTML, XHTML, XML	RDF, RDFa, Microformats
Semantics	No	No	Yes, Using RDFS/OWL
Linking	Hyperlink	Hyperlink	URI
Metadata	Relational Schema	XSD/DTD	Ontology
Data Model	Relational	Relational, Hierarchical	Graph
Machine Learning	No	No	Yes
Query Language	SQL	SQL, XPath	SPARQL
Questions Answered	Where to search the data?	How to share the data with others?	How to search, integrate and control data?
Efforts required to search product/service/people	Much efforts	Less efforts due to product reviews and tagging	Very less efforts due to integration of data through Mobile Agents
Examples	News/Information Sites, E-Commerce Sites	Wikis, Blogs, Social Networking sites.	Google Squared, Zemanta, TripIt, Siri, Wolfram Alfa, Watson, etc.
Application Areas	Searching, Shopping, Advertisement, etc.	Social Networking	Intelligent Search Engines, Semantic Social Networking

The above table shows the steady development of the web generations. The level of human comforts has been increased in each web generation.

VII. CONCLUSION

This paper presents the journey of three generations of World Wide Web so far mankind has experienced. The tabular comparison gives an idea of a variety of features related to these web generations. Web 1.0 provided users a platform to search and buy products or services from anywhere at any time. Web 2.0 facilitated users to share their views and ideas with other users across the globe through social media. Web 3.0 added machine learning to the web pages which reduced human cognitive efforts required to deal with the Internet. The symbiotic nature of Web 4.0 will bring a new era of “human social engagement” with the web.

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