Web Technologies From Web 2.0 To Web 4.0

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Abstract- *Web is coined to be as an outright phenomenon in the today's society with incorporated use of modern innovative technology and redefining the way of organizing, communicating and collaborating with individual which in terms lead us to mixture of spectacular successes and failures. This paper provides a background of the evolution of the web from web 2.0 to web 4.0. Web 2.0 as a web of people connections, Web 3.0 as a web of knowledge connections and web 4.0 as a web of intelligence connections are described as four generations of the web*

Keywords- Web2.0, Web 3.0, Web 4.0, Semantic web, World Wide Web

I. INTRODUCTION

The World Wide Web (commonly known as the web) is not synonymous with the internet but is the most prominent part of the internet that can be defined as a techno-social system to interact humans based on technological networks. The notion of the techno-social system refers to a system that enhances human cognition, communication, and co-operation; Cognition is the necessary prerequisite to communicate and the precondition to co-operate. In other words, cooperation needs communication and communication needs cognition.

Web is the largest transformable-information construct that its idea was introduced by Tim Burners-Lee in 1989 at first [1, 9]. Much progress has been made about the web and related technologies in the past two decades. Web 1.0 as a web of cognition, web 2.0 as a web of communication, web 3.0 as a web of co-operation and web 4.0 as a web of integration are Introduced such as four generation of the web since the advent of the web. This paper discusses what is web technology, & its background, Section organization, Web 2.0, Web 3.0, and Web 4.0

II. WHAT IS WEB TECHNOLOGY

Web technology refers to the means by which computers communicate with each other using markup languages and multimedia packages. It gives us a way to interact with hosted information, like websites. Web technology involves the use of hypertext markup language (HTML) and cascading style sheets (CSS)

Web Technology background:

Web technology background provides information about web technologies that relate to the interface between web servers and their clients. This information includes markup languages, programming interfaces and languages, and standards for document identification and display.

Section Organization:

1. Markup Languages Section - Includes all markup languages including HTML, XML, and SGML. Documentation in this section currently includes an HTML Guide, XML Guide, and a Document Type Definition (DTD) reading reference.
2. CGI Section- Includes four documents describing implementation of the client to server web interface. It includes information about the common gateway interface (CGI), server side includes (SSI), JavaScript, and writing perl script programs
3. HTTP Section - Thic section currently includes an HTTP Reference which is based on RFC 2616. It has brief descriptions of the HTTP request and response headers and also lists the possible response headers such as 404 (not found).
4. PHP - PHP is a scripting language that runs on the web server and the script code is embedded in the HTML document. It is easy to use with syntax similar to C which is why it is so popular. This section includes a PHP Introduction manual.
5. JAVA Section - Documentation is being generated for this section. It currently contains some web links.
6. MIME Section - This section describes Multipurpose Internet Mail Extension along with its purpose and it also includes a few MIME related web links.
7. Graphics - Gif files used to add graphics to web pages.

WEB 2.0 :

The term web 2.0 was officially defined in 2004 by Dale Dougherty, vice-president of O'Reilly Media, in a conference brainstorming session between O'Reilly and MediaLive International . Tim O'Reilly defines web 2.0 on his website1 as follows:

"Web 2.0 is the business revolution in the computer industry caused by the move to the internet as platform, and an attempt to understand the rules for success on that new platform. Chief among those rules is this: Build applications that harness network effects to get better the more people use them."

Web 2.0 is also known the wisdom web, people-centric web, participative web, and read-write web. With reading as well as writing, the web could become bi-directional. Web 2.0 is a web as a platform where users can leave many of the controls they have be used to in web 1.0. In other words, the users of web 2.0 have more interaction with less control. Web 2.0 is not a new version of web 1.0 bendy web design, creative reuse, updates; collaborative content creation and modification were facilitated through web 2.0. One of outstanding features of web 2.0 is to support collaboration and to help gather collective intelligence rather web 1.0 . Table 1 compare web 1.0 and web 2.0 in some features simplicity. Table 1. A Comparison of web 1.0 and web 2.0

Web 2.0	Web 3.0
Reading	Reading/Writing
Companies	Communities
Client-Server	Peer to Peer
HTML, Portals	XML, RSS
Taxonomy	Tags
Owning	Sharing
IPOs	Trade sales
Netscape	Google
Web forms	Web applications
Screen scraping	APIs
Dialup	Broadband
Hardware costs	Bandwidth costs
Lectures	Conversation
Advertising	Word of mouth
Services sold over the web	Web services
Information portals	Platforms

The main technologies and services of web 2.0 are included blogs, really simple syndication (RSS), wikis,

mashups, tags, folksonomy, and tag clouds that some of them described as follows in briefly:

➢ Blogs- The term weblog (or blog) was proposed by Jorn Barger in 1997. The blog is included the web pages called posts which published chronologically with the most first, in journal style. Visitors of the blogs can add a comment below a blog entry.

Most blogs are textual and but there are other sorts such as photoblogs or photologs, video blogs or vlogs and podcasts.

Posts of blogs can be tagged with keywords in order to categorize the subjects of the posts. For instance when the post becomes old, it can be filed into a standard, theme based menu system. Linking is another important aspect of blogging. Linking deepens on the conversational nature of the blogosphere and its sense of immediacy and helps to facilitate retrieval and to reference information on different blogs.

➢ Really Simple Syndication - RSS is a family of web feed formats used for syndicating content from blogs or web pages. RSS is an XML file that summarizes information items and links to the information sources. Users are informed to updates of the blogs or web sites which they're interested in. Atom is another syndication specification aimed at resolving issues of multiple incompatible RSS versions.

➢ Wikis- A wiki is a web page (or set of web pages) that can be easily edited by anyone who is allowed access. Unlike blogs, previous versions of wikis can be examined by a history function and can be restored by a rollback function. Wiki features are included: wiki markup language, simple site structure and navigation, simple template, supporting of multiple users, built-in search feature and simple workflow.

➢ Mashups- Web mashup is a web page (or web site) that combines information and services from multiple sources on the web. Mashups can be grouped into seven categories: mapping, search, mobile, messaging, sports, shopping, and movies. More than 40 percent of mashups are mapping mashups. It is easier and quicker to create mashups than to code applications from scratch in traditional ways; this capability is one of most valuable features of web 2.0. Mashups are generally created using application programming interfaces.

Several development equipment is available to create blogs, wikis, mashups, and social networks. These tools, such as mashup tools, wiki engines, blog software, make adoption of web 2.0 easier, quicker, and cheaper. Developers use three

essential development approaches to make applications of web 2.0: Asynchronous JavaScript and XML (AJAX), Flex, and the Google Web Toolkit.

- Asynchronous JavaScript and XML- AJAX is a web development approach that used for development of most interactive websites by retrieving small amount of data from web server and display it on the web application without reloading the whole page . AJAX is included several technologies: XHTML or HTML, cascading style sheets (CSS), JavaScript and XML.
- Flex- Adobe Flex is a software development kit (SDK) to create and deliver cross platformrich internet applications (RIAs) on the web. Flex is based on Flash and supports common design patterns by providing a programming language.
- Google Web Toolkit- GWT is an open source Java development framework that makes creating AJAX applications easy. It allows to web developers debug AJAX applications in the Java language using the Java development tools of their choice. GMT provides a complier and a special web browser that help developers to debug the GWT applications

WEB 3.0:

John Markoff suggested that web 3.0 as third generation of the web in 2006. The basic idea of web 3.0 is to define structure data and link them in order to more effective discovery, automation, integration, and reuse across various applications. Web 3.0 tries to link, integrate, and analyze data from various data sets to obtain new information stream; It is able to improve data management, support accessibility of mobile internet, simulate creativity and innovation, encourage factor of globalization phenomena, enhance customers' satisfaction and help to organize collaboration in social web.

Web 3.0 is also known as semantic web. Semantic web was thought up by Tim Berners-Lee, inventor of the World Wide Web. There is a dedicated team at the World Wide Web consortium (W3C) working to improve, extend and standardize the system, languages, publications and tools have already been developed. Semantic web is a web that can exhibit things in the approach which computer can understand. The main important purpose of semantic web is to make the web readable by machines and not only by humans.

The existing web is a web of documents, in some way like a global file system that the most important problems about it are included: The web of documents was designed for human consumption in which primary objects are documents and links are between documents (or parts of them). Semantics

content and links are embedded and the degree of structure between objects is fairly low. Figure 1 represents the structure of web of documents in simple
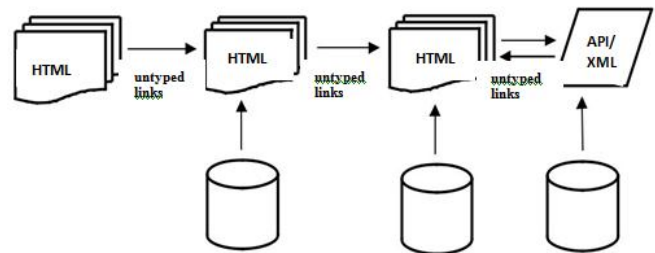
Figure 1. Web of Documents

Semantic web is being to be developed to rise above the problems of current web. Semantic Web can be defined a web of data, in some ways like a global database that most its features are included: The aim of design web of data is machines first, humans later. Primary objects are things so links are between things. Semantics of content and links are explicit and the degree of structure between objects is high based on RDF model. In Figure 2, the structure of web of data is shown simplicity.
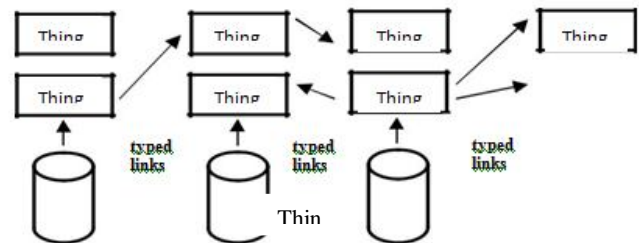

The main difference between web 2.0 and web 3.0 is that web 2.0 targets on content creativity of users and producers while web 3.0 targets on linked data sets. Table 2 compares some differences between web 2.0 and web 3.0.

Table 2. A Comparison of web 2.0 and web 3.0

Web 2.0	Web 3.0
Read/Write Web	Portable Personal Web
Communities	Individuals
Sharing Content	Consolidating Dynamic Content
Blogs	Lifestream
AJAX	RDF
Wikipedia, google	Dbpedia, igoogle
Tagging	User engagement

Tim Berners-Lee proposed a layered architecture for semantic web that often represented using a diagram, with

many variations since. Figure 3 gives a typical representation of this diagram.
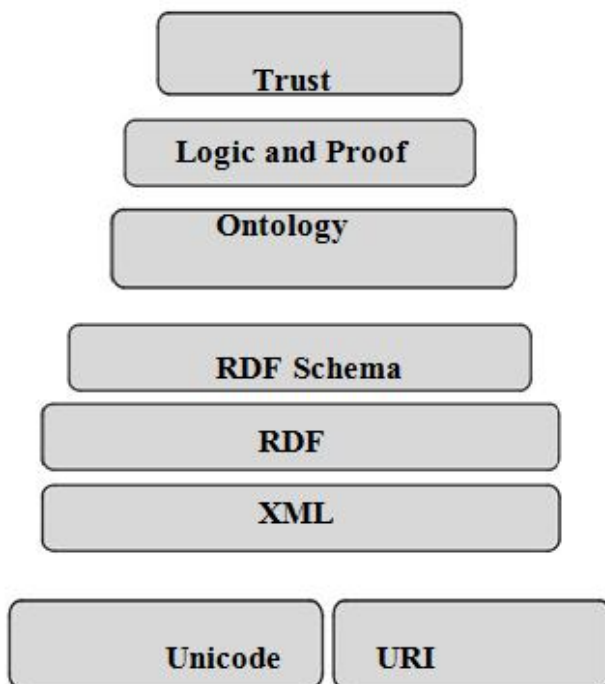
Figure 3. Semantic Web layered architecture

The layers of the semantic web architecture are briefly described as follows:

- ❖ Unicode and URI: Unicode is used to represent of any character uniquely whatever this character was written by any language and Uniform Resource Identifier (URI) are unique identifiers for resources of all types. The functionality of Unicode and URI could be described as the provision of a unique identification mechanism within the language stack for the semantic web.
- ❖ Extensible Markup Language: XML and its related standards, such as namespaces (NS), and schemas are used to form a common means to structure data on the web without any communication between the meanings of the data. XML is used as a base syntax for other technologies developed for the upper layers of the semantic web. NS is used to identify and distinguish different XML elements of different vocabularies. It supports mixing of different elements from various vocabularies to do a specific function. XML schema assures that the received information is according to the sent information when two applications at this level exchange information with together.

- ❖ Resource Description Framework: RDF is a simple data model that uses URIs to identify web-based resources and describes relationships between the resources in terms of named properties and values. Generally, the RDF family supports interoperability at the semantic level. RDF developments consist of the base web language, so that agents are able to make logical inferences to perform functions based on metadata.
- ❖ RDF Schema: provides a predefined, basic type system for RDF models. It describes classes and properties of the resources in the basic RDF model. RDF Schema provides a simple reasoning framework to infer types of resources.
- ❖ Ontology: The ontology layer described properties and the relation between properties and different. Ontology can be defined as a collection of terms used to describe a specific domain with the ability of inference.
- ❖ Logic and Proof: This layer is on top of the ontology structure to make new inferences by an automatic reasoning system. The agents are able to make deductions as to whether particular resources satisfy their requirements by using such the reasoning systems [11].
- ❖ Trust: The last layer of the stack addresses trust in order to provide an assurance ofquality of the information on the web and a degree of confidence in the resource providing this information.

Semantic web is not limited to publish data on the web; it is about making links to connect related data. Berners-Lee introduced a set of rules have become known as the Linked Data principles to publish and connect data on the web in 2007

1. Use URIs as names for things
2. Use HTTP URIs to look up those names
3. Provide useful information, using the standards (RDF, SPARQL) by look up a URI
   Include links to other URIs to discover more things
4. Data providers can add their data to a single global data space by publishing data on the web according to the Linked Data principles.

WEB 4.0:

It is an underground idea in progress and there is no exact definition of how it would be. Web 4.0 is also known as symbiotic web. The dream behind of the symbiotic web is interaction between humans and machines in symbiosis. It is feasible to build more powerful interfaces such as mind

controlled interfaces using web 4.0. In simple words, 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.

Web 4.0 will be the read-write-execution-concurrency web. It achieves a critical mass of participation in online networks that deliver global transparency, governance, distribution, participation, collaboration into key communities such as industry, political, social and other communities. Web 4.0 or webOS will be such as a middleware in which it will start functioning like an operating system. The webOS will be parallel to the human brain and implies a massive web of highly intelligent interactions.

Although there is no exact idea about web 4.0 and its technologies, but it is obvious that the web is moving toward using artificial intelligence to become as an intelligent web.

III. CONCLUSION

This paper provided an overview of web technology. Web 2.0, web 3.0 and web 4.0 were described as Three generations of the web in this paper. The characteristics of the generations are introduced and compared. It is concluded web as an information space has much progress since 1989 and it is moving toward using artificial intelligent techniques & web of highly intelligent interactions in close future.

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