Development History Of The World Wide Web

Karwan Jacksi, Shakir M. Abass

Abstract: There are many technologies which are used on the Internet to share files, each of them have different features, methods and protocols. However, the most common and easiest one is the Web which was established by few simple features. The Web continuously developing to be as much as easy for the users. The Web developers want to make a machine which thinks like humans by adding new tools, methods and protocols to the current Web. This paper focuses on the most widely used technologies in the Web, and presents the stages of the development of the World Wide Web. Moreover, the evolution of the Web from Web1.0 to Web3.0 and semantic web is revealed. The paper, in addition, explains the technologies and tools of the Web and compares between Web portals and search engines. Finally, assessment of the activation period for each one is presented.

Index Terms:Semantic Web, Web1.0, Web2.0, Web3.0, World Wide Web, Web Portal, Search Engines.

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1 INTRODUCTION

Briefly, we can define the web that means sharing among the information, Documents and resources between the users via the internet [1]. Also, it is as tunnel to accessing storage data on serves and display it on client by browser through the internet, information is related to gather by links that include text, picture, sound, video [2]. The early Web was consisting of collection of text created sites formatted in HTML hosted on the servers. On the other hand, The Web appeared in the early 1989s, which was very primitive that invented by British scientist: Tim Berners-Lee. The web firstly designed and progressed to meet the request for information-sharing among universities and institutes scientists in the world. In March 1989 Berners-Lee discuss with the head of CERN about system called "Mesh" that referenced ENQUIRE [3]. Web1.0 basically designed as the first model of the web, the user was only seeing information without post anything [4].

Fig. 1. History of Web

In 1999, The Darcy DiNucci decides to announce the Web 2.0,which became popular in 2004. It also called Participative and Social Web is the read write network application.

where the user can share and connect with each other. In 2015, generate the Web3.0 establish as semantic web and become common, also known as "The Internet of Things". [1]. Fig.1 shown the stage of web. In this paper explain history of web in details and we compared each version with other.

2 OVERVIEW

The web such as global database that user can share information through his device connected to the internet [5]. There are many of resources explain the stages of the Web technology through its development whenever it is become easier for users it is become more complex for developer. The web is involved from simple to more advance structures. The web established before half a century, the first version started with Web 1.0 to current version Semantic web [3].

2.1 Web1.0

It represents the basic of web it was used even 2003, invented by Tim Berners-Lee and it is just the readable site with raw data of the World Wide Web. The user can only Search and read the information through browser, he cannot share and commend on the site. In other words, it is static (fixed) information [6]. In web 1.0, a few of person that must be has knowledge of how the webpages are designed (interlinked) can create and modified the webpages compare with large number of users there not necessary to have knowledge about how the webpages are designed. In the Web 1.0 technique, some companies design applications that allow users download information from the web but they have not seeing the procedure of how the applications works. Technologies used in Web1.0 are HTML, HTTP and URI [2]. In addition, other protocols used in web1.0 like XML, XHTML and CSS. There are combined technologies between server and client such as ASP, PHP, JSP, CGI, and PERL. The server side uses JavaScript, VBscript and flash on the client [4]. Web 1.0 it is very slow and the user need to refresh the site every time when new information added to the web pages. The web1.0 problem it just works one direction. In other word, the user cannot post or modify the webpage [1]. Fig.2 showed the Web1.0.
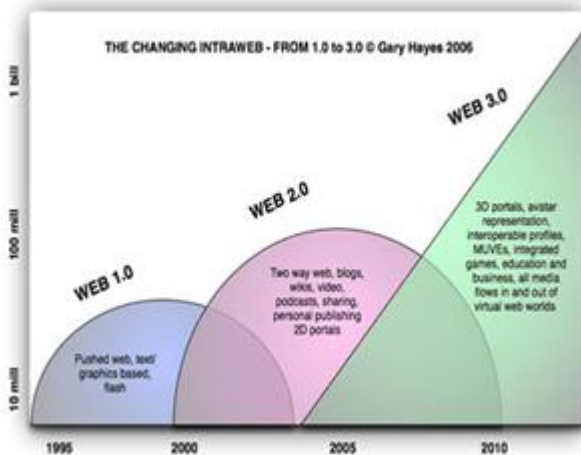
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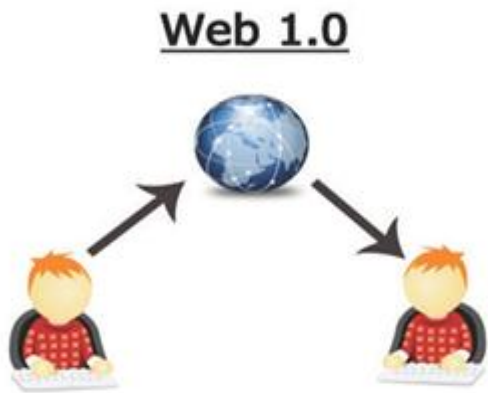
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Fig. 2. Web1.0

2.2 Web2.0

It is the second version of web. In 2004 it presented formally by Dale Dougherty who was vice-president of O'Reilly Media [2]. It is also called the read and write web (writable), it is representing a new method to use the current technologies of internet, and the web could become bi-directional. Actually the web1.0 presents to the user accessing possibility to upload and download from the webpage like provider (site admin) but in limited controlling. In other words, actual interactive of user to allow simply upload as well as download. The users of web 2.0 have more interaction with less control. Technology infrastructure of web2.0 consist of some rules such as RSS, Atom, RDF witch used by the designer for creation the web 2.0 services, also the web2.0 uses Ajax technology in internet such as JavaScript and XML, DOM, REST, XML and CSS. The web2.0 allows the users the ability to creation social activities and communicates with each other [3]. But these properties also consider issues because the user can be hacked in privacy and personal information security [2]. The Web2.0 is illustrated in fig.3.

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Fig. 3. Web2.0

2.3 Web3.0

It is also the third and current version of web started in 2014 known as executable web that allows user the ability to interact with dynamic applications. In other word, sometimes is called the Semantic Web and personalization. Web 3.0 will be a complete reinvention of the web. Conrad Wolfram theory

about web3.0 tries to make the computer be able thinking and more intelligence for search about new data instead the humans [4]. Web 3.0 is a new method that used in various fields on the internet. In other word, convert the web into huge database. In Web 3.0, proposed to be the computers like human to describe the specific information in high speed and bring the information for the user as meaning of word and do not search for the same word in web. One example of Web 3.0 is Google which is technology infrastructure of web3.0 [2]. The fig.4 demonstrates web 3.0.

Fig. 4. Web3.0.

That 3D graphics tools or applications are now available to the user to create 3D objects and the control on the animation but even now under development, many of website provides this feature for example: Secondlife.com. The web3.0 consists of levels but not all levels applied until nowadays [1]. Although the web3.0 include many features but also there are many problems, such as reduced to know ID of user on the Web, Increase the request of client to server, difficult to create Intelligent web where the provider need more knowledge of web design [3].

2.4 The Web Technology Stack

Briefly, it is a protocol stack consists from four layers that are used to define, locate, implement, and make Web services interact with each other. Web used many of protocols that describe different aspects of a single communication or taken together. The technique of find data resource on web it executed by a Uniform Resource Identifier (URI) this information may be a web page, text, image, video, audio [2]. Hyper Text Transfer Protocol (HTTP) is a protocol that responsible on web communications between server and client; it is collection of rules that controls on the data transferring like text, graphic images, sound, video, and other piece of data. Also there is protocol basically use to transfer files like text, picture, audio, etc. called File Transfer Protocol (FTP). IP Security (IP Sec) is another protocols used by web to decomposing and encryption the data that transferred between server and client with the same cryptographic keys [4].

2.5 Portals and Search Engines

A Web portal is a type of sites designed to presents to the user the ability to visit and providing a link to other site. It is created for some purpose like distributed applications, the share information between the users [2]. In other word, it also can be represented as huge database of components that different number of user can uses it at the same time. The web portal

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allows the user in search navigation and information integration, also provides some other features business intelligence and distribution games. There are some examples of Web portal like Netvibes, iGoogle, MSN, NAVER [6].A search engine is also term can have called search sites that designed to provides to the user capabilities to access the information from any website stored on a server, such as on the World Wide Web. In other word, is a web system uses some criteria to find the information and bring all sites of web that contains this word or phrases. There are a lot of site as examples of search engine like Google, Yahoo, Bing …etc. [6].

2.6 The Semantic Web
The web becomes day to day larger and the search about the any word or phrase is issue because there are a lot of site contains this word and many of them does not have the correct information. Tim Berners-Lee proposed the new term is Semantic Web. It is last version of the web that help us to find the exactly information that we want by machines instead of human. Semantic web use technique that search depending on meaning of word and what the user think about [5]. Semantic web has some criteria using in search like location of the user and previous search of user by provide the inclusion of semantic content in Web pages. In other word, The Semantic Web uses a technology that allows machines to understand the user and response the user requests subject to their meaning. The semantic web has levels and until today all the levels have not completed. Example for semantic web is GOOGL. The semantic web is not so much a technology as an infrastructure, enabling the creation of meaning through standards, markup languages, and related processing tools. Each layer of the semantic web technology stack provides services to the layer above and draws on the services of the layers below. The following sections briefly describe each layer. Semantic web uses some technologies like URLs, XML, RDF, etc. [1].

2.6.1 Semantic Web Technology
The technology of semantic web uses standard semantics for the data around us to gives the full meaning. This technology with Linked Data technology is envisioned by World Wide Web inventor [9]. According to Sir Tim Berner-Lee there are relationship among data in all formats and sources. Some developing language uses for define and link data on the web to be easy for machines to understand and process them. This technology gives the ability for machines to store, managing and return information according to their meaning and the relationship [6].

2.6.2 Semantic Web Stack
It is one of the semantic web layers also it known as semantic web cake illustrates the architecture of the semantic web. The semantic web is representation of the language; the technologies that use in semantic web is shown by the stack, these technologies which standardized for semantic web are organized to achieve the semantic web to be possible. In other word, the semantic web stack shows that the semantic web in not now technology but it is extraction of traditional hypertext web [7]. The semantic web stack is shown in fig.5.

2.6.3 Ontology
Ontologies are importance for the semantic web, although they don't have the specific definition but can be considered as group of URIs. Ontology is the central idea in philosophical that aims to study of entities and their relations. In other word, it means all kind of anything existing in world, and what the relation between them which related together. On the semantic Web it is the concepts and relationships which describe range of concern, also it used to describe the vocabularies that used in some application. These vocabularies may be simple or complex [8], [9].
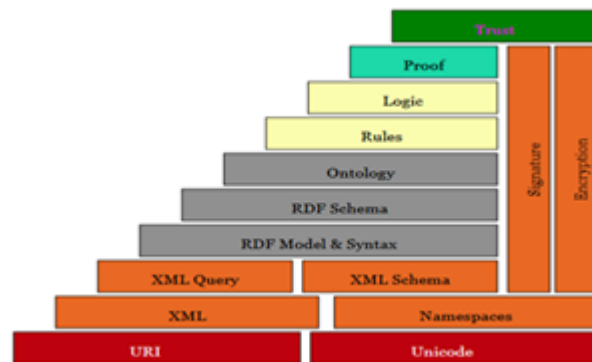
Fig. 5. Semantic Web Stack

2.6.4 Resource Description Framework (RDF)
The Resource Description Framework (RDF): is the framework generally used to describe any resource of the internet like web side and the web contents [10], [11]. The authors of the resource are found within the RDF description, creation of data or updating. The information that search by user of keywords is related to engine data group or categories of subject. The framework of the RDF allows every user to share the sites and descriptions very easy and more intelligence agents. In other side, The RDF is application for anther technology like XML and it's developed by World Wide Consortium (W3C). Is that model which used to exchange data on the web site? There are some features of RDF which support the merging of data even the basic schemas are differing. There are some tools related to RDF but the last tools added are Apache Jena, Mobi, FRED, Outdated-ARC RDF Store and Outdated-Adobe's XML. The RDF is very limited hierarchy of subclass and properties compared with OWL [12], [13], [14].

```
<?xml version="1.0"?>

<rdf:RDF
xmlns:rdf= "http://www.w3.org/1999/02/22-rdf-syntax-ns#"
xmlns:rdfs="http://www.w3.org/2000/01/rdf-schema#"
xml:base=  "http://www.animals.fake/animals#">

<rdf:Description rdf:ID="animal">
  <rdf:type
    rdf:resource="http://www.w3.org/2000/01/rdf-schema#Class"/>
</rdf:Description>

<rdf:Description rdf:ID="horse">
  <rdf:type
    rdf:resource="http://www.w3.org/2000/01/rdf-schema#Class"/>
  <rdfs:subClassOf rdf:resource="#animal"/>
</rdf:Description>

</rdf:RDF>
```

Fig. 6. Example of RDFS

2.6.5 Resource Description Framework Schema (RDFS)
Is group of classes that have various properties that use the RDF extensible knowledge which represented model of data, the basic elements provided for ontologies description, also it

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called RDF vocabularies. these vocabularies aims to organize the RDF resources which saved in triple store to access by the query language SPARQL [7], [15]. The RDFS contain some classes that are similar to the classes in OOP language, which define the resources of class and subclass. Example of RDFS illustrate in fig. 6. The RDFS language most time use to define main class and types when the terms described in RDF and sometime use to specific of characteristics for anther resources. like range and domain of properties[9].

2.6.6 Ontology Web Language (OWL)

The WOL is language used in semantic web created to many of complex knowledge of things or set of things also the relationship between them. The OWL is one of the simple languages that is based on computational logic language. The OWL documents some time published on the WWW [6]. The OWL is piece for the Semantic Web Technology stack of W3C that contain the RDF, SPARQL and RDFS. The present OWL version also is known as OWL2 which developed by the work group of W3C OWL which published in 2009. And the second version published in 2014. The OWL contains some tools like Apache Jane, Mobi, FRED, Graph DB and Openlink Virtuoso. OWL depended on the RDF and RDFS also XML syntax main syntax of the OWL [16].

2.6.7 SPARQL Protocol and RDF Query Language

It is semantic web language that considers one of the standardized languages used in semantic web for query graph data which representation by RDF triples. It standardized in 2008 by W3C. Also it used to process and retrieve the data from stored database in RDF [7], [15]. As well as it is recommended by Data Access Working Group (DAWG) under W3C, also it is the basic technology of semantic web. The data repositories of RDF are supporting the SPARQL by directly or by dedicated tools of SPARQL. Also the SPARQL has many feature computed query achieved by sub-graph matching. The contents of SPARQL query consist of some patterns, conjunctions, disjunctions and optional patterns. There are some SPARQL query as Select Queries, Construct Queries and Ask Queries [9], [16]. Some of these queries illustrate in fig. 7.
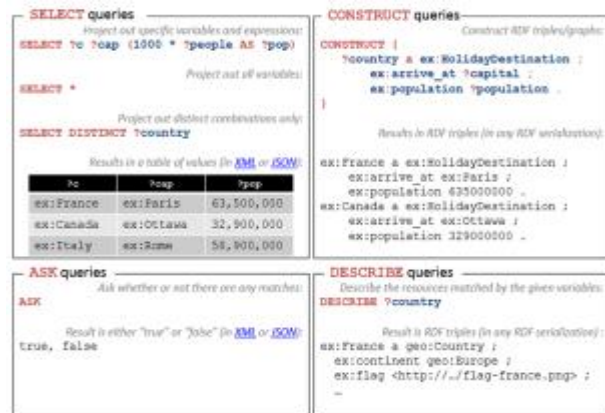

***Fig. 7**. Type of SPARQL Queries*

3 DISCUSSION

Through the stages of the web development we can see clearly that web 0.1 was the base of web. It was has few feature that cannot allows the users to do anything, just the

user can read only from the web. In addition, web 0.1 cannot support all designing languages. The web 0.2 is better somewhat because it allows the users to post some time on the web and it support many languages and protocols, also is better in security. While the web 0.3 is the current version of web that is differences from the other two versions, it has many features that allows the users do many things. On the other hand, it increases the user's ability to change and post on the sites. Also it more safety is because uses some techniques like tunnel. In addition, the web 0.3 provides the 3D graph, better performance of traffics. Finally, the semantic web is other type of the web. The main feature in web 0.3 is intelligence which means when the user search about things the research methods depends not only on the keywords but also on what is in users' mind. The comparative between all versions are illustrated in table1.

***Table1**: Main Comparative For web's Versions*

Web Version	Activate Period	Features	Technology Used	Description
Web1.0	Started in 1993 by Tim Berners-Lee	Only read Few features	HTML, HTTP, XML, XHTML and CSS	Very basic web poor ability of user.
Web 2.0	Started in 2003 by Dale Dougherty	Read and Write user can post and write on sits	JavaScript and XML, DOM, REST, XML and CSS	Most popular web and it is allow user more features
Web 3.0	started in 2014	Executable more features allows the user execute some application	LLC, CEO HTML5, CSS JavaScript	Very rich feature for user but not standardized all levels
Semantic Web	Started in 2015	Very intelligence easy for user	RDF,RDFS, OWL and SPARQL	More intelligent for search about information but complex for developer

4 CONCLUSION

Through the history of web developments, we noticed that the web is growing form the basic web that just has very few tools and control into huge intelligence database of information. Also it become easy for all kind of user, since the users not need to more information about the communication technology to be able of using the web, it very comfortable for search about any information think in our mind, get more the million sites through milliseconds. The current version of Web (Semantic Web) is going to be like human for search about information, it become very service for the user but complex for developer but even now there are some levels of semantic web are not standardized but it development continuously. In future I will think the web becomes like humans, since when we search about information it firstly thinks what it in our mind and understand the user instead search by keywords. In feature the web will be cleverer than human.

REFERENCES

[1] Aghaei, S., Nematbakhsh, M. and Farsani, H. (2012). Evolution of the World Wide Web : From Web 1.0 to Web 4.0. International journal of Web & Semantic Technology, 3(1), pp.1-10.

[2] Choudhury, N. (2014). World Wide Web and Its Journey from Web 1.0 to Web 4.0. International Journal of Computer Science and Information Technologies.

[3] Tim Berners-Lee, "The World Wide Web: A very short personal history", http://www.w3.org/People/Berners-Lee/ShortHistory.html , 1998.

[4] Keshab Nath, Sourish Dhar, Subhash Basishtha. Web 1.0 to Web 3.0 - Evolution of the Web and its various challenges, February 2014.

[5] [DU,XIAOFENG (2009), Semantic Service Description Framework For E-cient Service Discovery and Composition, Durhamtheses, Durham University. Available At Durham.

[6] John D. King. Search Engine Content Analysis, December 15, 2008.

[7] G. Antoniou, E. Franconi and F. Harmelen, "Introduction to Semantic Web Ontology Languages", University of Bozen–Bolzano, Italy, 2017. [Accessed 5 February 2019].

[8] Z. Rimale, E. Habib and A. Tragha, "A Semantic Learning Object (SLO)Web-Editor based on Web Ontology Language (OWL) using a New OWL2XSLO Approach", International Journal of Advanced Computer Science and Applications, vol. 7, no. 12, 2016.

[9] J. Srinivasan, "Semantic Cloud Architecture An Integration of Cloud and Semantic Web", IMS Manthan (The Journal of Innovations), vol. 8, no. 2, 2015.

[10] R. Agustaf, "Indonesian Course Ontology Based on Semantic Web", International journal of Web & Semantic Technology, vol. 7, no. 2, pp. 01-09, 2016. Available: 10.5121/ijwest.2016.7201.

[11] M. A. M.Sadeeq, S. R. M. Zeebaree, R. Qashi, S. H. Ahmed and K. Jacksi, "Internet of Things Security: A Survey," 2018 International Conference on Advanced Science and Engineering (ICOASE), Duhok, 2018, pp. 162-166.

[12] K. Jacksi, N. Dimililer and S. R., "State of the Art Exploration Systems for Linked Data: A Review", International Journal of Advanced Computer Science and Applications, vol. 7, no. 11, 2016. Available: 10.14569/ijacsa.2016.071120.

[13] R. R. Zebari, R. M. Zeebaree and K. Jacksi, "Impact Analysis of HTTP and SYN Flood DDoS Attacks on Apache 2 and IIS 10.0 Web Servers", International Conference on Advanced Science and Engineering (ICOASE), Duhok, pp. 156-161, 2018. Available: 10.1109/ICOASE.2018.8548783.

[14] K. Jacksi, S. R. M. Zeebaree and N. Dimililer, "LOD Explorer: Presenting the Web of Data", (IJACSA) International Journal of Advanced Computer Science and Applications, vol. 9, no. 1, pp. 45-51, 2018.

[15] K. Jacksi, A. Selamat Adel AL-Zebari and S. R.M. Zeebaree, " Designing an ontology of E-learning system for duhok polytechnic university using protégé OWL tool", Journal of Advanced Research in Dynamical and Control Systems, vol. 11, no. 5, pp. 24-37, 2019.

[16] K. Jacksi, A. Selamat Adel AL-Zebari and S. R.M. Zeebaree, "ELMS–DPU Ontology Visualization with Protégé VOWL and Web VOWL", Journal of Advanced Research in Dynamical and Control Systems, vol. 11, no. 1, pp. 478-485, 2019.

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