

**EMERGING TECHNOLOGY FOR LIBRARIES: WEB 3.0****Dr. Ravindra B. Bagul\*****\*Librarian**

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**QR Code**

**ABSTRACT:** - *The WWW is more and more useful application for application communication. Most people today can conceive of life without the internet. Web 3.0 as the third decade of the web (2010-2020). It refers to a supposed third generation of internet- based services that collectively comprise what might be called the intelligent web such as those using semantic web, micro formats, natural language search, data- mining, machine learning, recommendation agents and artificial intelligence technologies. Purpose of the study is to understand web 3.0 technology, and its application to develop the library services.*

**KEYWORDS:** Evolution of Web 3.0, Web 3.0 features, semantic web, Resource Description Framework (RFD), Artificial Intelligence, Technologies.

**Introduction**

A web service is a software system designed to support computer-to-computer interaction over the Internet. Web services are not new and usually take the form of an Application Programming Interface (API). In today's world of extreme competition on the business front, information exchange and efficient communication is the need of the day. The web is an increasingly important resource in many aspects of life: education, employment, government, commerce, health care, recreation, and more. The web is a system of interlinked, hypertext documents accessed via the Internet. With a web browser, user views web

pages that may contain text, images, videos, and other multimedia and navigates between them using hyperlinks.

We Ever since the invention of Web by Tim-Berners Lee in the year 1989, it has rapidly expanded and evolved indifferent phases, namely, Web 1.0, Web 2.0 and Web 3.0. The transition from Web 1.0 to Web 2.0 was a significant phase in terms of information because Web 1.0 is all about one-way information, while Web 2.0 is a two-way model. The advent of various networking sites, such as Blogger, Twitter and Facebook, during the phase of Web 2.0, has revolutionized the way in which the information

can be shared and collaborated among multiple users. The next generation Web, known as Web 3.0, is the combination of the features of both the phases and contains a few more features.

### 1.1 Web 3.0

Web 3.0 refers to a supposed third generation of Internet-based services that collectively comprise what might be called 'intelligent Web', such as those using semantic Web, micro formats, natural language search, data-mining, machine learning, recommendation agents and artificial intelligence technologies. As per the Wikipedia, an online encyclopedia, "Web 3.0 is a third generation of Internet-based Web services, which emphasize machine-facilitated understanding of information in order to provide a more productive and intuitive user experience."

Web 3.0 is the concept of next evolution of World Wide Web about linking, integrating, and analyzing data from various sources of data to obtain new information streams. Also, Web 3.0 aims to link devices to generate new approaches of connecting to the web by several machines and exchanging data among machines. However, the standard definition of Web 3.0 has not yet been emerged at this moment since Web 3.0 is mainly under developing by World Wide Web Consortium (W3C) to become a reality.

The main important purpose of Web 3.0, to link data, is supported by semantic web. Semantic web is a web that can demonstrate things in the approach which computer can understand. The

system offers a common framework that helps data to be connected, shared and reused across the applications, organizations and communities. The semantic web allows a person or a machine to begin with one database and then link through an infinity set of open databases which are not connect by wires, but connect data by referring into common things such as a person, place, idea, concept, etc. Semantic web mainly operates on Resource Description Framework (RFD) which is standard model for data interchange on the web. RDF is written in XML language that can easily be exchanged between the different types of computers with different types of operating system.

Meantime, RFD joins structure of the web with Uniform Resource Identifiers (URIs) and allows original data in each database to form in an original form such as XML, Excel, etc because RFD builds an abstract layer separately from the underlying data format.

One of important logics behind the development of semantic web is Artificial Intelligence. The Artificial Intelligence (AI) is the field of computer science targeting to create machines that are able to occupy on behavior that humans consider intelligent (Herbet Simon, An introduction to the science of Artificial Intelligent, 1997). Thereby, some parts of semantic web technologies are relied on Artificial Intelligence research such as model technology for RDF and knowledge representation for ontology. However, the

development of semantic web also generates new perspective for Artificial Intelligence community as the benefits of URIs linkage in RDF.

Another objective of Web 3.0 is a ubiquitous web that facilitates accessibility for anyone, anywhere, anytime by using any devices. This objective desires to break barriers of bandwidth constraints, poor display on mobile device and cost of data besides computer device. Then, web 3.0 will enable a web linked of devices to match with the increasing in web of linked data by using Cascading Style Sheet layout (CSS) standards which allows HTML document to display in different output style, support content adaptation and use smaller image.

In other words, it can be explained as third-generation of the Web which is enabled by a combination of various emerging technologies like:

1. Transformation of the Web from a network of separate applications and content repositories to a seamless and interoperable one.
2. Ubiquitous connectivity, adoption of broadband networks and access to Internet through mobile devices.
3. Network computing, SaaS business models, interoperability of Web services, distributed computing, grid computing and cloud computing.
4. Open technologies, open APIs and protocols, open data formats, open-source software platforms and open data.

5. Open identity, open reputation, roaming portable identity and personal data.

6. The intelligent Web, semantic Web technologies, such as Resource Description Framework (RDF), Web Ontology Language (OWL), Semantic Web Rule Language (SWRL), SPARQL-SPARQL Protocol and RDF Query Language, Gleaning Resource Descriptions from Dialects of Languages (GRDDL), semantic application platforms and statement-based data stores.

7. Distributed databases, the 'World Wide Database', and

8. Intelligent applications, natural language processing, machine learning, machine reasoning, and autonomous agents.

### **1.1.1 Need for web 3.0**

When we browse the Web for some information, it first displays links of some websites, which may or may not be apt for us. One has to try using various combinations of keywords to get the relevant information. The Web only scans for the keywords specified by the user. Therefore, it is very important to have a platform that reduces the time spent in searching the solutions and help us to arrive at a better solution. In Web 2.0, the answers are displayed in all the contexts, except the actual one which the user is searching. This difficulty can be overcome in Web 3.0 as it helps the user to arrive at the answer which he wants.

Web 3.0 is an answer to the problems mentioned above. The whole process of search is

expected to change once Web 3.0 is brought in to the picture. This can help in the speedy gathering of information from the Internet. With its help, the system can be better equipped to provide the required information to the users by searching, organizing and presenting only the relevant information. The era of Web 3.0 can be said an 'age of artificial intelligence'.

### **1.1.2 Fundamentals of web 3.0**

Some experts say that Web 3.0 is like a personal assistant which has information about practically everything. This is the reason that it is also called a 'giant database'. In Web 2.0, the Internet has been used as a means for providing connection between people while in Web 3.0. it is used to make connections with information. This can be better explained with the following example. If one wishes to go on a vacation with an estimated budget of \$3,000, by using the current Web technologies, one has to browse through some sites to get the required information about the expanses to be incurred on travel package, place of stay, sightseeing, etc. By browsing various sites, one can compare the rates offered by different travel agents. This is certainly a cumbersome and time-consuming process.

However, with Web 3.0, one can reduce time that is spent on browsing different sites as the Internet would do all the work, even when the search parameters are narrowly specified. The Web browser will gather, analyze and present the information in a way that will make the comparison easier. This happens as Web 3.0 can

understand the information available on the Web. A Web 3.0 search engine not only looks for the keywords specified, but also interprets the context in which they are presented. It can provide relevant results along with some suggestions for searching more data.

Web 3.0 is also called the 'Internet of Services'. Besides the human readable part of the Web, there will be machine accessible services which can be combined/ orchestrated to higher level of services.

### **1.1.3 Structure of web 3.0**

Web 3.0 has a totally different structure when compare to the earlier versions of the Web. The basic structure is characterized by semiotics and semantics. Semantics refers to the study of meaning in communication, whereas, semiotics is the study of sign processes (semiosis), or signification and communication, signs and symbols, both individually and grouped into sign systems. It includes the study of how a meaning is constructed and understood. "Semantics can be very useful to the user as it helps him in arriving at the right answer for his query.

### **1.1.4 Objectives of web 3.0**

The following are the basic objectives of Web 3.0:

- To provide a ubiquitous Web this facilitates accessibility of the net to anywhere and anytime with the available device.
- To break the barriers, such as bandwidth constraints, poor display on mobile devices, and reducing the cost of the devices which are involved with it.

### **1.1.5 Components of web 3.0**

Web 3.0 comprises two main platforms: Semantic technologies and social computing environment. Web 3.0 adopts the semantic technologies and open standards which can be applied to the current Web. The main focus of social computing environment is on human-machine synergy which is required in organizing a large number of social Web communities.

## **1.2 Advantages of web 3.0**

### **1.2.1 Improves Data Management**

Management of data in websites is a complex process, as combining data from various structures requires knowledge of many applications and, in some cases, the computer may or may not be able to understand some data. In such cases, it becomes very difficult to link data for obtaining the required input. This problem can be resolved to some extent with the adoption of semantic Web because it first describes the relationship between different sets of data which makes it easier for the computer to understand the relationship and integrates them easily for obtaining the desired output.

### **1.2.2 Supports accessibility of Mobile Internet**

Globally, the number of subscribers for mobile devices was likely to touch 4.8 billion by the end of 2016. The global mobile penetration rate was expected to touch 65% during the same period. However, with the advent of 3G-4 G technologies, which facilitates easy access of Internet in the mobile devices, the demand is likely to be

increased for Web 3.0 because of its superior quality. It is expected to play a very important role in enhancing the accessibility of the Internet through mobile devices. Web 3.0 is based on Cascading Style Sheet (CSS) Standard, which helps in reducing the size of the page to less than 20kb.

### **1.2.3 Web 3.0 Stimulates Creativity and Innovation**

The main point in Web 3.0 is the flexibility of linking different databases. The information and knowledge datasets can be utilized equally by the systems, as well as human beings, thereby enhancing their efficiency. This encourages innovation processes which, in turn, help in the generation of ideas and also in research and development (R&D) area to create a new model.

### **1.2.4 Web 3.0 Encourages Factor of Globalization Phenomena**

Web 3.0 aims at building and standardizing various data structures through a common programming language known as Resource Description Framework (RDF). This is the standard model for exchanging data on the Web. RDF is written in XML, The datasets of current information in the World Wide Web will be unlocked from the existing data structure and integrated all data structure together in the same standard. This facilitates easy exchange of information among different systems. This breaks the barriers bandwidth, poor display of Web on mobile devices, etc.

### 1.2.5 Web 3.0 Enhances Customers' Satisfaction

With the help of 'Artificial Intelligence', Web 3.0 helps the organization to improve the level of their customers' satisfaction in terms of Customer Relationship Management (CRM). Through this, customers can have access to entire information about the product that is being offered by the company on its Web page. This improves the company's image in the market and as a result, more customers can be attracted.

### 1.2.6 Web 3.0 Helps to Organize Collaboration in Social Web

Nowadays, most people have registered themselves with the various social networking sites. Many Weblogs have emerged as a part of these sites. By Web 3.0, the information available can be linked through RDF. This process helps in creating a list of conversations across blogs and mailing lists.

With Web 3.0, the users can experience a totally novel form of Internet because it can be accessed on different devices. It also offers a rich application tier with more logic.

### 1.3 Web 3.0 Technologies

In today's Internet dominated world, every business organization has recognized the need for having an effective Web 3.0 site. In the present always-on world, a company's website plays a very critical role in competing with others and in attaining success. The following are some of the technologies employed in Web 3.0:

1. Artificial Intelligence.

2. Automated reasoning.
3. Cognitive architecture.
4. Composite applications.
5. Distributed computing.
6. Knowledge representation.
7. Ontology (computer service).
8. Recombinant text.
9. Scalable vector graphics.
10. Semantic Web.
11. Semantic wiki, and
12. Software agent.

### 1.4 Characteristics

The major characteristics of Web 3.0 as marked by Nova Spivack are

- *SaaS* Business Model.
- Open Source Software Platform.
- Distributed Database –or what called as “The World Wide Database”.
- Web Personalization.
- Resource Pooling
- Intelligent Web.

### 1.5 Challenges

Semantic Web faces several challenging issue like:

- Vastness: The World Wide Web contains many billions of pages. Redundancy in Data may occur which has not yet been able to eliminate all semantically duplicated terms.
- Vagueness: This arises from the vagueness of user queries, of concepts represented by content providers, of matching query terms to provider terms

and of trying to combine different knowledge bases with overlapping but subtly different concepts.

- Inconsistency: These are logical contradictions which will inevitably arise during the development of large ontologies, and when ontologies from separate sources are combined.
- Deceit: This is when the producer of the information is intentionally misleading the consumer of the information.

### **1.6 Applications of Web 3.0 Technologies in the Library:**

Libraries in ancient times were considered as mere depository of books and other documents and the Librarian was thought as the custodian of these documents. Information during earlier days was used to be stored on clay tablets, palm leaves and Papyrus. With the passing of time and the rapid developments in information technology, the new ways of communication have taken effect ,and the ways in which information was previously handled, stored and disseminated have been altered. Nowadays Electronic media such as CDs,DVDs, Microfilms, Videotapes etc are replacing the physical forms of Library documents. We even see books gradually transforming to e-books, e-journals taking place of journals, online e-papers-free and commercial, digital manuscripts, and various other documents in electronic form as the information resources of a Library. These advances further have greatly metamorphosed the libraries from a simple, static

depository of documents to the organizations which can now fulfill the information requirements of all the users quickly and efficiently. All these transformations demand the Library professionals to shift from the traditional Library system to the Digital and Virtual Libraries. Library Professionals cannot neglect the changing face of libraries and need to conform to the Digital Library environment.

The conversion of traditional Library collections to the Digital and Virtual Library collections, the ready availability of information on the internet and its widespread use really present the Library Professionals with an opportunity not a threat to play an active role in order to serve the Information Society in a better way than before.

Information is growing at a very high speed each and every day especially in the field of science and technology. Library professionals have to keep pace with the advancements that are taking place in the field of IT. As it is the knowledge of information technology that can help the professionals to provide the accurate and precise information to their users who now seldom leave their home or office to seek the information that they require, Search engines send user straight to the information that they require. This is the era of Internet. Advent of Information technology has changed the information profession and we as Library professionals should not only accept the challenge but should prevail over the situation and should make ourselves equipped with the arms in

the form of a sound knowledge about Information technology and especially Internet.

Library 3.0 is a model for a modernized form of library services that reflects a transition within the library world in the way services are delivered to users. It refers to libraries using technologies such as the semantic web, cloud computing, mobile devices and re-envisioning our use of established technologies such as federated search to facilitate user-generated content and collaboration to promote and make library collections accessible. With Library 3.0, library services are frequently updated and evaluated to meet the emerging needs of library users. The end result of Library 3.0 is the expansion of the “borderless library” where collections can be made readily available to library users regardless of their physical location. Library 3.0 is a virtual complement to physical library spaces and ideally will work seamlessly within established library services and collections.

#### **1.6.1 Web OPAC:**

One of the key aspects of Library 3.0 is Web OPAC. A Web OPAC is a library catalogue on the Web or Intranet. Users can search the required information by connecting to Uniform Resource Locator (URL) of Web OPAC anytime during the day and from anywhere in the world. It is programmed to facilitate the library’s members to access the OPAC through their own search for the ease of borrowing instead of searching through the card catalogue. In addition, members would also be able to request for the information about borrowing, reservation etc related to their

own library profile, as well as to make automatic reservations.

#### **1.6.2 Ontologies :**

Ontologies are used for annotating information to the web content and expressing its semantics in a machine-readable manner. These are the techniques to give richer semantic relationships between terms and thoughts of knowledge. These give more standardization in managing web contents instead of merely indexing the terms. Ontology aims at how the information is organized rather than organizing the information. These will be able to give more flexibility in providing semantic description to the content in learning object repositories and at the same time these facilitate automated functions and task delegation to intelligent agents. Ontology deals with questions concerning what entities exist or can be said to exist and how such entities can be grouped, related within a hierarchy and subdivided according to similarities and differences.

#### **1.6.3 Ubiquitous Contents:**

The ubiquitous computing offers various contents which can be used or reused frequently. The contents of this generation need to be created in various formats and can also be easily shared, transferred and accessible through all modes of communication. Ubiquitous contents are the personal contents of the people persistently stored on the web in the form of movies, blog spots, RSS feeds, wikis, stories, articles, music, games etc. These are always there on the web and accessible

from everywhere over the internet through all mobile and internet accessible devices.

#### **1.6.4 Geo Tagging:**

This helps users to find specific information located at specific location. It is simply a marking of various media or digital contents like images, photographs, videos, websites or RSS feeds etc. Most of the cellphones and mobile devices have GPS (Global Positioning System) facilities.

#### **1.6.5 Virtual Reference Service:**

Since technology is developing very fast in all domains, librarians are more determined to serve the users who are away from the libraries. Linda Berube (2003) defines that Digital reference or Virtual reference primarily refers to a network of expertise, intermediation and resources placed at the disposal of someone seeking answers in an online environment. In virtual reference service, apart from helping the users in personal or telephonic way, libraries are now developing the contents which can easily be transferable and readable in cell phones and other mobile devices to help users at any point of time.

#### **1.6.6 Semantic Web :**

The Semantic Web has been proved very useful for the Librarians in providing effective Library services. As the Librarians are information providers they should bring people and information together. Semantic Web is a remarkable tools for libraries where it protects proprietary information and helps in sharing the wealth of knowledge. The vision, goals and mission of both the libraries and the Semantic

Web are similar. Both of these have been developed for accessing information available in abundance and discovering the knowledge through cooperation and collaboration for the advancement of society. The use of Semantic Web technologies in developing Library Portals facilitates users' search, access and retrieval of learning resources. The portal should aim to provide access to a coalition of learning repositories with learning resources available in different formats. The implication of Library Portals with Semantic Web services will fulfill the vision of Libraries. The large collections of learning resources are semantically annotated adopting various technologies that facilitate user's access to the content in one or more learning repositories.

#### **1.6.7 Cloud Computing:**

'Cloud Computing' means using the Internet and central remote servers to maintain data and applications instead of maintaining data on individual mainframe computers or PCs. In short, cloud computing refers to the technologies that provide software, data access, storage devices that do not require physical location of the system. It is one of the most important Library 3.0 applications that is gaining popularity day by day.

#### **1.6.8 Federated Search**

Modern day searching is synonymous with Federated Searching which is one of the aspects of Library 3.0. It can help users to take greater advantage of online resources offered by libraries. Many online databases need different logins, look

vastly different and search and display results in different ways. It would be easier for users to have all the search results displayed in one place and in one way , just like as a Google Search.

### 1.6.9 Mobile Library Catalogues:

The use of mobile phones and mobile applications has increased dramatically over the past 10 years. At present not many libraries in India offer mobile friendly versions of their websites and LMS.

This technology is only fairly recent so there will be some debate as to the best way to proceed. All libraries should cater to users who access their library through their phones or other mobile devices. Developing an app is not necessary in most cases rather making the website / catalogue clear and easy to move around should suffice. There is great potential for expansion of this technology in modern day libraries in India. More people are using mobile phones and devices as tools for tasks for which they previously may have used a laptop or desktop computer.

### 1.6.10 Quick Response Code ( QR Code) :

A QR Code is a matrix barcode readable by smart phones and mobile phones with cameras. They are sometimes referred to as 2d codes, 2d barcodes or mobile codes. It is one of the important aspects of Library 3.0.

The number of smart phones and internet enabled cell phones in this country is increasing rapidly. Essentially, QR codes are a low-threshold technology, low-cost, easy to implement and easy

to use. Essentially, QR codes are a convenient way to add the virtual to the physical- to provide useful content often at the time of need.

## 2 Conclusion

This paper provided overviews of web 3.0 and its applications to develop the library services. Web 3.0 is a model for a modernized form of library services that reflects a transition within the library world in the way services are delivered to users. It refers to libraries using technologies such as the semantic web, cloud computing, mobile devices and re-envisioning our use of established technologies such as federated search to facilitate user-generated content and collaboration to promote and make library collections accessible.

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