THE FUTURE WEB, TECHNOLOGIES AND DEVELOPMENT TOOLS

INTRODUCTION

Advances in Internet technology have led to the release of several tools for Web development. Many of the tools are easy to use and made available to the public as open source to aid in development. A popular example is the LAMP (Linux, Apache, MySQL, PHP) stack, which is usually distributed free of charge. The availability of free tools has greatly influenced the rate at which many people around the globe setup new Web sites daily. Easy to use software for Web development include amongst others: Adobe Dreamweaver, Netbeans, WebDev, or Microsoft Expression Studio, Adobe Flex, and so on. By using these software, virtually anyone can develop a Web page in a matter of minutes. Knowledge of Hypertext Markup Language (HTML) or other programming language is not usually required, but is recommended for professional results. Newer generation of web development tools use the strong growth in LAMP, Java Platform, Enterprise Edition technologies and Microsoft .NET technologies to provide the Web as a way to run applications online. Web developers now help to deliver applications as Web services, which were traditionally only available as applications on a desk, based computer. Thus, instead of running executable code on a local computer, users can now interact with online applications to create new contents. This has enabled new methods in communication and allowed for many opportunities to decentralize information and media distribution. In this unit, we shall discuss other technologies, models and tools that enhance easy development of Web applications.

ARTIFICIAL INTELLIGENCE

Artificial intelligence (AI) has been described as the future of the world. This has no restriction to field specification as showed in several decades. This is seen when physical strength is being replaced by robots, and the greatest minds began to work on the full automation of our lives.
It is possible to ignore the existence of this for a while in automating the production of products, consumer goods, cars and other things. Either we like it or not, AI is sneaking into our lives much deeper than we think. A typical example of the application of AI is the smart home, voice search, home cleaning robots, autopilot among others. Each of them already has its embodiment in the market.

PROGRAMMING LANGUAGES

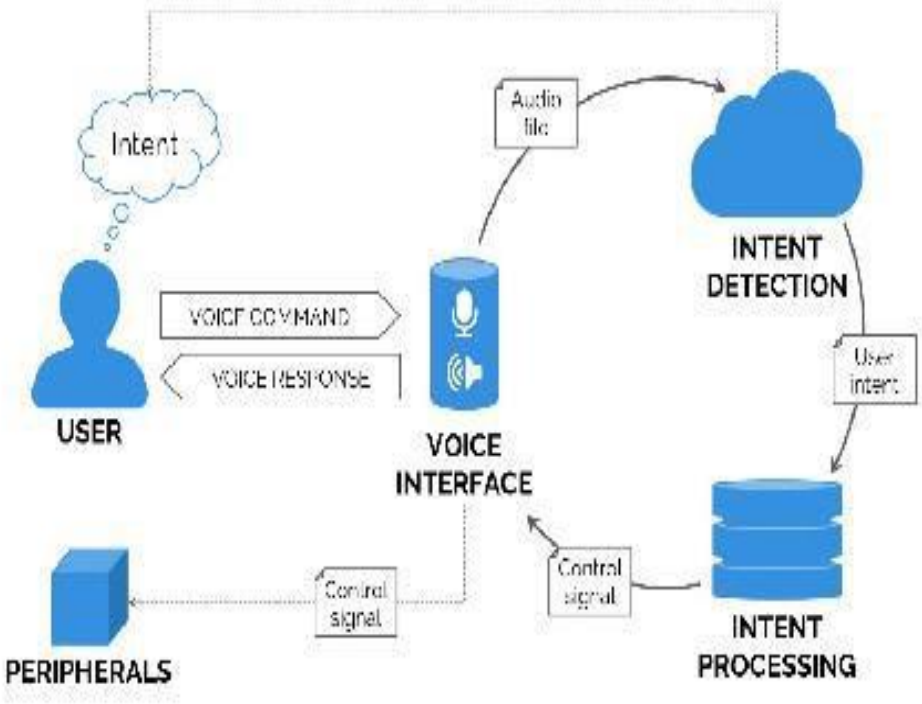
This is essential for web developers both professionals and beginners. Their demand directly depends on what frameworks and languages they can work with. They need to understand the required knowledge needed to get the job going. Some of the current tools in web developments are discussed.
JavaScript, Python and PHP are the most popular programming languages in recent years. The most important in web development is JavaScript. Python follows in order of importance but really weak in mobile applications. However, for browser web services this language is one of the best. PHP is considered one of the best backend languages in web application. It is very easy to learn and use. It is also suitable for creating 80% of simple web services.

FRAMEWORKS

This is part of the development environment. Typical example includes the React and Vue which are the basis of all front-end developments. React is today the most sought-after framework in most companies. For a long time, it competed with Angular. But the developers claimed that Angular sags significantly in efficiency. Vue recently became popular. However, it has captured the Asian market. This is expected to meet up with React in times of popularity and use. Xiaomi is another well-known brands that has completely switched to using Vue.

VOICE COMMANDS

Voice command is one of the applications of AI. It was not previously noticeable because the functionality was not perfect. Products with high quality voice input were disproportionally expensive. Voice search is not as fast as the text input because the browser needs time for a clear speech recognition. However, it takes on a new look and influences the development of most web services as seen in figure below.



The mechanism of voice input

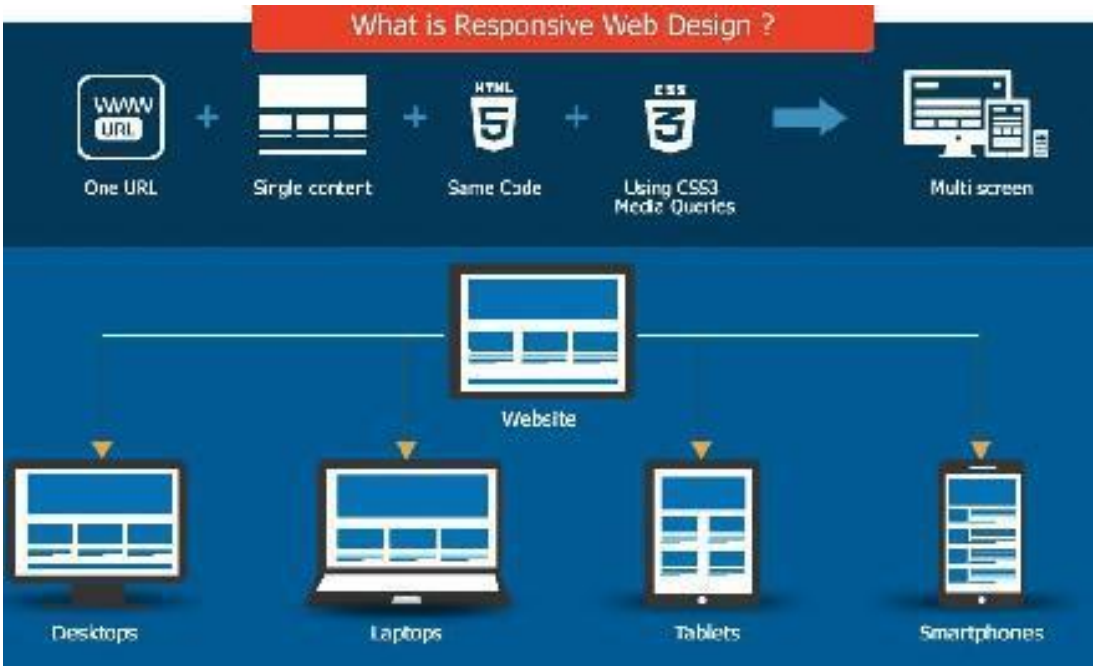
INTERACTIVITY

Interactivity if one of the influences of web development. The task of the developer is to make the most convenient and practical use of all applications. That is why web services will be more interactive.

One example of an interactive application is the Genesis car dealer website. Instead of flipping through hundreds of pages, the user can explore the car with a mouse click. The functionality allows you to collect your car through; colour selection, equipment selection and wheel selection. In short, the buyer will be able to change everything that does not affect the characteristics of the car.

ADAPTABILITY

Decades ago, we visit web pages only from a computer. Recently, the use of smartphones and tables has taken over because their functionality and performance is much higher. In web applications, mobile phones are not inferior to computers. The only difference is the screen size. Ease and convenience of the graphics should not suffer because of different monitors as graphically seen in figure below.



Principles of responsive web development

ONE-PAGE SITES

The effectiveness of single page site was noticed because of its benefits. Such benefit include ability to save development resources, its faster mode of loading among others. Modern users appreciate their time, so wandering around the site without achieving their aims may be frustrating. Also, the correct placement of data on a one-page website is an outstanding benefit in web development which attracts the attention of clients in a matter of seconds. Similarly, buyers are interested in products that they understand in 5 seconds thank products that they will study in several hours.

From the above, Service providers publish services to a service broker. Service requesters find required services using a service broker and bind to them.

Cloud Computing

Cloud computing refers to the use and access of multiple server-based computational resources via a digital network (WAN, Internet connection using the World Wide Web, and so on). Cloud users may access the server resources using a computer, netbook, pad computer, smart phone, PDA, or other devices. In cloud computing, applications are provided and managed by the cloud server and data are stored remotely in the cloud configuration. Users do not download and install applications on their own device or computer; all processing and storage is maintained by the cloud server. The on- line services are usually offered by a cloud provider or by a private organization. Before the advent of cloud computing, tasks such as using word processing would not be possible without the installation of application software on a user's computer. A user would need to purchase a license for each application from a software vendor and obtained the right to install the application on one computer system. As computer technologies advanced, local area networks (LAN) and more networking capabilities, the client-server model of computing were born, where server computers with enhanced capabilities and large storage devices could be used to host application services and data for a large workgroup. In a client-server computing environment, a network-friendly client version of the application was required on client computers, which utilised the client system's resources (memory and CPU for processing), even though the resultant application data files (such as word processing documents) were stored centrally on the data servers. In this case, many users on a network purchased multiple user licenses of an application for use. Cloud computing differs from the classic client-server model discussed in module one of this course material, by providing applications from a server that are executed and managed by a client's web browser, with no installed client version of an application required. Cloud computing provides computation, software, data access, and storage services that do not require end-user knowledge of the physical location and configuration of the system that delivers the services. One may compare this scenario with the concept drawn from the electricity grid, wherein end-users consume power without needing to understand the component devices or infrastructure required to provide the service. The reason behind centralization is to give cloud service providers complete control over the versions of the browser-based applications provided to clients, which removes the need for version upgrades or license management on individual client computing devices.

In addition, cloud computing describes a new supplement, consumption, and delivery model for information technology service based on Internet protocols, and in most cases typically involves provisioning of dynamically scalable and often virtualised resources. It is a by-product and consequence of the ease-of-access to remote computing sites provided by the Internet. This may take the form of web-based tools or applications that users can access and use through a web browser as if they were programs installed locally on their own computers. The term "Software as a service" (SaaS) is at times used to describe application programs offered through cloud computing.

Blogs

A blog is a blend of the term "Web log." It is a type of Website or part of a website. Many blogs provide commentary or news on a particular subject; others function as more personal online diaries. A typical blog combines text, images, and links to other blogs, Web pages, and other media related to its topic. The ability of readers to leave comments in an interactive format is an important part of many blogs. Most blogs are primarily textual, although some focus on art (art blog), photographs (photoblog), videos (video blogging), music (MP3 blog), and audio (podcasting). Microblogging is another type of blogging, featuring very short posts. Most blogs are interactive, allowing visitors to leave comments and even communicate with each other via widgets on the blogs. This interactivity distinguishes them from other static websites. Entries are commonly displayed in reverse-chronological order. Many blogs are hosted at blog communities such as http://blogspot.com.

RSS

Really Simple Syndication or Rich Site Summary (RSS) is commonly used to create newsfeed from blog postings and other Web sites. The RSS feeds contain a summary of new items posted to the site. Web feeds benefit publishers by letting them syndicate content automatically. They benefit readers who want to subscribe to timely updates from favoured websites or to aggregate feeds from many sites into one place. RSS feeds can be read using software called an "RSS reader", "feed reader", or "aggregator", which can be web-based, desktop-based, or mobile-device-based. Some browser, such as Firefox, Safari, and Internet 7 can display RSS feeds. A standardised XML file format allows the information to be published once and viewed by many different programs. The user subscribes to a feed by entering into the reader the feed"s

URL or by clicking a feed icon in a Web browser that initiates the subscription process. The RSS reader checks the user"s subscribed feeds regularly for new work, downloads any updates that it finds, and provides a user interface to monitor and read the feeds. RSS allows users to avoid inspecting all of the websites they are interested in manually, and instead subscribe to Websites such that all new content is pushed onto their browsers when it becomes available. By providing up-to-date, linkable content for anyone to use, RSS enables website developers to draw more traffic. It also allows users to get news and information from many sources easily and reduces content developers time. RSS simplifies importing information from portals, weblogs and news sites. Any piece of information can be syndicated via RSS, not just news.

Podcasts

Podcasts are typically audio files, delivered by an RSS feed on the Web. They may also be made available by recording an MP3 file and providing a link on a Web page. They usually would take the format of an audio blog, interview or radio show. These files can be saved to your computer or to an MP3 player (such as iPod) for later listening.

Wiki

A wiki is a Web site that allows immediate update by visitors using a simple form on a Web page at any time. Some wikis are designed to serve a small group of people such as the members of an organization. The most powerful and popular wiki is Wikipedia which is accessible at the URL (http::/Wikipedia.org). It is an online encyclopedia, which can be updated by any registered user at any time. Wiki is a form of social software in action where visitors sharing their collective knowledge can create a resource freely used by all. Though there have been isolated cases of practical jokes and occasionally inaccurate information posted at Wikipedia, the information and resources provided is still good enough as starting point when exploring a topic.

Microformat

Microformat is a standard format for representing information aggregate that can be understood by computers thereby enabling easier access and retrieval of information. It could also lead to new types of applications/services on the Web. Some people consider the web as containing loose information while others see logical aggregates, business cards, resume, events, etc. The need to organize information on the Web cannot be overemphasized. Microformat standard encourage sites to organise their information such that its increases interoperability and accessibility. For example, if one wants to create an event or an events calendar, one could use the hCalalender microformat. Some other available microformats are the adr for address information, hresume for resume and xfolk for collections of bookmarks. These all allow new services to be created with ease.

Resources Description Framework (RDF)

The Resource Description Framework (RDF), developed by the World Wide Web consortium (W3C) is one way of making the Web more meaningful. It is based on XML and used to describe content in a way that is understood by computers. RDF helps connect isolated databases across the web with consistent semantics. The structure of any expression in RDF is a collection of triples. RDF triples consist of two pieces of information (subject and object) and linking fact (predicate).

Ontologies

Advances in Internet technologies makes items on the Web to be organized in such a way that meaning can be easily derived from them. Ontologies are ways of organising and describing related items, and are used to represent semantics. It serves as a means of cataloguing Internet content in a way that can be understood by the computers. RDF and OWL (Web Ontology Language) are designed for formatting ontologies.

Application Programming Interface (APIs)

Application Programming Interface (APIs) provides application with access to external services and databases. For example, a traditional programming API, like the Sun‟s Java API, allows programmers to use already-written methods and functions in their programs. In addition, Web services have APIs that permit their functionality and information to be shared or used across the internet. Most major Web 2.0 companies (for example, eBay, Amazon, Google, Yahoo! and Flickr) provide APIs to encourage use of their services and data in the development of mashups, widgets or gadgets.

Mashups

Mashups is a means of combining contents or functionality from existing Web services, Websites and RSS feeds or other solutions to serve a new purpose. For example, a skilled developer could mashup Google Maps with a tourist site to create more exciting services/sites on the Internet. The use of APIs helps to save lots of time and money in mashups processes of combining two or more applications to create others. Its possible to build great mashups in a day. Please, note that the mashup may rely on one or more third parties software. Thus, if the API provider experiences downtime, the mashup will be unavailable as well because of the dependence. The way out will be to use mashup that are programmed to avoid sites that could be down. It is also recommended that a developer check the “term of service” for using third party software for the purpose of mashup.

Widgets and Gadgets

Widgets are commonly referred to as gadgets. They are mini applications designed to run either as stand-alone or as add-on features in Web pages. Widgets can be used to for the personalization of a user's Internet experience. Some personalized services may include the display of real-time weather conditions, viewing of maps, receiving event reminder, providing easy access to search engines, aggregating RSS feeds, and so on. The robustness of web services, APIs and other related tools make it easy to develop Widgets. Several catalogs of widgets exist online with the most all-inclusive being Widgipedia which provides an extensive widgets and gadgets for a variety of platform.

Web 2.0

The term "Web 2.0" is associated with Web applications that facilitate participatory information sharing, interoperability, user-centred design, and collaboration on the World Wide Web. A Web 2.0 site allows users interact and collaborate with each other in a social media dialogue as creators (prosumers) of user-generated content in a virtual community, in contrast to websites where users (consumers) are limited to the passive viewing of content that was created for them.

Examples of Web 2.0 include social networking sites, blogs, wikis, video sharing sites, hosted services, web applications, mashups and folksonomies. Web 2.0 websites allow users to do more than just retrieve information. By increasing what was already possible in Web 1.0, they provide the user with more user-interface, software and storage facilities, all through their browser. Users can provide the data that is on a Web 2.0 site and exercise some control over that data. These sites may have an "Architecture of participation" that encourages users to add value to the application as they use it. The Web 2.0 offers all users the same freedom to contribute.

Web 2.0 Tools

The client-side/web browser technologies used in Web 2.0 development are Asynchronous JavaScript and XML (Ajax), Adobe Flash and the Adobe Flex framework, and JavaScript/Ajax Dojo Toolkit, MooTools, jQuery, and so on. Ajax programming uses JavaScript to upload and download new data from the web server without undergoing a full page reload. To allow users to continue to interact with the page, communications such as data requests going to the server are separated from data coming back to the page (asynchronously). Otherwise, the user would have to routinely wait for the data to come back before they can do anything else on that page, just as a user has to wait for a page to complete the reload. This also increases overall performance of the site, as the sending of requests can complete quicker independent of blocking and queuing required sending data back to the client. The data fetched by an Ajax request is typically formatted in XML or JSON (JavaScript Object Notation) format, which constitute the two widely, used structured data formats. Since both of these formats are natively understood by JavaScript, a programmer can easily use them to transmit structured data in their web application. When this data is received via Ajax, the JavaScript program then uses the Document Object Model (DOM) to dynamically update the web page based on the new data, allowing for a rapid and interactive user experience. In short, using these techniques, Web designers can make their pages function like desktop applications. For example, Google Docs uses this technique to create a Web based word processor. Adobe Flex is another technology often used in Web 2.0 applications. Compared to JavaScript libraries like jQuery, Flex makes it easier for programmers to populate large data grids, charts, and other heavy user interactions.[Applications programmed in Flex, are compiled and displayed as Flash within the browser. Flash is capable of doing many things which were not possible pre-HTML5, the language used to construct web pages. Out of the many capabilities, of Flash, the most commonly used in Web 2.0 is its ability to play audio and video files.

This has allowed for the creation of Web 2.0 sites where video media is seamlessly integrated with standard HTML. In addition to Flash and Ajax, JavaScript/Ajax frameworks have recently become a very popular means of creating Web 2.0 sites. At their core, these frameworks do not use technology any different from JavaScript, Ajax, and the DOM. What frameworks do is smooth over inconsistencies between web browsers and extends the functionality available to developers. Many of them also come with customisable, prefabricated "widgets" that accomplish such common tasks as picking a date from a calendar, displaying a data chart, or making a tabbed panel. On the server side, Web 2.0 uses many of the same technologies as Web 1.0.

New languages such as PHP, Ruby, Perl, Python, JSP and ASP are used by developers to dynamically output data using information from files and databases. What has begun to change in Web 2.0 is the way this data is formatted. In the early days of the Internet, there was little need for different websites to communicate with each other and share data. In the new "participatory web", however, sharing data between sites has become an essential capability. To share its data with other sites, a website must be able to generate output in machine-readable formats such as XML (Atom, RSS, etc) and JSON. When a site‟s data is available in one of these formats, another website can use it to integrate a portion of that site's functionality into itself, linking the two together. This is one of the hallmarks of the philosophy behind the Web 2.0 movement.

XHTML

eXtensible Hypertext Markup Language (XHTML) is the newer version of HTML, which was covered extensively in Module two of the course material. XHTML combines the formatting strengths of HTML and the data structures and extensibility strengths of XML to deploy applications for device-independent Web access. XHTML uses the tags and attributes of HTML along with the syntax to XML. Using HTML to write application that runs on electronic devices with fewer resources such as a personal digital assistant (PDA) or mobile phone could be an issue. However, this can be accomplished in XHTML since it is more of a descriptive language (unlike HTML) than a structure language.