Unit -5

Web Application Deployment

WWW

- English scientist Tim Berners- Lee invented the World Wide Web in 1989. He wrote the first web browser computer program in 1990 while employed at CERN in Switzerland. The Web browser was released outside of CERN in 1991, first to other research institutions starting in January 1991 and to the general public on the Internet in August 1991.
- The World Wide Web, abbreviated as WWW and commonly known as the Web, is a system of interlinked hypertext documents accessed via the Internet.
- A **Web Browser** is a software program that enables you to view Web pages on your computer. Browsers connect computers to the Internet and allow people to “surf the Web.”
- With a web browser, one can view web pages that may contain text, images, videos, and other multimedia and navigate between them via hyperlinks.
- in WWW, documents and other web resources are identified by Uniform Resource Locators (URLs), interlinked by hypertext links, and can be accessed via the Internet.

WWW

- The World Wide Web (WWW) is a combination of all resources and users on the Internet that are using the Hyper Text Transfer Protocol (HTTP)
- From the World Wide Web Consortium (W3C)

"The World Wide Web is the universe of network-accessible information, an embodiment of human knowledge”

Some Common Terms

- A site or area on the World Wide Web that is accessed by its own Internet address is called a **Web site**.

- **A Web Page** is like a page in a book. Websites often have several pages that you can access by clicking on **links.** A Web site can be a collection of related **Web pages**.

- Each Web site contains a **home page** (this is the original starting page) and may also contain additional pages.

- Different computers will have different home pages. You can set your own webpage.

Parts of a Web Address

- A web address is typically composed of **four parts**:
- For example, the address **http://www.google.ca** is made up of the following areas:
- **http://**
  This Web server uses Hypertext Transfer Protocol (HTTP). This is the most common protocol on the Internet.
- **www**
  This site is on the World Wide Web.
- **google**
  The Web server and site maintainer.
- **ca**
  This tells us it is a site in Canada.

- Endings of web pages tells us a bit about the page. Some common endings to web addresses are:
  - **com** (commercial)
  - **edu** (educational institution)
  - **gov** (government)
  - **net** (network)
  - **org** (organization)

- You might also see addresses that add a country code as the last part of the address such as:
  - **in** (India)
  - **ca** (Canada)
  - **uk** (United Kingdom)
  - **fr** (France)
  - **us** (United States of America)
  - **au** (Australia)

Internet

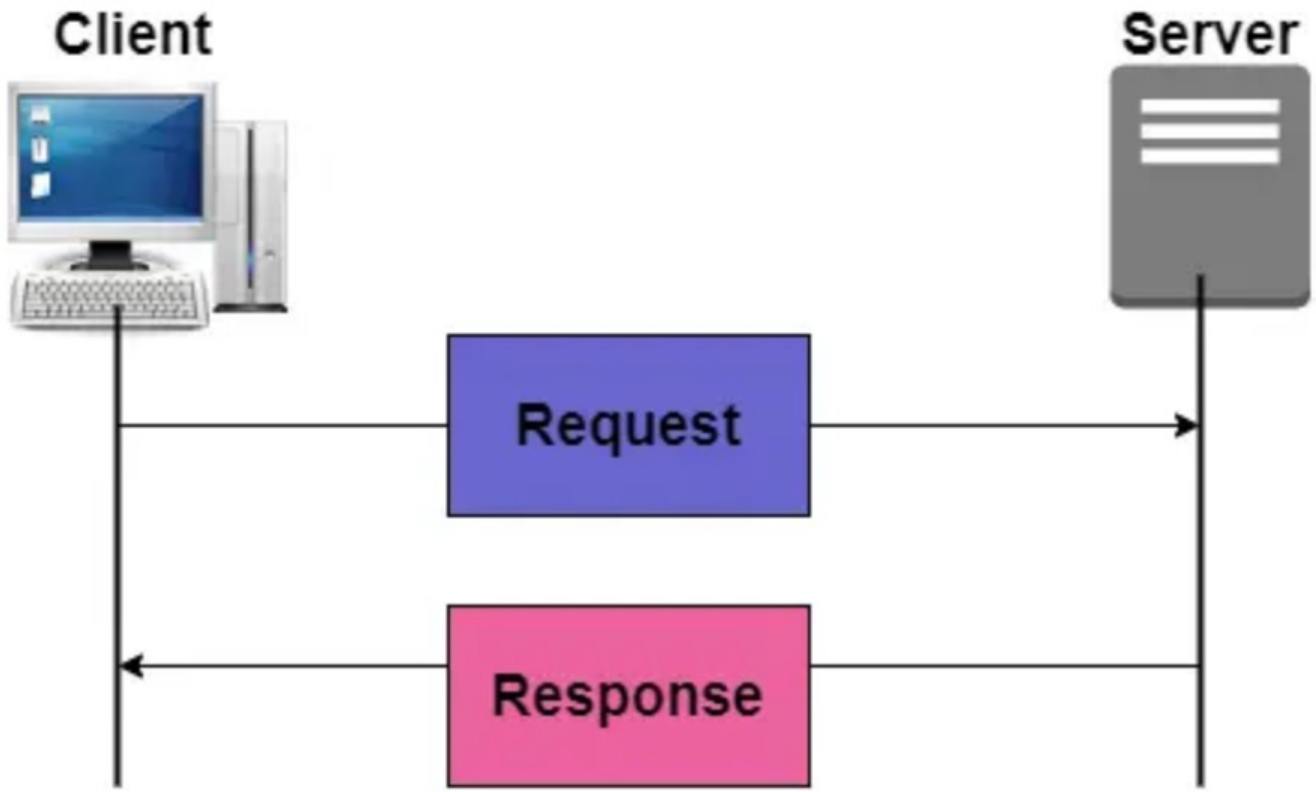
- The Internet is the global system of interconnected computer networks that use the Internet protocol suite (TCP/IP) to link devices worldwide.
- It is a network of networks that consists of private, public, academic, business, and government networks of local to global scope, linked by a broad array of electronic, wireless, and optical networking technologies.
- The Internet carries a vast range of information resources and services, such as the inter-linked hypertext documents and applications of the World Wide Web (WWW), electronic mail, telephony, and file sharing.

WWW	Internet
It Is a collection of web pages that consists of pieces of information	It is a global network of networks that facilitates the working of www.
It is commonly known as web	It is commonly known as net
www uses HTTP as its protocol	The Internet has an internet protocol (IP) for its functioning
It is considered as software oriented	It is considered as hardware with a physical infrastructure
WWW is service on top of that infrastructure.	Internet is infrastructure.
It was invented in 1989 by Tim Berners Lee. It was built by research physicists to share their research findings among their colleagues	It was invented in 1960 during an experiment by the U.S. military to stay in touch in case of nuclear strikes.
It connects people around the globe	It connects computers and other devices
It is dependent on the internet in order to perform its functions	It is independent of WWW and has its own functioning
The first version was NSFNET (National Science Foundation Network)	The first version was formed was ARPANET (Advanced Research Projects Agency Network)
There are over 1.9 billion websites on the internet. These	There are around 4.96 billion internet users. These numbers

HTTP Protocol

- The Hypertext Transfer Protocol (HTTP) is an application-level protocol with the lightness and speed necessary for distributed, collaborative, hypermedia information systems.
- It is a generic, stateless, object-oriented protocol which can be used for many tasks, such as name servers and distributed object management systems, through extension of its request methods (commands).
- A feature of HTTP is the typing of data representation, allowing systems to be built independently of the data being transferred.

HTTP Protocol

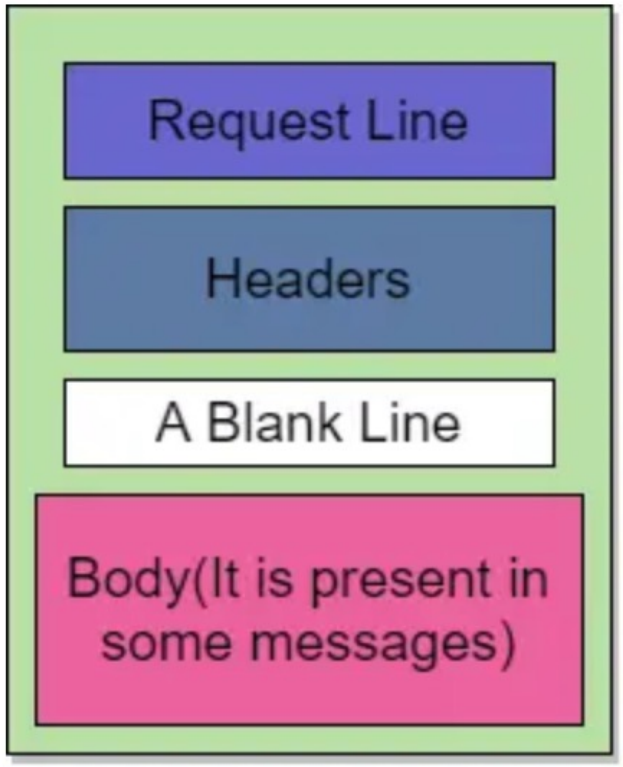


HTTP Protocol: Request and Response Paradigm

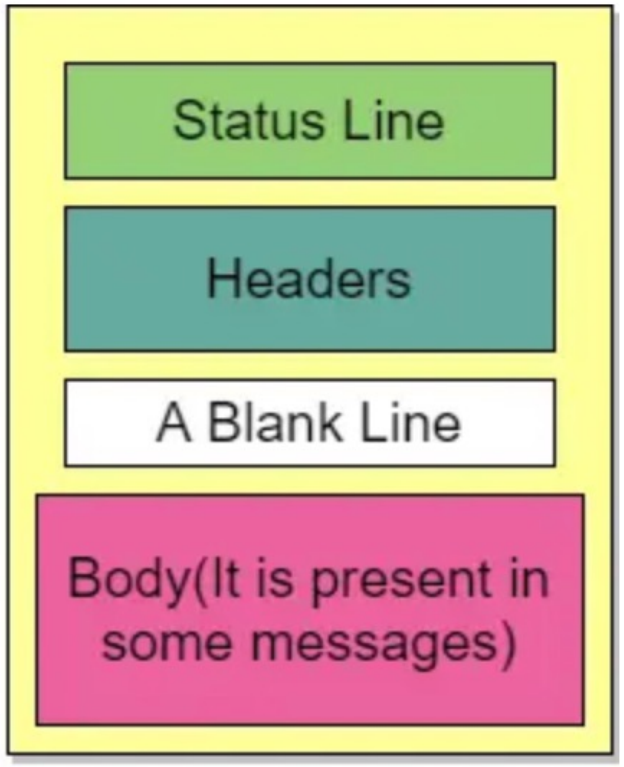
- The HTTP is based on a request/response paradigm.
- A client establishes a connection with a server and sends a request to the server in the form of a request method, URL, and protocol version, followed by a MIME-like message containing request modifiers, client information, and possible body content.
- The server responds with a status line, including the message's protocol version and a success or error code, followed by a MIME-like message containing server information, entity maintain information, and possible body content.

**MIME - Multipurpose Internet Mail Extensions - It lets users exchange different kinds of data files, including audio, video, images and application programs, over email

HTTP Protocol: Request and Response Paradigm

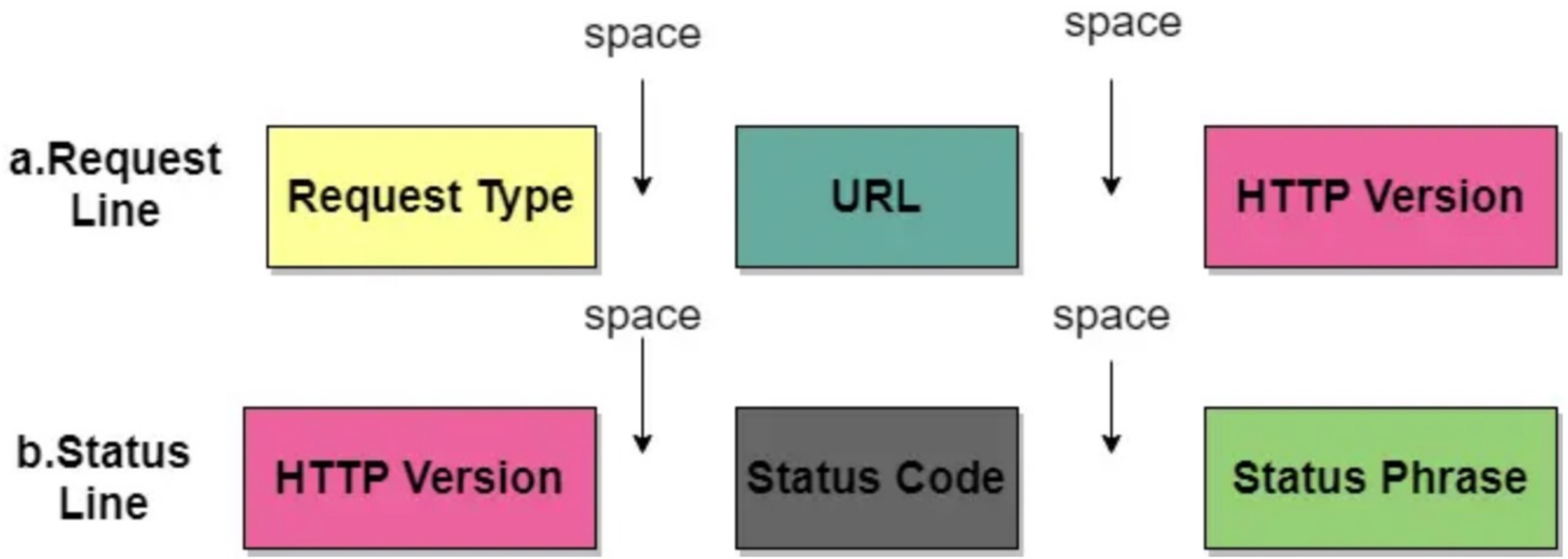


Request Message



Response Message

HTTP Protocol: Request and Response Paradigm



Request Type

Name of Method	Action
GET	This method is used to request a document from the server.
HEAD	This method mainly requests information about a document and not the document itself
POST	This method sends some information from the client to the server.
PUT	This method sends a document from the server to the client.
TRACE	This method echoes the incoming request.
CONNECT	This method means reserved
OPTION	In order to inquire about the available options.

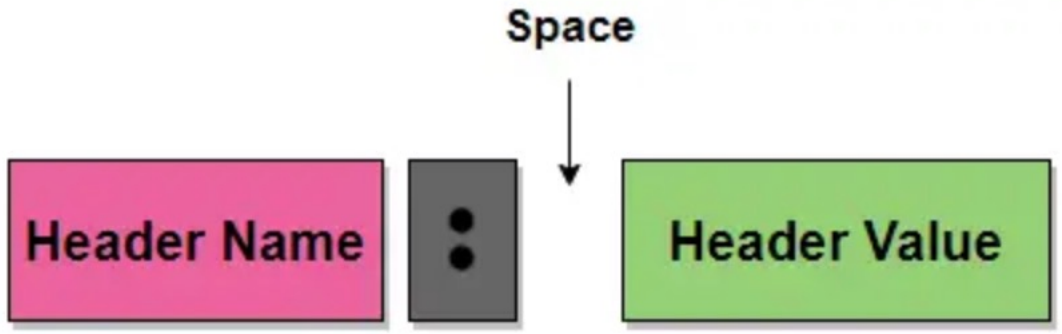
****The status code is the field of the response message.**

The status code consists of three digits.

****Status Phrase is used to explain the status code in the form of text**

HTTP Header

- The header is used to exchange the additional information between the client and the server. The header mainly consists of one or more header lines. Each header line has a header name, a colon, space, and a header value



Body

- It can be present in the request message or in the response message. The body part mainly contains the document to be sent or received.

Basic Features

There are three basic features that make HTTP a simple but powerful protocol:

- **HTTP is connectionless:** The HTTP client, i.e., a browser initiates an HTTP request and after a request is made, the client waits for the response. The server processes the request and sends a response back after which client disconnect the connection. So client and server knows about each other during current request and response only. Further requests are made on new connection like client and server are new to each other.
- **HTTP is media independent:** It means, any type of data can be sent by HTTP as long as both the client and the server know how to handle the data content. It is required for the client as well as the server to specify the content type using appropriate MIME-type.
- **HTTP is stateless:** This means that the server doesn’t keep any information about the client after it sends its response, and therefore it can’t recognize that multiple requests from the same client may be related.

Web Browser

- A web browser is a software program used to access the world wide web, often known as the Internet.
- It serves as a bridge between ourselves and the information on the internet.
- This content might be images, audio, movies, or other items on our displays via a web page.
- The web browser is a client application since it seeks information from the web server.
- The browser is a component of the client-server concept that serves as the client.
- It communicates with the web server using HTTP (hypertext transfer protocol).
- Google, Internet Explorer, Safari, Netscape Navigator, Mozilla Firefox, are some popular browsers.

Web Servers

- A web server is a software component and hardware that responds to client requests over the World Wide Web using HTTP and other protocols.
- A web server's primary function is to show website content by storing, processing, and distributing web pages to users.
- Web servers also offer SMTP (Simple Mail Transmission Protocol) and FTP, which are used for email, file transfer, and storage, in addition to HTTP.
- The web server software is accessible via domain names and guarantees that the site's content is delivered to the requesting user.
- The software side comprises several components, including at least a Web Server. The HTTP server can understand HTTP and URLs.

Web Browser	Web Server
A web browser is a software program that shows a web page. It normally connects to the internet to access the document.	A web server is a computer or software that provides services to other applications known as clients.
The web browser requests online pages and services from the server.	The Web server acknowledges, approves, and answers a web browser's request for web content or service.
A web browser is software that searches the internet for information using web pages.	The web server is in charge of linking. websites and web browsers.
The web browser is a conduit between the server and the client, displaying web content to the client.	A web server is a piece of software, or a system that manages web applications, creates responses and takes input from clients.
A controller, a client application, and interpreters are the components of web browser architecture.	Hardware, operating system software and web server software are the components of web server architecture.
The web browser sends an HTTP. request and receive an HTTP response.	The web server receives HTTP requests and responds with HTTP answers.
There is no processing model for web browsers.	Web servers have three processing models: process-based, thread-based, and hybrids.
The client's machine has a web browser installed.	The web server can be a remote machine on the other side of your system or even on the other side of the world, or it might be your home computer.
Mozilla, Chrome Browser, and Internet Explorer are examples of web browsers.	Apache Server is an example of a Web Server.

Web 2.0

"Web 2.0 is the business revolution in the computer industry caused by the move to the internet as a platform, and any attempt to understand the rules for success on that new platform."– Tim O' Reilly.

- Web 2.0 is not the second version of Web 1.0, It is an enhanced version of Web 1.0.
- 2.0 denotes two-way data traffic on the Web (R/W)
- It is also called Participatory web (or) Read/Write Web
- Earlier data traffic on the web was unidirectional(Read-Only)
- Web 2.0 refers to worldwide websites which highlight user-generated content, usability, and interoperability for end users.
- Web 2.0 is also called the participative social web.
- It does not refer to a modification to any technical specification, but to modify the way Web pages are designed and used.
- The transition is beneficial, but it does not seem that when the changes occur.
- Interaction and collaboration with each other are allowed by Web 2.0 in a social media dialogue as the creator of user-generated content in a virtual community.

Advantages of Web 2.0

- Available at any time, any place.
- Variety of media.
- Ease of usage.
- Learners can actively be involved in knowledge building.
- Can create dynamic learning communities.
- Everybody is the author and the editor, every edit that has been made can be tracked.
- User-friendly.
- Updates in the wiki are immediate and it offers more sources for researchers.
- It provides real-time discussion.

Usage of Web 2.0

The social Web contains several online tools and platforms where people share their perspectives, opinions, thoughts, and experiences. Web 2.0 applications tend to interact much more with the end user. As such, the end-user is not only a user of the application but also a participant in these 8 tools mentioned below:

- Podcasting
- Blogging
- Tagging
- Curating with RSS
- Social bookmarking
- Social networking
- Social media
- Web content voting

Features of Web 2.0

- Free sorting of information, permits users to retrieve and classify the information collectively.
- Dynamic content that is responsive to user input.
- Information flows between the site owner and site users using evaluation & online commenting.
- Developed APIs to allow self-usage, such as by a software application.
- Web access leads to concerns different, from the traditional Internet user base to a wider variety of users.

Web Design

- Web designing is the process of planning, conceptualizing, and implementing the plan for designing a website in a way that is functional and offers a good user experience.
- User experience is central to the web designing process.
- Websites have an array of elements presented in ways that make them easy to navigate.
- Web designing essentially involves working on every attribute of the website that people interact with, so that the website is simple and efficient, allows users to quickly find the information they need, and looks visually pleasing. All these factors, when combined, decide how well the website is designed.

Concepts of Effective Web Design

- Within just 10-15 seconds a visitor landing on your website can decide whether he/she should stay there or switch from there.
- No matter how much complex code you have written in the backend part of your website if your UI/UX part is not impressive then a user won’t take interest in other things and will move away from there.
- Website designing is subjective where a design can be impressive for one user, but the same design might be ugly for another user and that’s the reason it is one of the most complex and creative jobs for designers.
- Web designing is not just about adding content and elements on your website to make it beautiful, it’s also about how you add everything to make it easy to use.
- Some factors of poor website designing are -
  - If the user is unable to determine the purpose of your website,
  - If the user is facing difficulty in navigating from one page to another page,
  - If the page layout is not impressive and easy to understand.

Principles of Effective Web Design

- User-centric design
- Self-explanatory
- Test Early, Test Often
- Purpose (the needs of the user)
- Navigation / Communication –
  - organising information using headlines and sub headlines, using bullet points instead of long windy sentences
- Typefaces
  - Use easy to read fonts (Sans Serif fonts such as Arial and Verdana).
  - The ideal font size for reading easily online is 16px and stick to a maximum of 3 typefaces in a maximum of 3 point sizes to keep your design streamlined.
- Colours
  - Complementary colours create balance and harmony. Using contrasting colours for the text and background will make reading easier on the eye.
- Images
- “F” Pattern design
  - Most of what people see is in the top and left of the screen and the right side of the screen is rarely seen.
- Load time
- Mobile friendly / Multiple screen size friendly

Web Design Issues

- Browser & Operating System
- Bandwidth and Cache
- Display resolution
- Look and Feel of the Website
- Page Layout and linking
- Locating Information
- User centric design
- Sitemap

Browser & Operating System

- The different browsers and their versions greatly affect the way a page is rendered, as different browsers sometimes interpret same HTML tag in a different way.
- Different versions of HTML also support different sets of tags.
- Same browser may work slightly different on different operating system and hardware platform.
- To make a web page portable, test it on different browsers on different operating systems.
- Validate your HTML doc using W3C validator.

Bandwidth and Cache

- Connection speed plays an important role in designing web pages, if user has low bandwidth connection and a web page contains too many images, it takes more time to download.
- Browser provides temporary memory called cache to store the graphics.
- When user gives the URL of the web page for the first time, HTML file together with all the graphics files referred in a page is downloaded and displayed.

Display Resolution

- As we do not have any control on display resolution of the monitors on which user views our pages.
- Display or screen resolution is measured in terms of pixels and common resolutions are 800 X 600 and 1024 X 786. (1204 X 1024)
- We have 3 choices for Web page design.
  - Design a web page with fixed resolution.
  - Make a flexible design using HTML table to fit into different resolution.
  - We can use centered design to display page properly.

Look and Feel of the Website

- Look and feel of the website decides the overall appearance of the website.
- It includes all the design aspects such as
  - Web site theme
  - Presentation
  - Graphics
  - Visual structure
  - Fonts, Graphics, and colors
  - Navigation etc…

Page Layout and linking

- Website contains of individual web pages that are linked together using various navigational links.
- Page layout defines the visual structure of the page and divides the page area into different parts to present the information of varying importance.
- Page layout allows the designer to distribute the contents on a page such that visitor can view it easily and find necessary details.

Locating Information

- Webpage is viewed on a computer screen and the screen can be divided into five major areas such as center, top, right, bottom and left in this particular order.
- Well designed websites put
  - Left side provide links or menu
  - Top is used for logo and title or news
  - Right side provide link for other information
  - Bottom is used for quick link or copyright message

User-Centric Design

- It is very difficult for any Web designer to predict the exact behavior of the Web site users.
- However, idea of general behavior of common user helps in making design of the Web site user centric.
- Users either scan the information on the web page to find the section of their interest or read the information to get details.

Sitemap

- Many a times Web sites are too complex as there are a large number of sections and each section contains many pages.
- User gets confused about where he/she is and where to go from there.
- Provide the navigation bar on each page to jump directly to a particular section.
- Provide sitemap including links to each section and their page directly.

Planning and Publishing website

- To achieve higher success of the website in terms of user satisfaction, better planning is needed.
- Before we start developing a website, we should ask question such as
  - Why are we developing this website?
  - What do we achieve by developing this website?
  - who will use this website?
  - What are the information contents?
  - How are these contents organized?
  - What are the possible ways?

Designing Effective Navigation

- The most important design element in the web design after page layout is navigation design.
- Navigation means the ways to move from one page to another page in a Web site using hyperlinks provided on the page.
- If navigation design is not proper then user feels the problem in moving around the pages in your site in a desired manner or gets confused and leaves the site.

Tips for Effective Navigation

- Navigation links are either text based, i.e. a word or a phrase is used as a link, or graphical, i.e. a image, i.e. a icon or a logo is used as a link.
- Navigation links should be clear and meaningful.
- It should be consistent (accurate).
- Link should be understandable.
- Organize the links such that contents are grouped logically.

Tips for Effective Navigation

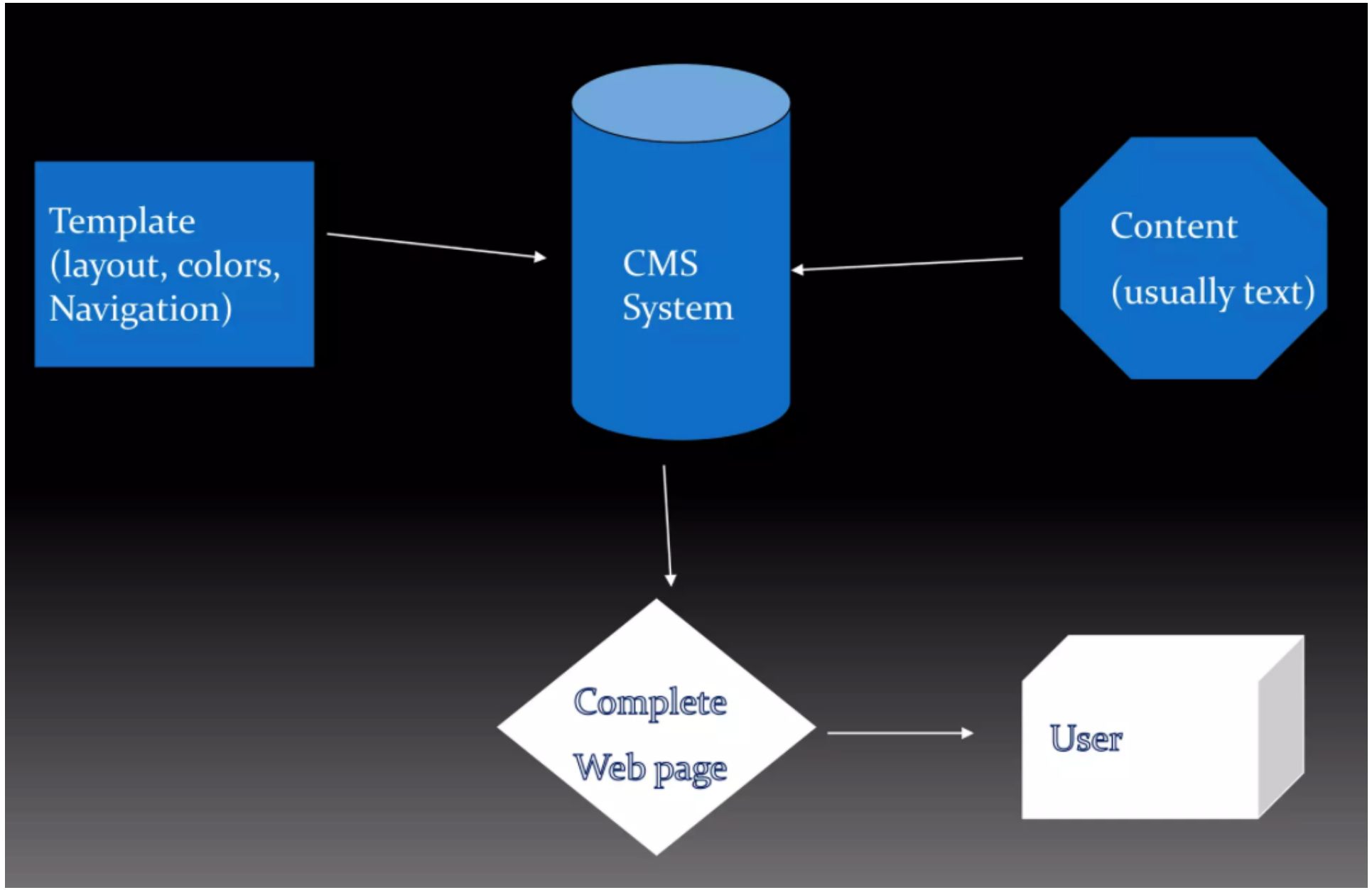
- Provide search link, if necessary, usually on top of the page.
- Use common links such as ‘about us’ or ‘Contact us’.
- Provide the way to return to first page.
- Provide the user with information regarding location
- Horizontal navigation bar can be provided on each page to directly jump to any section

Content Management System

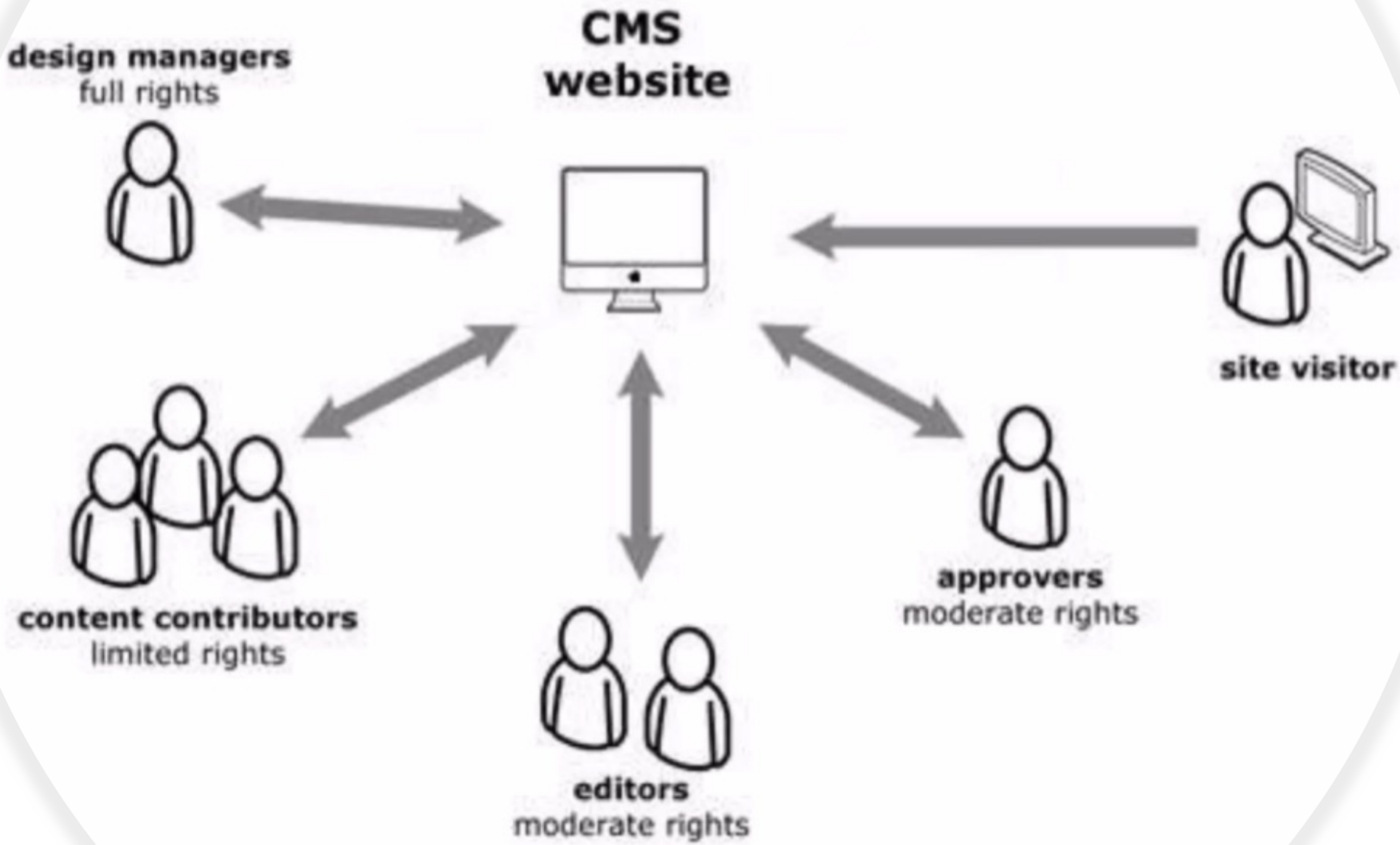
- A content management system (CMS) is software that helps users create, manage, and modify content on a website without the need for technical knowledge.
- In other words, a CMS lets you build a website without needing to write code from scratch (or even know how to code at all).
- Instead of building your own system for creating web pages, storing images, and other functions, the content management system handles all that basic infrastructure stuff for you so that you can focus on more forward-facing parts of your website.
- Some of the best and most popular CMS providers are: Wordpress, Joomla, Drupal, Optimizely CMS, Contentful, Squarespace, and Wix.

Content Management System

- Content Management Systems are typically used for enterprise content management (ECM) and web content management (WCM).
- An enterprise content management system manages both structured and unstructured content. It includes software, strategies and security to effectively manage content.
- A web content management system is similar to an ECM system, but the differentiating factor is the WCMS is for web content -- such as product pages on e-commerce websites. It contains a publishing tool and facilitates collaborative authoring.


Template
(layout, colors,
Navigation)
CMS
System
Content
(usually text)
Complete
Web page
User

How CMS Works



Advantages of Content Management System

- It's puts user in control.
- " Don't have to be expertise.
  - WHY TO LEARN HTML WHEN CMS AVAILABLE.!!
- Large scale changes can be made to site much easier.
- Structured content and content reuse.
- Security and control.
- Saves money and time.
- Open source so, it is WIN-WIN condition for user

Advantages of Content Management System

- Stronger collaboration and organization
  - With a CMS, multiple content marketing team members can contribute and help publish content.
- User friendly
  - With a CMS, users don’t have to learn HTML or CSS. No matter their skill level, users across the organization can create and publish content. A content management system makes it easy to upload content onto web pages and update it through a content editor.
- SEO and content optimization tools and plug-ins
  - With a CMS, you can add plug-ins and tools to increase your search ranking. These tools can include options within the front-end interface to add web page titles, meta descriptions, and alt tags.
- More time to spend on content
  - Content creators can concentrate on producing quality content. Marketing teams don't have to work with multiple files or code. They can share their work with colleagues easily, even if those colleagues are miles away. They have time to refine copy, tweak imagery, produce more video content, or conduct A/B testing on different subject lines, offers, CTAs, and formats.

Benefits of Content Management System

- **Ease of use**
  - Due to a graphical user interface, even those with limited technical knowledge can use the software.
- **Easy to search for information**
  - A built-in search function enables users to enter what they are searching for and have a list of items returned to them -- much like a Google search engine.
- **Easy to manage content**
  - Not only is creating content easy, but so is removing content. A CMS makes it easy to unpublish content to keep websites up to date.
- Acce**ssible from anywhere**
  - A CMS can be cloud-based or on premises, but users can access content from anywhere with a device that's connected to the internet.
- **Allows multiple users**
  - A CMS makes it easy to manage publishing permissions.
- **Instant content updates**
  - A CMS enables users to manage and update content in real time -- without needing to wait for a developer.
- **Easy to scale**
  - A CMS makes it easy for businesses to add new web pages as their business grows without the need for a developer.
- **Easy to update**
  - Development teams can roll out updates with just a few clicks.

JSON (JavaScript Object Notation)

- A lightweight text-based data-interchange format.
- Completely language independent.
- Based on a subset of the JavaScript Programming Language.
- Easy to understand, manipulate and generate
- JSON is
  - Straightforward syntax
  - Easy to create and manipulate
  - Can be natively parsed in JavaScript using eval0
  - Supported by all major JavaScript frameworks
  - Supported by most backend technologies
- JSON is not
  - a "document" format
  - ×a markup language
  - ×a programming language

JSON v/s XML

- Similarities:
  - Plain text formats
  - "Self-describing" (human readable)
  - Hierarchical (Values can contain lists of objects or values)
  - Open-source
- Dissimilarities:
  - JSON is lighter and faster than XML
  - JSON uses typed objects. All XML values are type-less strings and must be parsed at runtime.
  - Less syntax, no semantics
  - Properties are immediately accessible to JavaScript code

JSON v/s XML

The below XML document contains data about a book: its title, authors, date of publication, and publisher.

```
<Book>
    <Title>Parsing Techniques</Title>
    <Authors>
        <Author>Dick Grune</Author>
        <Author>Ceriel J.H. Jacobs</Author>
    </Authors>
    <Date>2007</Date>
    <Publisher>Springer</Publisher>
</Book>
```

Same data, JSON-formatted

```
{
    "Book":
        {
            "Title": "Parsing Techniques",
            "Authors": [ "Dick Grune", "Ceriel J.H. Jacobs" ],
            "Date": "2007",
            "Publisher": "Springer"
        }
}
```

JSON	XML
JSON stands for javascript object notation.	XML stands for an extensible markup language.
The extension of json file is .json.	The extension of xml file is .xml.
The internet media type is application/json.	The internet media type is application/xml or text/xml.
The type of format in JSON is data interchange.	The type of format in XML is a markup language.
It is extended from javascript.	It is extended from SGML.
The object created in JSON has some type.	XML data does not have any type.
The data types supported by JSON are strings, numbers, Booleans, null, array.	XML data is in a string format.
It does not have any capacity to display the data.	XML is a markup language, so it has the capacity to display the content.
JSON has no tags.	XML data is represented in tags, i.e., start tag and end tag.
JSON is quicker to read and write.	XML file takes time to read and write because the learning curve is higher.
JSON can use arrays to represent the data.	XML does not contain the concept of arrays.
It can be parsed by a standard javascript function. It has to be parsed before use.	XML data which is used to interchange the data, must be parsed with respective to their programming language to use that.
It can be easily parsed and little bit code is required to parse the data.	It is difficult to parse.
File size is smaller as compared to XML.	File size is larger.
JSON is data-oriented.	XML is document-oriented.
It is less secure than XML.	It is more secure than JSON.

JSON v/s XML

- Despite the many differences between JSON and XML, what mainly distinguishes them is data parsing.
- JSON can easily be parsed by a regular JavaScript function since it is already integrated. The same does not happen with XML, which has to be parsed with an XML parser, thus being more difficult and slow.
- From developer’s point of view, JSON is faster and easier to use.
- Even though XML is slower and more complex, it also provides additional features that, to these days, JSON has not yet developed.
- Technology never stops evolving, and as JavaScript became one of the most popular programming languages, JSON also began to gain attention increasingly. Further, once JSON is simpler, easier to use, and has an overall outstanding performance with a good speed, it didn't take long until developers started utilizing it.
- To perform data exchanges that do not require many concerns regarding validation and syntax, JSON is most likely the best option.