CHAPTER 1

WEB BASICS

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Course Objectives

- At the end of this course you will be able to:
  - Identify difference between client side and server side programming.
  - Design and implement a micro-services.
  - Basic understanding on using HTML.
  - Basic understanding of how CSS affects designs.
  - Basic understanding of JavaScript and it's usage with micro-services.
  - Use PHP Framework as Server-side Framework to create micro-services.

Books and References

- Reference Books:
  - Robin Nixon, "*Learning PHP, MySQL & JavaScript*", 6th Edition, O'Reilly, ISBN: 978-1-492-09382-4
  - Programming the World Wide Web, 4th edition, Robert W. Sebesta, 2008, Pearson Addison Wesley
  - Kyle Simpson, "*You Don't Know JS – ES6 & Beyond*", 1st Edition, O'Reilly, ISBN: 978-1-491-90424-4
  - Matt Stauffer, "*Laravel Up & Running*", 2nd Edition, O'Reilly, ISBN: 978-1-492-04121-4
  - W3Schools Online Web Tutorials, www.w3school.com
  - OWASP Online Documentation https://owasp.org/Top10
  - World Wide Web Bible, Bryan Pfaffenberger, ISBN: 81-7029-781-8
  - The Complete reference to HTML and XHTML, Thomas Powell, McGraw-Hill Education; 4th edition

Late Submission Policy

1. All assignments are due on the specified due date and time. No late work will be accepted without prior approval from the Lecturer.
2. Students may submit late assignments up to 24 hours after the due date and time. Late assignments will receive a maximum grade of 80%, which reflects a 20% reduction in the original grade.
3. Students must notify the Lecturer in writing (email, Canvas message, etc.) of their intent to submit a late assignment within 24 hours of the due date and time. Failure to notify the Lecturer may result in the late assignment not being accepted.
4. Late assignments submitted more than 24 hours after the due date and time will not be accepted, and the student will receive a grade of zero for the assignment.
5. Late submissions will not be considered for participation points or other related coursework. Any participation points related to the assignment will only be awarded to those who submit the assignment on time.
6. If a student anticipates needing an extension beyond the 24-hour grace period, they must contact the Lecturer as soon as possible and provide appropriate documentation to support their request.
7. Instructors reserve the right to modify this policy on a case-by-case basis to ensure that students are not unfairly penalized for circumstances beyond their control.

Contents:

1. Introduction to Web
2. Web Architecture
3. Web Protocols
4. DNS
5. HTML
6. CSS

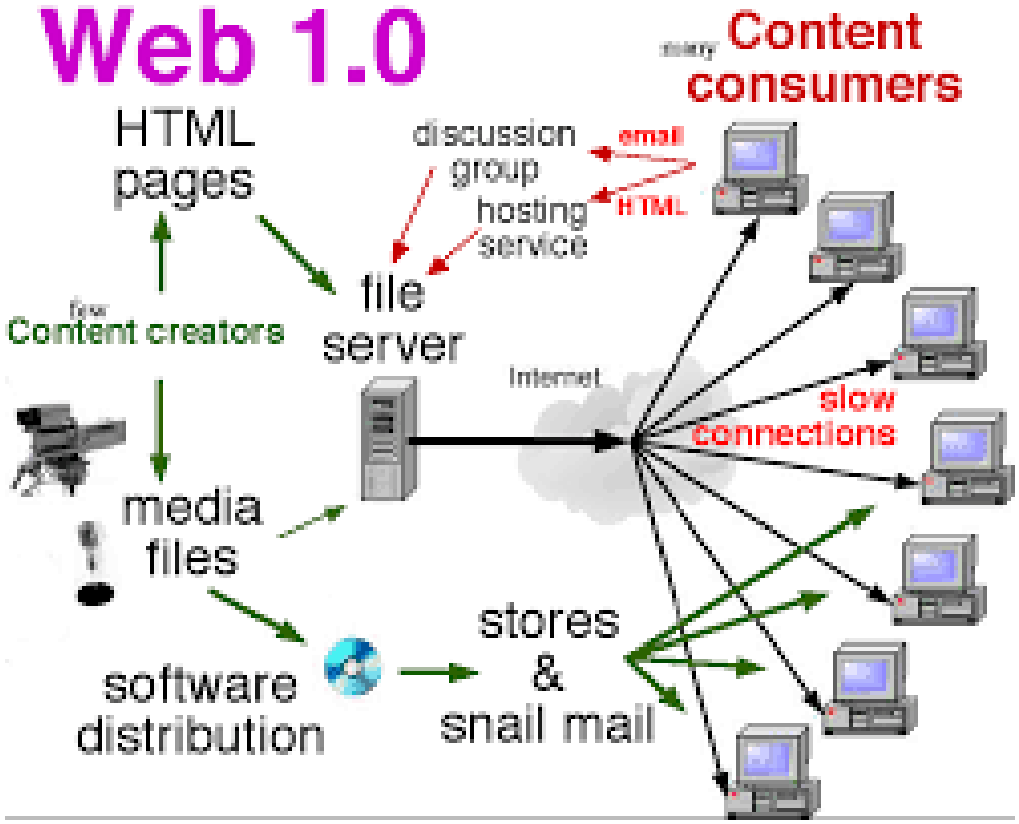
1. Introduction to Web

- The web has gone through three major generations of development: Web 1.0, Web 2.0, Web 3.0, and Web x.0
- Each generation has brought new features and capabilities to the web, leading to significant changes in how we interact with information and with each other online
- Understanding the evolution of the web is important for staying up-to-date with the latest technologies and trends

Web 1.0

- Web 1.0 is the first generation of the web, also known as the “static web”.
- It was a one-way communication platform where users could only consume information.
- Content was primarily text-based with some basic graphics and images.
- Websites were created using HTML, CSS, and JavaScript.
- Examples:
  - early search engines like Yahoo! and AOL.

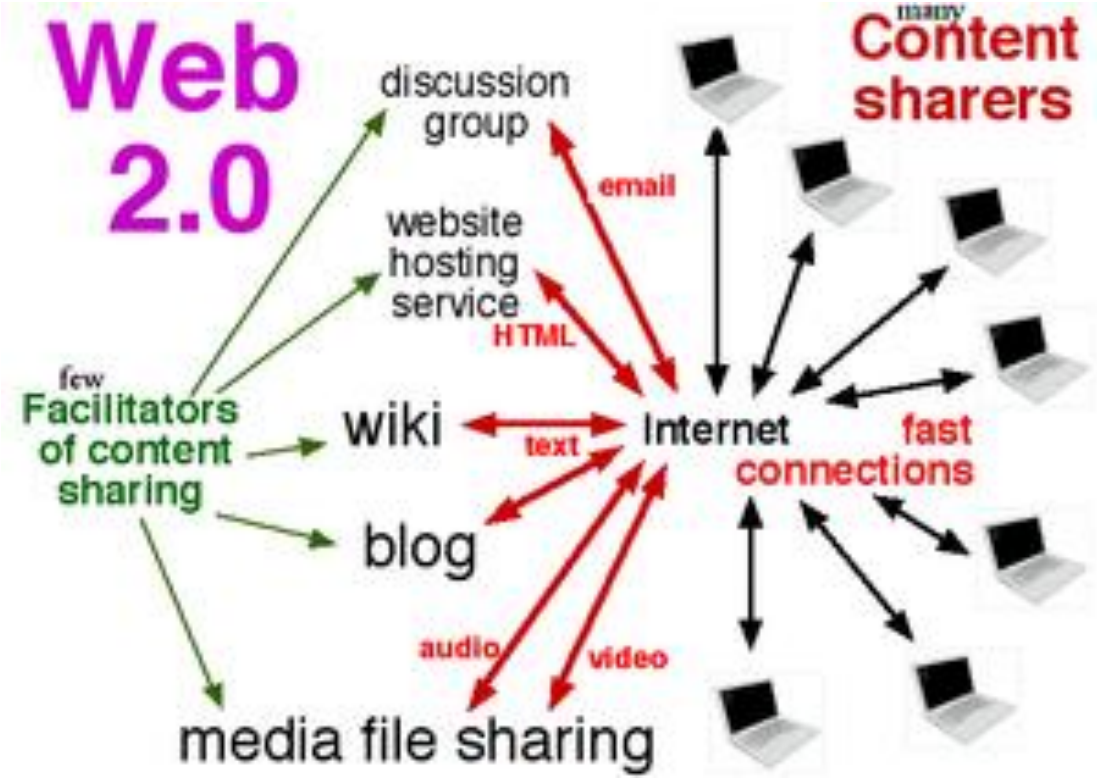
Web 1.0


Web 1.0
many
Content consumers
HTML pages
discussion group hosting service
email
HTML
few
Content creators
file server
Internet
slow connections
media files
software distribution
stores & snail mail

Web 2.0

- Web 2.0 is the second generation of the web, also known as the “dynamic web”.
- It is a two-way communication platform where users can both consume and contribute information.
- Content is more interactive and multimedia-based, with social media, blogs, and wikis becoming popular.
- Websites are created using more advanced languages and frameworks like Ruby on Rails, PHP, and Node.js.
- Examples
  - Facebook, Twitter, Wikipedia etc.

Web 2.0


Web 2.0
discussion group
website hosting service
few
Facilitators of content sharing
wiki
blog
media file sharing
email
HTML
text
audio
video
Internet
many
Content sharers
fast connections

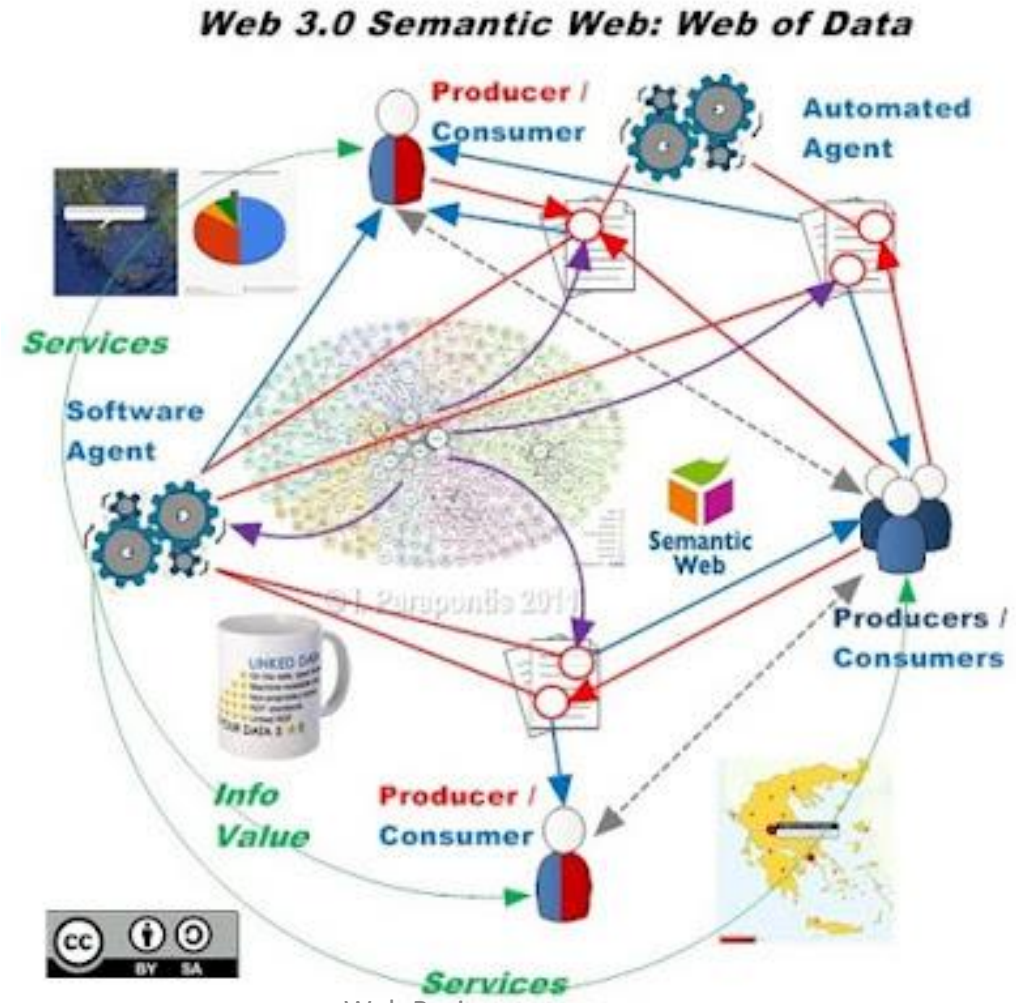
Key Features of Web 2.0

- Social media:
  - Web 2.0 introduced the concept of social media, where users could create and share content with others
- User-generated content:
  - users became creators and contributors, not just consumers of content
- Interactivity:
  - made the web more interactive and dynamic, with features like commenting, sharing, and real-time updates
- Rich media:
  - made it possible to share and consume multimedia content like videos, photos, and podcasts
- Collaboration:
  - encouraged collaboration and cooperation among users, leading to the development of platforms like Wikipedia and GitHub

Web 3.0

- Web 3.0 is the third generation of the web, also known as the “semantic web”.
- It is a more intelligent and personalized web, with a focus on artificial intelligence, machine learning, and blockchain technology.
- Content is highly personalized, with websites adapting to user’s preferences and providing a more immersive experience.
- Websites are created using advanced technologies like the Internet of Things (IoT) and augmented reality.
- Examples:
  - Ethereum, IPFS, Filecoin etc.

Web 3.0

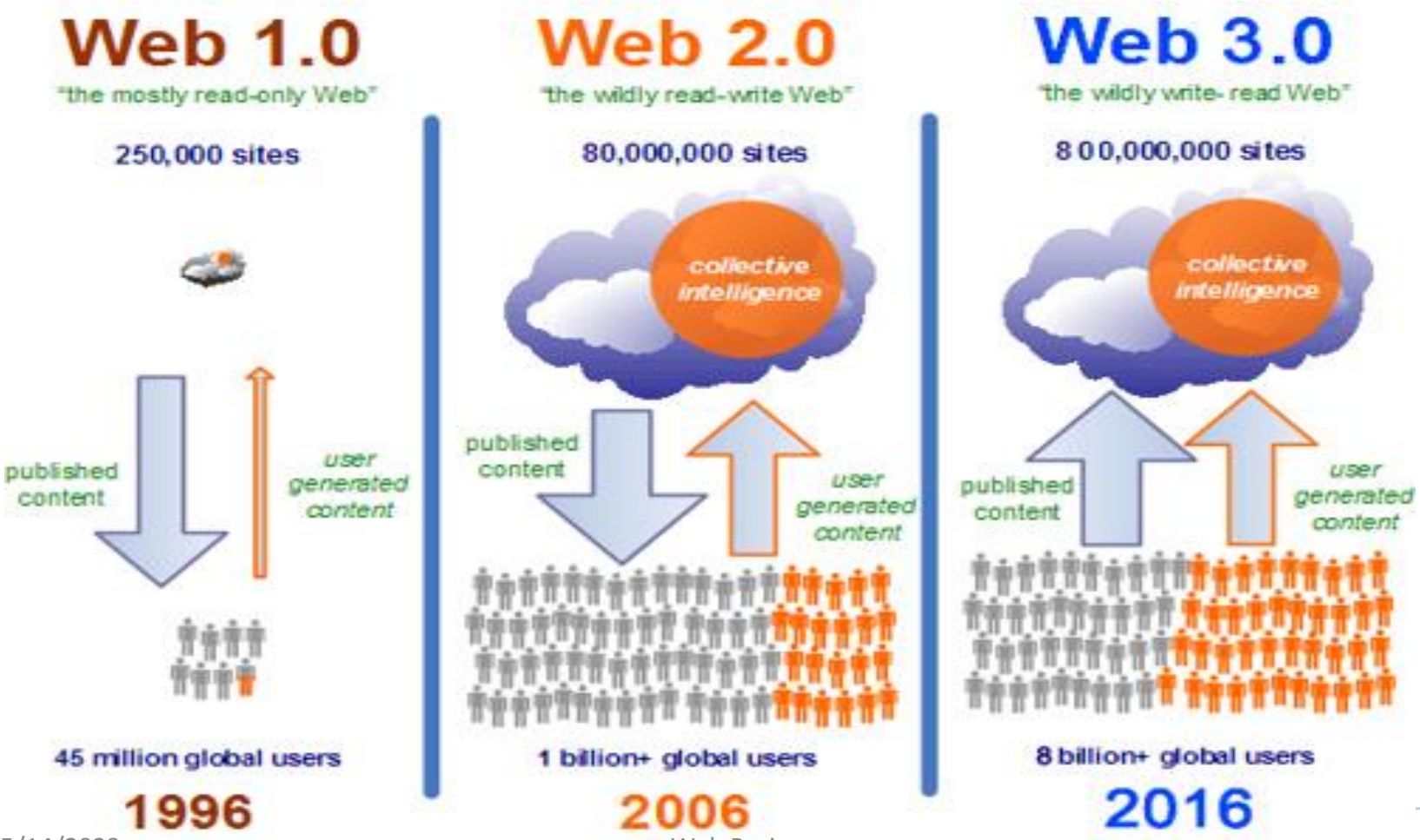


Key Features of Web 3.0

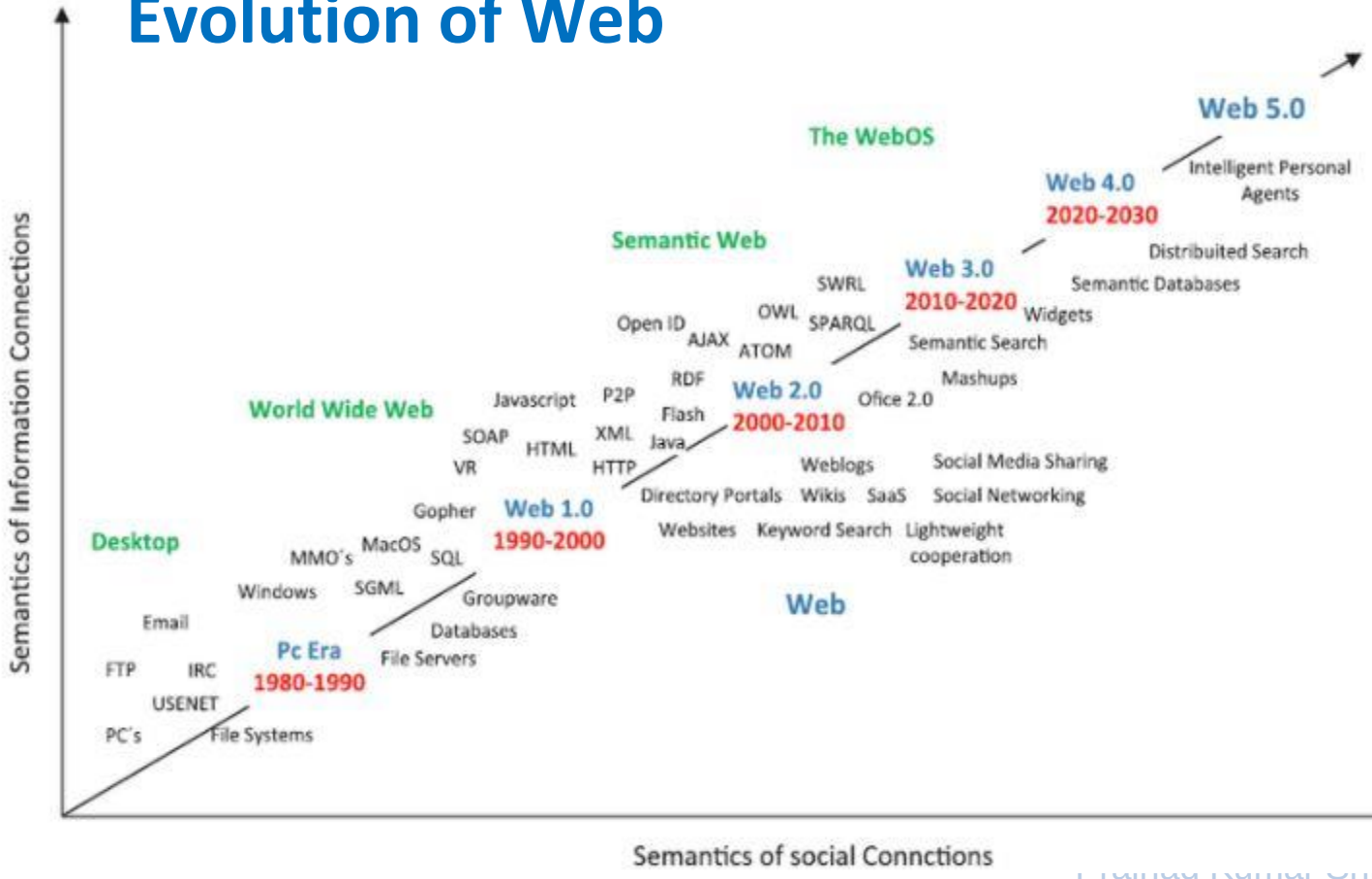
- Semantic web:
  - Web 3.0 is sometimes called the "Semantic web" because it uses metadata and other technologies to make data more interconnected and understandable by machines
- Artificial intelligence:
  - integrates artificial intelligence (AI) technologies like machine learning, natural language processing, and computer vision to provide more personalized and intuitive experiences for users
- Decentralization:
  - aims to be more decentralized, with distributed systems and blockchain technology providing greater security and control over data
- Interoperability:
  - emphasizes interoperability, making it easier for different platforms and applications to work together seamlessly

Key Features of Web 3.0

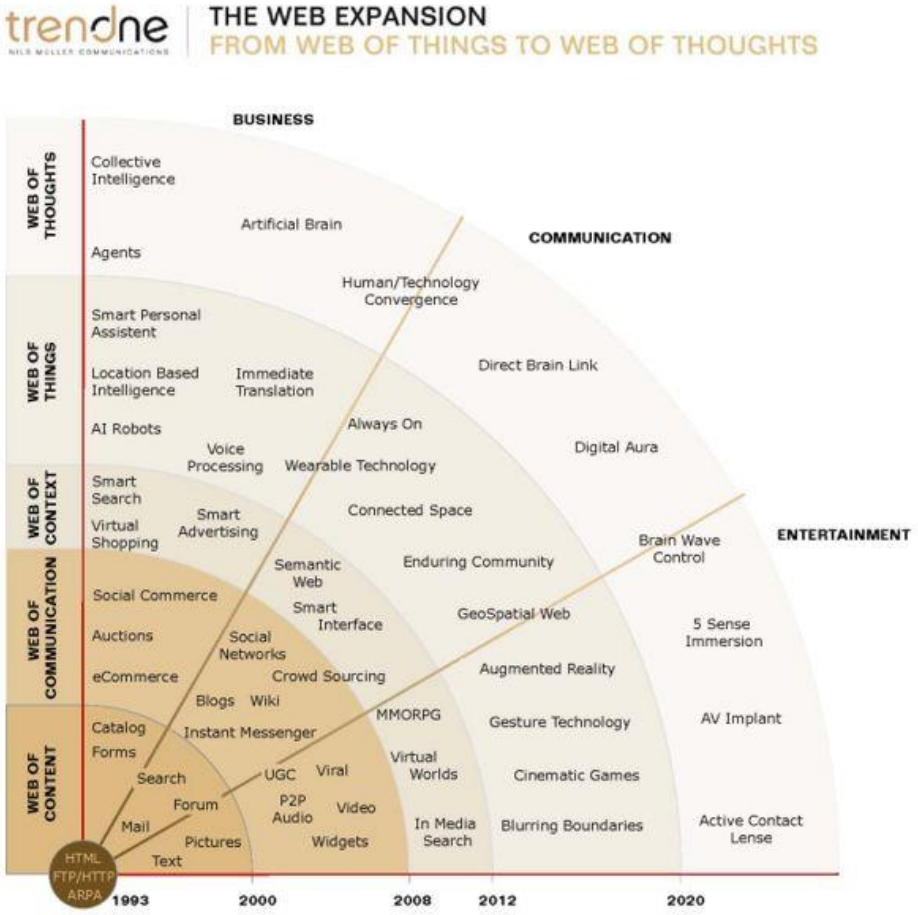
- Augmented reality and virtual reality:
  - leverages augmented reality (AR) and virtual reality (VR) technologies to create immersive experiences that blur the line between the physical and digital worlds
- Intelligent agents:
  - introduces intelligent agents, or virtual assistants, that can help users navigate and interact with the web in more intuitive and efficient ways.


Web 1.0
"the mostly read-only Web"
250,000 sites
published content
user generated content
45 million global users
1996
Web 2.0
"the wildly read-write Web"
80,000,000 sites
collective intelligence
published content
user generated content
1 billion+ global users
2006
Web 3.0
"the wildly write- read Web"
8 00,000,000 sites
collective intelligence
published content
user generated content
8 billion+ global users
2016

Evolution of Web



Evolution of Web

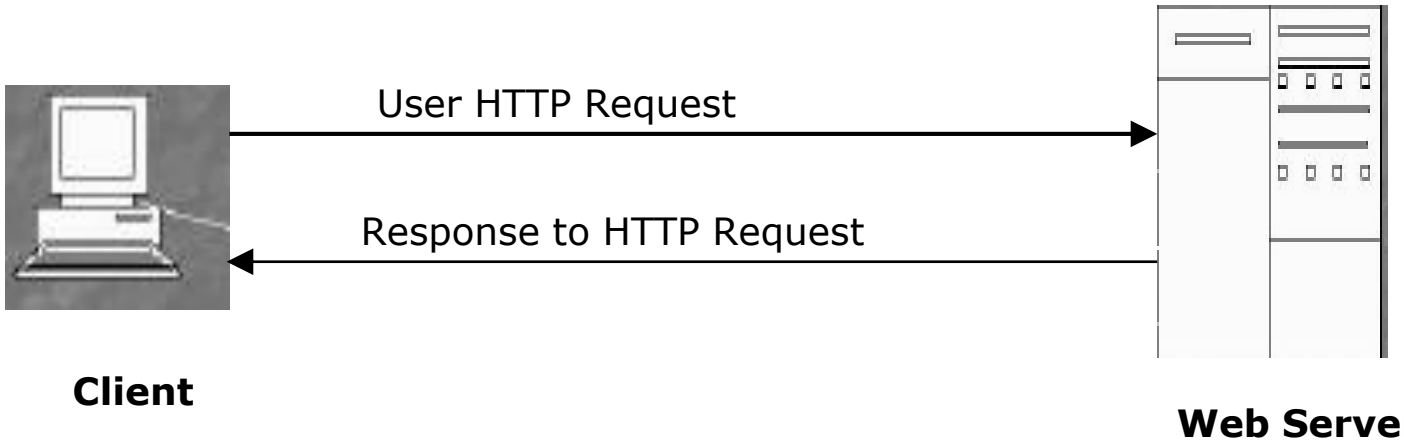


2. Web Architecture

- conceptual structure of the internet.
- Types of web architecture include:
  - two-tier architecture
  - three-tier architecture

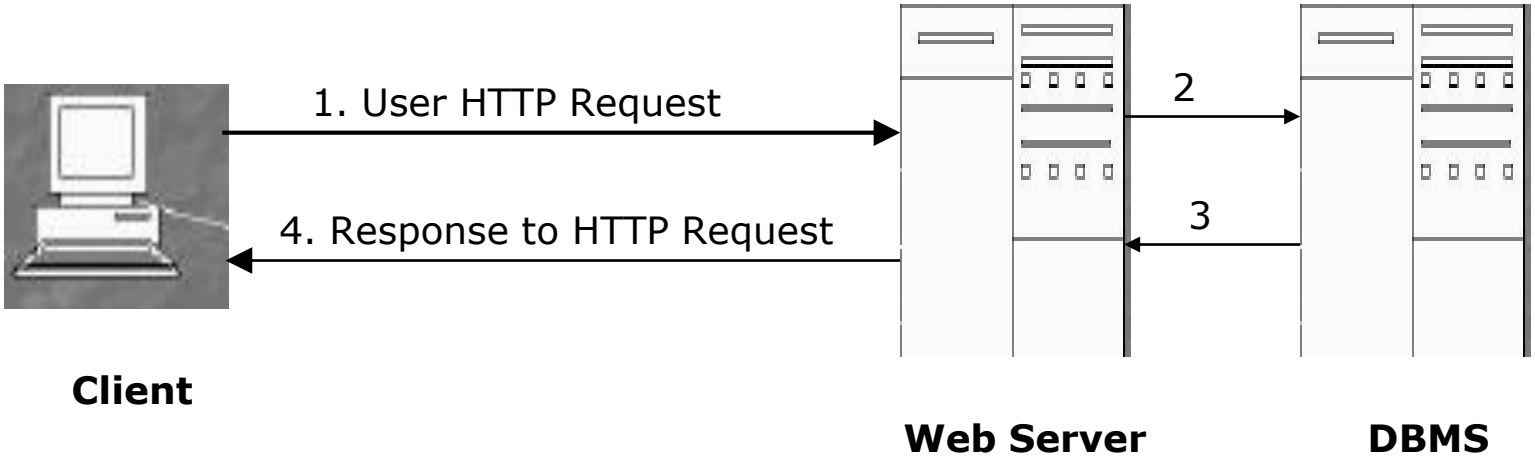
Two-tier Architecture

- Also known as “Client-Server” model/architecture.
  - First tier => client
  - Second tier => database server and web application



Three-tier Architecture

- First tier => client
- Second tier => web server
- Third tier => database server



3. Web Protocols

- Web protocols are a set of rules and standards that govern how information is exchanged on the internet
- Understanding web protocols is important for developing and managing web applications and websites
- This presentation will provide an overview of some of the most important web protocols.
- Different Protocols:
  - HTTP(s)
  - POP
  - SMTP
  - FTP

Hypertext Transfer Protocol (HTTP)

- HTTP is the protocol used for transferring data over the web
- It enables communication between clients (such as web browsers) and servers (such as web servers)
- Two phases of HTTP:
  - Request
  - Response
- Phases consists of:
  - Header
  - Body
- HTTP is a request-response protocol, meaning that a client sends a request to a server, and the server sends a response back to the client
- HTTP is stateless, which means that each request and response is independent of previous requests and responses

HTTP Requests

- HTTP requests are sent by clients to servers to request information or actions
- There are several types of HTTP requests, including:
  - **GET**: retrieves information from the server
  - **POST**: sends data to the server to create or update a resource
  - **PUT**: sends data to the server to update a resource
  - **DELETE**: deletes a resource from the server
- HTTP requests include a URL, headers, and an optional request body

HTTP Responses

- HTTP responses are sent by servers to clients in response to a request
- There are several types of HTTP responses, including:
  - 1xx: Informational responses
  - 2xx: Success responses
  - 3xx: Redirection responses
  - 4xx: Client error responses
  - 5xx: Server error responses
- HTTP responses include headers and an optional response body

HTTP Status Codes

- When something goes wrong, the web server returns a special "error code".

First Digit	Category
1	Informational
2	Success
3	Redirection
4	Client error
5	Server error

Simple Mail Transfer Protocol (SMTP)

- SMTP is a protocol used for sending email messages between servers
- It enables clients to send messages to a server for delivery to a recipient
- SMTP can be used with a range of email clients and servers, and can support both text and HTML messages
- SMTP typically uses port 25 for communication

Post Office Protocol (POP)

- POP is a protocol used for retrieving email messages from a server
- It enables clients to download messages from a server for local storage and viewing
- POP can be used with a range of email clients and servers, and typically uses port 110 for communication
- POP can be configured to either delete messages from the server after downloading or leave them on the server

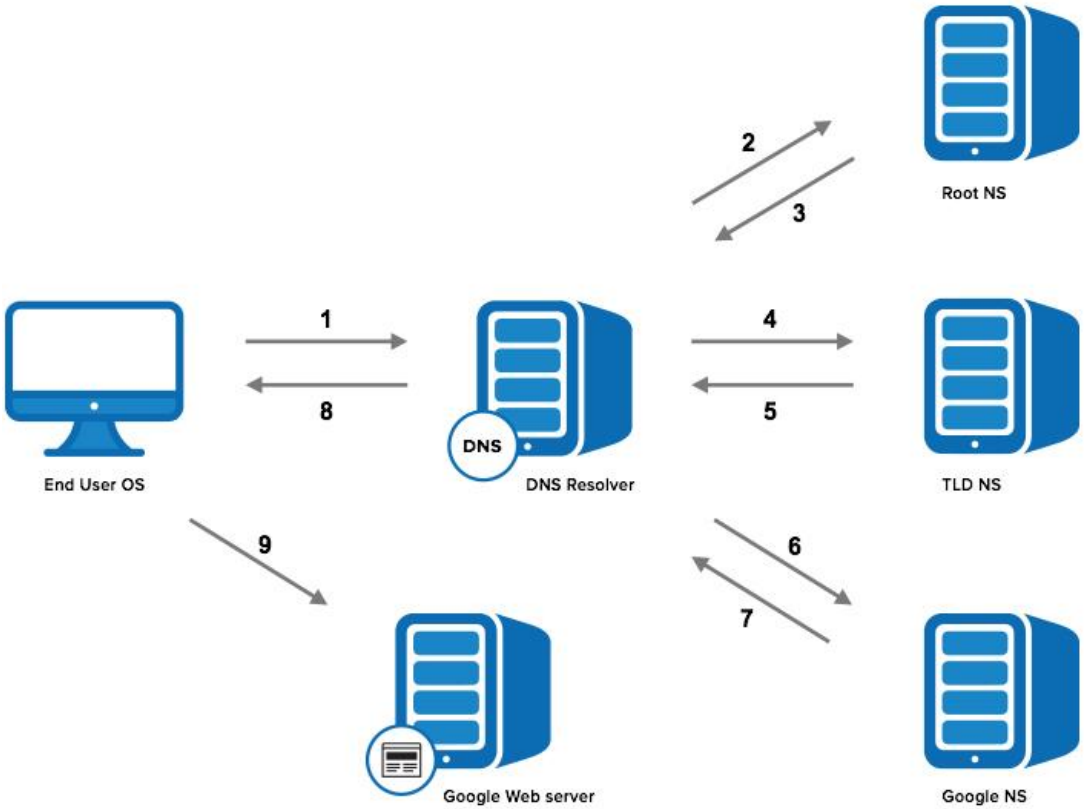
File Transfer Protocol (FTP)

- FTP is a protocol used for transferring files between computers over the internet
- It enables clients to upload and download files from servers using a range of commands
- FTP can be used in a command-line interface or with a graphical user interface (GUI)
- FTP typically uses port 21 for communication

4. Domain Name System (DNS)

- Domain name is not identified by the computer.
- Domain names are mapped to IP addresses by ***name servers***.
  - Example: google.com -----> 142.250.176.14
- Many systems maintain a local cache called a hosts file.
  - Windows: C:\Windows\system32\drivers\etc\hosts
  - Mac: /private/etc/hosts
  - Linux: /etc/hosts

Domain Name Conversion



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