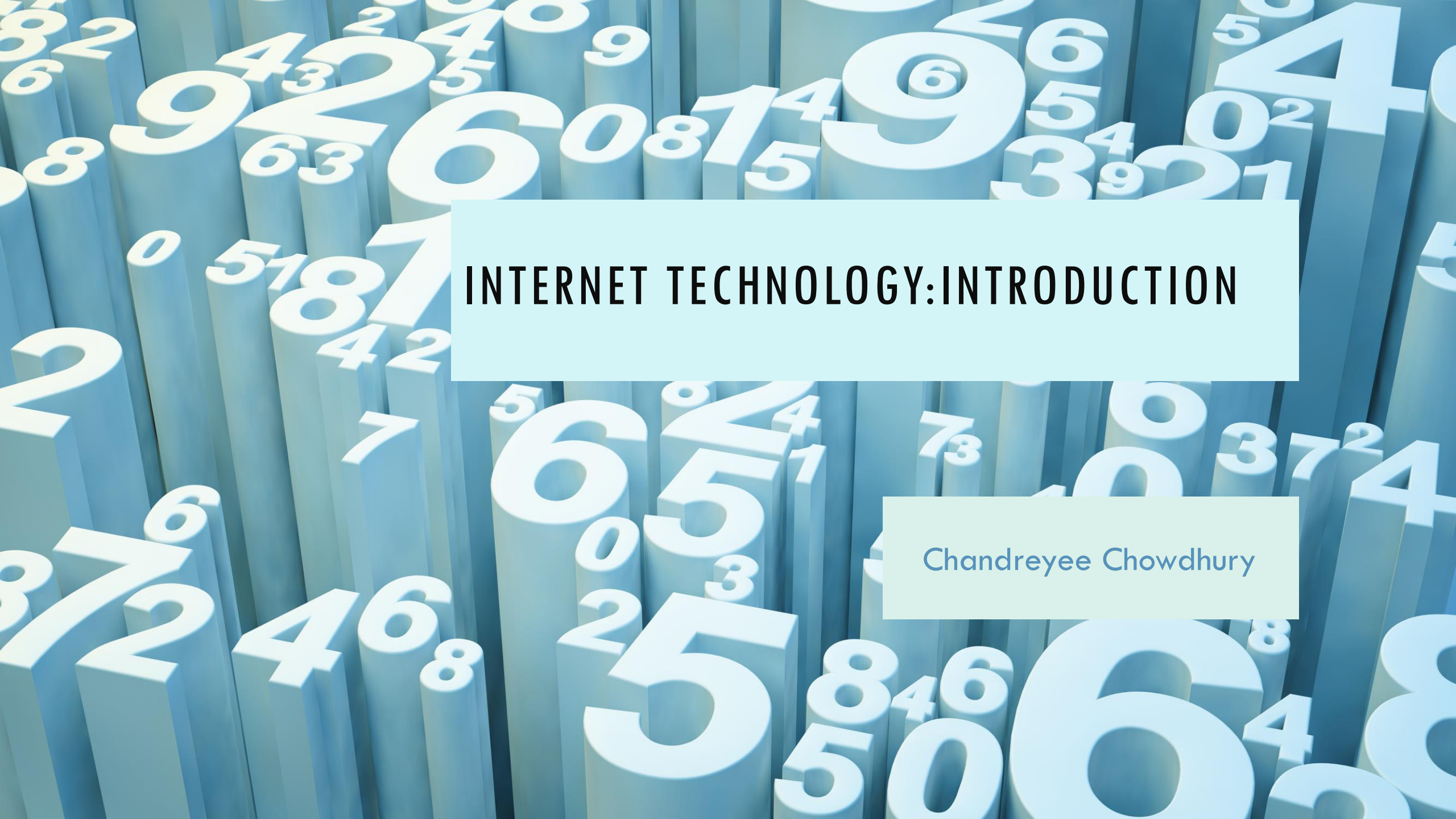


INTERNET TECHNOLOGY:INTRODUCTION

Chandreyee Chowdhury

HISTORY OF WEB APPLICATIONS

- 1945-1969
  - First Computer (ENIAC)
  - ARPANET

Military Applications

- 1970-1979
  - Computers were very expensive

Business Applications

- 1980-1989
  - PCs
  - Word excel
  - TCP/IP protocol stack
  - www first web browser and website in 1989

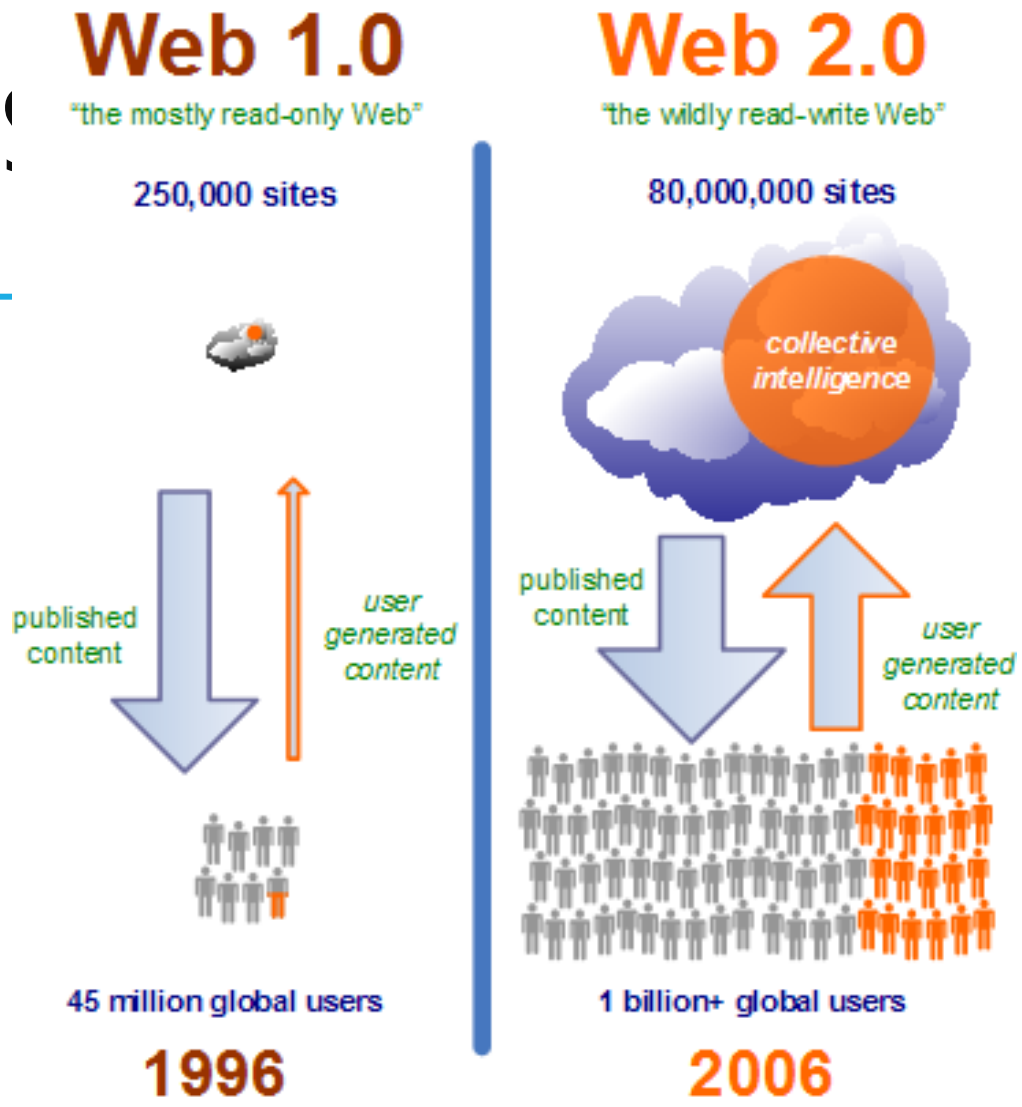
PC Applications

HISTORY OF WEB APPLICATIONS-WEB 1.0

- 1990-1999
  - The first website by Tim Burners Lee in 1990
  - The goal was to create a common information space in which people communicate by sharing information
  - Amazon, Google were formed
  - Read only web
  - Simple but massive valuation of internet based companies
  - Mostly static web pages
  - Less user interaction
  - Mozec –the first GUI based browser that later led to Netscape Navigator in 1994 and then Mozilla
  - Internet Explorer
  - Browser war

HISTORY OF WEB APPLICATIONS

- 2000-2009
  - Interactive with Ajax
    - Updated without reloading the entire page
    - User experience comparable with desktop applications
  - Social networking
  - Wikipedia, Facebook, Amazon EC2
  - Online commerce
  - Line blurring between desktop and web applications
  - Read-write web/ people-centric web
  - Cloud computing



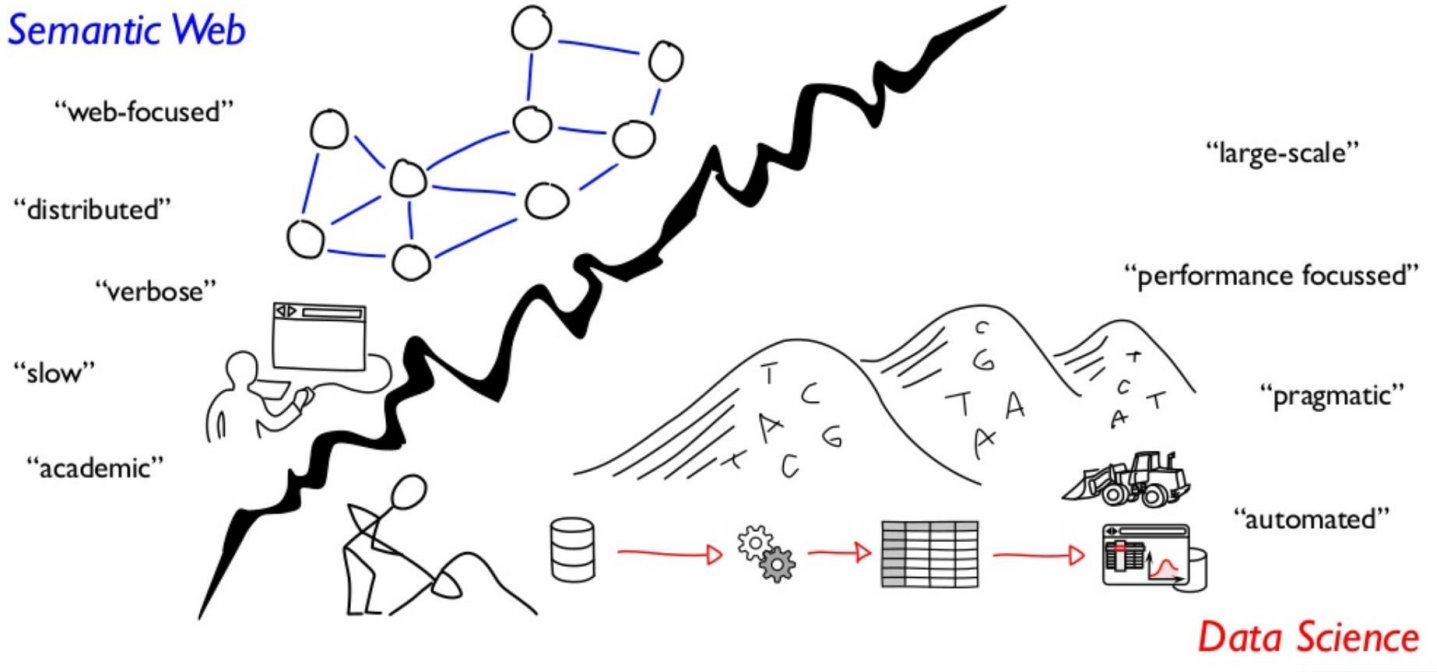
WEB APPS IN WEB 1.0

1. Static web pages- data closely related to presentation
2. More complicated server side scripts for richer applications
3. Incompatibility between browsers
4. Need for more user interaction
5. New technologies for better user experience
   - Client side scripts
   - Web caching

HISTORY OF WEB APPLICATIONS-WEB 3.0

- 2010-2019
  - HTML5
  - Responsive design
  - Mobile applications, IoT
  - Intelligent web in terms of recommendation systems
  - Intelligent web
    - Linking information from different websites to predict user behavior

SEMANTIC WEB



Semantic Web wants to transform the web from a "web of documents" into a "web of data".

- Motivation
  - Automated extraction of mundane stuffs
  - Better information retrieval

- Instead of asking machines to understand humans, semantic web help machines to solve well-defined problems on well-defined data via well-defined operations

- Machine facilitated understanding of the information on the www

- Resource description framework (RDF), knowledge graph

Lampa, Samuel. 2018. "Semantic Web ♡ Data Science? - Practical large scale semantic data handling with RDFIO and RDF-HDT." SlideShare, April 10. Accessed 2017-05-27.

https://cacm.acm.org/magazines/2021/2/250085-a-review-of-the-semantic-web-field/fulltext

WEB 2.0 AND WEB 3.0 ENABLERS

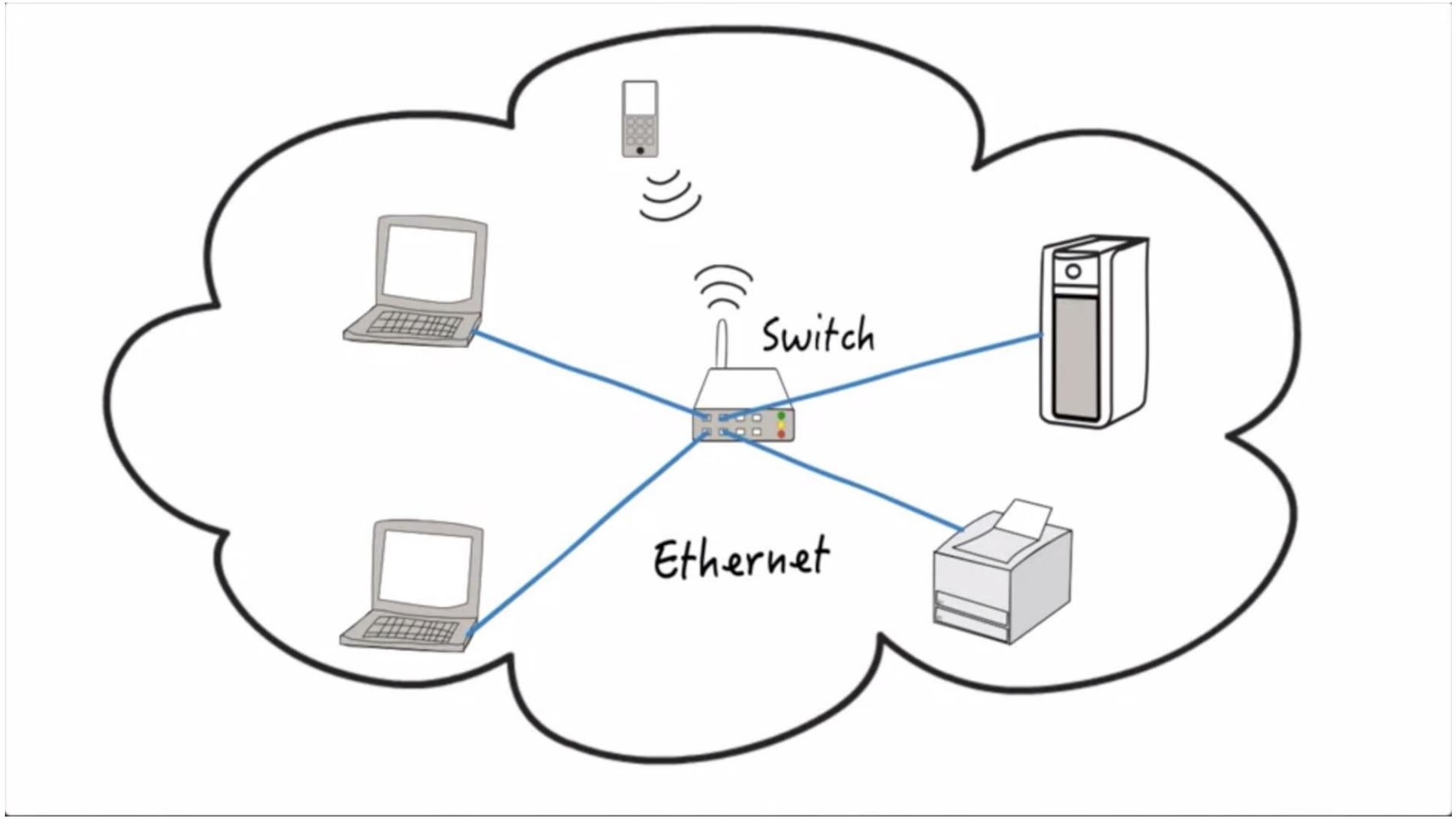
- Javascript
- Ajax-asynchronous delivery of content
- Web services interoperability through REST API
  - The ability to use services from other websites
- cloud computing (IAAS, SAAS, PAAS)
- Web enabled devices (IoT)
- Powerful mobile phones with location information
  - As powerful as a supercomputer just a decade ago
  - Sensors for richer user experience
  - Crowdsourcing

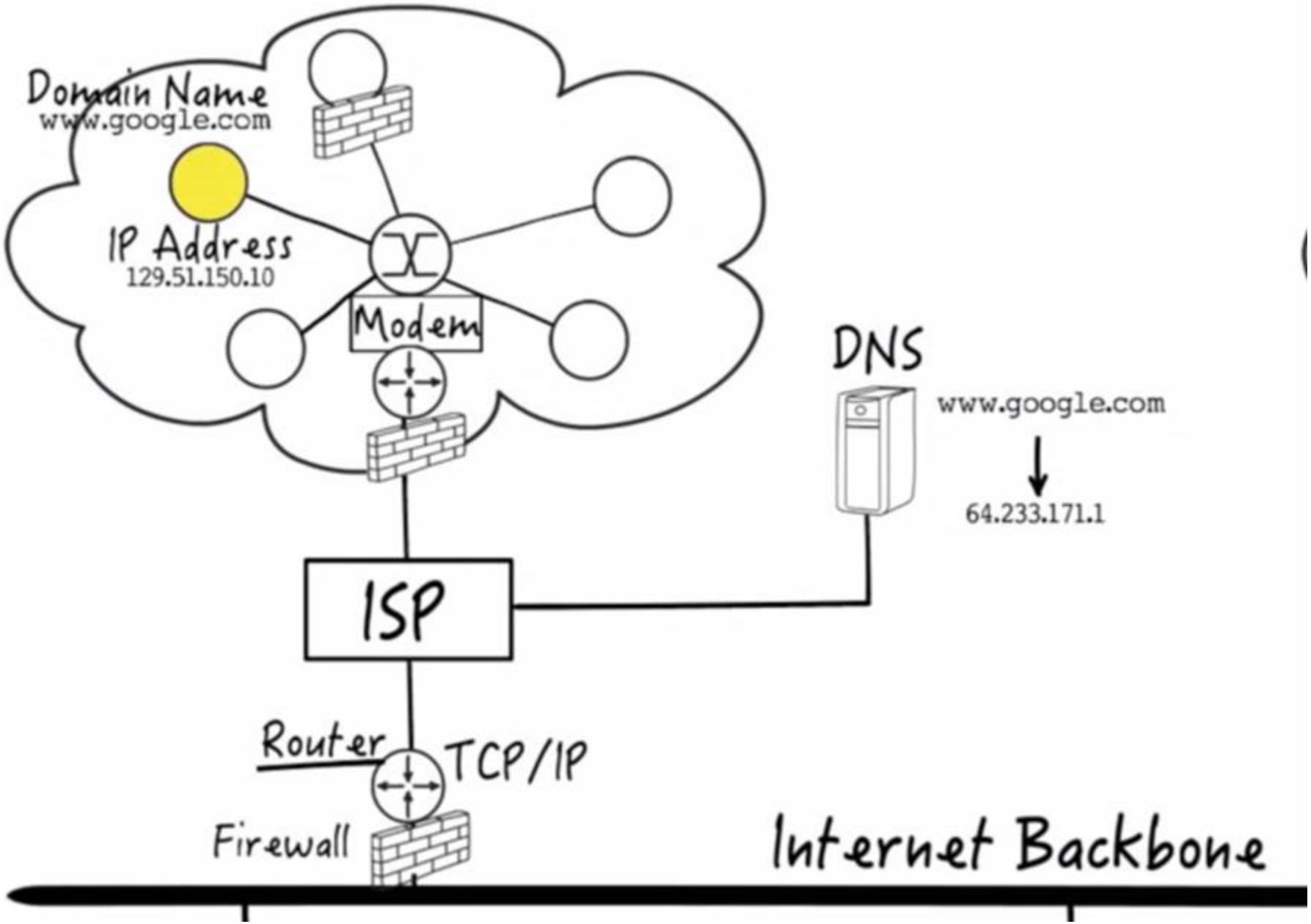
WEB 4.0

- Web 4.0
  - web of things
  - read-write-execution-concurrency web
- It ensures global transparency, governance, distribution, participation, collaboration into key communities such as industry, political, social and other communities
- Natural language based interfaces

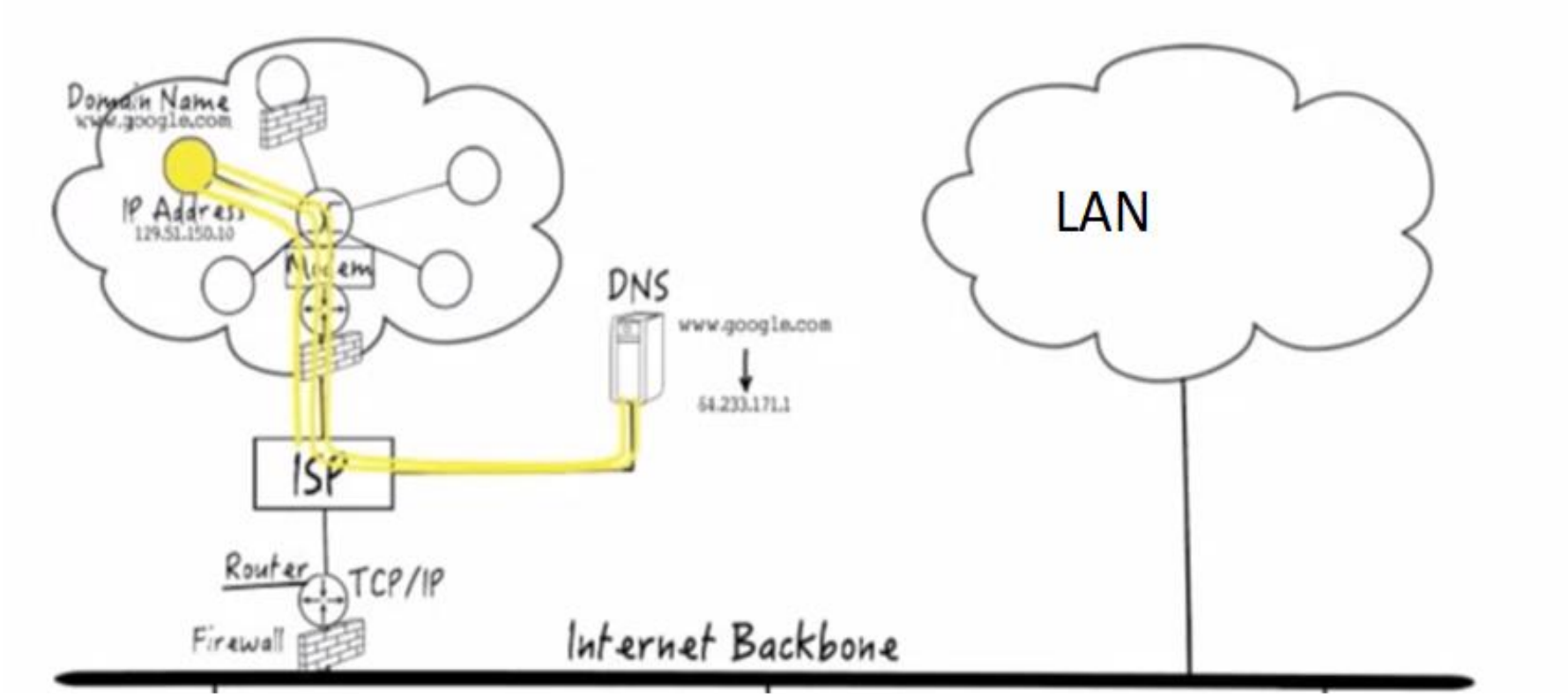
https://medium.com/@tuhfatussalisah/world-wide-web-from-web-1-0-to-web-4-0-and-society-5-0-48690a43b776
Choudhury, N.WorldWideWeb and its journey from web 1.0 to web 4.0. Int. J. Comput. Sci. Inf. Technol. **2014**, 5, 8096–8100.

BASIC SETUP




Domain Name
www.google.com
IP Address
129.51.150.10
Modem
DNS
www.google.com
64.233.171.1
ISP
Router
TCP/IP
Firewall
Internet Backbone

BASIC SETUP


Domain Name
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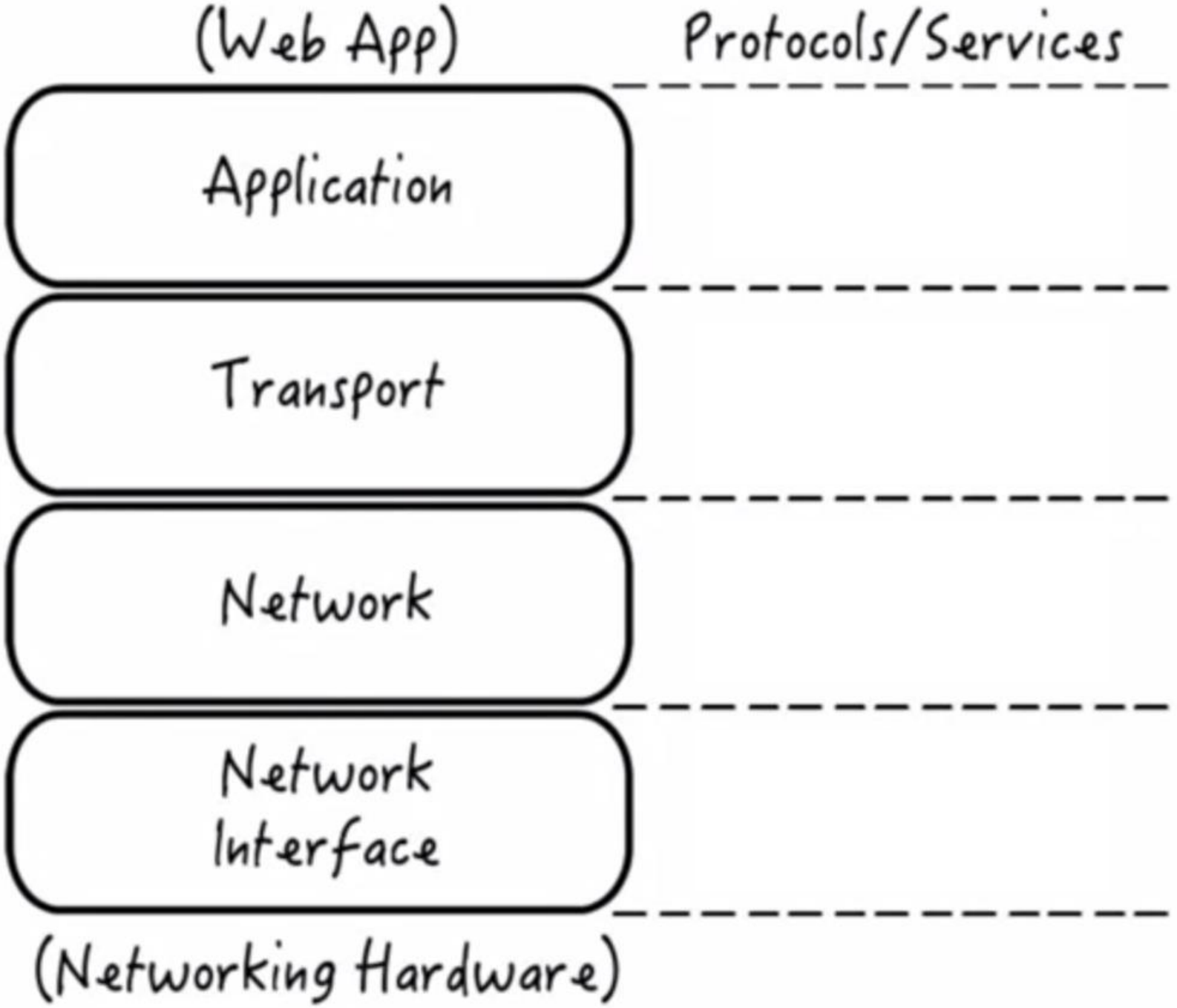
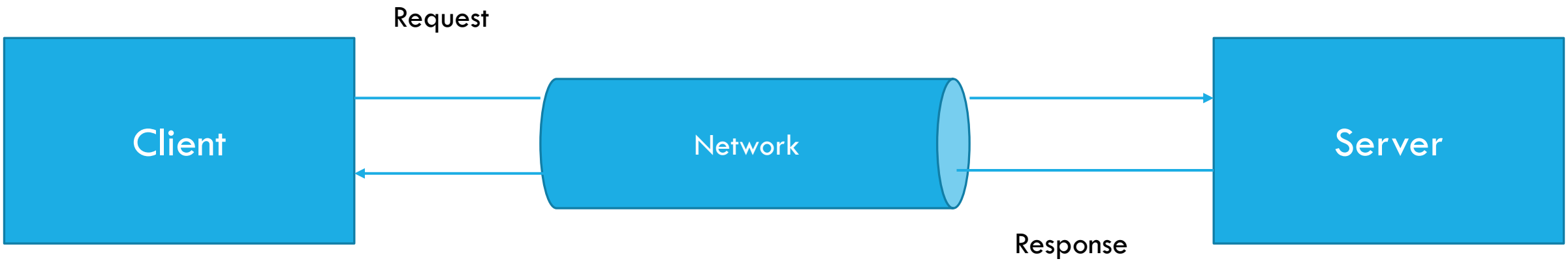


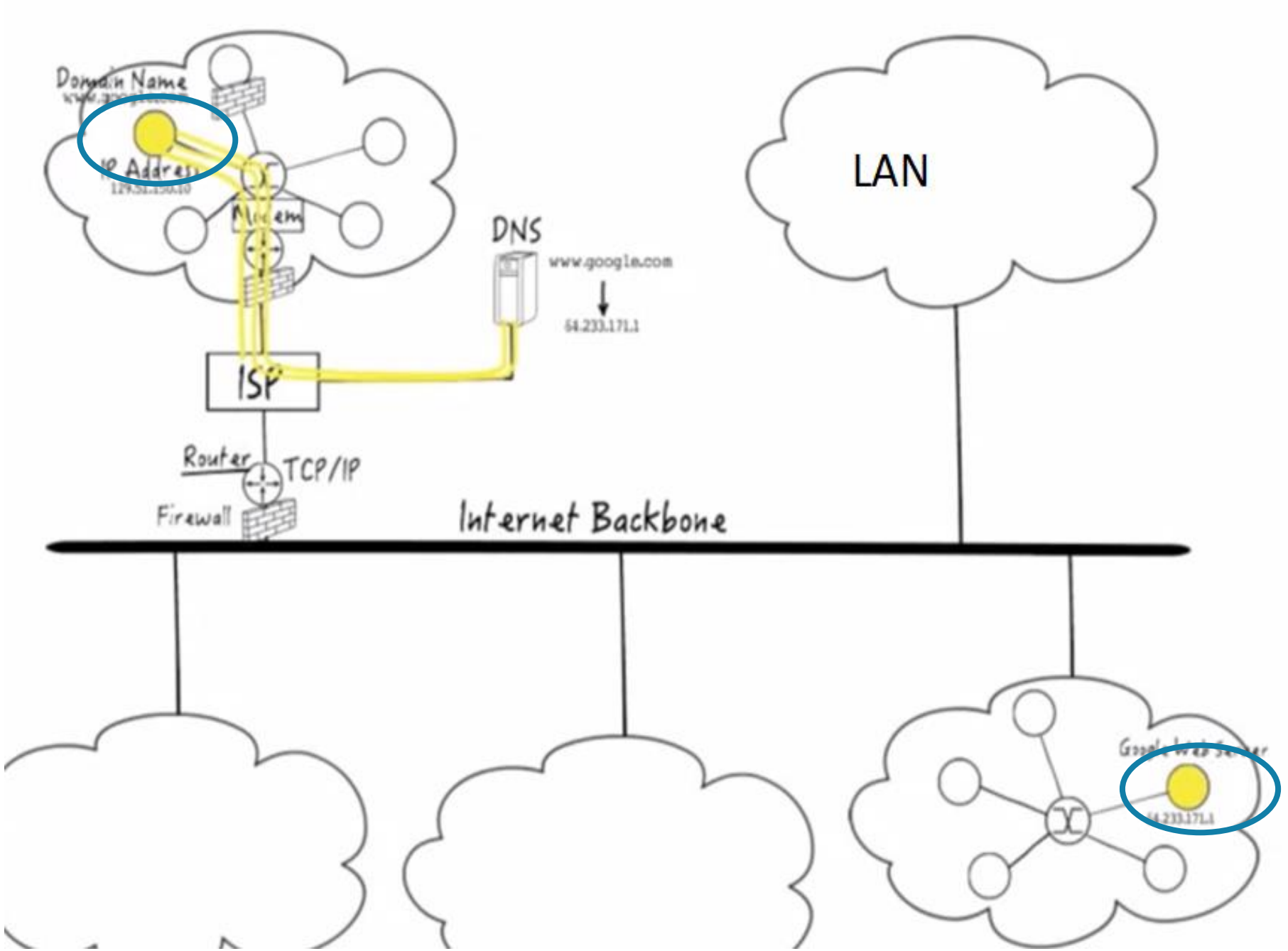
- Net neutrality
- Security and privacy

WEB APP MODEL-CLIENT SERVER ARCHITECTURE



- Listens to requests and provides services/resources
- Connects and requests for services/resources

BASIC SETUP


Domain Name
IP Address
Modem
DNS
www.google.com
64.233.171.1
ISP
Router
TCP/IP
Firewall
Internet Backbone
LAN

WEB APP

A web application is accessed by users via the Internet, using a browser as the client, and consists of a collection of client and server-side scripts, HTML pages, and other resources that may be spread across multiple servers, or throughout the world wide web

- www- It is a system of interlinked documents (web pages) accessed via the Internet using HTTP
- web pages contain hypermedia (text, graphics, etc.), along with hyperlinks to the other web pages
- The structure of the web is what makes it useful and gives its value
- A web app is built on WWW and WWW is built on top of the Internet

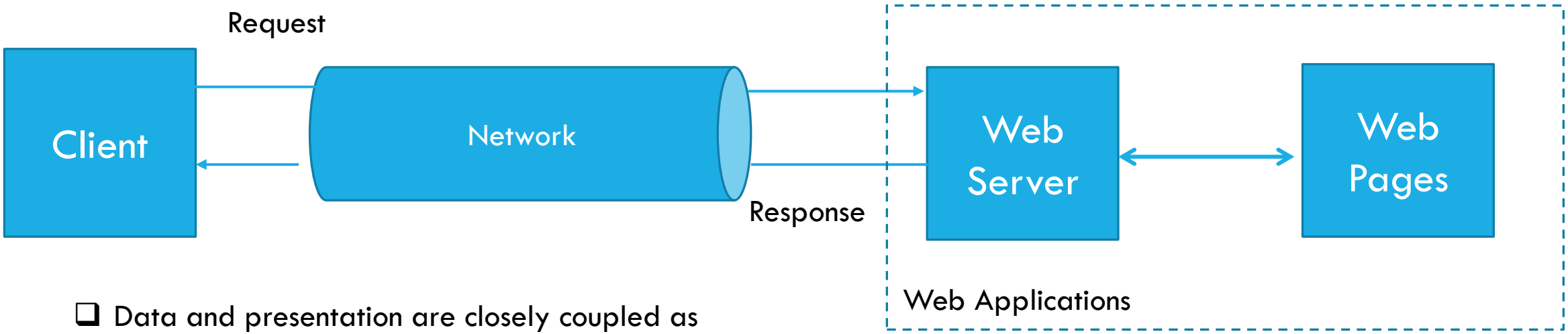
ADVANTAGES OF WEB APPLICATIONS

- Ubiquity and convenience of using a web browser as a client
- Inherent cross-platform compatibility in todays' browsers
- Update and maintain web apps without distributing and installing software
  - it should be executed on common web browsers
- reduction of IT cost, especially on the maintenance

DISADVANTAGES OF WEB APPLICATIONS

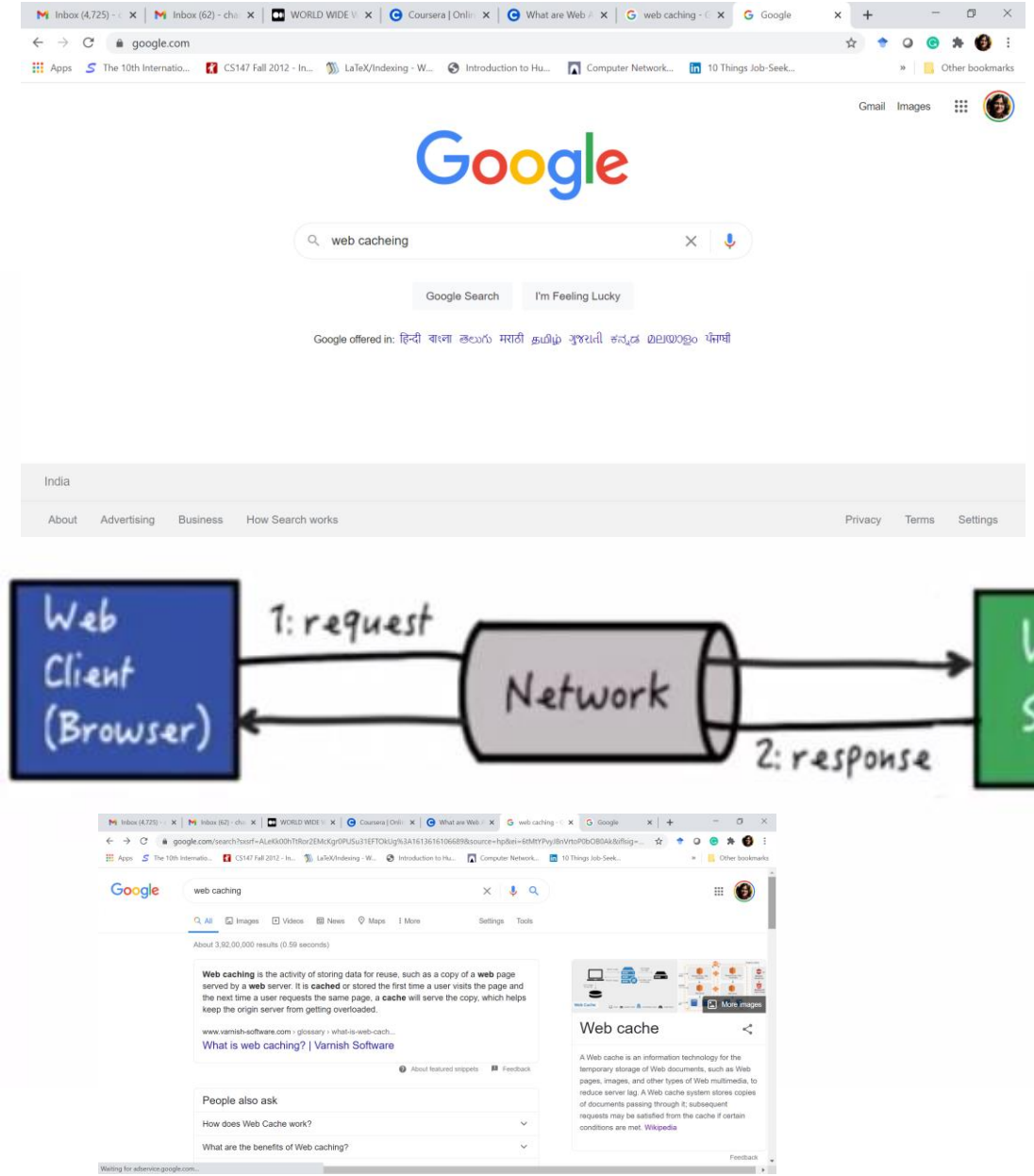
- User experience
- Privacy and security
- Web apps are difficult to debug and develop (programmer's perspectives)

WEB APP ARCHITECTURE-WEB 1.0



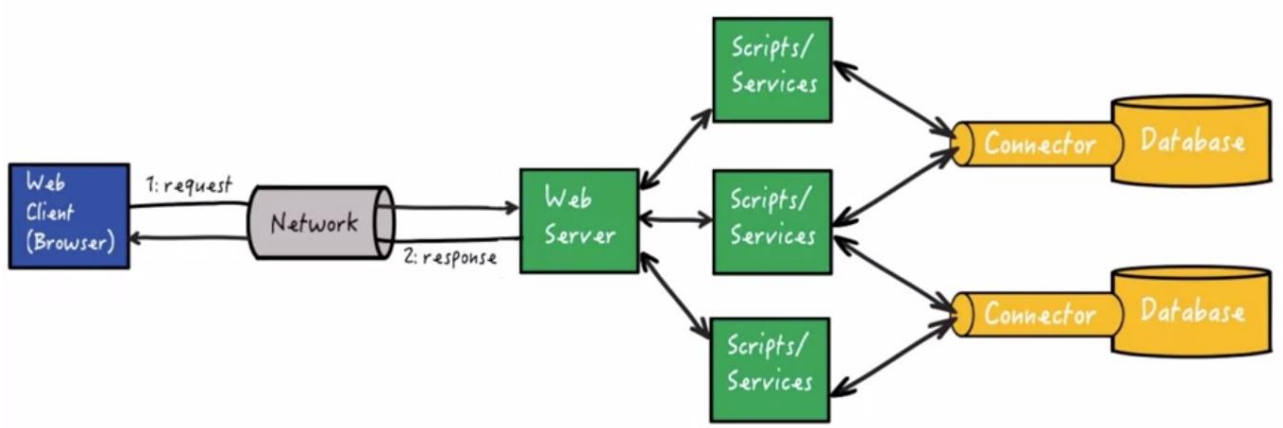
- Data and presentation are closely coupled as web pages are static

WEB 2.0 – ARCHITECTURE FOR WEB APPS



Ref:Course on Web Application Development: Basic Concepts, available on Coursera.org

COMPLEXITY OF WEB APPLICATIONS



- A typical web application involves numerous protocols, programming languages and technology spread throughout the web stack.
- This makes developing, maintaining, and extending complex web applications extremely difficult.
- We need to use a foundation of solid design principles

in order to simplify the development and maintenance of web applications.

DESIGN PATTERN

Motivation

- ease of development, maintenance and enhancement of web apps

A design pattern is a reusable solution to a design problem that involves a set of components that interact to solve a general design problem within a particular context

- It is an abstract template that can be applied over and over again in many different context
- Well known design patterns are often used alone or in combination to simplify a complex design
- Design patterns are a way to communicate parts of a design

N-TIER ARCHITECTURE

A client server architecture in which application functionality is further divided into separate tiers mainly for

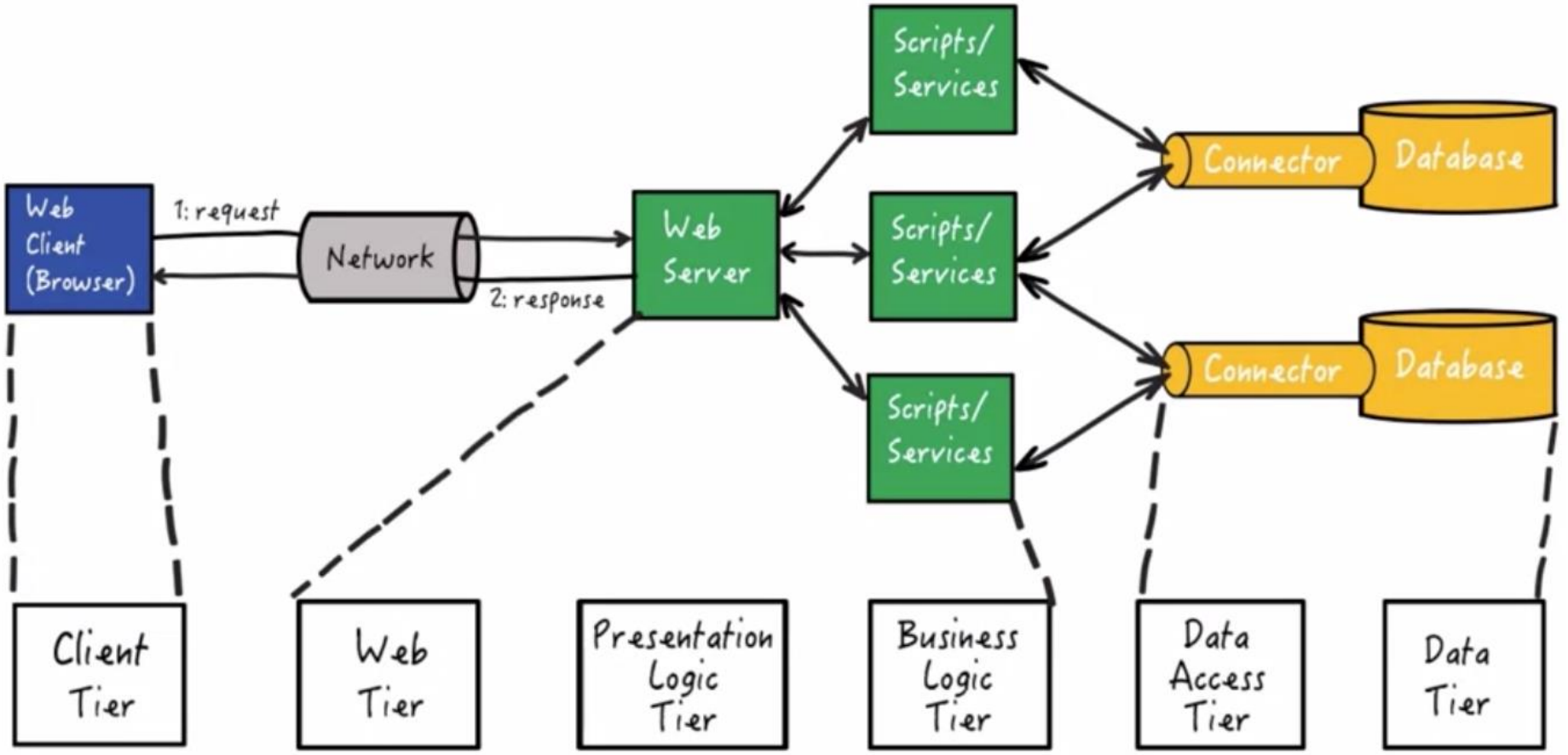
- Presentation
- Application processing
- Data management

Advantages

- Separation of concern
- Each layer is encapsulated within a well defines interface
- Each tier can be changed without affecting the other tier

- Presentation tier
- Data tier
- Application (logic) tier

6-TIER ARCHITECTURE



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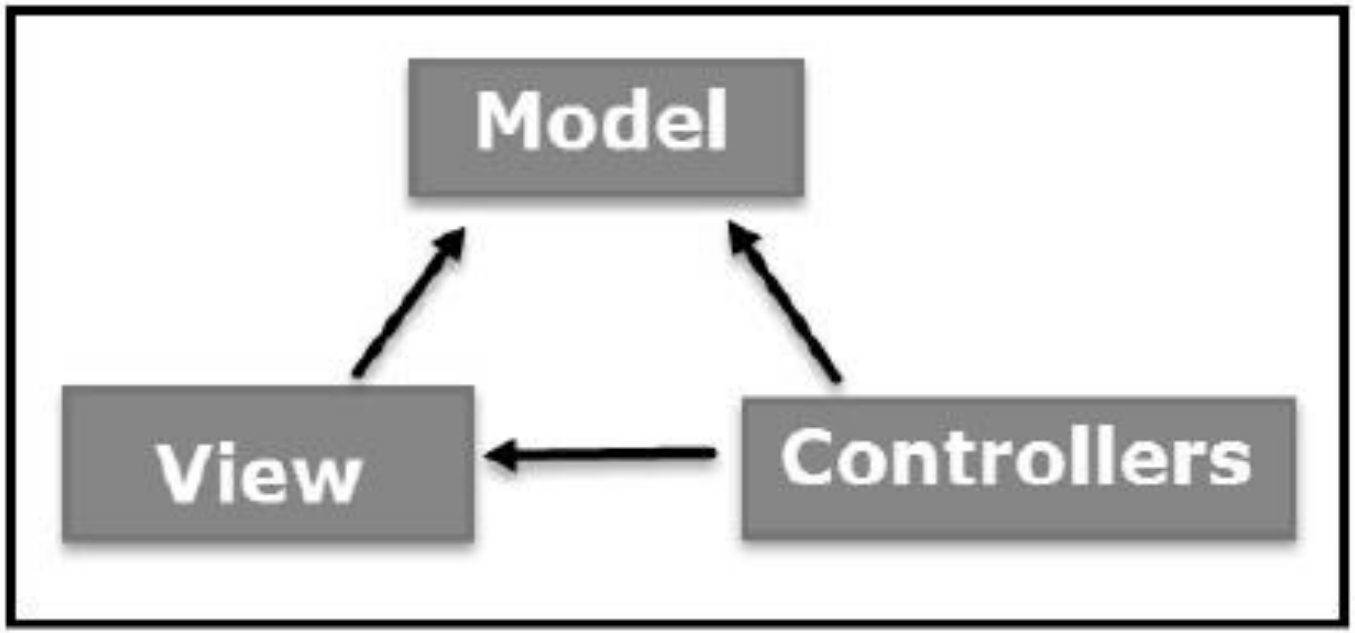
6-TIER ARCHITECTURE

- dynamically generated web content will be passed to the web tier
- data access tier shields the particulars of the database
- each tier communicates with its adjacent tiers mainly
- each tier can be changed without affecting the application as a whole
- int a=F(6);
- int F(int i){
  - return i++;
- }

SOFTWARE DESIGN PATTERNS



APPLICATION FRAMEWORKS

- provides frozen spots
  - overall architecture
  - How the components interact
- allows to concentrate in hot spots to extend the behaviour of the framework
  - Hot spots are the functions written for the application
- A framework is not suitable for a problem when …

WEB APPLICATION FRAMEWORKS

- An application framework that is designed to support development of web applications that generally includes
  - Database support
  - Templating framework for generating dynamic web content
  - HTTP session management with middleware support
  - Built-in testing framework
- It can also support internationalization, security and privacy
- Consistent look and feel and consistent with database

WEB FRAMEWORKS EXAMPLES

- Ruby on Rails
- Play
- ASP.NET
- Django
- Symfony
- Spring
- Vue.js
- Angular js