

CI6206 Internet Programming

Course Briefing &
Introduction to Web technologies



Wong Twee Wee

Ver1.4



CONTENT

- **Couse briefing**
- **History of WWW**
- **Basics of WWW**

1. COURSE DESCRIPTION

- **This course introduces the various core technologies of creating a Java Web-based application. These core technologies include:**
 - **HTML and CSS (Hypertext MarkUp Language and Cascading Style Sheets)**
 - **HTTP (HyperText Transfer Protocol) and the Web Servers XML**
 - **Client-side Programming Using JavaScript, Ajax (Asynchronous JavaScript & XML), CSS, jQuery and bootstrapping.**
 - **JSON (JavaScript Object Notation)**
 - **Server-side Programming Using JAVA**
 - **Deployment of web application**
 - **Securing Java web application**

TOOLS & SOFTWARE

- JDK 8.0 and above
- Tomcat Catalina 8 and above
- Eclipse IDE for Java (latest) supporting JDK 8.0
- MySQL Community Server Database 8
- Workbench for MYSQL (GUI) 8
- Web APIs



Good to know some of these ..

HTML, Java Programming Language, HTTP and Apache Tomcat Server, SQL and MySQL Database System and client scripting.

DISTRIBUTION OF ICA

■ Assignments – Individual/Pair work

- Technology paper (Individual) : **20%**
 - Choose a topic from a list and perform research work
 - Submit report
- Web application project (Individual/Pair) : **30%**
 - From team to create a usable web application using servlet and client-side technologies.

■ Test

- Online Test 1 – 15%
- Online Test 2 – 15%
- Online Test 3 – 20%



2. BIRTH OF THE WORLD WIDE WEB

Two most significant events in the formation of the WWW

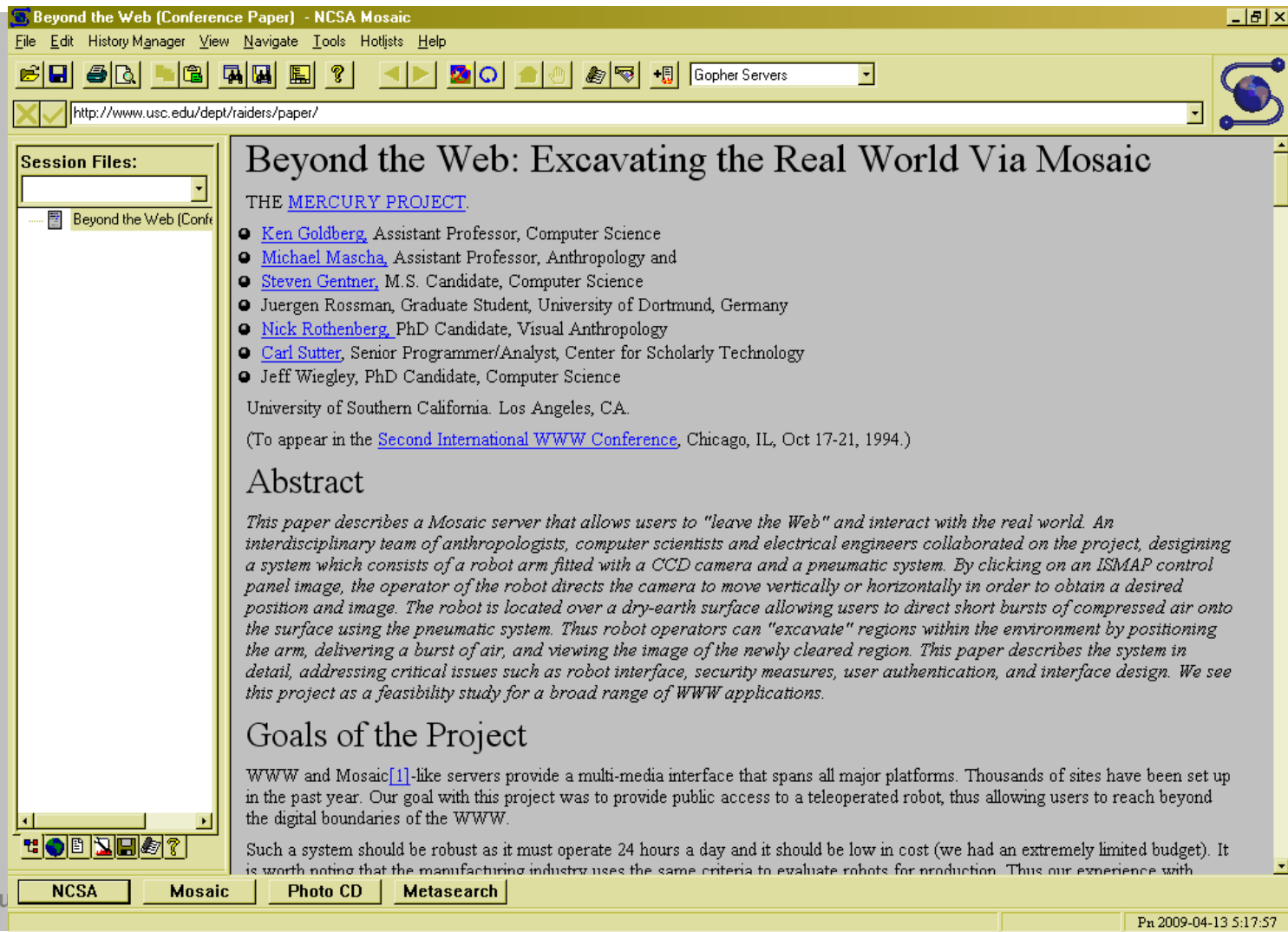
- 1991

- Tim Berners-Lee releases **WWW!**

- 1993

- Marc Andreessen & others at NCSA - University of Illinois developed **Mosaic** - **1st Web Browser**

MOSAIC BROWSER



WWW



Presentation of
content



www.google.com



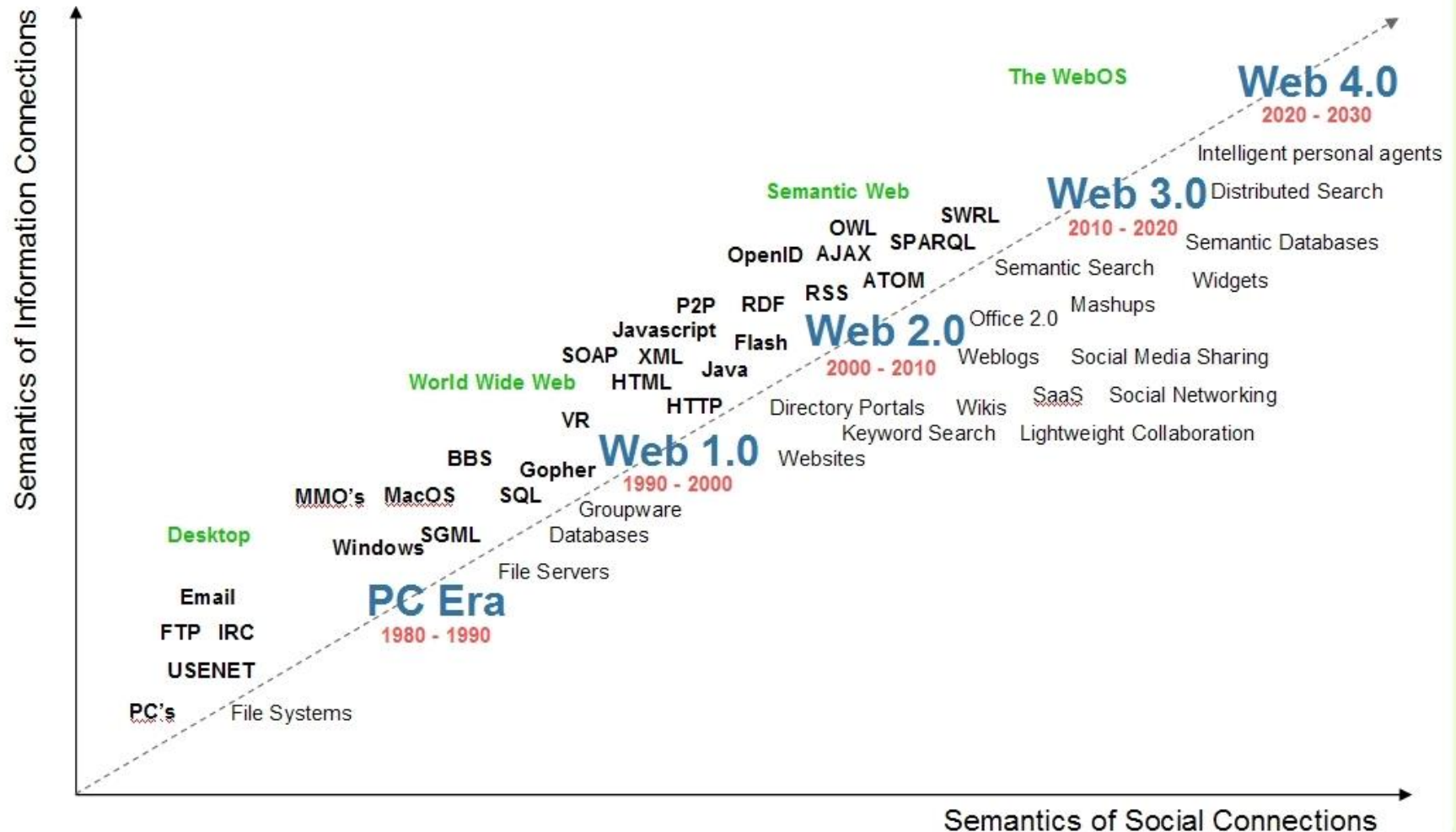
www.ntu.edu.sg



www.facebook.com



WHERE ARE WE NOW?

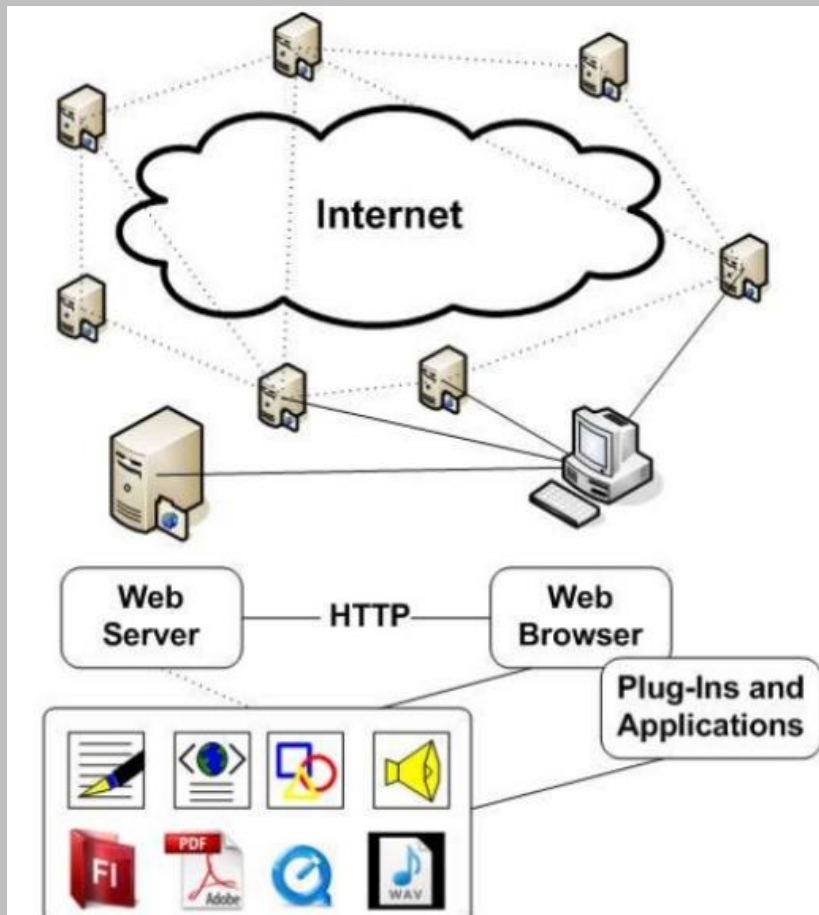


WEB 1.0

INFO – CENTRIC WEB

- The first generation of the World Wide Web (WWW), characterized by separate static websites.
- It is one-way broadcasting.
- It was widely used between 1998 and 2001, and it is still used beside Web 2.0 in almost all web sites.

THE STATIC WEB



- **Displaying of same info to all visitors**
- **Publication Medium/Marketing info**
- **Hyperlinked context and Media (Photos)**
- **Non Interactive Maps**

Advantages

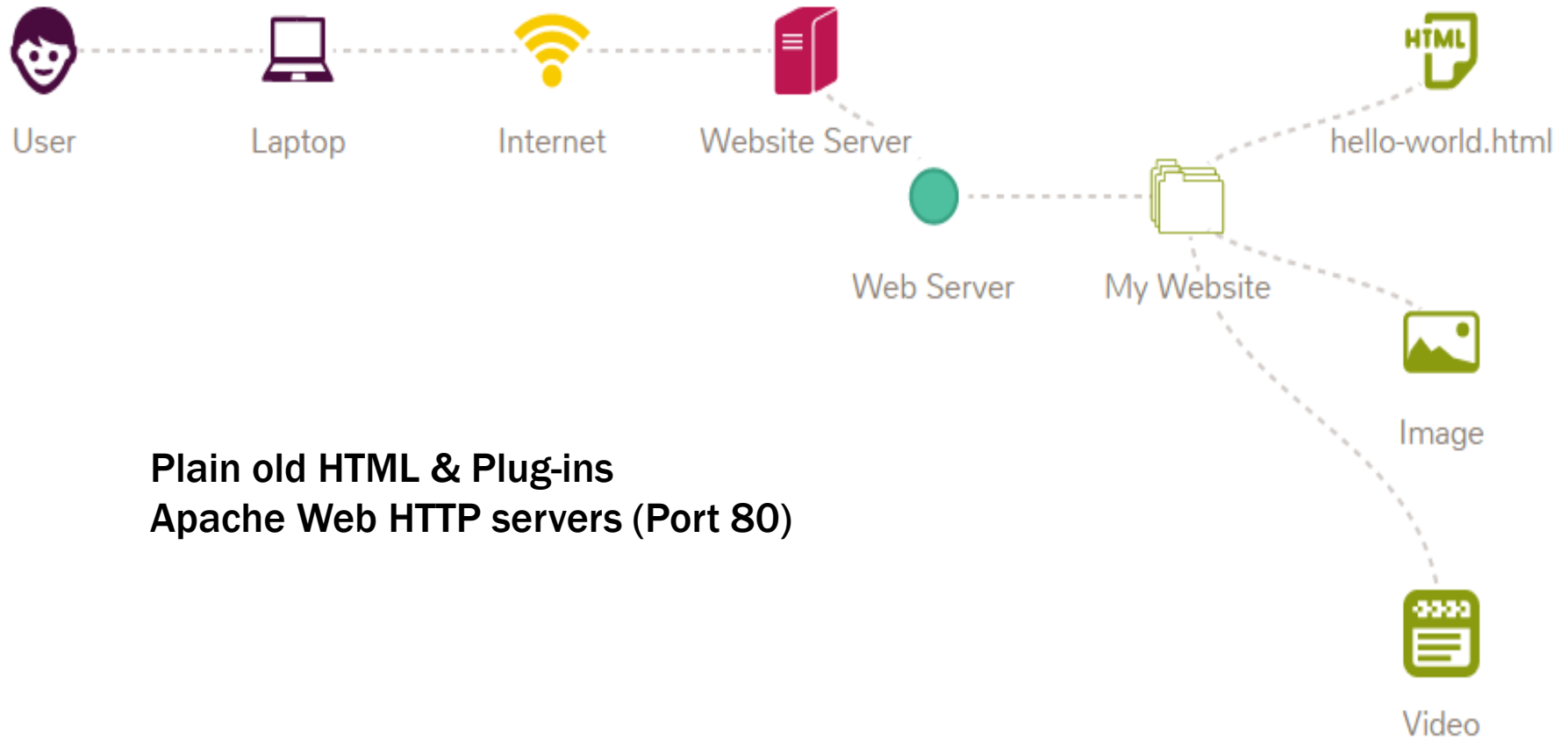
- Quick, affordable, convenient hosting

Disadvantages

- Requires web developers to update site (HTML)
- Content can get stagnant

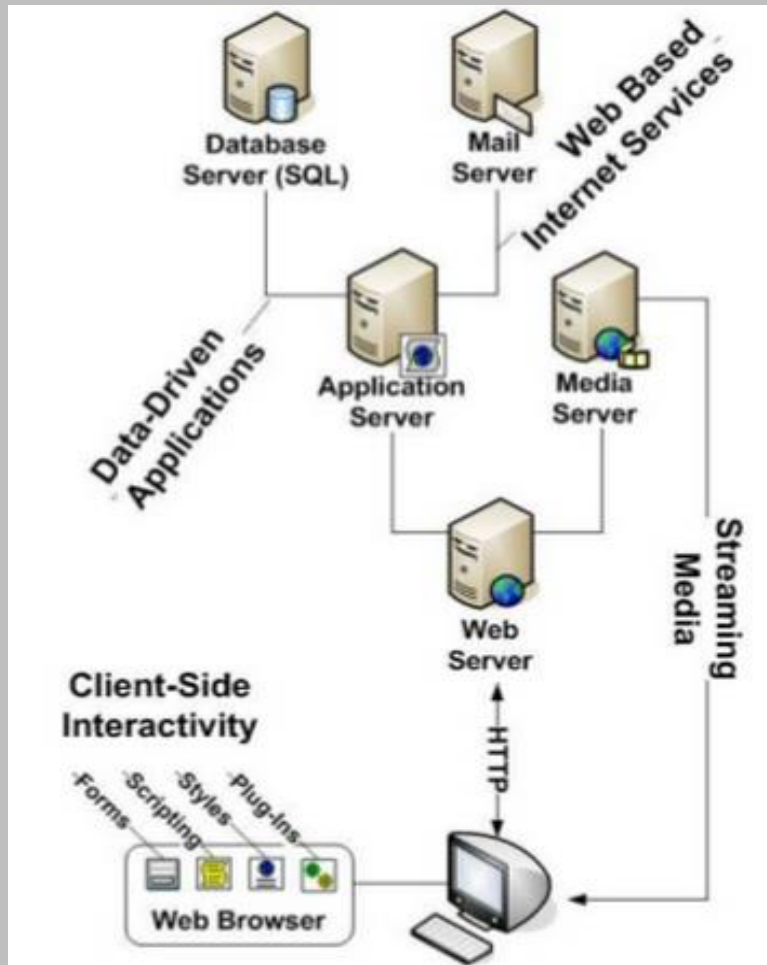
Example : <http://www.playworks-manchester.co.uk/default.aspx>

THE STATIC WEB



Source : <http://nilclass.com/courses/what-is-a-static-website/#1>

THE DYNAMIC WEB



- **Web-Based Application platform**
 - Internet Services
 - Data-Driven Applications
- **Interactive Web Pages**
- **Search engines/Form submission**

Advantages

- A more functional website.
- Backend admin features allow convenient update to web content.
- More interaction and collaboration (e.g search, maps, ecommerce)

Disadvantages

- Slower / more expensive to develop
- Hosting costs a little more

STATIC VS DYNAMIC WEB

Static Website



Dynamic Website



WEB 2.0

PEOPLE CENTRIC WEB

- **Technologies and Trends**

- **Social networking sites:**
 - Facebook, MySpace, Hi5, ... etc.
- **Tagging or Labeling Content:**
 - Del.icio.us.
- **Wikis:**
 - Wikipedia.
- **Community-generated content:**
 - eBay, carousell etc

- **Open Services:**
 - Google.
- **P2P:**
 - Bit Torrent.
- **New Web technologies:**
 - XML, RSS, Ajax.
- **Open Source Software**

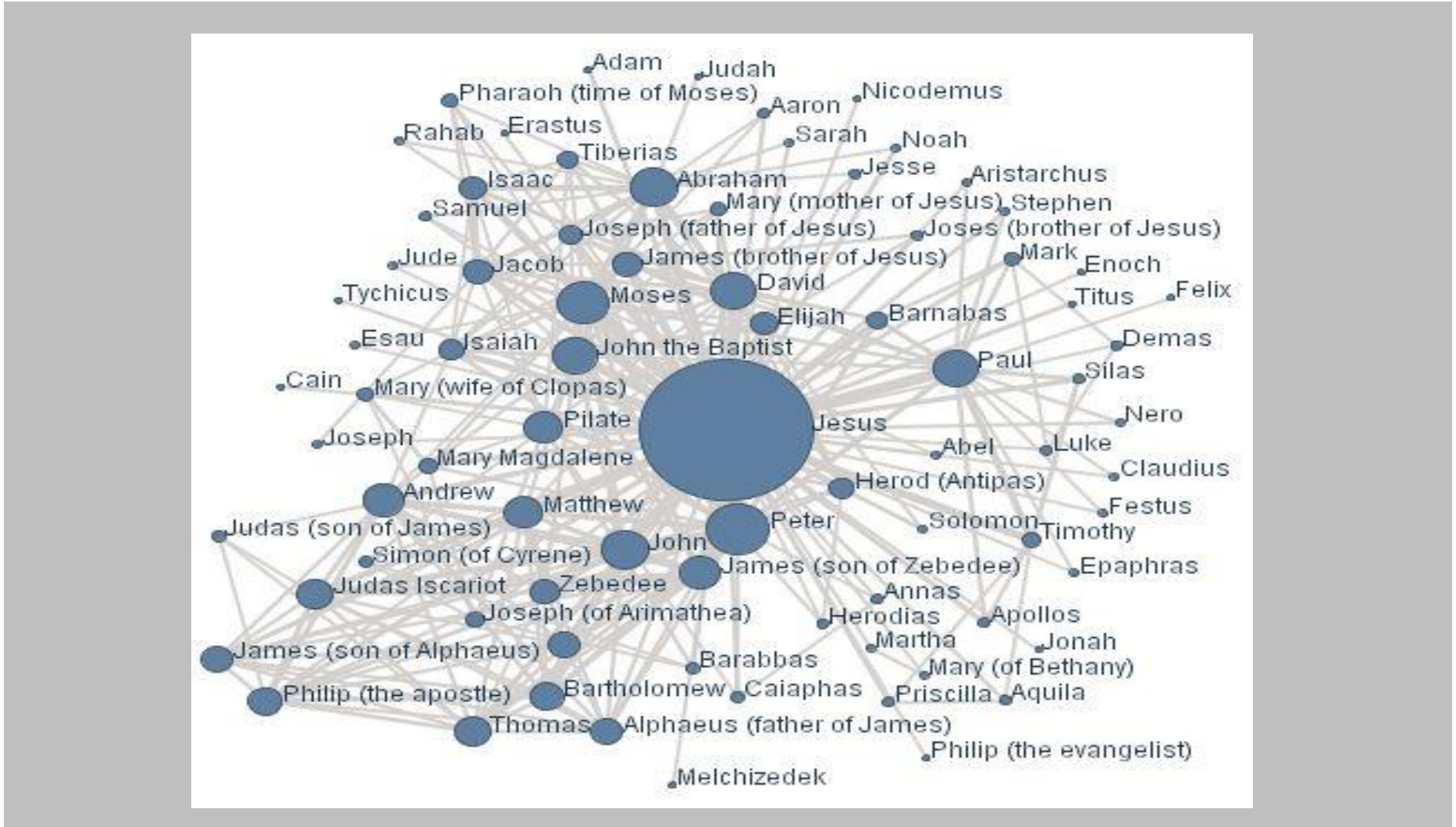


THE SOCIAL WEB



- Extensible Interoperable Application
- Customization and Personalization
- User Generated Content Tools
- Tagged and Syndicated Content
- Commenting, Feedback, Reviews
- Data Feeds and Tools
- Community and Collaboration

RELATIONSHIP



WEB 3.0

MACHINE CENTRIC WEB

- Different meanings are intended to describe the evolution of Web usage and interaction between the many possible evolutionary paths.
- The third generation of Web technologies and services that emphasize a machine-facilitated understanding of information on the Web.

WEB 3.0

SEMANTIC WEB

- It is a group of methods and technologies to allow machines to understand the meaning - or "semantics" - of information on the World Wide Web.
- The semantic web is a vision of information that is understandable by computers, so computers can perform more of the tedious work involved in finding, combining, and acting upon information on the web.

SEMANTIC WEB

INTELLIGENT

- The development of Web 3.0 focuses on adding metadata or information to describe the content of the web which:
 - Provide an intelligent level to the web site.
 - Enable the user to communicate completely with the machines.
 - Enable machines to communicate with each others.

WEB 3.0 ONWARDS

- Smart Devices/sesors & Cloud computing
- Access to the Web from Anywhere
- Device Feature Integration (Camera, GPS, Smart Objects, Arduino, Raspberry Pi)
- Deep learning/AI
- Gesture based computing, Augmented/mixed reality



SEMANTIC WEB

INTELLIGENT SYSTEM PLANNING

- Example:

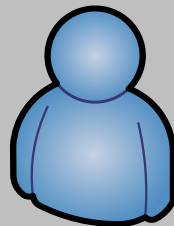
The Question: "I'm looking for a place and transport for 6 days vacation in Melbourne and I have a budget of \$5000"

- Today's System, such query can lead to hours of search (through lists of flights, hotel, car rentals) and the options are often at odds with one another.
- Web 3.0 will call up a complete vacation package that was planned as meticulously as if it had been assembled by a human travel agent.

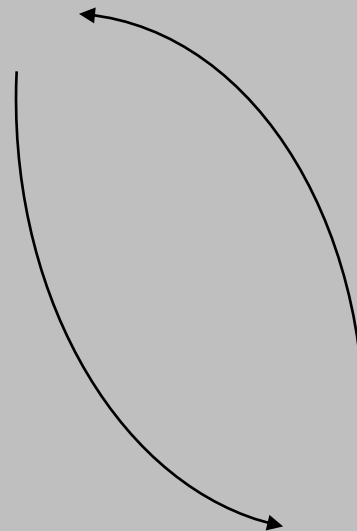
3. BASICS OF WWW



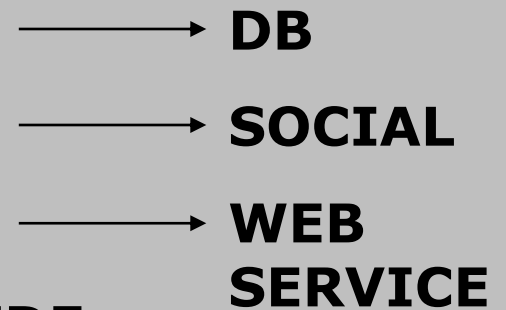
CLIENT SIDE



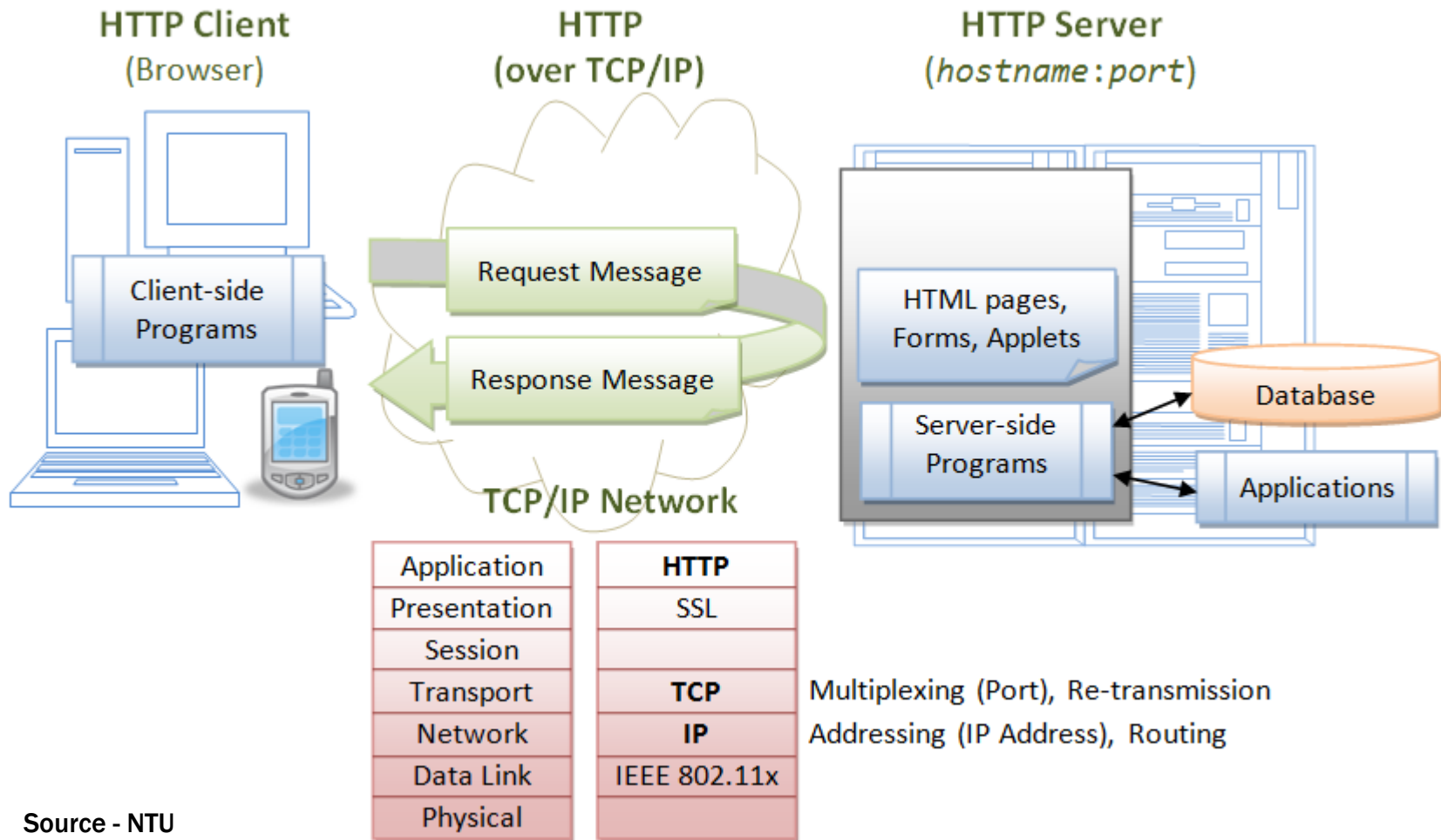
USER



**SERVER SIDE
(PHYSICAL/CLOUD)**

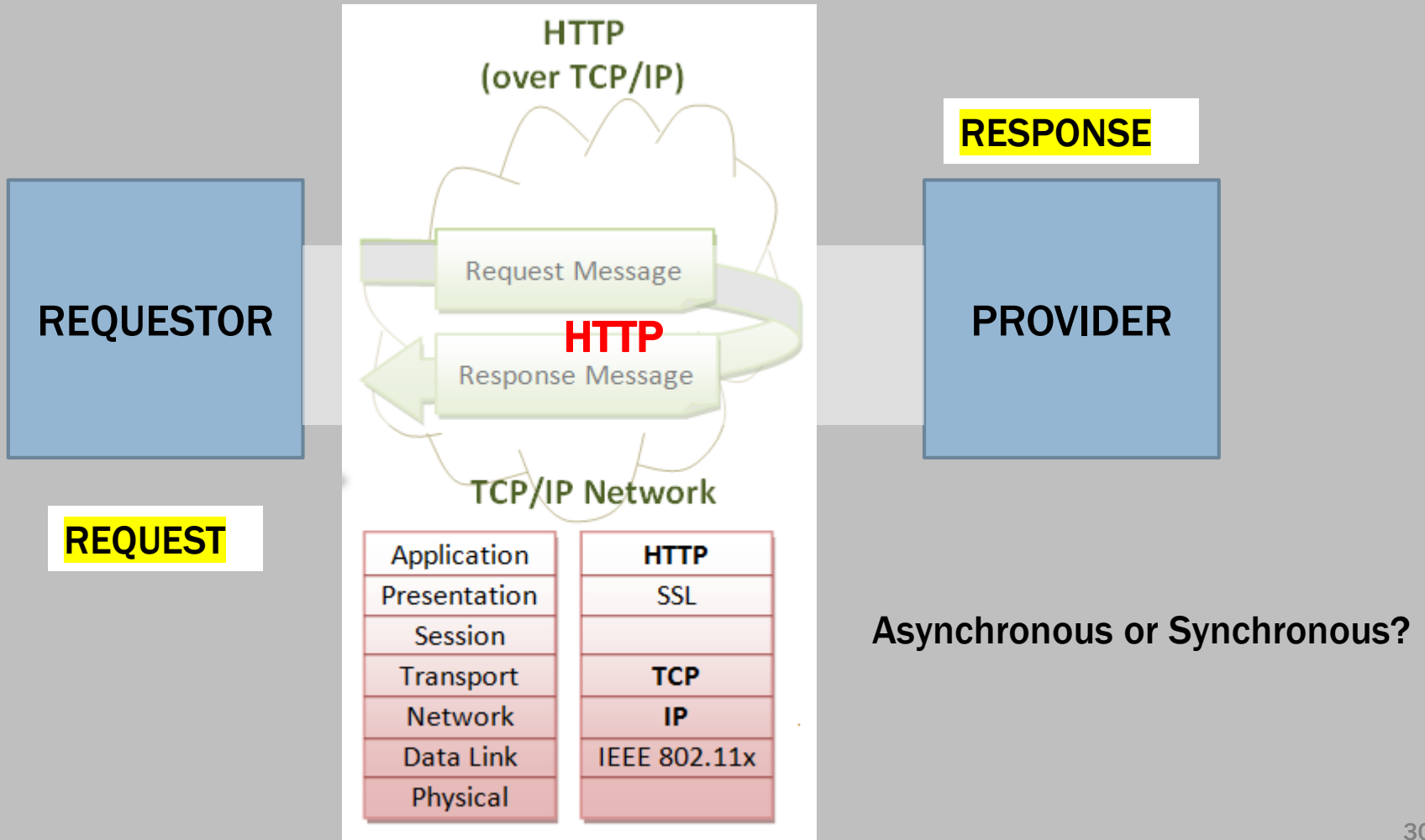


DYNAMIC WEB APPLICATION



Source - NTU

COMMUNICATION OVER WWW



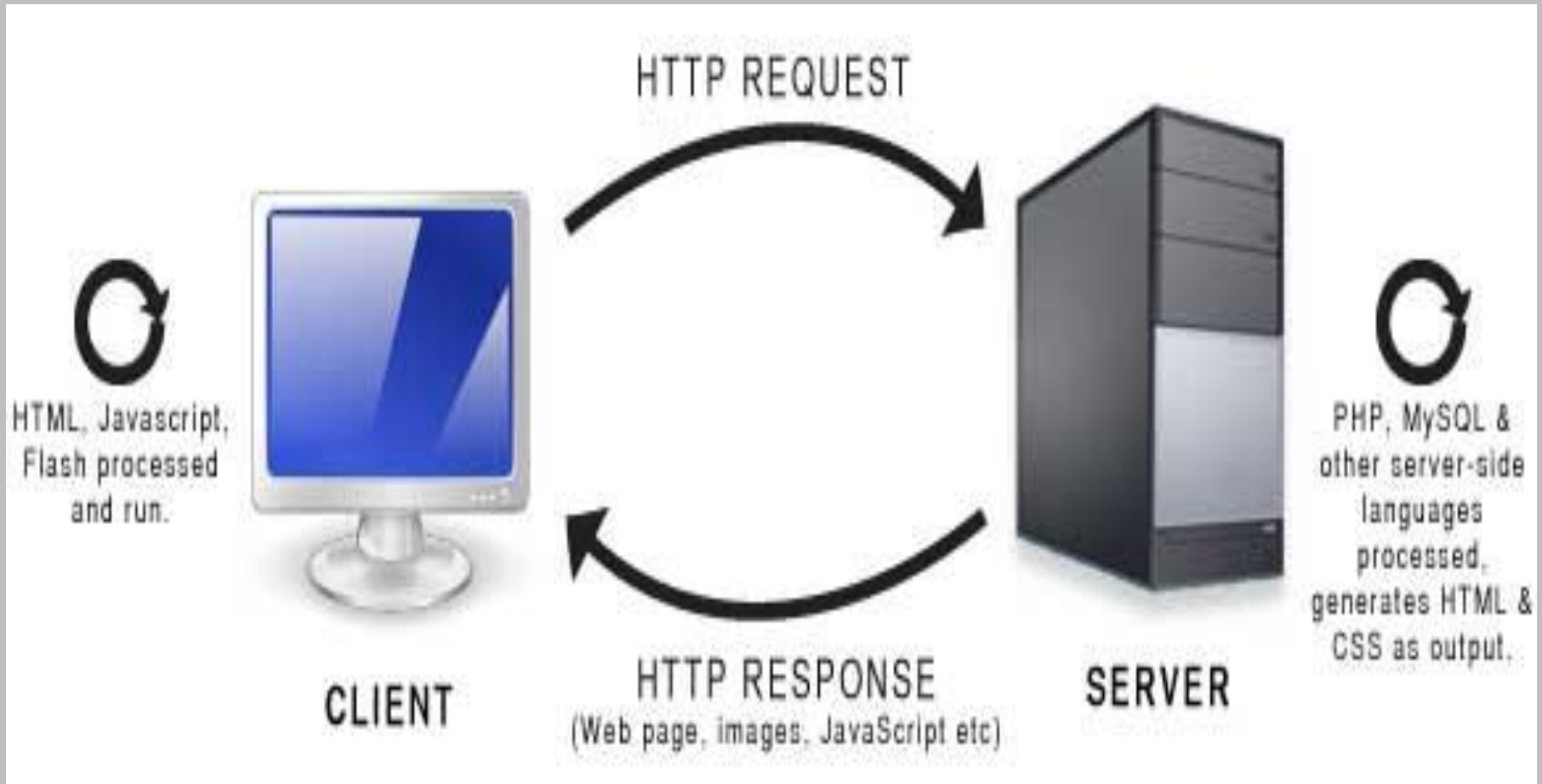
HTTP

- HTTP makes use of TCP to open connections between clients and servers and to pass the requests and responses between them.
- When a user clicks a link or types a web address:
 1. A **TCP connection** is opened between browser and server
 2. Then **requests and responses** are sent back and forth using HTTP via Port 80 (SSL Port 443) or any other Ports during development (e.g 8080 or 8000)
- HTTP is a **stateless** protocol, meaning each request for data is dealt with in isolation; once the server sends the response, it forgets everything about the original request.

FETCHING PAGES OVER THE INTERNET

- Architecturally, the Internet consists of a collection of layers, each one providing services for the one above it:
 - The Internet Layer gets packets to their destinations;
 - The Transport Layer sends streams of data;
 - The Application Layer provides high-level services to applications such as Web browsers.

WEB TECHNOLOGY (PART 1)



CLIENT SIDE VS. SERVER SIDE WEB

■ CLIENT

- An application on (usually a different host) that initiates the connection to a server.
- Example: A web browser is a client program that initiates connections to web servers.

■ SERVER

- An application on a host that waits for incoming connection requests from a client.
- Example:
 - A web server (www) waits for incoming connections from browser clients.
 - A web server connecting to a database server

CLIENT SIDE VS. SERVER SIDE WEB

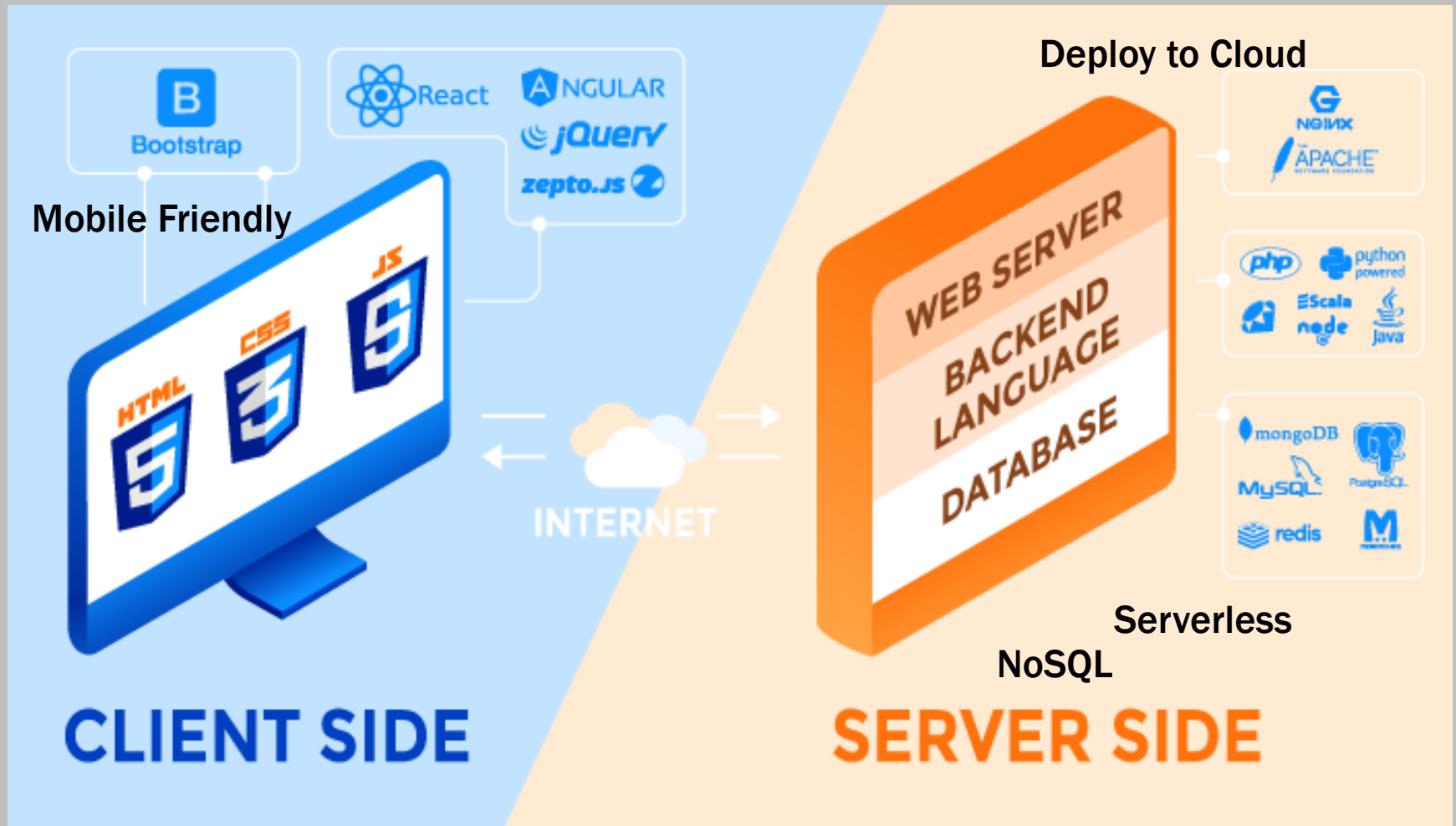
■ client-side

- Interactivity and scripting (e.g., mouse and keyboard handling)
- Web Forms: buttons, textboxes, etc.
- Form validation
- HTML, XML

■ server-side

- Process request
- Database (SQL)
- Web Service
- Authentication (login)

WEB TECHNOLOGY (PART 2)



CLIENT SIDE VS. SERVER SIDE WEB

■ client-side

- Bootstrapping, CSS
- JSON
- 3rd Party tools (Captcha, Maps, Authenticator etc)
- Single Page Application (SPA)

■ server-side

- Cloud computing : deployment to AWS, AZURE etc
- NoSQL
- Security!

WEB FRAMEWORK

- A framework is a software development that is designed to support the development of dynamic websites, web-applications and web services.
- It is a set of prewritten code or libraries which provide functionality common to a whole class of applications.
- To hide the infrastructural code related to handling HTTP requests and responses.

WEB FRAMEWORK

Server-side Web Framework

Java

Spring MVC

Struts

JSF

PERL

PHP

RUBY

Flask (Python)

Django (Python)

ASP.NET

Friday, August 14, 2020

Client-side Web Framework

AngularJS

ReactJS

Vue.js

EmberJS

MeteorJS

BackboneJS

Bootstrap

library

CSS, JSON, AJAX

jQuery, Javascript

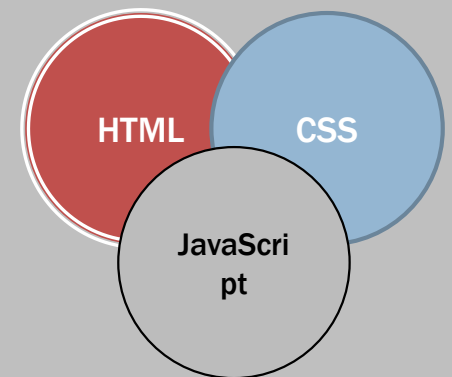
WEB DEVELOPERS

- **Front-End Developer / Designer**
- **Back-End Developer / Web Programmer**
- **Security – Secure coding**
- **Database – Data admin**
- **Cloud computing – Server admin**
- **Version Control! (GITHUB)**

Full Stack Developer!

FRONT-END DEVELOPER

- Focuses on look and feel of a website
- Uses HTML, CSS, and JavaScript
- Is competent in color scheming, graphic design, and information flow
- Creates a great user experience
- Is right-brained: Strong intuition, creativity, & imagination



BACK-END DEVELOPER

- Creates the inner workings of a website
- Is competent in programming languages (PHP, .NET, Python, C, Ruby)
- Is left-brained: logic, linear thinking, technical
- Hands-on coding experience is required

SECURITY

- Writing Secure code
- Conduct penetration test on your web application
- Data encryption
- Password hashing

DATABASE ADMIN

- **Maintain database**
- **Database design**
- **Data backup**
- **Data security**
- **SQL queries**

CLOUD COMPUTING

- Using cloud computing platform with steep learning curve
- Use of Virtual Machine
- Deploying application onto the cloud

FULL STACK DEVELOPER

- Comfortable working with both back-end and front-end technologies.
- Work with
 - Databases
 - PHP/Python/.Net/Ruby/Java
 - HTML
 - CSS
 - JavaScript
 - *and everything in between*

https://www.w3schools.com/whatis/whatis_fullstack.asp

WEB TECHNOLOGY (THIS COURSE)

■ Client-side Technologies

- HTML, XHTML, Javascript (ES2015)
- CSS, AJAX, jQuery, Bootstrapping
- Javascript framework
 - Angular.js, Dojo.js, React.js, Ember.js, Aurelia.js etc ...
- CSS framework
 - Material, Materialize, Leaf, Bootstrap etc

■ Server-side Technologies

- Servlet, JSP, JEE
- JSON, XML, REST
- Application server
- Database
 - MySQL, Maria, MongoDB,
- Web Framework
 - Google Web Toolkit, Play, Spring, Struts