COMP 4021
Internet Computing

The Internet -
Some Context for the Course

This Presentation

- What is Internet Computing? Is it just a buzzword?
- What is the Internet – history, advantages, size?
- What is Web (the original)→Web 1.0 → Web 2.0 →“Web” today?

What is "Internet Computing"?

- Internet Computing = Internet + Computing
- Internet = Network (of two or more computers) implemented on TCP/IP network protocol
- Contrast with "Desktop computing": Office, Calendar, which only run on one machine (What about Office 365? What about cloud computing?)
- Internet Computing = Applications running on internet to accomplish a task

What are Internet Applications?

- Today, it is hard to imagine applications that do not involve a "network" or "internet": Emails, file transfer, web, etc.
- Internet must adhere to the "Internet" protocol: TCP/IP
- Internet applications must adhere to the corresponding protocol defined over TCP/IP protocols
  - Web: HTTP (Hypertext Transfer Protocol)
  - Email: POP and SMTP

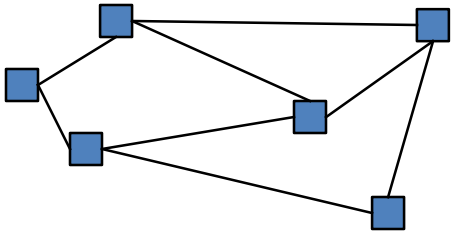
What is Internet?

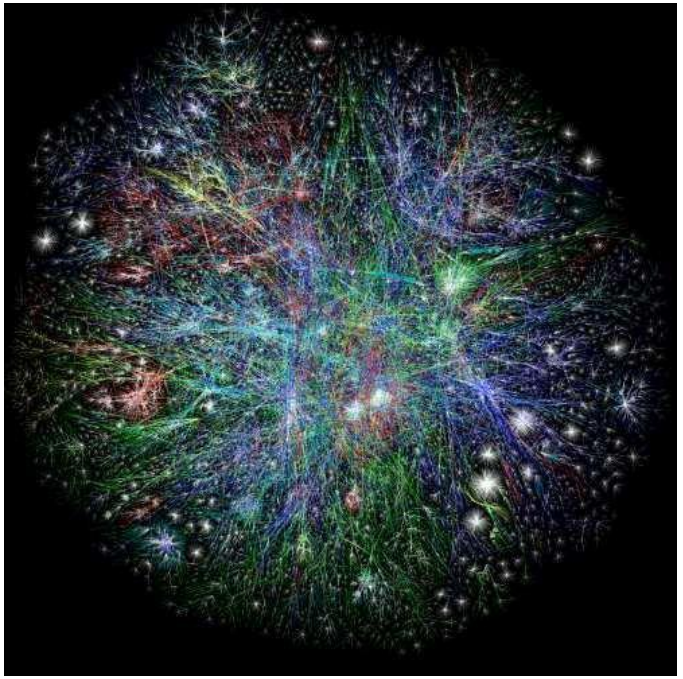
- What is the difference between a "network" and the "internet"?
- A network could have different architectures:
  - Star/Tree shape: One master computer is connected to many other computers by direct links
  - Ring shape: One computer is connected to two neighbors to form a ring
  - Bus shape: Every computers connected to the same wire (Ethernet)
  - Graph shape: A computer can connect to any other computers
- Internet must be scalable; hence Internet is a graph (although a particular segment can take any shape)

What is the formal definition of Internet?

What does the Internet look like?

- A network of computers connected like a graph
- How is it compared to other topologies: Star, Ring, Bus, etc.,?





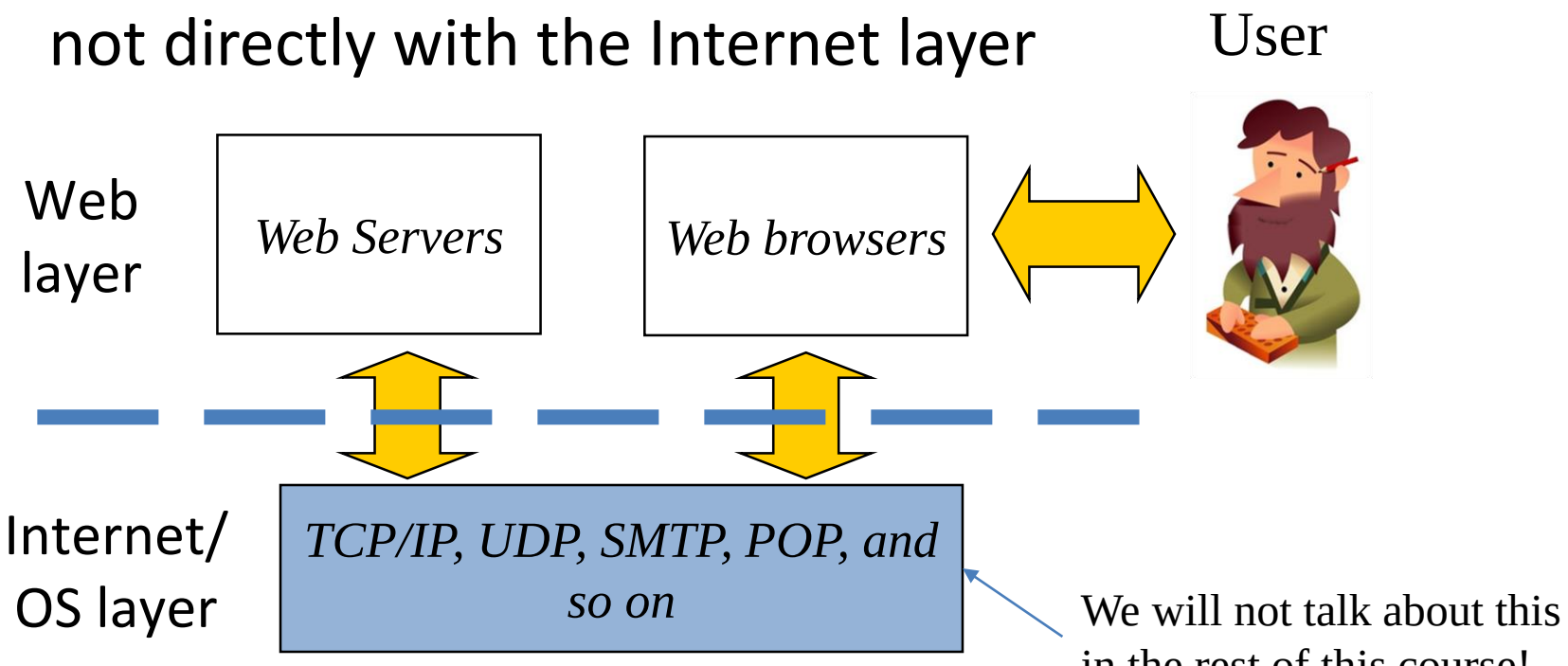
- Blue: North America
- Yellow: Asia
- White: Unknown

What is the Internet good for?

- Fast?
  - Traverse multiple hoops to deliver a message
- Flexible/Reliable?
  - It is not easy to partition the Internet
- Low cost?
  - Hoop-by-hoop vs direct connections between every pair of nodes
- Universal?
  - Adhere to international standards
- Accessible?
  - Available (almost) everywhere, including mobile internet/phones
- Distributed?
  - Ten of millions of computers on the Internet
- Expandable?
  - A new node just attaches to an existing node

What is the Web?

- The web is the 'layer' above the Internet
- Users typically interact with the web layer, not directly with the Internet layer



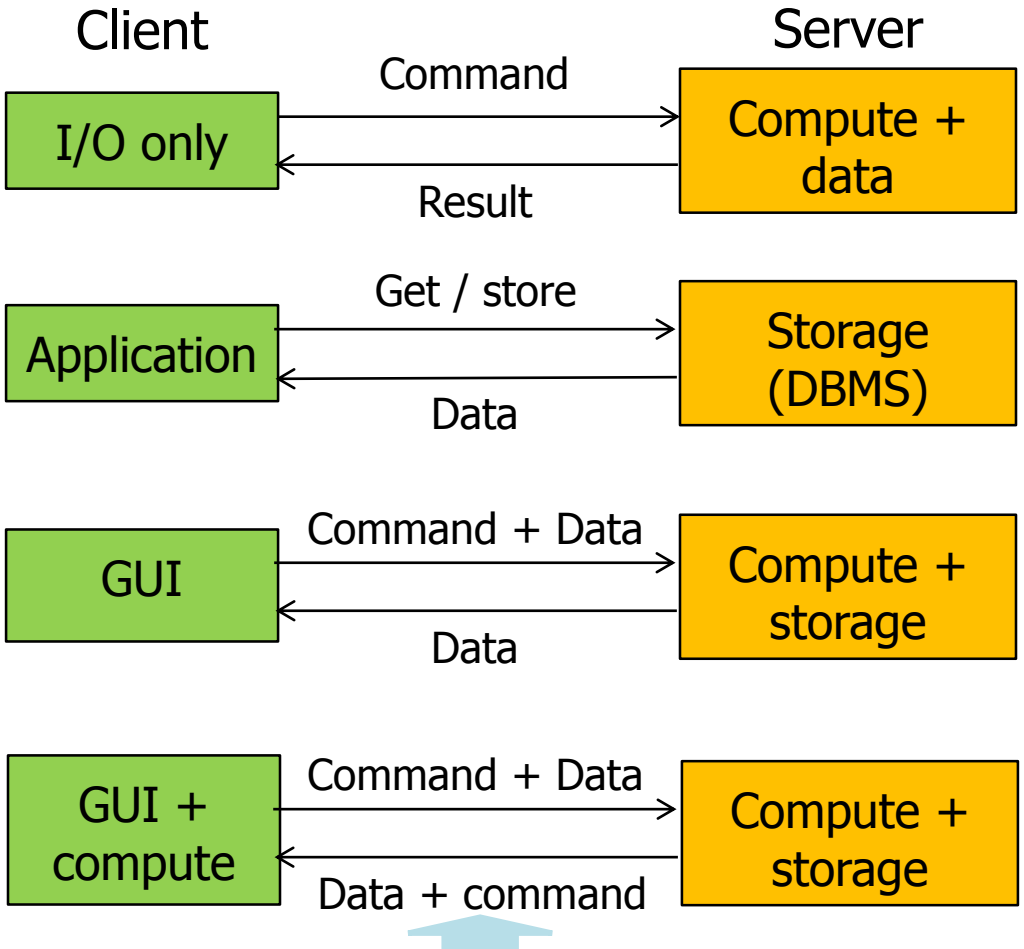
Architecture Involving Two Parties

Dumb Client: Client only does I/O (e.g., ssh terminal)

Desktop: Client does almost everything (e.g., Office editing a file on network drive)

Client-server (**Thin** client): Client does GUI only (e.g., control mouse and windows

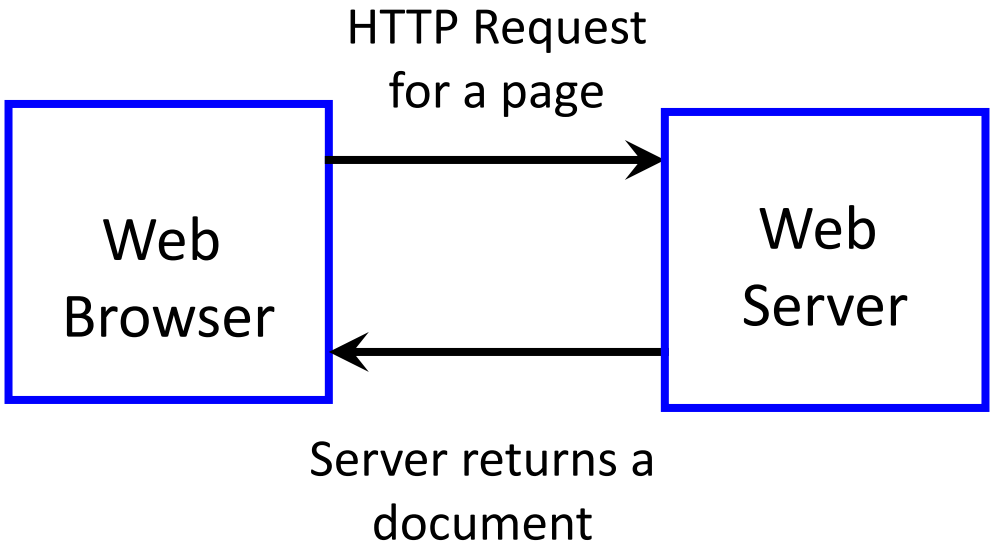
Client-server (**Thick** client): Intelligent partitioning of work between client and server



On this slide, we have not mentioned the network protocol between the two communicating parties

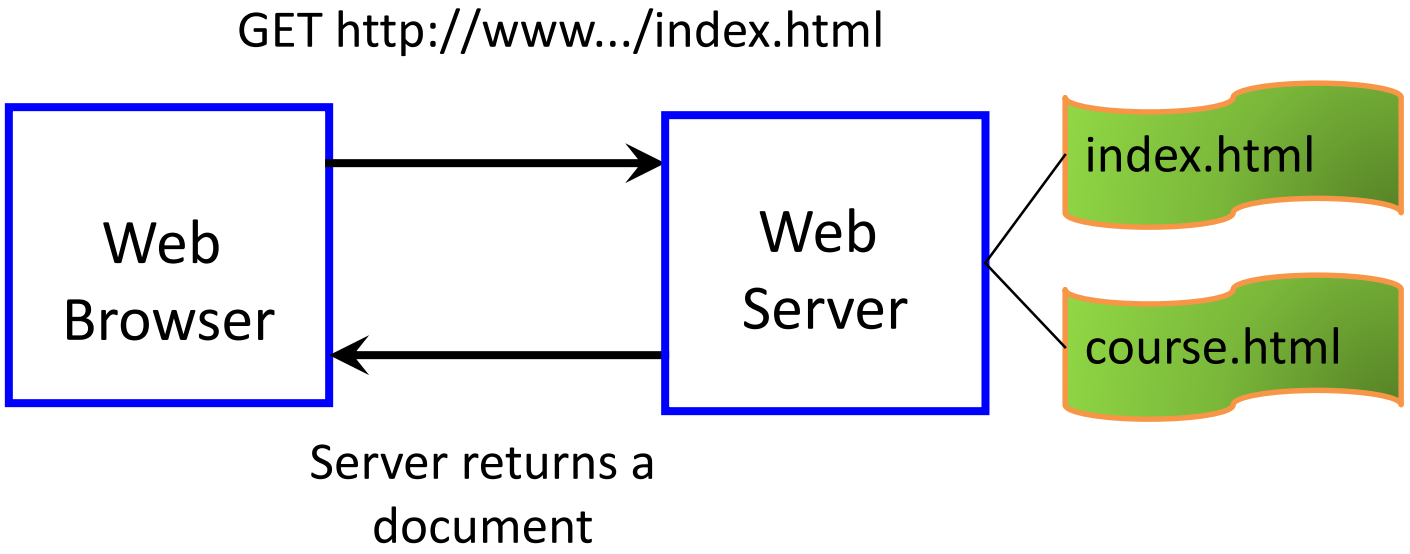
We will only Talk about
the Web Layer
from Now On

2-Tier Web Applications



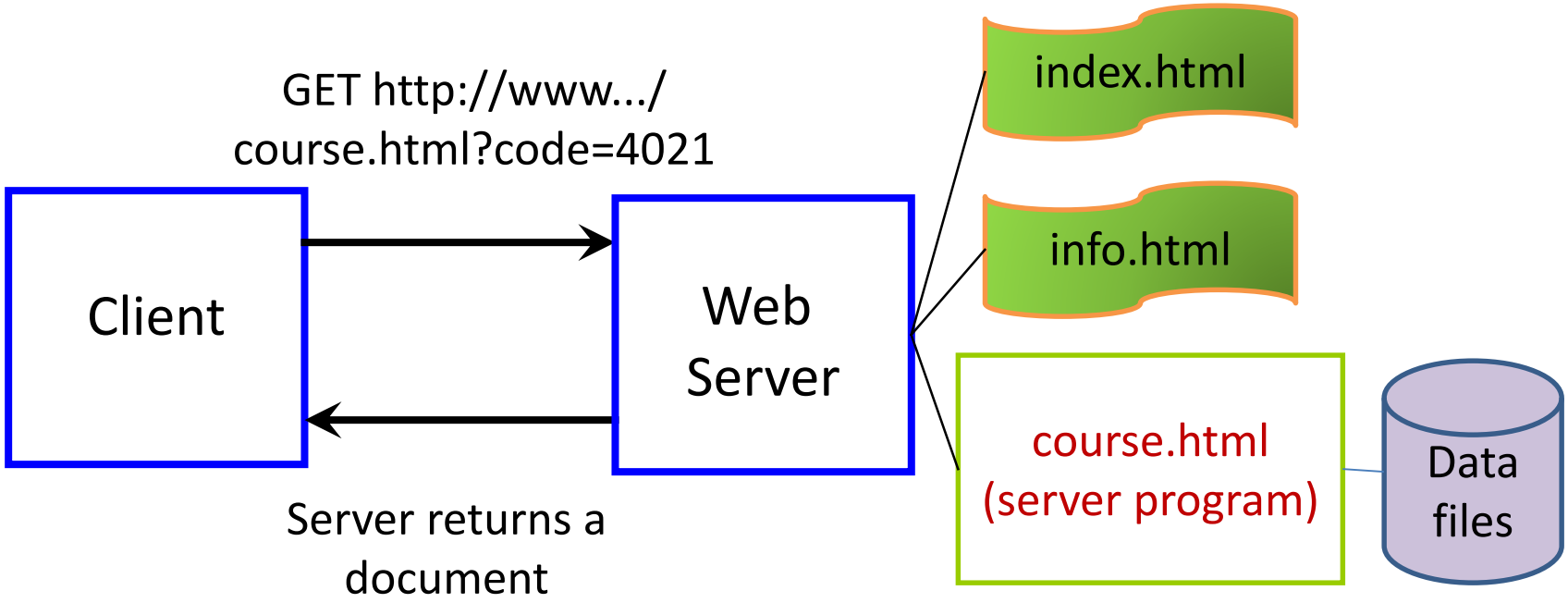
- Client-server is a general term, which include non-http (non-web) clients and servers
- In the web world, client is equal to browser; server is equal to web server such as Apache and all processes behind it
- Popular web servers: Apache, IIS, WebSphere, etc.

Web with Static Pages



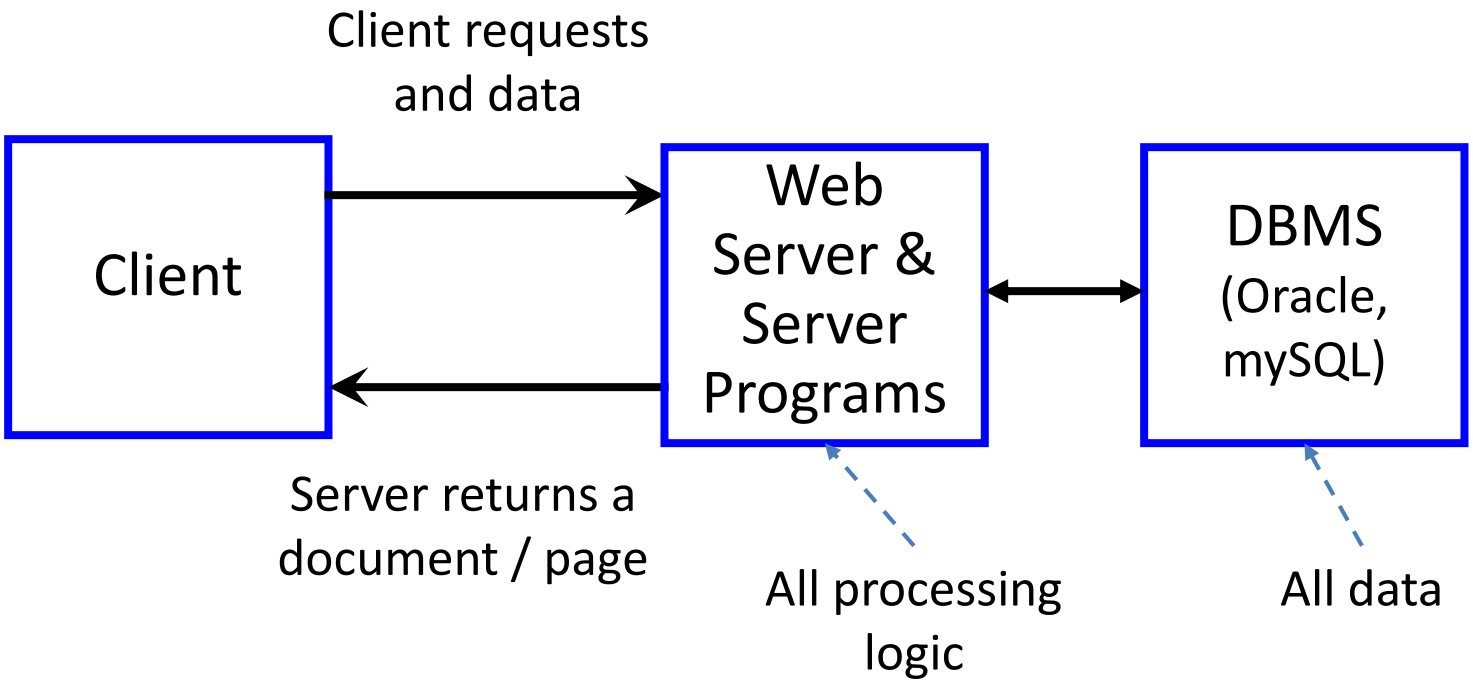
- Pages are static HTML pages with specific URLs (non-parameterized)
- Web Server does nothing more than mapping the URL to the local file and return it to the browser

Web with Dynamic Pages

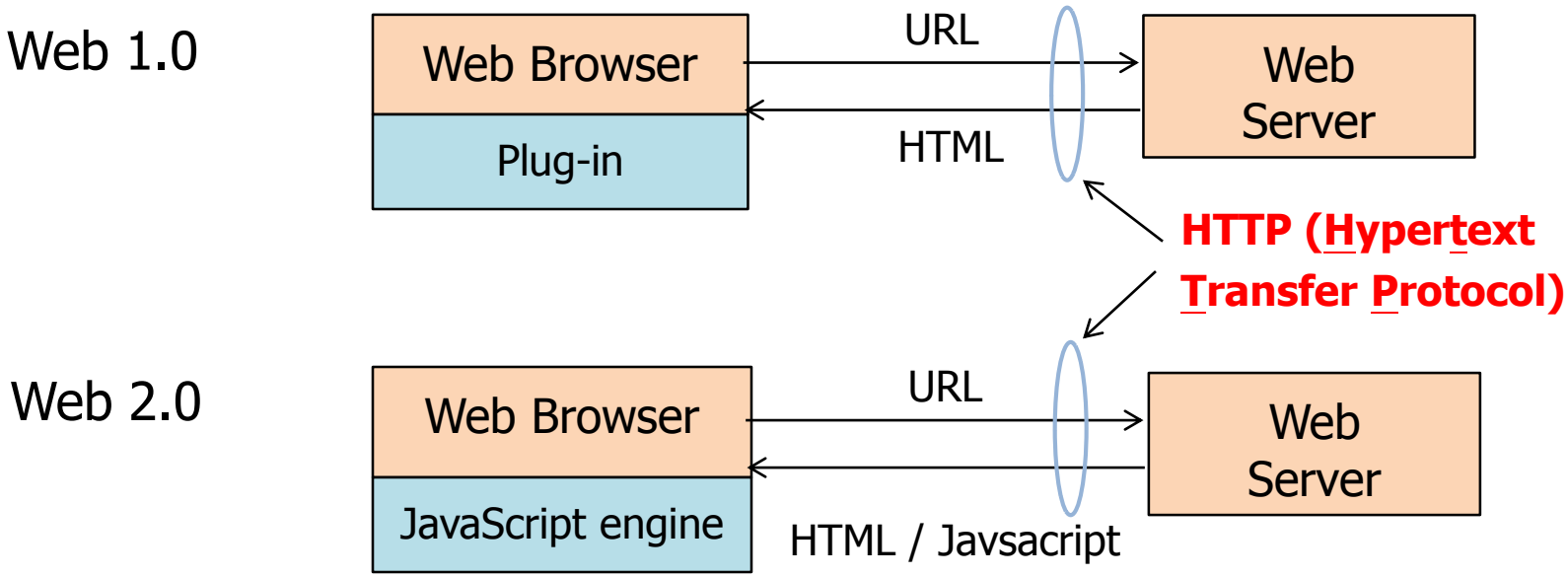


- Contents are assembled dynamically by a server program
- Request URL can contain parameters or be form data
- Server programs can be written in PHP, JSP, Python, Perl, C, etc. and accept parameters on the URL string

3-Tier Architecture



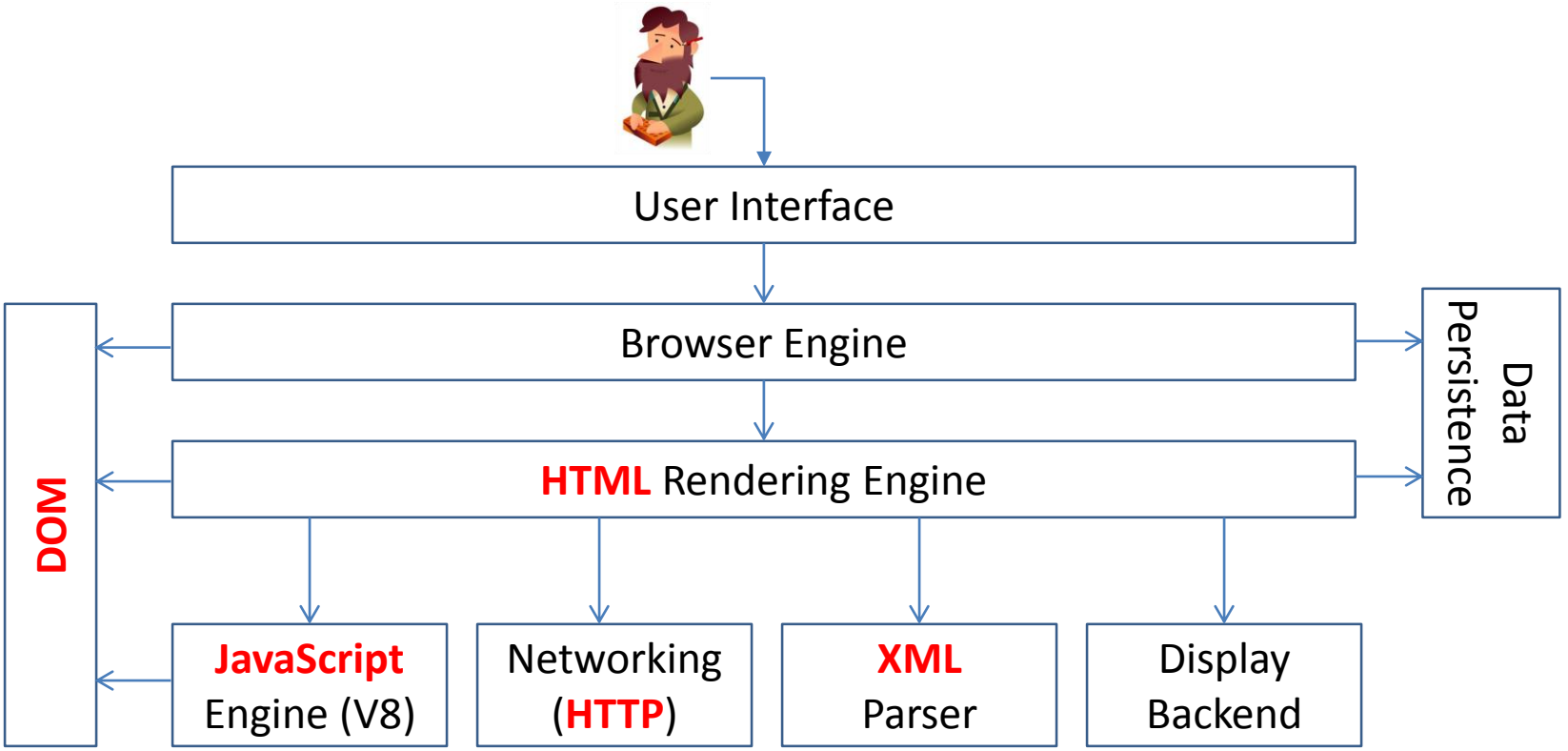
Rich Internet Applications (RIAs)



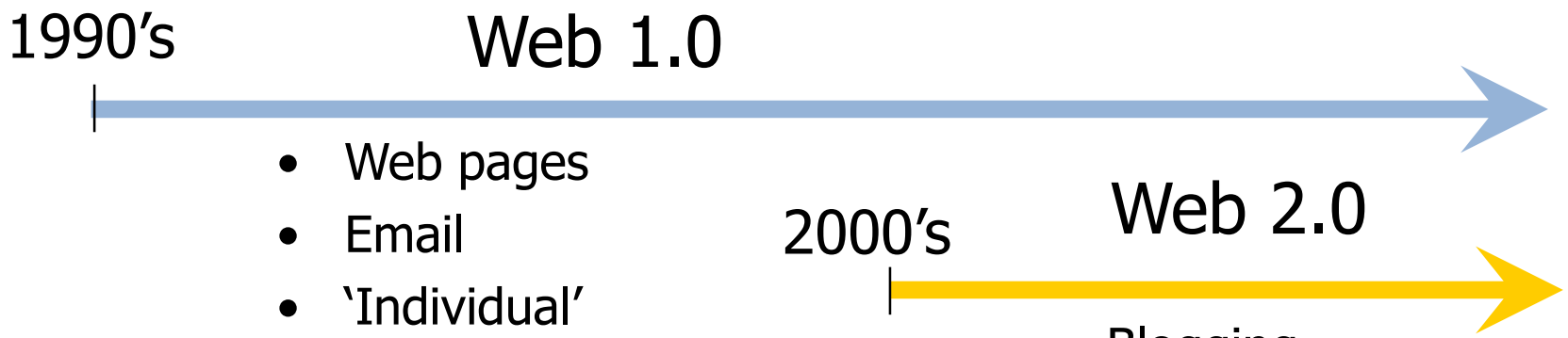
Web 1.0	Web 2.0
Dumb browser	Smart browser
Dumb web pages	Smart web pages
Dumb interaction	Smart interaction

- Web browsers become very powerful (Javascript, HTML5, Ajax, etc.)
- Web browsers shield the users from the underlying operating systems

Inside the Web Browser



From Web 1.0 to Web 2.0 and Back to "Web"



- These days most people don't use the term 'Web 2.0', because almost everything is 'Web 2.0'

Common properties of these applications?

Cornerstone Technologies of the Web

We will study in this course:

- HTML + CSS
- JavaScript + JQuery library
- DOM
- HTTP
- PHP

Should I take COMP 4021? [1]

- The course is NOT a webpage design course.
- We study what the tags do when we need them
- At the end of the course, you will know maybe dozens of the basic tags and styling parameters
- You can take the course if HTML and perhaps a bit of CSS for formatting is all you know.

Should I take COMP 4021? [2]

- If you know how to write JavaScript program to manipulate the DOM (i.e., you know what DOM is and the API), you should not take the course because you know half of the course.
- If all you know is to write a JavaScript program to display “Good Morning” or “Good Afternoon” by checking the time, you can take the course

Should I take COMP 4021? [3]

- The course will NOT cover *node.js*, *Ruby/Rails*, *Flash*, canvas, websocket, web security, etc.
- It is an introductory course on JavaScript/DOM programming, plus server side (PHP) programming.
- We learn JavaScript and the only library we learn a bit is JQuery. This is like learning C++ or Java without using libraries, e.g., to write a program to sort instead of using a sort library.
- If you already know jQuery and develop web applications using libraries and frameworks, this course is like assembly language programming for you.
- Yes, we are learning the foundational technologies of the web, and we are proud of it!

Take Home Message

- Web is one of the most influential and popular applications developed on Internet
- Internet Computing
  = Web programming
  = Browser programming + Server programming + Communication
- Well known terms you ought to know:
  - Client-server architecture, 2-tier or 3-tier architecture
  - Thin/thick/fat clients, rich internet applications (RIAs)
- Static vs dynamic pages
- Web 2.0 vs Web 1.0