

**INFX 1606**

INTRODUCTION TO  
WEBSITE CREATION



# The Internet and the World Wide Web (WWW)

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## **Before we go any further...**

Have you registered to use **Top Hat**?

- You will need this to access lecture material, quizzes, readings, etc.

Have you checked if you have access to **Brightspace**?

- <https://dal.brightspace.com>
- You will need your Dal Net ID
- You will need access to submit labs / assignments / project

# Outline

Networks and the Internet

A brief history of the Internet

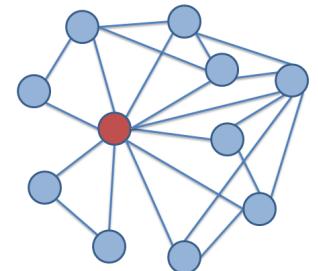
World Wide Web (WWW)

Hyper-Text Transfer Protocol (HTTP)

Domain Name System (DNS)

# What is a network?

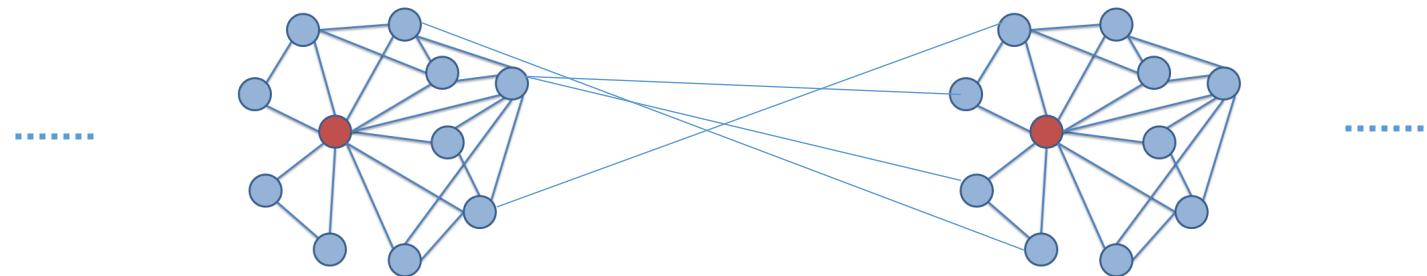
Network = Group of “connected communicating devices”



What happens when one network wants to communicate with another?

We get a group of “interconnected networks,” a.k.a internetworks

An internetwork is also referred to as an internet



# The Internet: What

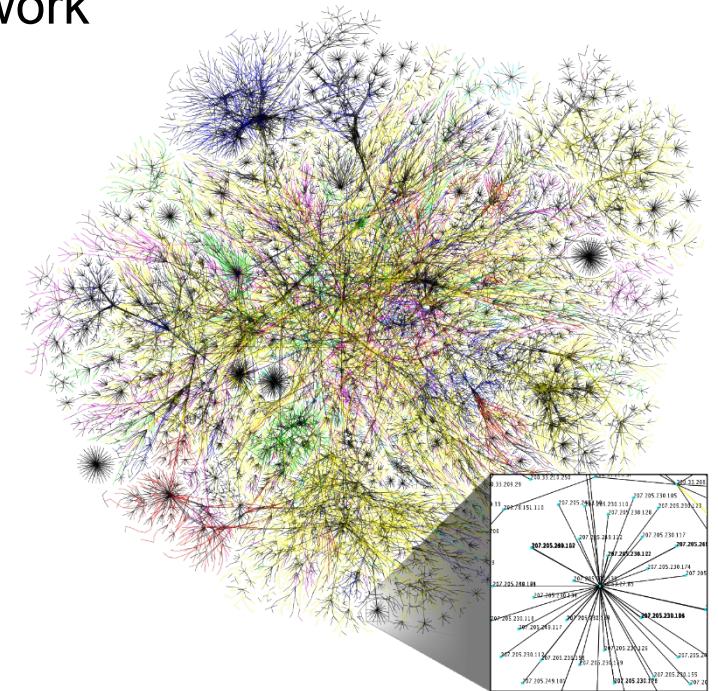
# What is the Internet?

# The Internet is the most popular internetwork

# It is a network of networks

Consists of interconnected computer networks that link billions of devices

**Networks on the Internet include private and organizational networks**



# The Internet: Who, When, Where, How and Why?

Started as a research project to connect mainframe computer systems in research organizations

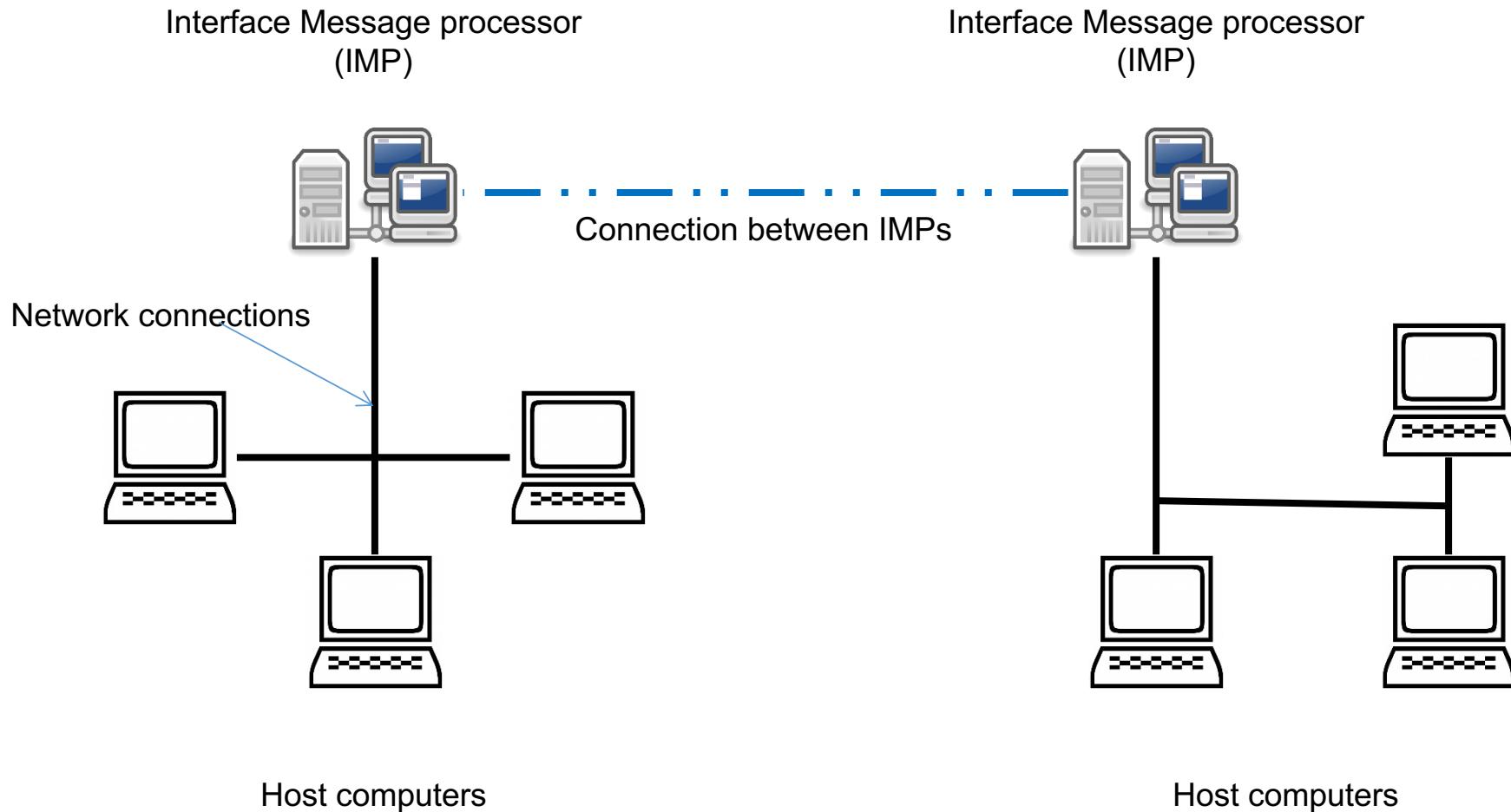
**ARPA** (Advanced Research Projects Agency) in the US started this project to find a way to help researchers communicate their results

(Well, mainly as a way to prevent more than one research group – that they funded – from focusing on same solutions to problems)

ARPA proposed the idea for **ARPANET** in 1967 – this would be a small network of computers, not necessarily from the same manufacturer

# The Internet: Who, When, Where, How and Why?

## Structure of ARPANET



# The Internet: Who, When, Where, How and Why?

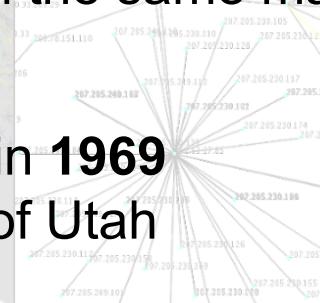
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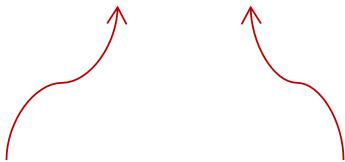
ARPA proposed the idea for **ARPANET** in 1967 – this would be a small network of computers, not necessarily from the same manufacturer

ARPANET was successfully implemented in **1969**  
Four nodes: UCLA, UCSB, SRI and Univ. of Utah



# The Internet: Who, When, Where, How and Why?

*They're known as  
the fathers of the Internet*



1973: Vint Cerf and Bob Kahn collaborated and wrote a paper on the ***Internetting Project***, detailing protocols for end-to-end communication of data

Their paper discussed **Transmission Control Protocol (TCP)**

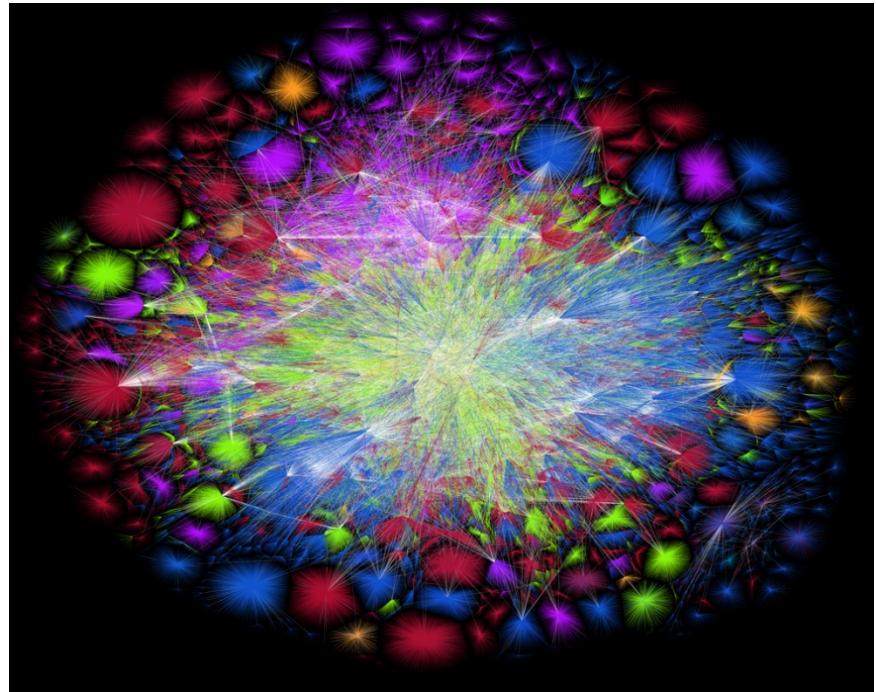
Later, TCP was split into **TCP** and **Internetworking Protocol (IP)**, which became known as **TCP/IP** → used as the Internet communication standard

# The Internet Today

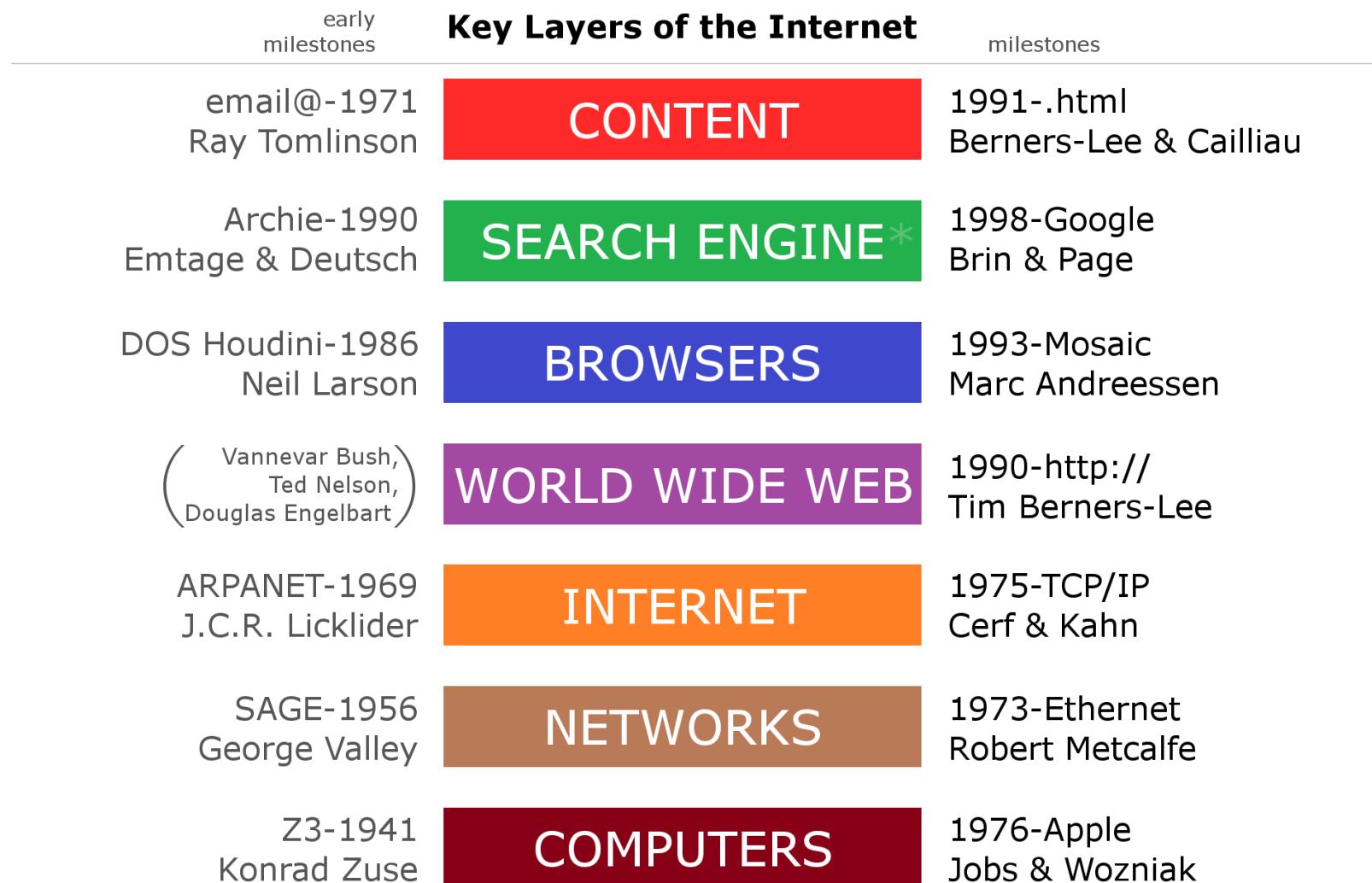
Not a simple hierarchical structure

Contains many local area networks (LANs), wide area networks (WANs), personal area networks (PANs), etc., joined by connecting devices and switching stations

All these route data packets between hosts and servers, helping us do what we do best – communicate!



# Essential Elements of the Internet





# World Wide Web (WWW)

Also known as **W3** or the **Web**

The Web is an information space, proposed by Tim Berners-Lee in 1989  
(<http://www.w3.org/History/1989/proposal.html>)

In the Web, “items of interest” are referred to as “resources” and identified by global identifiers – Uniform Resource Identifiers (URIs)

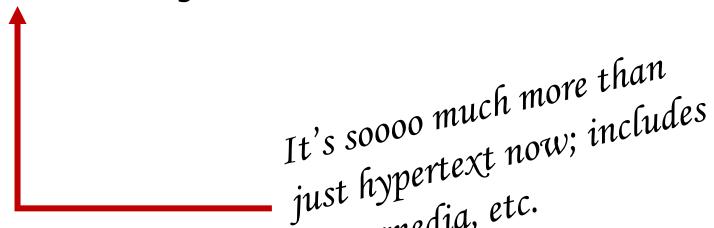
Note:

- URIs can be either URNs (Uniform Resource Names) or URLs (Uniform Resource Locators).
- *“URN defines an item’s identity, while the URL provides a method for finding it”* [Wikipedia, [https://en.wikipedia.org/wiki/Uniform\\_Resource\\_Identifier](https://en.wikipedia.org/wiki/Uniform_Resource_Identifier)]
- What makes a URN into a URL is the presence of the access protocol. i.e. **a.com/index.html** is a URN, but **https://a.com/index.html** is a URL.

# World Wide Web (WWW)

Tim Berners-Lee proposed his concept to CERN to help with managing general information about experiments at CERN

His solution was based on a “***distributed hypertext system***”



It's soooo much more than just hypertext now; includes hypermedia, etc.

## ***HyperText***

Text displayed on electronic devices with references (referred to as ***hyperlinks***)

Users can access the references immediately (through hyperlinks)

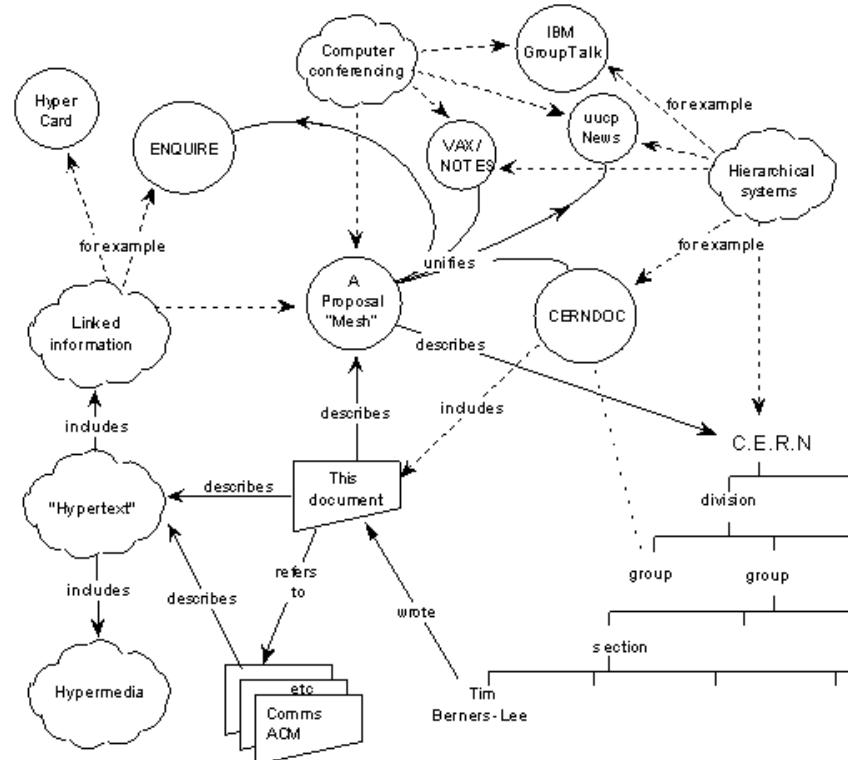
Hypertext is also machine-readable, and helps organizing information so that related items are connected

# World Wide Web (WWW)

Tim Berners-Lee's system was aimed at preventing information loss, when employees leave or move to other projects

Some characteristics of the Web, as proposed by Tim Berners-Lee:

- [1] This would use **HyperText** to link information resources



# World Wide Web (WWW)

Tim Berners-Lee's system was aimed at preventing information loss, when employees leave or move to other projects

Some characteristics of the Web, as proposed by Tim Berners-Lee:

- [1] This would use **HyperText** to link information resources
- [2] Would allow multiple users to **access** the same data, enabling **remote access**, and access from **different types of systems** (Unix, MacIntosh, etc.)
- [3] **Non-centralized** → start small, isolated and merge to grow
- [4] Would allow **data analysis** (search, generate custom lists, etc.)
- [5] **“Live links”** → to help in retrieving fresh (or “live”) data in systems whose state is always changing

# World Wide Web (WWW)

Tim Berners-Lee's proposal also included definitions for:

- **URLs**: Uniform Resource Locators

They are a type of uniform resource identifier (URIs)

- **HTTP**: HyperText Transfer Protocol

The protocol used to transfer HyperText representation of a resource from the host (server) to another host (client)

- **HTML**: HyperText Markup Language

The programming language that helps represent the resource and contained information on the host (client)

# World Wide Web (WWW)

**URLs:** Uniform Resource Locators

Informally referred to as **web addresses**

Used to identify a web resource, using a scheme to specify  
**“its location on a network and a mechanism for retrieving it”**

Examples:

web pages → <http://www.dal.ca>

file transfer → <ftp://127.0.0.1/www/>

email to → <mailto:firstname.lastname@company.com>

file access → <file:///path/on/computer/filename.extension>

etc.

# World Wide Web (WWW)

## HTTP: HyperText Transfer Protocol

This forms the foundation for data communication on WWW

It is a **request-response protocol**, based on the client-server computing model

An example:

Web browser on a computer is the client, and another computer that “hosts” a web site is the server

# World Wide Web (WWW)

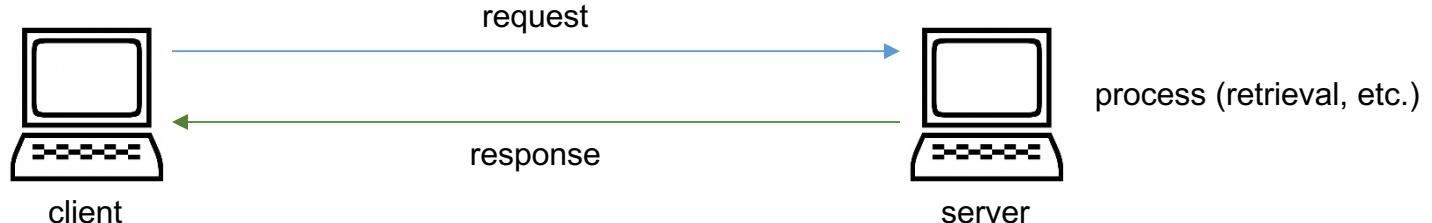
## HTTP: HyperText Transfer Protocol

An example (cont'd):

Web browser on a computer is the client, and another computer that “hosts” a web site is the server

How does this work?

- The client submits an **HTTP request** to server
- The **server retrieves the information resource**, performs any operation (e.g. updating a database), and returns a response
- The **response** contains completion status information about the request and requested content



# World Wide Web (WWW)

**HTTP:** HyperText Transfer Protocol

***Ports:***

An end point in the operating system

Not hardware, but rather a logical end point

Example: Port 80 used for HTTP and Port 443 for HTTPS

Technically, when you visit a website, your browser is sending a request to be served by port 80 at the server

So, <http://www.google.com> is actually <http://www.google.com:80> and, <https://www.dal.ca> is actually <https://www.dal.ca:443>

Remember it this way: ***the server “listens” to this port, and when it receives a request on that port, it knows the exact nature of request (e.g. HTTP, file transfer, etc.)***

# World Wide Web (WWW)

## HTML: HyperText Markup Language

Markup languages are used to **annotate a document** (with metadata)

HTML is the standard markup language used to create web pages

Web browsers render HTML files as specified by the various HTML elements

E.g.

```
<!DOCTYPE html>
<html Lang="en">
    <head>
        <meta charset="utf-8">
        <title>Test</title>
    </head>
    <body>
        <p>This is a test page!</p>
    </body>
</html>
```

## Internet v. WWW

In most cases, Internet and WWW seem to be interchangeably used, or used without much distinction.

This is not correct!!

**Internet** → global system of interconnected networks

**WWW** → One of the services transferred over the Internet, with a collection of documents and other resources that are stored on servers

*Data exchange on WWW is facilitated by the Internet*

# World Wide Web (WWW)

So, how does a computer (client) retrieve information from the server?

First, user enters URL on browser (client)

Then, server hosting the resource with URL responds with data

Is that all?

Nope! Computers can only understand numbers.

So, URLs have to be “translated” into **IP (Internet Protocol) addresses**



# World Wide Web (WWW)

So, how does a computer (client) retrieve information from the server?

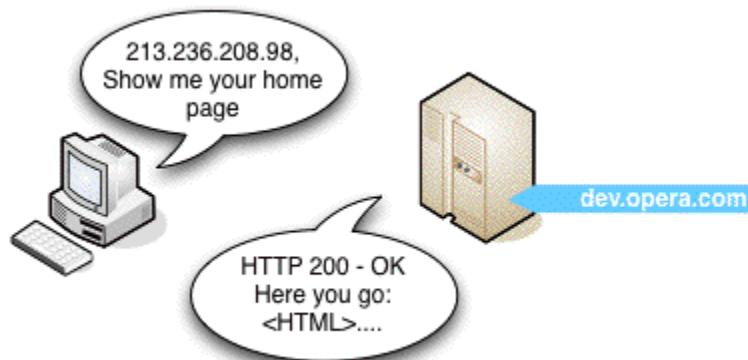
First, user enters URL on browser (client)

URL is then translated into IP address

Browser then sends request to IP address

} Domain Name System  
(DNS)

Then, server (with the specified IP address) hosting the resource with URL responds with data



# Domain Name System (DNS)

Hierarchical and distributed naming system for resources connected to the Internet or any private network

The most important function of DNS is ***translation of domain names*** into IP addresses (e.g. IPv4: 8.8.8.8 and IPv6: 2001:4860:4860::8888)

Think of this like a telephone directory or even Facebook

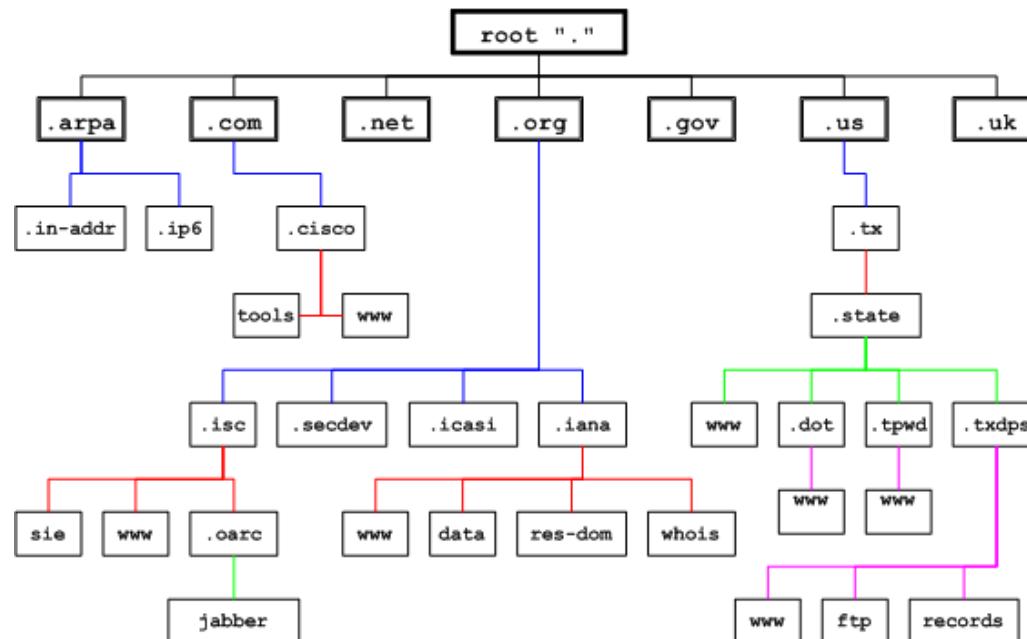
If you want to find someone on Facebook, you search by typing in the person's name, and you can click on the correct result to see the person's profile – without having to remember or know the URL of the person's profile

# Domain Name System (DNS)

How does DNS work?

There is a tree of domain names, called the **domain name space**

General structure: hierarchical



.arpa: primarily used for address to host mappings

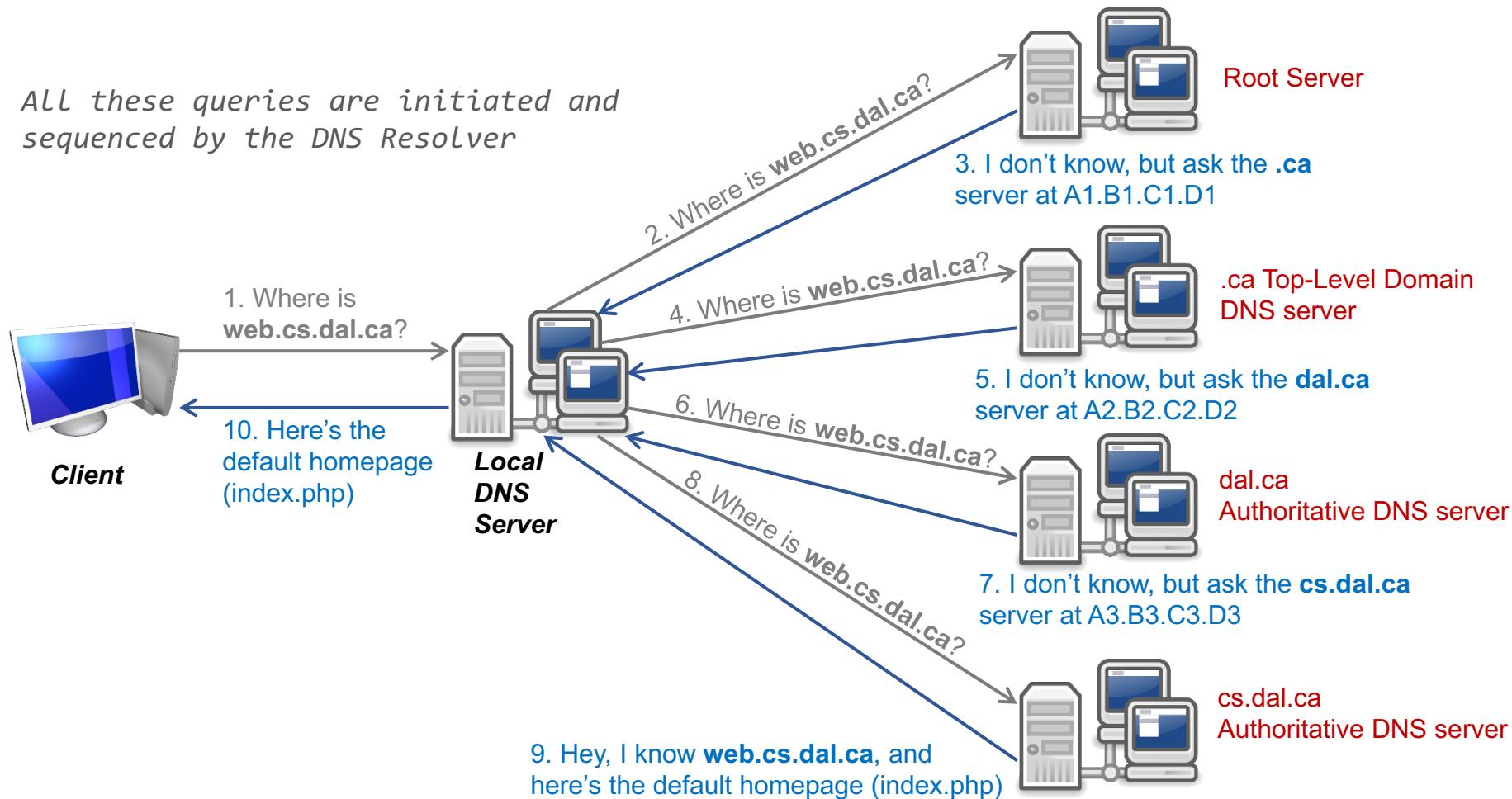
.com, .net, .org, .org: are generic TLDs (gTLD)

.us, .uk: are country code TLDs (ccTLD)

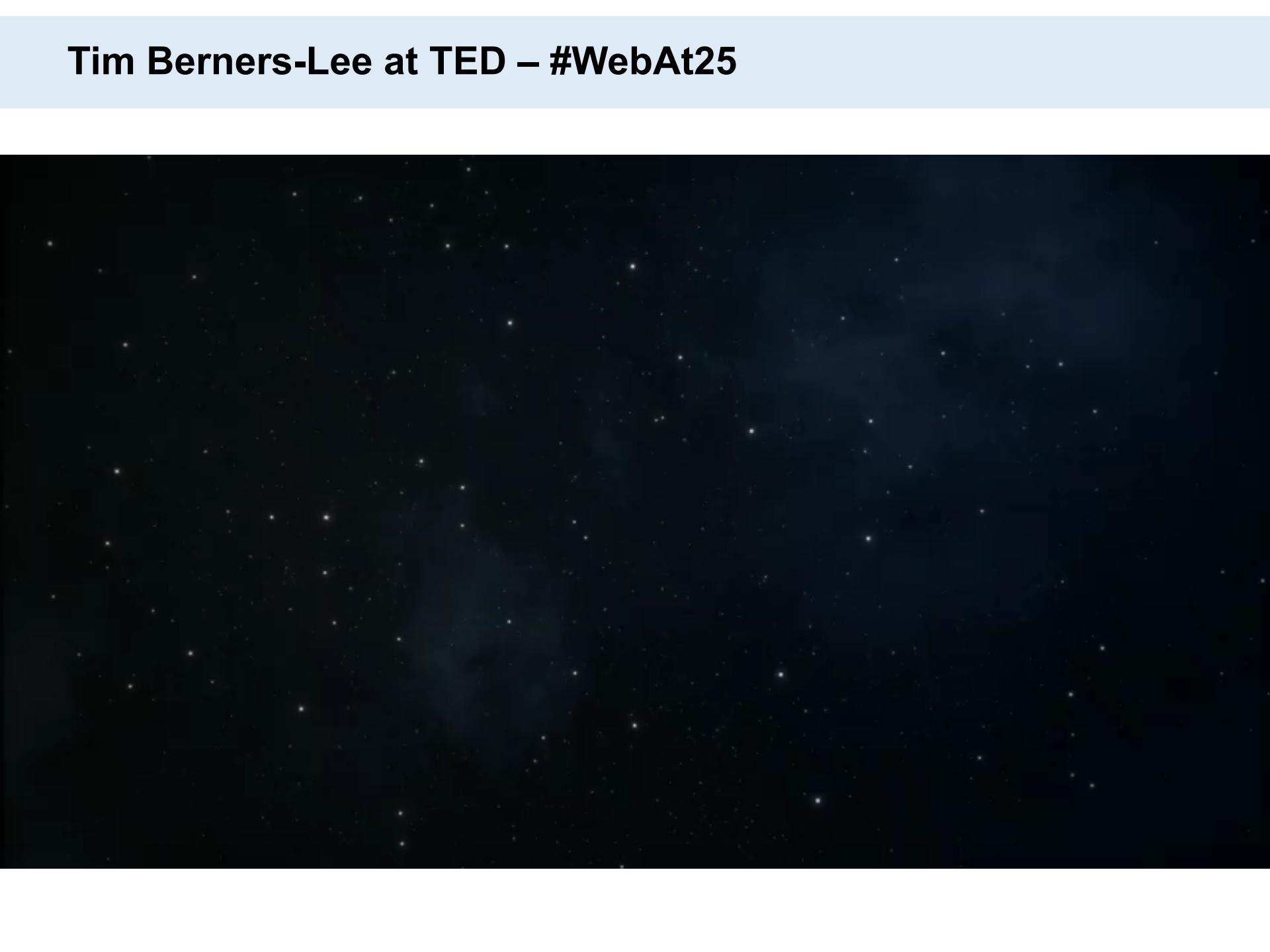
# Domain Name System (DNS)

How does DNS work?

Translation of web address into IP address is managed by a **DNS Resolver**, in a process called resolution



# Tim Berners-Lee at TED – #WebAt25



# Resources

- W3C (World Wide Web Consortium) Wiki:  
[http://www.w3.org/wiki/Main\\_Page](http://www.w3.org/wiki/Main_Page)
- W3C FAQ:  
<http://www.w3.org/Help/>
- WWW Proposal, Tim Berners-Lee, 1989:  
<http://www.w3.org/History/1989/proposal.html>

How many times have you visited some website and thought:

*“I wish this website was better to use!!”*

Or

*“Oh my! This website is so good!”*

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WEBSITE CREATION



# Interactions on the Web

# Outline

An overview of user interface (UI) design as applied to websites

Website UI design: Best practices

Heuristic evaluation or usability inspection guidelines

We will continue this discussion on Monday!