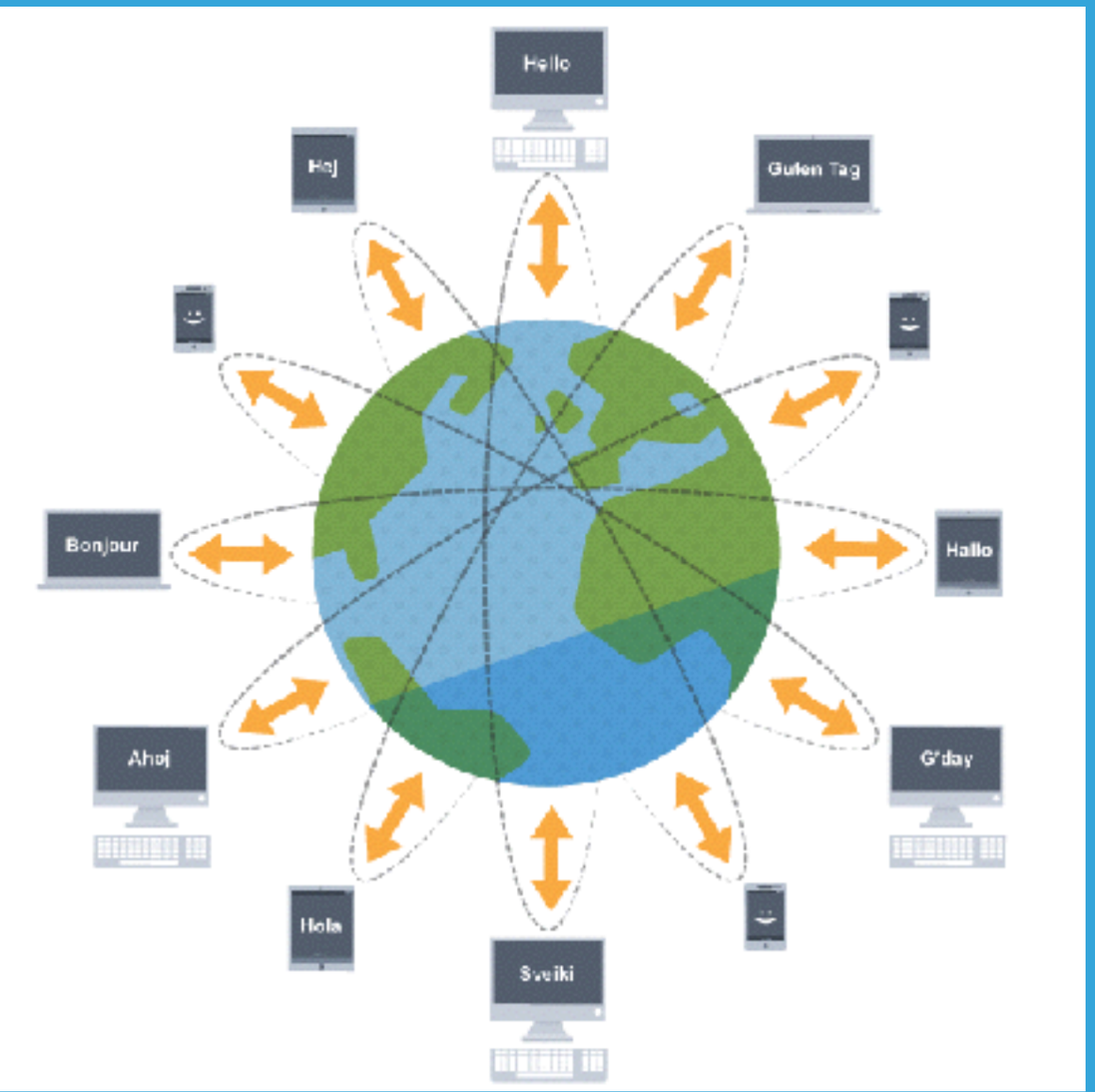
INFO2180 - LECTURE 1

INTERNET/WWW

WHAT IS THE INTERNET?



A CONNECTION OF COMPUTERS USING THE INTERNET PROTOCOL (IP)

Wikipedia

WHAT IS THE WWW?

IT IS THE PART OF THE INTERNET THAT CAN BE ACCESSED THROUGH WEBSITES.

A BRIEF HISTORY

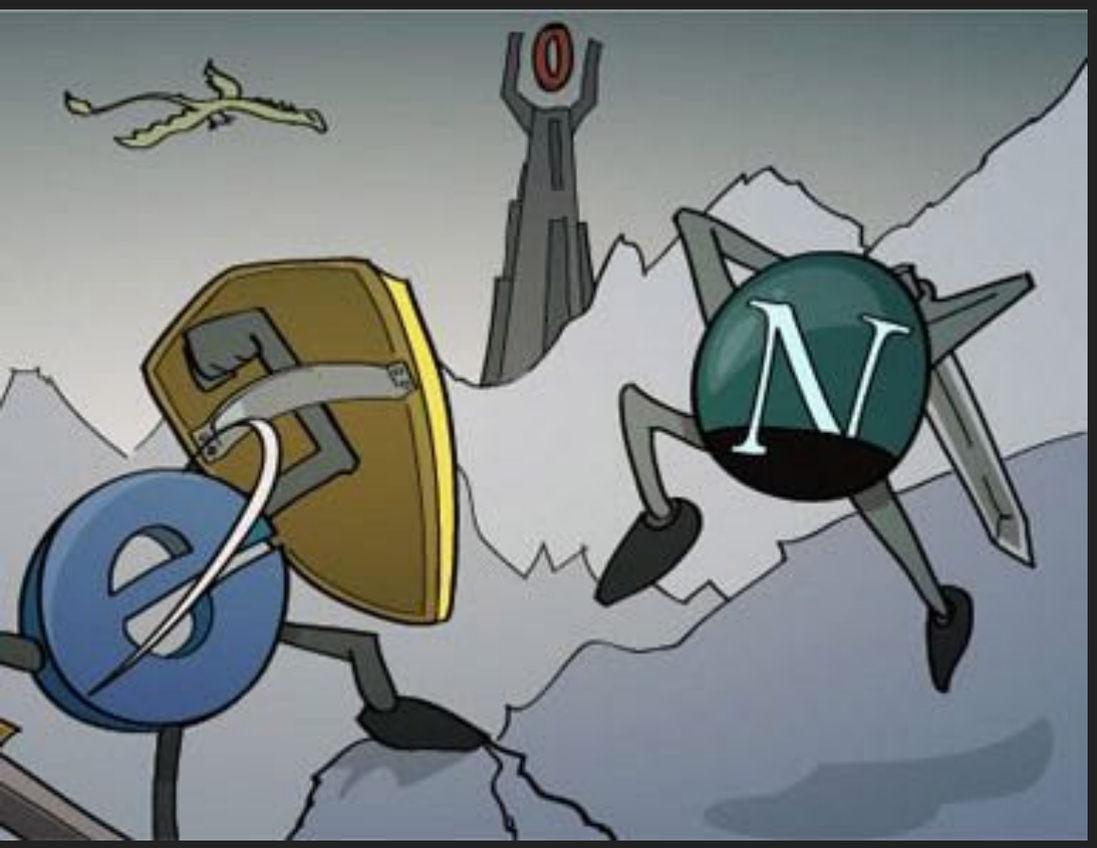
1960-1970

ARPANET

WHO IS THIS GUY?

CREATOR OF THE WORLD WIDE WEB (WWW): 1989-1991

TIM BERNERS-LEE



NETSCAPE NAVIGATOR - 1994
INTERNET EXPLORER - 1995

BROWSER WARS

NOTABLE INTERNET COMPANY LAUNCHES

- Amazon.com - went online in 1995
- Google - Built in 1996, officially a company in 1998
- Yahoo! - Founded in 1994

1997–2000

DOT-COM BUBBLE

1999–2001

DOT-COM COLLAPSE

SINCE THEN THE WEB HAS BECOME AN INTEGRAL PART OF OUR LIVES

KEY ASPECTS OF THE INTERNET

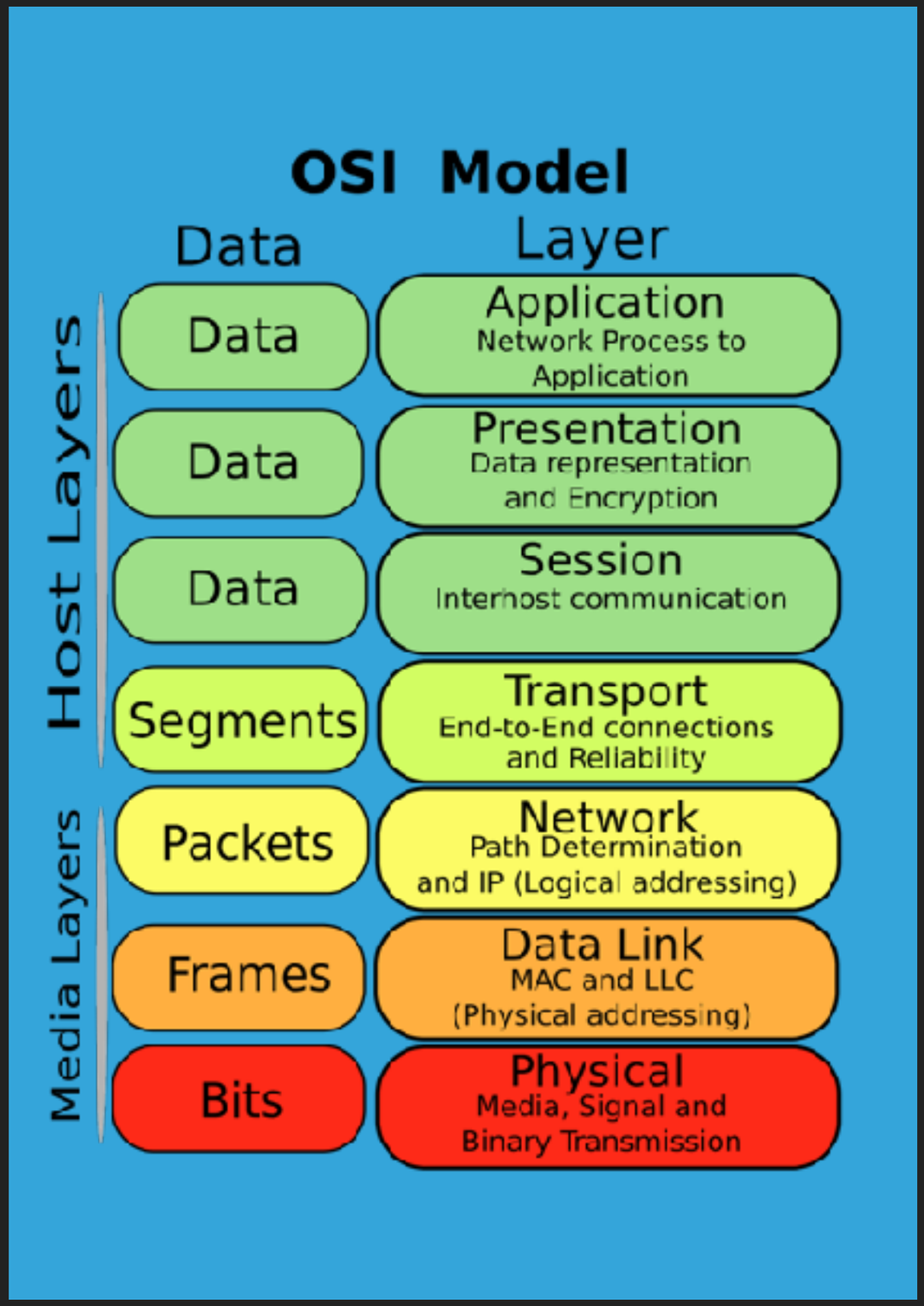
KEY ASPECTS OF THE INTERNET

- sub-networks can stand on their own
- computers can dynamically join and leave the network
- built on open standards; anyone can create a new internet device
- lack of centralized control (mostly)
- everyone can use it with simple, commonly available software

THE INTERNET USES A LAYERED ARCHITECTURE

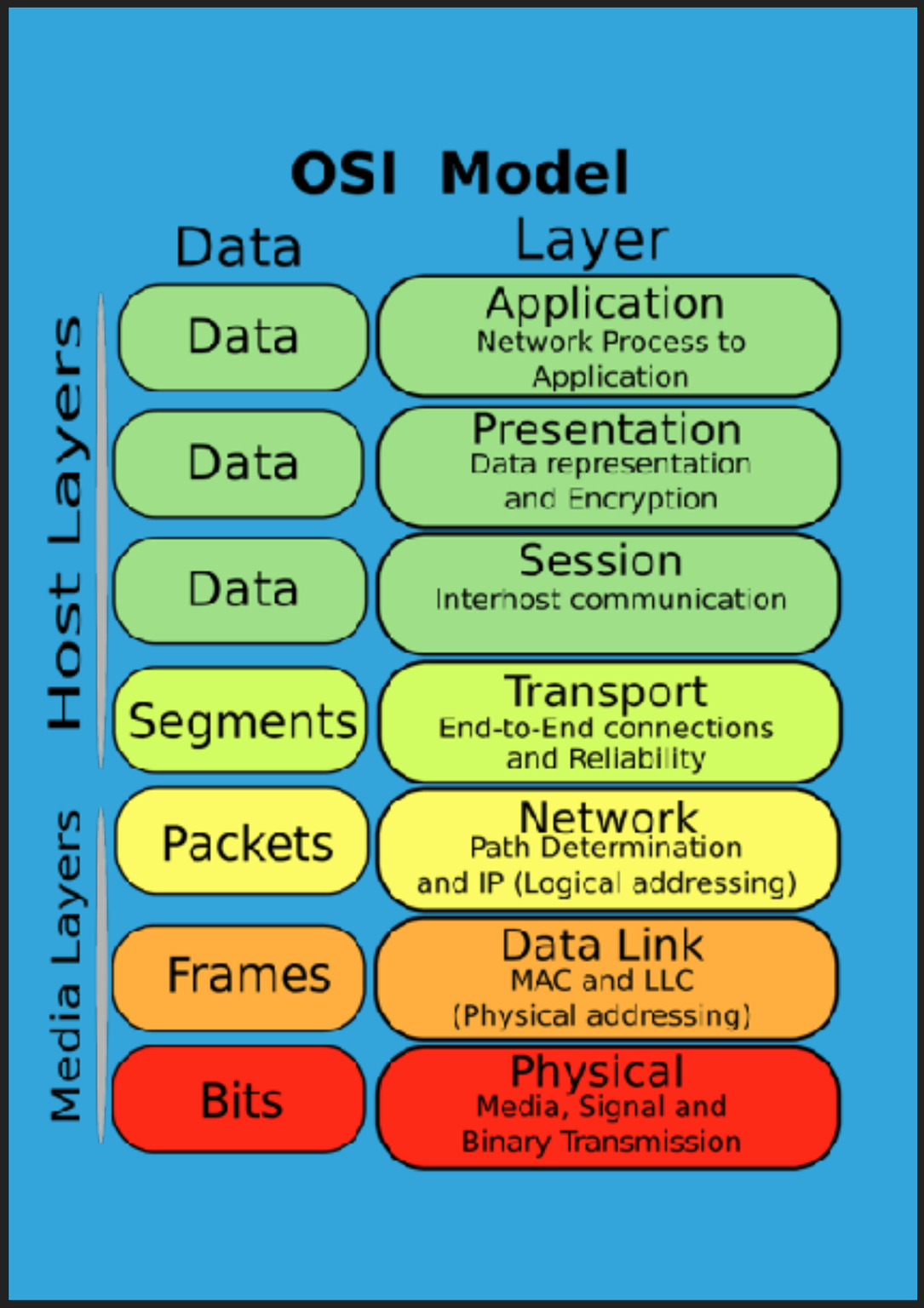
OSI MODEL LAYERS

- Physical - hardware to send and receive data. e.g. ethernet cables, modems, coaxial cable.
- Data Link - handles the moving of data in and out across a physical link in a network



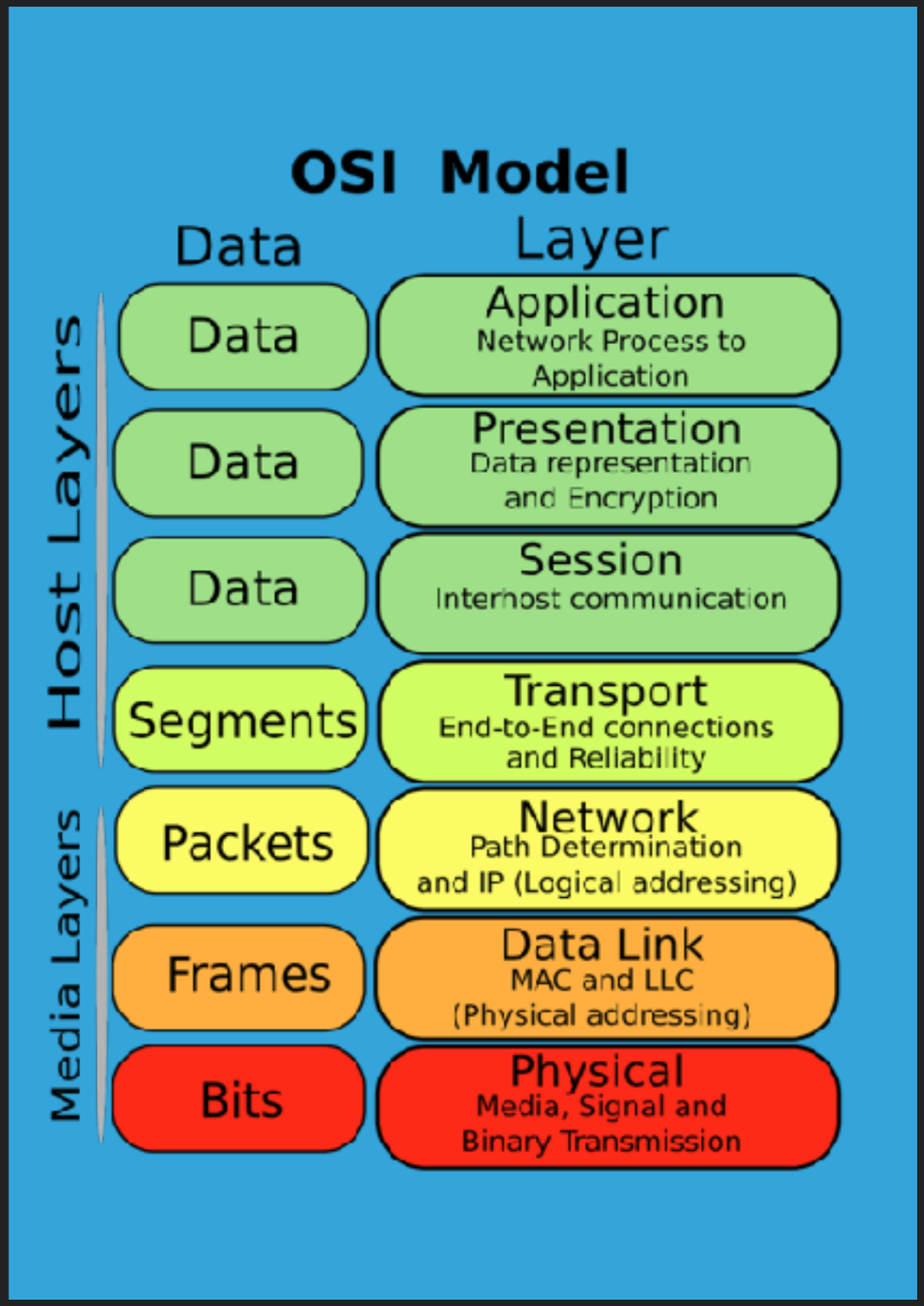
OSI MODEL LAYERS

- Network - decision is made to as to which physical path the information should follow from its source to its destination.
- Transport - ensures the reliability of data delivery by detecting and attempting to correct problems that occurred



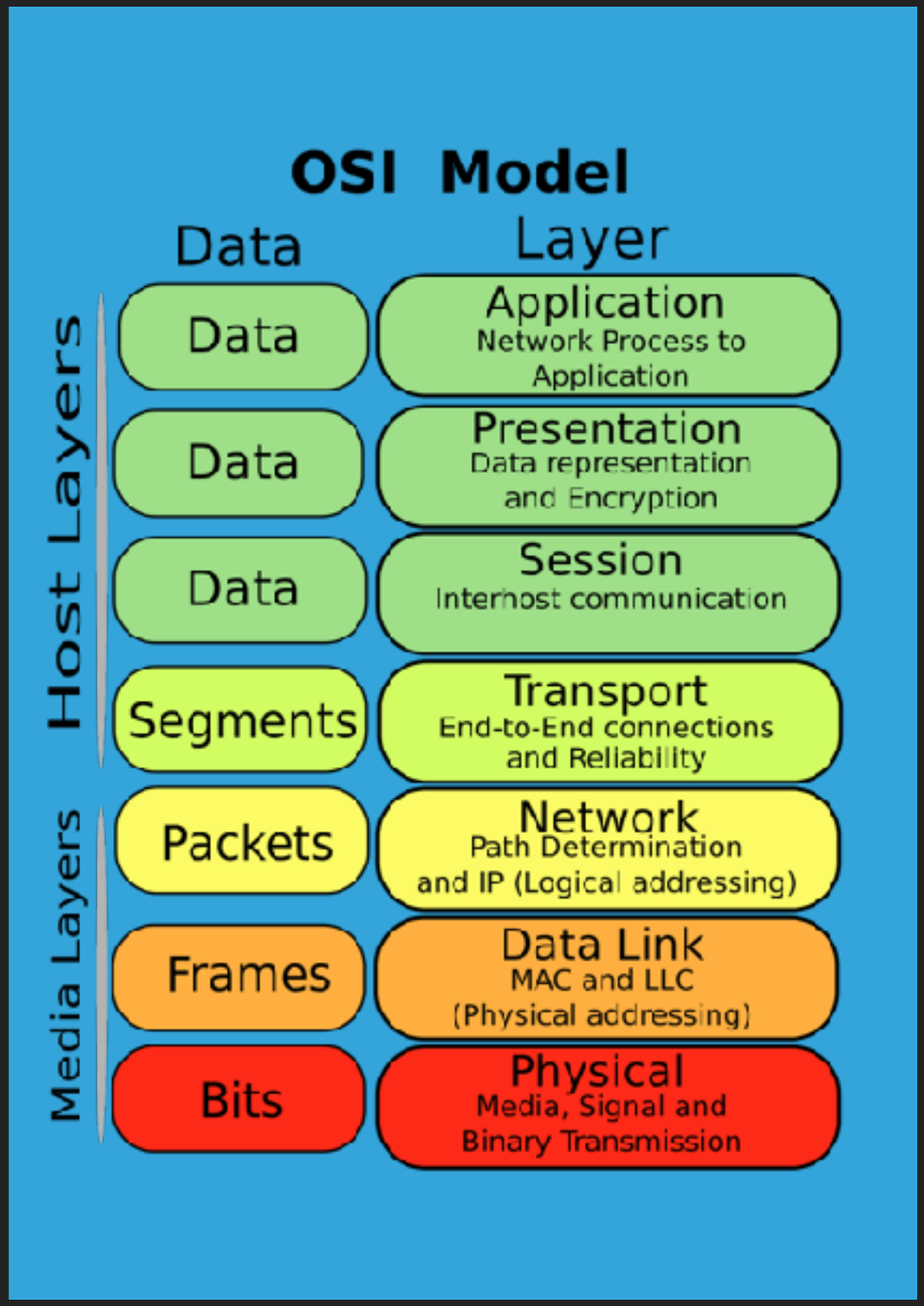
OSI MODEL LAYERS

- Session - manages the setting up and taking down of the association between two communicating end points that is called a connection.
- Presentation - transforms data into a form that application layer can accept. e.g. JPEG, MPEG, ASCII, encrypted or non-encrypted, etc.



OSI MODEL LAYERS

- Application - web browser, email, ftp



INTERNET PROTOCOL (IP)

SPECIFIES THE FORMAT OF PACKETS, ALSO CALLED DATAGRAMS, AND THE ADDRESSING SCHEME.

Webopedia

An IPv4 address (dotted-decimal notation)

172 . 16 . 254 . 1

10101100 . 00010000 . 11111110 . 00000001

One byte = Eight bits

Thirty-two bits (4 x 8), or 4 bytes

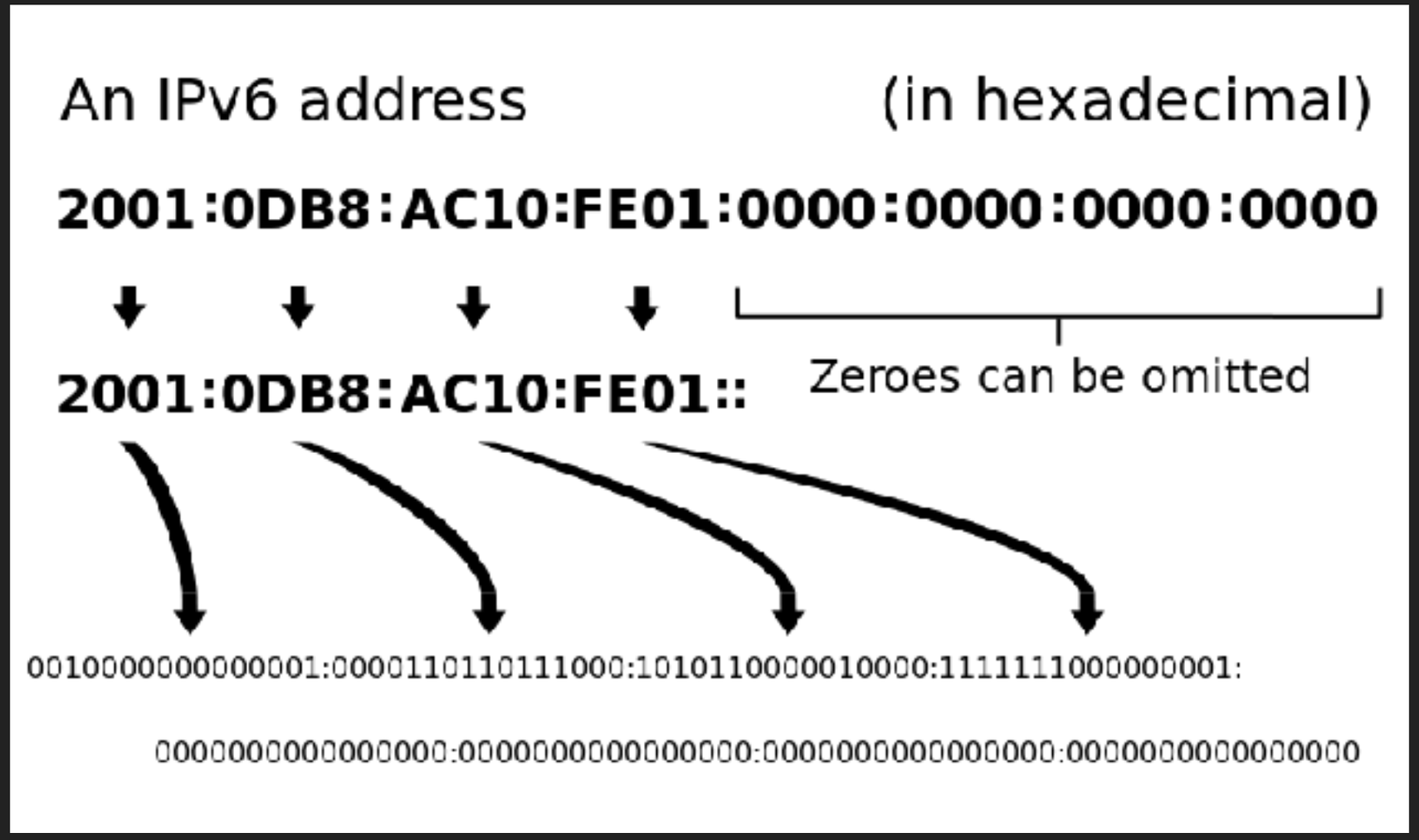
HOW CAN YOU FIND OUT YOUR IP ADDRESS

- Your Internet IP Address can be found on a site like whatismyip.com
- Your local IP address:

  In a terminal type **`ifconfig`** (Mac/Linux) or **`ipconfig`** (Windows)

IPV6

- We are running out of IPv4 addresses
- IPv6 increases the address space.



TRANSMISSION CONTROL PROTOCOL (TCP)

ADDS MULTIPLEXING, GUARANTEED MESSAGE DELIVERY ON TOP OF IP

Webopedia

TCP MULTIPLEXING

- Multiple Programs can use the Same IP address.
- This is done using different ports, which is a number given to each program or service
  - port 80 - web browser (443 for SSL)
  - port 25 - email
  - port 21 - ftp
  - port 22 - ssh

THE WORLD WIDE WEB (WWW)

WEB SERVERS

COMPUTERS THAT DELIVER (SERVES UP) WEB PAGES.

webopedia

WEB SERVER SOFTWARE

- Apache
- Nginx
- Microsoft Internet Information Server (IIS)

WEB BROWSERS

SOFTWARE USED TO LOCATE, RETRIEVE AND DISPLAY CONTENT ON THE WORLD WIDE WEB

webopedia

POPULAR WEB BROWSERS

Google Chrome, Mozilla Firefox, Opera, Safari, Internet Explorer, Microsoft Edge

DOMAIN NAME SYSTEM (DNS)

AN INTERNET SERVICE THAT TRANSLATES DOMAIN NAMES INTO IP ADDRESSES

webopedia

EXAMPLE

```
www.mona.uwi.edu –> 196.2.1.120
```

UNIFORM RESOURCE LOCATOR (URL)

GLOBAL ADDRESS OF DOCUMENTS AND OTHER RESOURCES ON THE WORLD WIDE WEB.

webopedia

EXAMPLE

WHAT DOES THE BROWSER DO?

- The Browser asks the DNS server for IP address for www.mona.uwi.edu
- Next, it connects to that IP address on port 80 (default port)
- Ask the server to `GET /foo/bar.html` (and any other resources on that page)
- Displays the web page in your browser

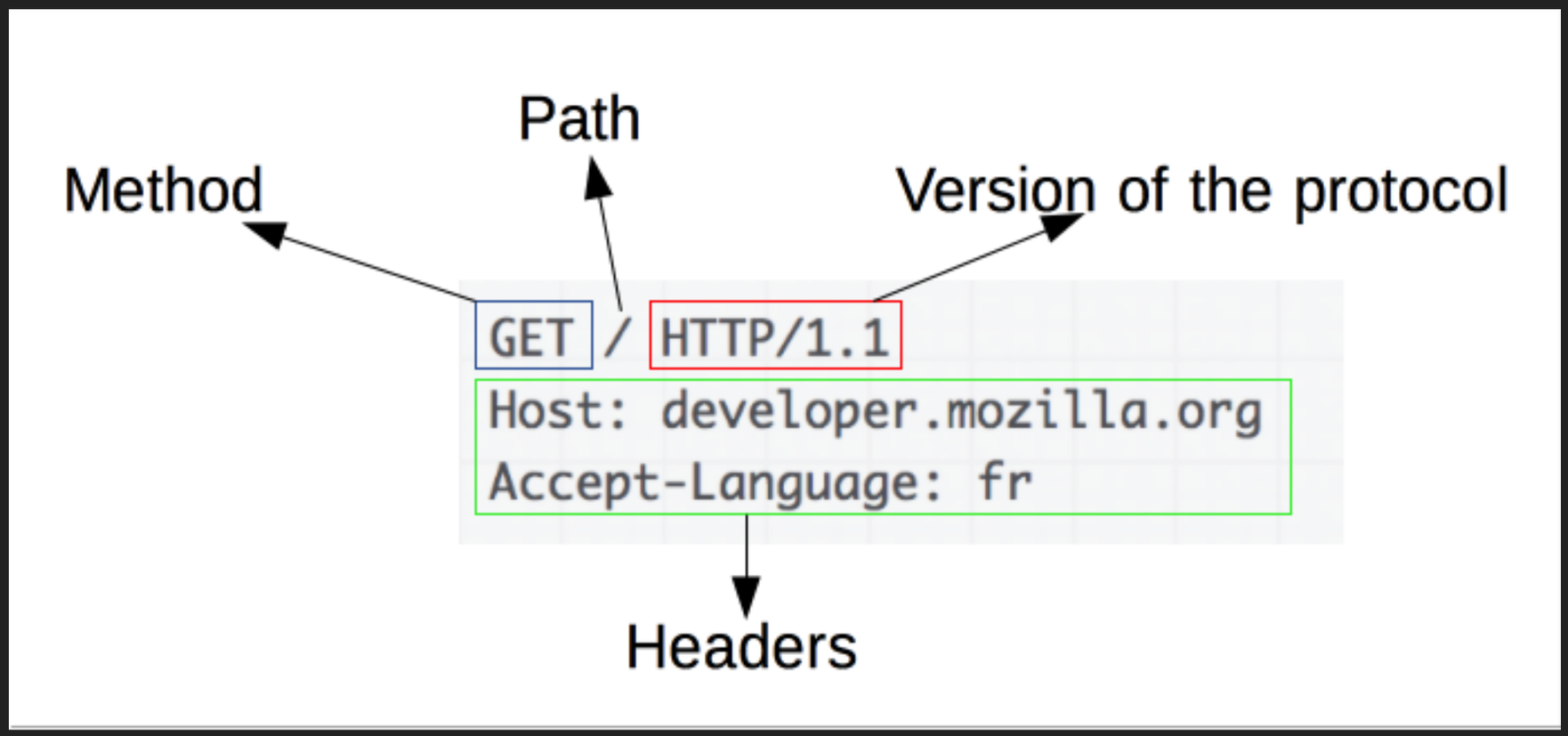
OTHER TYPES OF URLS

- Anchors - http://example.com/index.html#download
  allows you to jump to a point within a page
- Port - http://example.com:8080/myfile.html
  The when not using the default port 80
- Query String - http://example.com/about?id=1&property=value
  Pass additional parameters to the page

HYPERTEXT TRANSFER PROTOCOL (HTTP)

PROTOCOL THAT DEFINES HOW MESSAGES ARE FORMATTED AND TRANSMITTED, AND WHAT ACTIONS WEB SERVERS AND BROWSERS SHOULD TAKE IN RESPONSE TO VARIOUS COMMANDS

EXAMPLE HTTP REQUEST



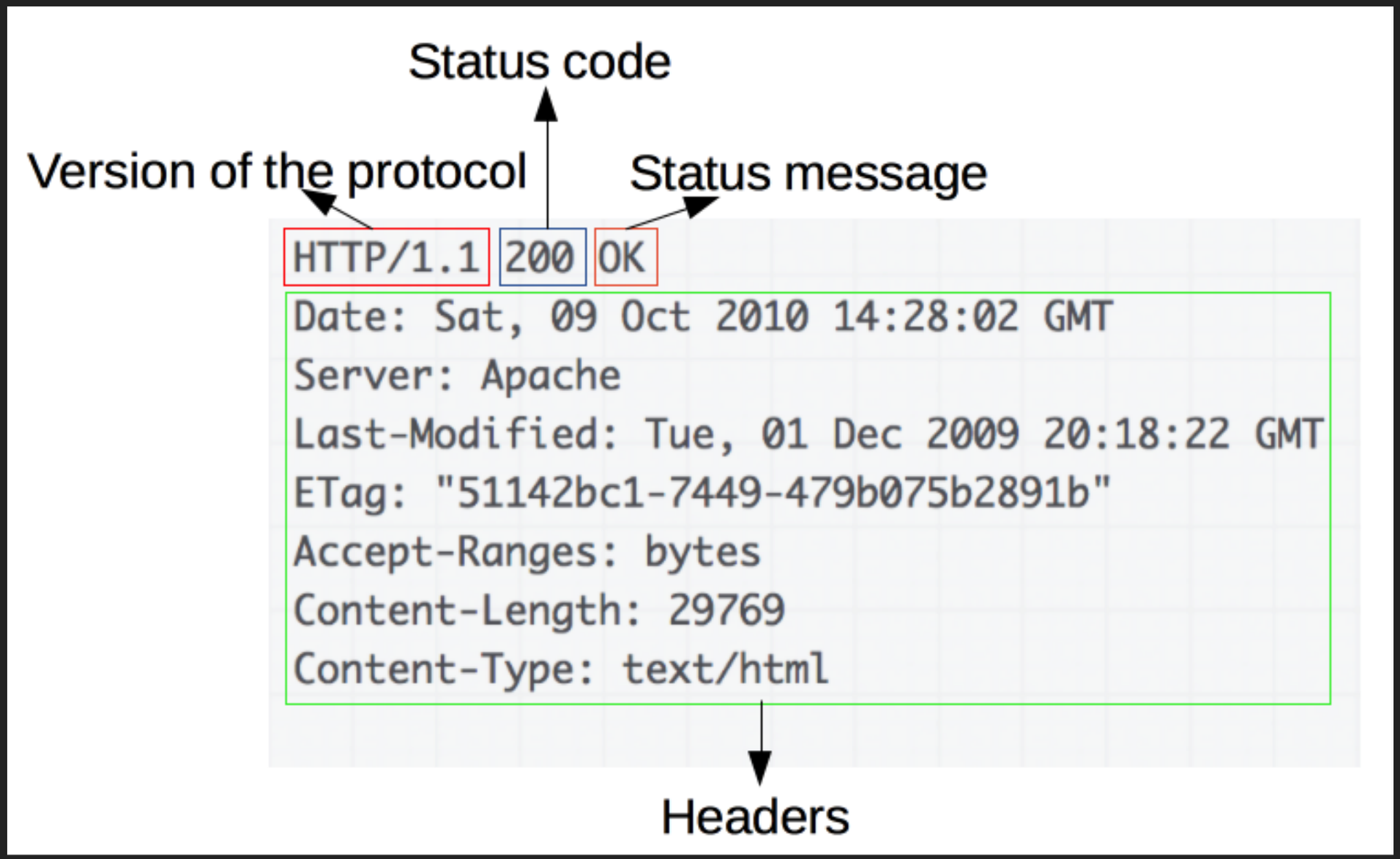
EXAMPLE HTTP GET REQUEST

```
GET /hello.htm HTTP/1.1

User-Agent: Mozilla/5.0 (Macintosh; Intel Mac OS X)

Host: www.mona.uwi.edu

Accept-Language: en-us

Accept-Encoding: gzip, deflate

Connection: Keep-Alive
```

EXAMPLE HTTP POST REQUEST

```
POST /process.php HTTP/1.1
User-Agent: Mozilla/5.0 (Macintosh; Intel Mac OS X)
Host: www.mona.uwi.edu
Content-Type: application/x-www-form-urlencoded
Content-Length: length
Accept-Language: en-us
Accept-Encoding: gzip, deflate
Connection: Keep-Alive

licenseID=string&content=string
```

EXAMPLE HTTP RESPONSE



SOME HTTP REQUEST METHODS

- GET
- POST
- PUT
- PATCH
- DELETE
- HEAD
- OPTIONS

SOME HTTP COMMANDS/METHODS

- GET - often used to read or retrieve a resource
- POST - often used to create a new resource
- PUT - most often used for Updates
- PATCH - used to modify resource but only contains the changes.
- DELETE - Deletes the resource
- HEAD - Same as GET but returns only HTTP headers and no document body
- OPTIONS - Returns the HTTP methods that the server supports

HTTP RESPONSE STATUS CODES

- 200
- 301
- 304
- 403
- 404
- 500

HTTP RESPONSE STATUS CODES

- 200 - OK
- 301 - Moved Permanently
- 304 - Not Modified
- 403 - Access Forbidden
- 404 - Not Found
- 500 - Internal Server Error

MIME TYPES

- Multipurpose Internet Mail Extensions (MIME)
- Used to specify the type of data
  - text/html for .html
  - text/plain for .txt
  - image/jpeg for .jpg

OTHER WEB LANGUAGES/TECHNOLOGIES

- `HTML` – HyperText Markup Language: basic building block of a webpage and used for creating a webpage.
- `CSS` – Cascading Stylesheets: used to style of your webpages.
- `JavaScript:` a lightweight, interpreted, programming language used to control the behaviour of your web pages.
- `PHP` – PHP Hypertext Preprocessor: server-side language used to dynamically create pages.

OTHER WEB LANGUAGES/TECHNOLOGIES

- `AJAX` – Asynchronous JavaScript + XML: the use of the XMLHttpRequest object to communicate with server-side scripts
- `XML` – eXtensible Markup Language: for exchanging and representing data
- `JSON` – JavaScript Object Notation: for exchanging and representing data.
- `SQL` – Structured Query Language: used to interact with a database.

ANY QUESTIONS?