Web Protocols

CSC 342 - Web Technologies

The Internet Protocol Suite

- The Internet protocol suite is conceptually divided into four layers:
  - Link layer: physical connectivity
  - Internet Layer: network-to-network
  - Transport Layer: host-to-host
  - Application Layer: process-to-process

Web Specific Protocols

- Internet Layer:
    - Internet Protocol (IP)
- Transport Layer:
    - Transmission Control Protocol (TCP)
- Application Layer:
    - Domain Name System (DNS)
    - Hypertext Transfer Protocol (HTTP)
    - Transport Layer Security (TLS)

Internet Protocol (IP)

- The Internet Protocol (IP) performs two basic functions:
    - Host addressing and identification
    - Packet routing
- IP packets may be lost, duplicated, or arrive out-of-order

Transmission Control Protocol (TCP)

- The Transmissions Control Protocol (TCP) provides a reliable communication mechanism on top of IP

- The main points of TCP data transfer:

  - ordered data

  - retransmission of lost packets

  - error-free data transfer

  - flow control

  - congestion control

Domain Name System (DNS)

- The Domain Name System (DNS) maps internet *domain names* to IP addresses

- A domain name locates an entity on the internet using a human-readable name

- The IP address of a domain name is retrieved by querying a DNS name server
    - If the name is inside the server's domain, then an authoritative response is returned
    - If the name is outside the server's domain, then the request is made to another DNS name server or a cached response is returned

Hypertext Transfer Protocol (HTTP)

- HTTP is a request-response protocol in the client-server computing model

- Form of a request:
    - Request line: [request method] [resource] HTTP/1.1
    - request header fields
    - empty line
    - optional message body

- Form of a response:
    - Response line: HTTP/1.1 [status code] [reason message]
    - response header fields
    - empty line
    - optional message body

HTTP Example

- Request:

```
GET /index.html HTTP/1.1
Host: www.example.com
```

- Response:

```
HTTP/1.1 200 OK
Content-Type: text/html; charset=UTF-8
Content-Length: 79
<html>
<head><title>Title</title></head>
<body><h1>Example</h1></body>
</html
```

HTTP Request Methods

- GET: requests a representation of the specified resource

- HEAD: requests a representation of the specified resource without the message body

- POST: requests that the server accept the data in the message body

- PUT: requests that the server store the data in the message body under the specified URI

- DELETE: requests that the server delete the resource

- TRACE: echoes the received request

- OPTIONS: returns the HTTP methods that the server supports for the specified URI

- CONNECT: converts the request to a TCP/IP tunnel

- PATCH: requests a partial modification to a resource

Uniform Resource Locator (URL)

`scheme:[//user:password@]host[:port]][/]path[?query][#fragm`

- **scheme:** e.g. http, ftp, mailto, file
- **authority:**
    - authentication: user name and password
    - host: name or IP address
    - port
- **path:** contains data source
- **query:** contains attribute-value pairs
- **fragment:** contains fragment identifier providing direction to a secondary source