Web Service Design

HTTP

HTTP Versions

HTTP 1.1

- Text based for document retrival in a human readable format.
- Stateless protocol: Everything needed to fulfil a request must be included in the message.
- Does not require client to server to maintain state.

HTTP 2

- High compatibility with 1.1
- Decrease server latency
- TCP/IP connections for faster loading
- Fully Muliplexed: Multiple requests and responses over a single TCP connection (Prevents Head of Line blocking)
- Uses data compression of headers
- Push responses to send anticipled requests implicitly to client cache

HTTP 3

- QUIC Transport layer (Better than UDP)
- Lower latency, faster encryption negotiation
- Better error performance control

HTTP Protocol Description

Message Framing

Format of a message consists of:

- Initial line
- 0 or more headers
- blank line
- message body (optional)
  Rich metadata can be included in hearders that is ingored by the browser making it browser friendly. Message body does not need to by hypertext allowing for different types of payloads to be sent in the message.

HTTP Requests

- **HTTP 1.0:**
  - GET: Get from server
  - HEAD: Return the header (GET with no content)
  - POST: Invoke server side program with data
- **HTTP 1.1:**
  - PUT: Store on server (Needs write perms)
  - OPTIONS: What options are supported by server
  - DELETE: Delete resource
  - TRACE: Echoes requests to see changes by intermediate servers
  - CONNECT: Use a proxy server to act as TCP tunnel for request

HTTP Response

First line of a HTTP response is a code indicating the result. Next is header data including request time and server details. MIME (Multipurpose Internet Mail Extensions) type. Mime type is contenty category/type.

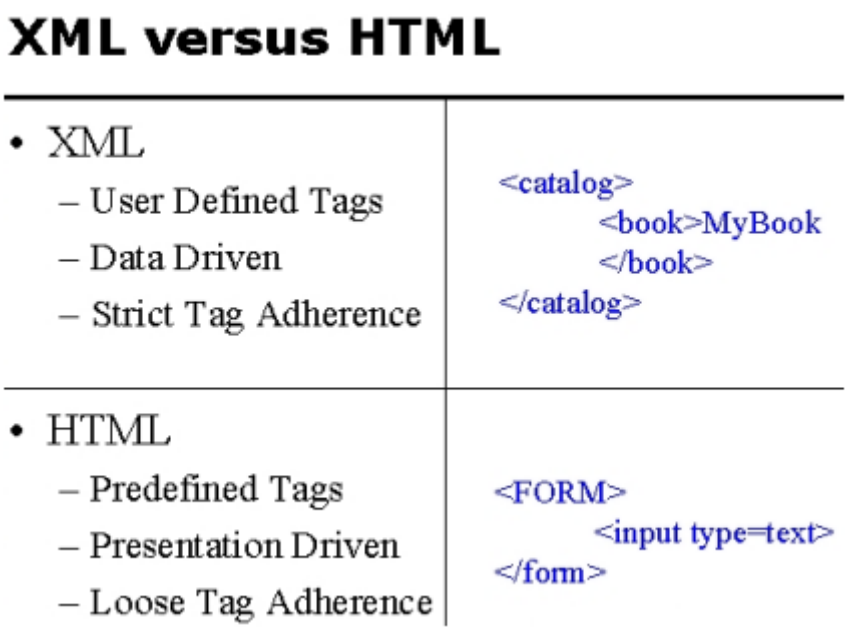
- Category = Kind of media (Video, Image, Audio)
- Type = Format of media (MP4, JPG, WAV)
  Content Lenght header refers to the number of bytes in the payload

Response Codes

- 1xx Informational
- 2xx Success
- 3xx Redirect
- 4xx Client Error
- 5xx Server Error

XML

Designed to overcome the shortcomings of HTML. XML (eXtensible Markup Language) allows for a dynamic interface with custom type parameters. Compatible with any programming language. Allows for secure stateful transaction oriented sessions. HTML is simple and does not support custon MIME data types



XML was designed to store and transport data with a focus on data structure, scope and type. HTML was just used to display data with focus on rendering. Unlike HTML, XML does not use predefined tags. The author defines the tages and structure. XML based Web Services is middleware to allow applications in any language or platform to work together. Web Services have self describing interfaces that allow for:

- Interoperability
- Composability
- Extensibility
  Functionality comes from applications rather than human interaction. HTTP is a standard transport protocol on a variety of platforms. XML is an interface to allow interoperability of platforms.

Web Services

Protocol stack based on open standards with four main components:

- Service Transport → Transporting messages between network applications. HTTP is a popular RPC like protocol that is widely used. HTTP is firewall friendly
- XML Messaging → Encoding messages in an XML format to be processed at either end of a network. Simple Object Access Protocol (SOAP) uses this.
- Service Description → XML based Web Service Definition Lanuage (WSDL). Specifies operations supported and message formatting needed to use the service.
- Service Discovery → Registry of services on a network to make their location and discription easily discoverable. This is done using the Univeral Description Discovery and Integration (UDDI) API. UDDI is XML based and platform independent. UDDI is self implemented as it's own webservice. It uses SOAP to provide access to WSDL listed in the directory.

Uniform Resource Identifier (URI)

Uniform Resource Identifier. Formatted string to identify a resource. There are 2 types of URI:

- URL: Uniform Resource Locator. Protocol to locate the resource identified

  ```
  http://<host> [ :<port>] [<path>[?<query>]]
  ```

- URN: Uniform Resource Name. Location Independent. Does not implement any protocol to locate the resource.
  - NID = Namespace Identifier
  - NSS = Namespace Specific String

  ```
  urn: <NID>:<NSS>
  ```

JSON

REST

SOAP
