# Web 2.0

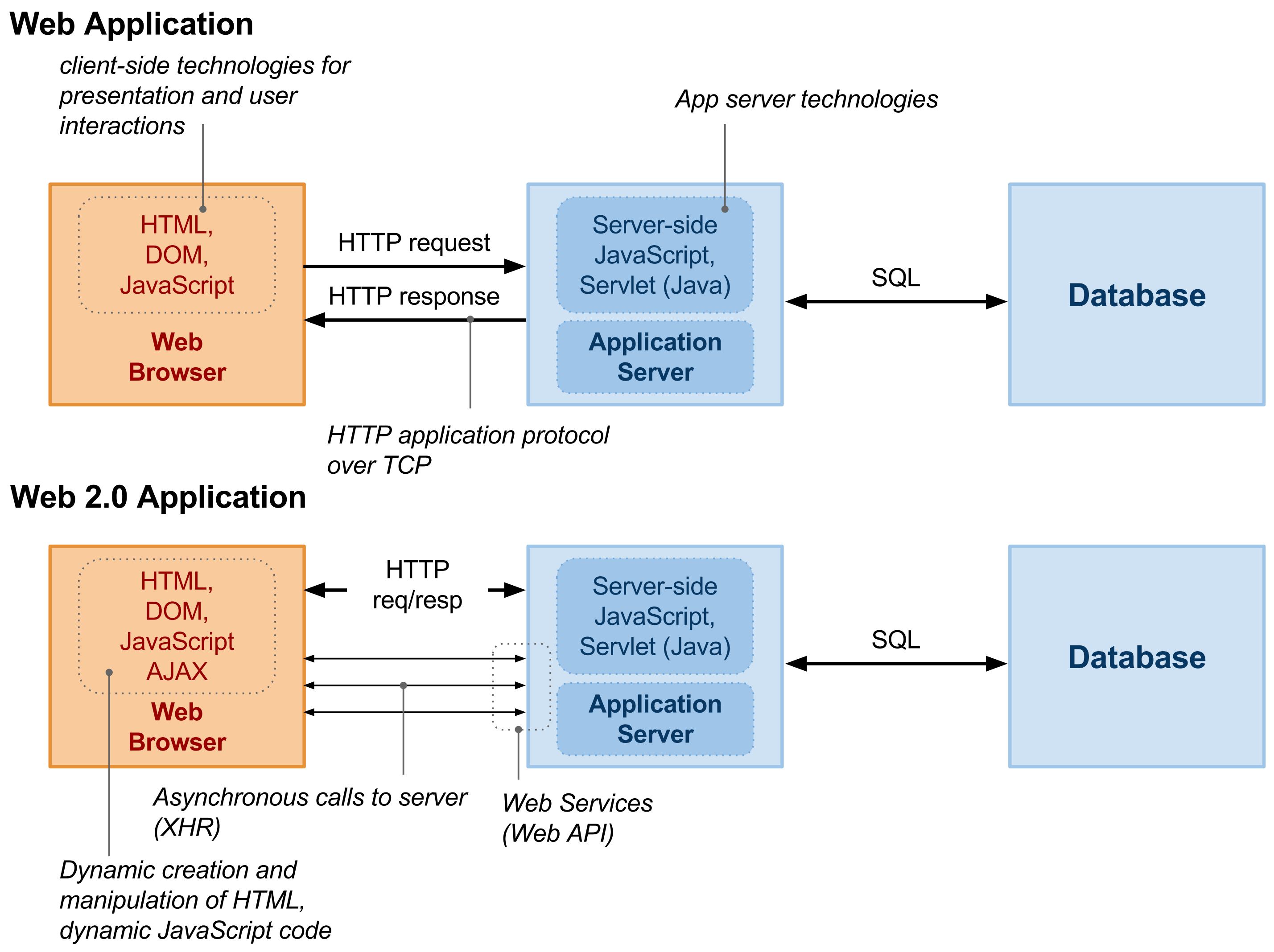
## Lecture 1: Introduction to JavaScript

**doc. Ing. Tomáš Vitvar, Ph.D.**
tomas@vitvar.com • @TomasVitvar • http://vitvar.com

Czech Technical University in Prague
Faculty of Information Technologies • Software and Web Engineering • http://vitvar.com/courses/w20

Modified: Sun Mar 12 2017, 08:20:27
Humla v0.3

# Web 2.0 Application Architecture


Web Application
client-side technologies for presentation and user interactions
App server technologies
HTML, DOM, JavaScript
Web Browser
HTTP request
HTTP response
Server-side JavaScript, Servlet (Java)
Application Server
SQL
Database
HTTP application protocol over TCP
Web 2.0 Application
HTML, DOM, JavaScript AJAX
Web Browser
HTTP req/resp
Server-side JavaScript, Servlet (Java)
Application Server
SQL
Database
Asynchronous calls to server (XHR)
Web Services (Web API)
Dynamic creation and manipulation of HTML, dynamic JavaScript code

## JavaScript

- Lightweight, interpreted, object-oriented language
- Standard
  – *All major browsers support ECMAScript 6 and 7*
- Major characteristics
  – *First-class functions*
    $\rightarrow$ *functions as first-class citizens*
    $\rightarrow$ *language supports: passing functions as arguments to other functions, returning functions as values from other functions, assigning functions to variables or storing them in data structures.*
  – *Anonymous functions*
    $\rightarrow$ *declared without any named identifier to refer to it*
  – *Closures*

## Overview

- JavaScript Basics
- Server-side JavaScript

## Objects and Arrays

- Objects and Arrays
- Functions

## Functions

- Function Callbacks
  - *You can use them to handle asynchronous events occurrences*
- Functions as values in object

## Closures

- Closures
  - *A function value that references variables from outside its body*

## Overview

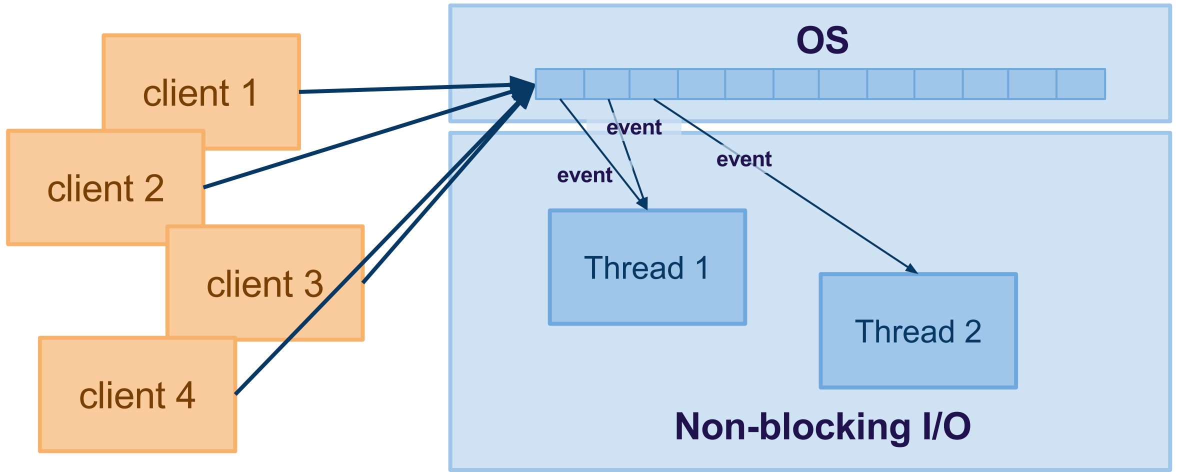
- JavaScript Basics
- Server-side JavaScript

## Recall: Application Server

- Environment that runs an application logic
  - *Client communicates with AS via an application protocol*
  - *Client – Browser, application protocol – HTTP*
- Terminology
  - *Application Server × Web Server × HTTP Server*
    - → *AS is a modular environment; provides technology to realize enterprise systems*
    - → *AS contains a Web server/HTTP server*
  - *We will deal with Web server only*
- Two major models to realize communication
  - *Blocking I/O (also called synchronous I/O)*
  - *Non-blocking I/O (also called asynchronous I/O)*
- A technology we will look at
  - *Node.js – runs server-side Javascript*

## Non-Blocking I/O Model

- Connections maintained by the OS, not the Web app
  - *The Web app registers events, OS triggers events when occur*



- Characteristics
  - *Event examples: new connection, read, write, closed*
  - *The app may create working threads, but controls the number!*
    *→ much less number of working threads as opposed to blocking I/O*

## Node.js

- Node.js
  - *Web server technology, very efficient and fast!*
  - *Event-driven I/O framework, based on JavaScript V8 engine*

    $\rightarrow$ *Any I/O is non-blocking (it is asynchronous)*
  - *One worker thread to process requests*

    $\rightarrow$ *You do not need to deal with concurrency issues*
  - *More threads to realize I/O*
  - *Open sourced, @GitHub, many libraries*
  - *Future platform for Web 2.0 apps*
- Every I/O as an event
  - *reading and writing from/to files*
  - *reading and writing from/to sockets*

## HTTP Server in Node.js

- HTTP Server implementation
  - *server running at* `138.232.189.127`, *port* `8080`.
  - *Test it using Telnet*

## Google Apps Script

- Google Apps Script
  - *JavaScript cloud scripting language*
  - *easy ways to automate tasks across Google products and third party services*
- You can
  - *Automate repetitive processes and workflows*
  - *Link Google products with third party services*
  - *Create custom spreadsheet functions*
  - *Build rich graphical user interfaces and menus*

## Rhino

- Rhino
  - *open-source implementation of JavaScript written entirely in Java*
  - *managed by the Mozilla Foundation*
    → *also provides another implementation of JavaScript engine written in C named SpiderMonkey*
  - *typically embedded into Java applications to provide scripting to end users*
  - *core language only and doesn't contain objects or methods for manipulating HTML documents*
  - *enabling development of webapps with JavaScript in containers like Jetty, Tomcat, and Google AppEngine*