Full-stack Web Development

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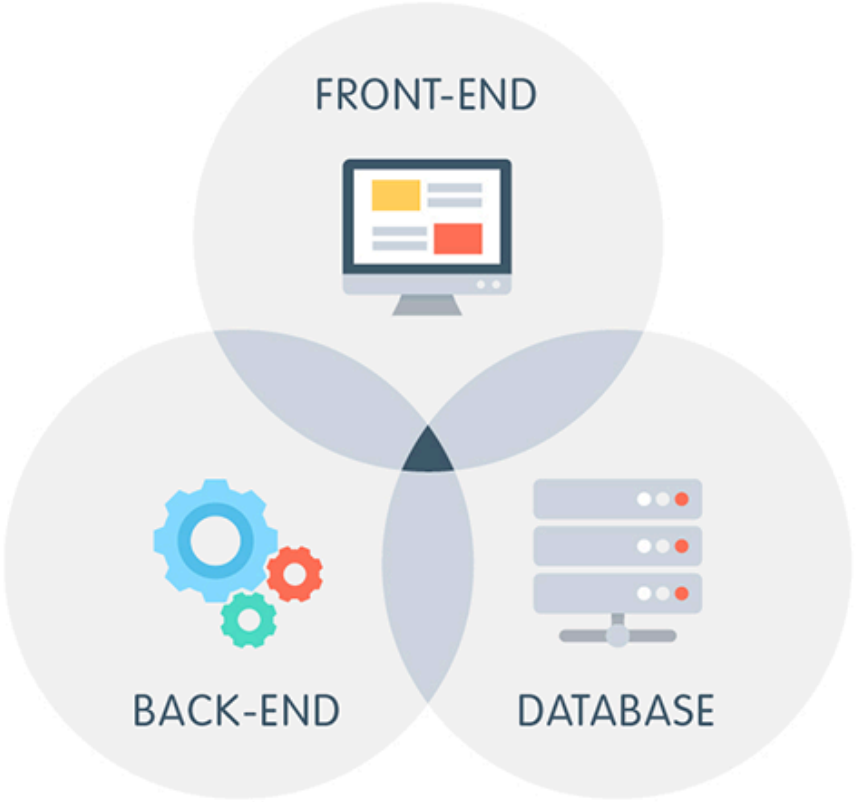
FULL-STACK DEVELOPMENT



Front-end

- HTML + CSS + JS
- UI / UX
- Web (HTTP / HTTPS)

Back-end

- Java / Python / Node.js
- Database
- APIs

Rank	Job Title	Mean Annual Salary (Above 2021 Nat'l Avg: $58,260 or higher)	Jobs Per 1M, Period ending 2023-01-01	% change in job share, Period ending 2020-01-01 vs Period ending 2023-01-01	% containing remote + hybrid phrases, Period ending 2023-01-01
1	full stack developer	129,637	1,398	56	51
2	data engineer	135,260	879	80	44
3	cloud engineer	133,114	678	65	42
4	psychiatric nurse	109,739	537	45	18
5	senior product manager	147,135	532	44	45
6	back end developer	148,827	429	81	60
7	site reliability engineer	153,134	377	121	55
8	machine learning engineer	153,252	246	53	37
9	psychiatric mental health nurse practitioner	134,011	230	180	20
10	product designer	121,363	213	39	48

Training Overview

- Instructors: Aaron Zhang & Alex Chen (Thursday TA Seession)
- Content & Schedule
- Assignments & Quiz
  - Every Thursday - Quiz
  - Leetcode - **~150 problems solved before the end of the training**
- Projects
  - two group projects
- PingCAP

TiDB Certificates

Advanced Certifications

PingCAP Certified TiDB Associate Database Administrator

Certify your knowledge of deploying, managing, and operating workloads on TiDB and TiDB Cloud.

View Exam Details

PingCAP Certified TiDB SQL Developer

Certify your ability to write and deploy applications on TiDB and TiDB Cloud.

View Exam Details

PingCAP Certified TiDB Professional Database Administrator

Certify your possession of the full skill set required to perform day to day administration of the TiDB and TiDB Cloud.

View Exam Details

Assessment & Grading

- 30% Quiz
- 35% Project 1
- 35% Project 2

How to succeed in this training

- Be curious
- Be proactive
- Be persistent
- **Be collaborative**
- **Be cautious about AI coding assistants**

Preparation prior to courses

set up the development environment

- Browser: **Chrome** / Firefox / Safari
- Code editor / IDE: **Visual Studio Code**, WebStorm
- Git / GitHub
- Set up Node.js env (optional for now)
- ~~*AI coding assistant: Copilot*~~

What is Javascript

- a programming language
- a scripting language
- a dynamic language
- a weakly typed language
- a prototype-based language
- a multi-paradigm language
- a single-threaded language

...

```
const pluckDeep = (key) => (obj) =>
  key.split('.').reduce((accum, key) => accum[key], obj)

const compose =
  (...fns) =>
  (res) =>
    fns.reduce((accum, next) => next(accum), res)

const unfold = (f, seed) => {
  const go = (f, seed, acc) => {
    const res = f(seed)
    return res ? go(f, res[1], acc.concat([res[0]])) :
acc}
  return go(f, seed, [])
}
```

Client-side Javascript vs Server-side Javascript

- Client-side Javascript
  - run in browser
  - manipulate DOM
  - make HTTP requests
  - ...
- Server-side Javascript
  - run in Node.js
  - manipulate files
  - make HTTP requests
  - ...

History of Javascript

- 1995: Brendan Eich, Netscape
- 1996: ECMAScript 1
- 1997: ECMAScript 2
- 1999: ECMAScript 3
- 2009: ECMAScript 5
- **2015: ECMAScript 6**
- 2016: ECMAScript 7

  ...

First Javascript Program

```
console.log('Hello World');
```

- run in browser console
- run in Node.js
- run in VS Code

Lexical Structure

- case sensitive
- whitespace
- Unicode

```
'café' === 'caf\u00e9';
```

- comments

- identifiers
  - an identifier == a name
  - start with a letter, underscore `_`, or dollar sign `$`
- reserved words
  - `break`, `case`, `catch`, `class`, `const`, `continue`, `debugger`, ...

Lexical Structure (cont'd)

- literals - a data value that appears directly in a program
  - 123, 12.34, 'abc', "abc", true, false, null, undefined, /abc/, ...
- optional semicolons
  - `;` is optional, but it is required when multiple statements appear in a single line
  - In general, if a statement begins with `(`, `[`, `/`, `+`, or `-`, it could be interpreted as a continuation of the statement before.

```
var x = 0; // Semicolon omitted here
[x, x + 1, x + 2].forEach(console.log);
```

Data Types

Primitive Types

- **number**
- **string**
- **boolean**
- **null**
- **undefined**
- symbol
- *bigint (ES2020)*

object / complex

- Object
- Array
- Function
- Date
- Regexp
- ...

Number

- integer
- floating-point
- `NaN`
- `Infinity` / `-Infinity` => `Number.POSITIVE_INFINITY` / `Number.NEGATIVE_INFINITY`
- `Number.MAX_VALUE` / `Number.MIN_VALUE`

String

- single quote `'` / double quote `"` (*no character type in Javascript*)
- backtick quote `` ` ``
- escape character `\`
- string length - maximum length is 2^53 - 1, but it depends on the browser
  - In V8: 2^29 - 24 (~1GiB), 2^28 - 16 (~512MiB) on 32-bit system.
  - In Firefox, 2^30 - 2 (~2GiB). Before Firefox 65, the maximum length was 2^28 - 1 (~512MiB).
  - In Safari, 2^31 - 1 (~4GiB).

Boolean

- `true` / `false`
- `Boolean()` function

Null & Undefined

- `null` - a special value that indicates a deliberate non-value
- `undefined` - a special value that indicates an uninitialized value

Symbol

- a new primitive type in ES6
- a unique and immutable data type
- used as the key of an object property

could be used to replace constants

```
const COLOR_RED = Symbol('red');
const COLOR_GREEN = Symbol('green');
const COLOR_BLUE = Symbol('blue');
```

Type Conversion / Coercion

- difference between conversion and coercion: coercion is implicit, conversion is either implicit or explicit
- `Number()` function
- `String()` function
- `Boolean()` function
- `parseInt()` / `parseFloat` function

Dynamic Typing

- a variable can hold a value of any type
- a variable can hold different types of values at different times
- a variable can be reassigned to a value of a different type

Variable Declaration

- `var` keyword
- `let` keyword
- `const` keyword
- naming convention
  - camelCase
  - snake_case
  - PascalCase

Variable Scope

- global scope
- function scope
- block scope (ES6)

Hoisting

```
console.log(x); // undefined
var x = 1;
```

Operators

- arithmetic operators
- assignment operators
- comparison operators
- logical operators
- string operators
- conditional (ternary) operator
- unary operators
- bitwise operators
- comma operator
- `typeof` operator
- `delete` operator
- `in` operator
- `instanceof` operator
- `void` operator