Required for any path

Web Developer in 2021

Git - Version Control

Basic Terminal Usage

Data Structures & Algorithms

GitHub

Licenses

Semantic Versioning

SSH

HTTP/HTTPS and APIs

Design Patterns

Character Encodings

Find the detailed version of this roadmap
along with resources and other roadmaps

http:// roadmap.sh

Choose your path

Front-end

Back-end

DevOps

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Front-end

Internet

- How does the internet work?
- What is HTTP?
- Browsers and how they work?

- DNS and how it works?
- What is Domain Name?
- What is hosting?

HTML

- Learn the basics
- Writing Semantic HTML
- Forms and Validations
- Conventions and Best Practices

- Accessibility
- SEO Basics

CSS

- Learn the basics
- Making Layouts
- Responsive design and Media Queries

- Floats
- Positioning
- Display
- Box Model
- CSS Grid
- Flex Box

JavaScript

- Syntax and Basic Constructs
- Learn DOM Manipulation
- Learn Fetch API / Ajax (XHR)
- ES6+ and modular JavaScript
- Understand the concepts Hoisting, Event Bubbling, Scope, Prototype, Shadow DOM, strict,

Version Control Systems
What are they and why you should use one

- Basic Usage of Git

Repo hosting services
Create account and Learn to use GitHub

- GitHub
- GitLab
- Bitbucket

Web Security Knowledge

npm and yarn both are fine, pick one or learn both, there is not much difference.

Package Managers

- npm
- yarn

Get at least a basic knowledge of all of these

- HTTPS
- Content Security Policy
- CORS
- OWASP Security Risks

CSS Architecture
With modern frameworks and CSS-in-JS you don't have to worry about these anymore but still it would be a good idea to get familiarized with BEM atleast.

- BEM
- OOCSS
- SMACSS

CSS Preprocessors
With how the modern frameworks there has been more push towards CSS-in-JS so you may not need these but still a good idea to familiarize yourself.

- Sass
- PostCSS
- Less

Build Tools

Task Runners
- npm scripts
- Gulp

Linters and Formatters
- Prettier
- ESLint
- StandardJS

Module Bundlers
- Webpack
- Rollup
- Parcel

Pick a Framework
- React.js
  - Redux
  - MobX
- Angular
  - RxJS
  - NgRx
- Vue.js
  - VueX

Modern CSS
- Styled Component
- CSS Module
- Styled JSX
- Emotion
- Radium
- Glamorou

Web Components
- HTML Templates
- Custom Elements
- Shadow DOM

CSS Frameworks

- Reactstrap
- Material UI
- Tailwind CSS
- Chakra UI

JS based and better to use with your framework based JavaScript applications.

- Bootstrap
- Materialize CSS
- Bulma

CSS first frameworks which don't come with JavaScript components by default.

Testing your Apps
Learn the difference between Unit, Integration, and Functional tests and learn how to write them with the tools listed on the left.

- Jest
- react-testing-library
- Cypress
- Enzyme

You can fill all your testing needs with just these.

- Mocha
- Chai
- Ava
- Jasmine

Progressive Web Apps

- Storage
- Web Sockets
- Service Workers
- Location
- Notifications
- Device Orientation
- Payments
- Credentials

Learn different Web APIs used in PWAs

- PRPL Pattern
- RAIL Model
- Performance Metrics
- Using Lighthouse
- Using DevTools

Calculating, Measuring and improving performance

Type Checkers
- TypeScript
- Flow

Server Side Rendering (SSR)
- React.js
  - Next.js
  - After.js
- Angular
  - Universal
- Vue.js
  - Nuxt.js

GraphQL
- Apollo
- Relay Modern

Mobile Applications
- React Native
- NativeScript
- Flutter
- Ionic

Static Site Generators
- Next.js
- GatsbyJS
- Nuxt.js
- Vuepress
- Jekyll
- Hugo
- Gridsome

Desktop Applications
- Electron
- Carlo
- Proton Native

Web Assembly
Web Assembly or WASM is the binary instructions generated from higher level languages such as Go, C, C++ or Rust. It is faster than JavaScript and WASM 1.0 has already shipped in the major browsers W3C accepted it as an official standard at the end of 2019. It will still take quite some time to go mainstream though.

Keep Learning

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Backend

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Basic Frontend Knowledge

- HTML
- CSS
- JavaScript

OS and General Knowledge

- Terminal Usage
- How OSs work in General
- Process Management
- Threads and Concurrency
- **Basic Terminal Commands** grep, awk, sed, lsof, curl, wget, tail, head, less, find, ssh, kill

- Memory Management
- Interprocess Communication
- I/O Management
- **POSIX Basics** stdin, stdout, stderr, pipes
- Basic Networking Concepts

Learn a Language
Make sure to learn its quirks. Core details about its runtime e.g. concurrency, memory model etc.

- Rust
- Go
- Java
- C#
- PHP
- JavaScript
- Python
- Ruby

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Relational Databases

- PostgreSQL
- MySQL
- MariaDB
- MS SQL
- Oracle

NoSQL Databases

- Document MongoDB, CouchDB
- Column DBs Cassandra
- Time series InfluxDB, TimescaleDB
- Realtime Firebase, RethinkDB

More about Databases

- ORMs
- ACID
- Transactions
- N+1 Problem
- Database Normalization
- Indexes and how they work

- Data Replication
- Sharding Strategies
- CAP Theorem

Learn about APIs

- HATEOAS
- Open API Spec and Swagger
- Authentication
  - Cookie Based
  - OAuth
  - Basic Authentication
  - Token Authentication
  - JWT
  - OpenID
  - SAML

- REST
  Read Roy Fielding's Paper
- JSON APIs
- SOAP
- gRPC

Caching

- CDN
- Server Side
- Client Side
- Redis
- Memcached

Web Security Knowledge

Hashing Algorithms
- MD5 and why not to use it
- SHA Family
- scrypt
- bcrypt

- HTTPS
- Content Security Policy
- CORS
- SSL/TLS
- OWASP Security Risks

Testing

- Integration Testing
- Unit Testing
- Functional Testing

CI / CD

Design and Development Principles

- GOF Design Patterns
- Domain Driven Design
- Test Driven Development
- SOLID
- KISS
- YAGNI
- DRY

Search Engines

- Elasticsearch
- Solr

Architectural Patterns

- Monolithic Apps
- Microservices
- SOA
- CQRS and Event Sourcing
- Serverless

Message Brokers

- RabbitMQ
- Kafka

Containerization vs Virtualization

- Docker
- rkt
- LXC

GraphQL

- Apollo
- Relay Modern

Graph Databases

- Neo4j

WebSockets

Web Servers

- Nginx
- Apache
- Caddy
- MS IIS

Mitigation Strategies

- Graceful Degradation
- Throttling
- Backpressure
- Loadshifting
- Circuit Breaker

Building for Scale
General topics that you should learn and care about for the sustainability of the product.

Understand the Diff.
- Instrumentation
- Monitoring
- Telemetry

- Migration Strategies
- Horizontal vs Vertical Scaling

Building with Observability in mind
Metrics logging and other observable items that could help you in debugging and solving the issues when things go wrong

Keep Learning

DevOps

- Personal Recommendation / Opinion
- Alternative Option - Pick this or purple
- Order in roadmap not strict (Learn anytime)
- I wouldn't recommend

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Learn a Programming Language

It doesn't matter which language you pick, key is to get some programming knowledge for automation

- Python
- Ruby
- Node.js
- Go
- Rust
- C
- C++

Understand different OS Concepts

- Process Management
- Threads and Concurrency
- Sockets
- POSIX Basics
- Networking Concepts
- Startup Management (intid)
- Service Management (systemd)
- I/O Management
- Virtualization
- Memory/Storage
- File Systems

Learn about Managing Servers

Get some administration knowledge in some OS. Go with any Linux distro. Pick Ubuntu if you have a little no experience with Linux.

Operating System

- Linux
- Unix
- Windows
- FreeBSD
- OpenBSD
- NetBSD
- SUSE Linux
- Debian
- Fedora
- Ubuntu
- CentOS
- RHEL
- DNS
- OSI Model
- White/Grey Listing

Learn to live in Terminal

- screen
- tmux
- terminal multiplexers

- Learn Bash Scripting
- Vim/Nano/PowerShell/Emacs

Text Manipulation Tools
awk, sed, grep, sort, uniq, cat, cut
echo, fmt, tr, nl, egrep, fgrep, wc

Process Monitoring
ps, top, htop, atop, lsof

Network
nmap, tcpdump, ping, mtr, traceroute, dig
airmon, airodump, iptables, netstat

Compiling apps from source
(gcc, make and other related stuff)

System Performance
nmon, iostat, sar, vmstat

Others strace, dtrace, systemtap
uname, df, history

Networking, Security and Protocols

- Emails
  - SMTP
  - IMAPS
  - POP3S
  - DMARC
  - SPF
  - Domain Keys
- HTTP
- HTTPS
- FTP
- SSL / TLS
- SSH
- Port Forwarding

What is and how to setup a _____

- Reverse Proxy
- Forward Proxy
- Caching Server
- Load Balancer
- Firewall

Web Server
- IIS
- Nginx
- Apache
- Tomcat
- Caddy

- Istio
- Envoy
- Linkerd
- Consul

Service Mesh

Learn Infrastructure as Code

Containers
- Docker
- LXC

Configuration Management
- Ansible
- Chef
- Salt
- Puppet

Container Orchestration
- Kubernetes
- Docker Swarm
- Mesos
- Nomad

Infrastructure Provisioning
- Terraform
- CloudFormation
- Pulumi

Learn some CI/CD Tool

- Gitlab CI
- GitHub Actions
- Bamboo
- Azure DevOps
- Jenkins
- Travis CI
- TeamCity
- Circle CI

Learn how to monitor software and infrastructure

Infrastructure Monitoring
- Prometheus
- Nagios
- Grafana
- Zabbix
- Monit
- Datadog

Application Monitoring

Logs Management
- Elastic Stack
- Graylog
- Splunk
- Papertrail

- Jaeger
- New Relic
- AppDynamics
- Instana
- OpenTracing

Cloud Providers
- AWS
- Google Cloud
- Azure
- Heroku
- Alibaba Cloud
- Digital Ocean
- Linode
- Vultr

Cloud Design Patterns
http://bit.ly/cloud-arch-patterns

- Availability
- Data Management
- Design and Implementation
- Management and Monitoring

Keep Learning