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rohitpaulk Merge pull request #1414 from m…

cf5d750 · 2 months ago

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README

Build your own <insert-technology-here>

This repository is a compilation of well-written, step-by-step guides for re-creating our favorite technologies from scratch.

> *What I cannot create, I do not understand — Richard Feynman.*

It's a great way to learn.

- 3D Renderer
- Augmented Reality
- BitTorrent Client
- Blockchain / Cryptocurrency
- Bot

About

Master programming by recreating your favorite technologies from scratch.

codecrafters.io

#programming #tutorials #free #awesome-list #tutorial-code #tutorial-exercises

Readme

Activity

Custom properties

388k stars

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Releases

No releases published

Packages

No packages published

Contributors 121

+ 107 contributors

- Command-Line Tool
- Database
- Docker
- Emulator / Virtual Machine
- Front-end Framework / Library
- Game
- Git
- Network Stack
- Neural Network
- Operating System
- Physics Engine
- Programming Language
- Regex Engine
- Search Engine
- Shell
- Template Engine
- Text Editor
- Visual Recognition System
- Voxel Engine
- Web Browser
- Web Server
- Uncategorized

Tutorials

Build your own `3D Renderer`

- **C++**: *Introduction to Ray Tracing: a Simple Method for Creating 3D Images*
- **C++**: *How OpenGL works: software rendering in 500 lines of code*
- **C++**: *Raycasting engine of Wolfenstein 3D*
- **C++**: *Physically Based Rendering:From Theory To Implementation*
- **C++**: *Ray Tracing in One Weekend*
- **C++**: *Rasterization: a Practical Implementation*
- **C# / TypeScript / JavaScript**: *Learning how to write a 3D soft engine from scratch in C#, TypeScript or JavaScript*

Languages

● **Markdown** 100.0%

- **Java / JavaScript**: *Build your own 3D renderer*
- **Java**: *How to create your own simple 3D render engine in pure Java*
- **JavaScript / Pseudocode**: *Computer Graphics from scratch*
- **Python**: *A 3D Modeller*

Build your own `Augmented Reality`

- **C#**: *How To: Augmented Reality App Tutorial for Beginners with Vuforia and Unity 3D* [video]
- **C#**: *How To Unity ARCore* [video]
- **C#**: *AR Portal Tutorial with Unity* [video]
- **C#**: *How to create a Dragon in Augmented Reality in Unity ARCore* [video]
- **C#**: *How to Augmented Reality AR Tutorial: ARKit Portal to the Upside Down* [video]
- **Python**: *Augmented Reality with Python and OpenCV*

Build your own `BitTorrent Client`

- **C#**: *Building a BitTorrent client from scratch in C#*
- **Go**: *Building a BitTorrent client from the ground up in Go*
- **Nim**: *Writing a Bencode Parser*
- **Node.js**: *Write your own bittorrent client*
- **Python**: *A BitTorrent client in Python 3.5*

Build your own `Blockchain / Cryptocurrency`

- **ATS**: *Functional Blockchain*
- **C#**: *Programming The Blockchain in C#*
- **Crystal**: *Write your own blockchain and PoW algorithm using Crystal*
- **Go**: *Building Blockchain in Go*
- **Go**: *Code your own blockchain in less than 200 lines of Go*
- **Java**: *Creating Your First Blockchain with Java*
- **JavaScript**: *A cryptocurrency implementation in less than 1500 lines of code*
- **JavaScript**: *Build your own Blockchain in JavaScript*
- **JavaScript**: *Learn & Build a JavaScript Blockchain*

- **JavaScript**: *Creating a blockchain with JavaScript*
- **JavaScript**: *How To Launch Your Own Production-Ready Cryptocurrency*
- **JavaScript**: *Writing a Blockchain in Node.js*
- **Kotlin**: *Let’s implement a cryptocurrency in Kotlin*
- **Python**: *Learn Blockchains by Building One*
- **Python**: *Build your own blockchain: a Python tutorial*
- **Python**: *A Practical Introduction to Blockchain with Python*
- **Python**: *Let’s Build the Tiniest Blockchain*
- **Ruby**: *Programming Blockchains Step-by-Step (Manuscripts Book Edition)*
- **Scala**: *How to build a simple actor-based blockchain*
- **TypeScript**: *Naivecoin: a tutorial for building a cryptocurrency*
- **TypeScript**: *NaivecoinStake: a tutorial for building a cryptocurrency with the Proof of Stake consensus*
- **Rust**: *Building A Blockchain in Rust & Substrate*

Build your own `Bot`

- **Haskell**: *Roll your own IRC bot*
- **Node.js**: *Creating a Simple Facebook Messenger AI Bot with API.ai in Node.js*
- **Node.js**: *How to make a responsive telegram bot*
- **Node.js**: *Create a Discord bot*
- **Node.js**: *gifbot - Building a GitHub App*
- **Node.js**: *Building A Simple AI Chatbot With Web Speech API And Node.js*
- **Python**: *How to Build Your First Slack Bot with Python*
- **Python**: *How to build a Slack Bot with Python using Slack Events API & Django under 20 minute*
- **Python**: *Build a Reddit Bot*
- **Python**: *How To Make A Reddit Bot* [video]
- **Python**: *How To Create a Telegram Bot Using Python*
- **Python**: *Create a Twitter Bot in Python Using Tweepy*
- **Python**: *Creating Reddit Bot with Python & PRAW* [video]
- **R**: *Build A Cryptocurrency Trading Bot with R*

- **Rust**: *A bot for Starcraft in Rust, C or any other language*

Build your own `Command-Line Tool`

- **Go**: *Visualize your local git contributions with Go*
- **Go**: *Build a command line app with Go: lolcat*
- **Go**: *Building a cli command with Go: cowsay*
- **Go**: *Go CLI tutorial: fortune clone*
- **Nim**: *Writing a stow alternative to manage dotfiles*
- **Node.js**: *Create a CLI tool in Javascript*
- **Rust**: *Command line apps in Rust*
- **Rust**: *Writing a Command Line Tool in Rust*
- **Zig**: *Build Your Own CLI App in Zig from Scratch*

Build your own `Database`

- **C**: *Let's Build a Simple Database*
- **C++**: *Build Your Own Redis from Scratch*
- **C#**: *Build Your Own Database*
- **Clojure**: *An Archaeology-Inspired Database*
- **Crystal**: *Why you should build your own NoSQL Database*
- **Go**: *Build Your Own Database from Scratch: Persistence, Indexing, Concurrency*
- **Go**: *Build Your Own Redis from Scratch*
- **JavaScript**: *Dagoba: an in-memory graph database*
- **Python**: *DBDB: Dog Bed Database*
- **Python**: *Write your own miniature Redis with Python*
- **Ruby**: *Build your own fast, persistent KV store in Ruby*
- **Rust**: *Build your own Redis client and server*

Build your own `Docker`

- **C**: *Linux containers in 500 lines of code*
- **Go**: *Build Your Own Container Using Less than 100 Lines of Go*
- **Go**: *Building a container from scratch in Go* [video]
- **Python**: *A workshop on Linux containers: Rebuild Docker from Scratch*

- **Python**: *A proof-of-concept imitation of Docker, written in 100% Python*
- **Shell**: *Docker implemented in around 100 lines of bash*

Build your own `Emulator / Virtual Machine`

- **C**: *Home-grown bytecode interpreters*
- **C**: *Virtual machine in C*
- **C**: *Write your Own Virtual Machine*
- **C**: *Writing a Game Boy emulator, Cinoop*
- **C++**: *How to write an emulator (CHIP-8 interpreter)*
- **C++**: *Emulation tutorial (CHIP-8 interpreter)*
- **C++**: *Emulation tutorial (GameBoy emulator)*
- **C++**: *Emulation tutorial (Master System emulator)*
- **C++**: *NES Emulator From Scratch* [video]
- **Common Lisp**: *CHIP-8 in Common Lisp*
- **JavaScript**: *GameBoy Emulation in JavaScript*
- **Python**: *Emulation Basics: Write your own Chip 8 Emulator/Interpreter*
- **Rust**: *0dmg: Learning Rust by building a partial Game Boy emulator*

Build your own `Front-end Framework / Library`

- **JavaScript**: *WTF is JSX (Let's Build a JSX Renderer)*
- **JavaScript**: *A DIY guide to build your own React*
- **JavaScript**: *Building React From Scratch* [video]
- **JavaScript**: *Gooact: React in 160 lines of JavaScript*
- **JavaScript**: *Learn how React Reconciler package works by building your own lightweight React DOM*
- **JavaScript**: *Build Yourself a Redux*
- **JavaScript**: *Let’s Write Redux!*
- **JavaScript**: *Redux: Implementing Store from Scratch* [video]
- **JavaScript**: *Build Your own Simplified AngularJS in 200 Lines of JavaScript*
- **JavaScript**: *Make Your Own AngularJS*
- **JavaScript**: *How to write your own Virtual DOM*

- **JavaScript**: *Building a frontend framework, from scratch, with components (templating, state, VDOM)*
- **JavaScript**: *Build your own React*
- **JavaScript**: *Building a Custom React Renderer* [video]

Build your own `Game`

- **C**: *Handmade Hero*
- **C**: *How to Program an NES game in C*
- **C**: *Chess Engine In C* [video]
- **C**: *Let's Make: Dangerous Dave* [video]
- **C**: *Learn Video Game Programming in C* [video]
- **C**: *Coding A Sudoku Solver in C* [video]
- **C**: *Coding a Rogue/Nethack RPG in C* [video]
- **C**: *On Tetris and Reimplementation*
- **C++**: *Breakout*
- **C++**: *Beginning Game Programming v2.0*
- **C++**: *Tetris tutorial in C++ platform independent focused in game logic for beginners*
- **C++**: *Remaking Cavestory in C++* [video]
- **C++**: *Reconstructing Cave Story* [video]
- **C++**: *Space Invaders from Scratch*
- **C#**: *Learn C# by Building a Simple RPG*
- **C#**: *Creating a Roguelike Game in C#*
- **C#**: *Build a C#/WPF RPG*
- **Go**: *Games With Go* [video]
- **Java**: *Code a 2D Game Engine using Java - Full Course for Beginners* [video]
- **Java**: *3D Game Development with LWJGL 3*
- **JavaScript**: *2D breakout game using Phaser*
- **JavaScript**: *How to Make Flappy Bird in HTML5 With Phaser*
- **JavaScript**: *Developing Games with React, Redux, and SVG*
- **JavaScript**: *Build your own 8-Ball Pool game from scratch* [video]
- **JavaScript**: *How to Make Your First Roguelike*
- **JavaScript**: *Think like a programmer: How to build Snake using only JavaScript, HTML & CSS*

- **Lua**: *BYTEPATH*
- **Python**: *Developing Games With PyGame*
- **Python**: *Making Games with Python & Pygame* [pdf]
- **Python**: *Roguelike Tutorial Revised*
- **Ruby**: *Developing Games With Ruby*
- **Ruby**: *Ruby Snake*
- **Rust**: *Adventures in Rust: A Basic 2D Game*
- **Rust**: *Roguelike Tutorial in Rust + tcod*

Build your own `Git`

- **Haskell**: *Reimplementing “git clone” in Haskell from the bottom up*
- **JavaScript**: *Gitlet*
- **JavaScript**: *Build GIT - Learn GIT*
- **Python**: *Just enough of a Git client to create a repo, commit, and push itself to GitHub*
- **Python**: *Write yourself a Git!*
- **Python**: *ugit: Learn Git Internals by Building Git Yourself*
- **Ruby**: *Rebuilding Git in Ruby*

Build your own `Network Stack`

- **C**: *Beej's Guide to Network Programming*
- **C**: *Let's code a TCP/IP stack*
- **C / Python**: *Build your own VPN/Virtual Switch*
- **Ruby**: *How to build a network stack in Ruby*

Build your own `Neural Network`

- **C#**: *Neural Network OCR*
- **F#**: *Building Neural Networks in F#*
- **Go**: *Build a multilayer perceptron with Golang*
- **Go**: *How to build a simple artificial neural network with Go*
- **Go**: *Building a Neural Net from Scratch in Go*
- **JavaScript / Java**: *Neural Networks - The Nature of Code* [video]
- **JavaScript**: *Neural networks from scratch for JavaScript linguists (Part1—The Perceptron)*

- **Python**: *A Neural Network in 11 lines of Python*
- **Python**: *Implement a Neural Network from Scratch*
- **Python**: *Optical Character Recognition (OCR)*
- **Python**: *Traffic signs classification with a convolutional network*
- **Python**: *Generate Music using LSTM Neural Network in Keras*
- **Python**: *An Introduction to Convolutional Neural Networks*
- **Python**: *Neural Networks: Zero to Hero*

Build your own `Operating System`

- **Assembly**: *Writing a Tiny x86 Bootloader*
- **Assembly**: *Baking Pi – Operating Systems Development*
- **C**: *Building a software and hardware stack for a simple computer from scratch* [video]
- **C**: *Operating Systems: From 0 to 1*
- **C**: *The little book about OS development*
- **C**: *Roll your own toy UNIX-clone OS*
- **C**: *Kernel 101 – Let's write a Kernel*
- **C**: *Kernel 201 – Let's write a Kernel with keyboard and screen support*
- **C**: *Build a minimal multi-tasking kernel for ARM from scratch*
- **C**: *How to create an OS from scratch*
- **C**: *Malloc tutorial*
- **C**: *Hack the virtual memory*
- **C**: *Learning operating system development using Linux kernel and Raspberry Pi*
- **C**: *Operating systems development for Dummies*
- **C++**: *Write your own Operating System* [video]
- **C++**: *Writing a Bootloader*
- **Rust**: *Writing an OS in Rust*
- **Rust**: *Add RISC-V Rust Operating System Tutorial*
- **(any)**: *Linux from scratch*

Build your own `Physics Engine`

- **C**: *Video Game Physics Tutorial*
- **C++**: *Game physics series by Allen Chou*
- **C++**: *How to Create a Custom Physics Engine*
- **C++**: *3D Physics Engine Tutorial* [video]
- **JavaScript**: *How Physics Engines Work*
- **JavaScript**: *Broad Phase Collision Detection Using Spatial Partitioning*
- **JavaScript**: *Build a simple 2D physics engine for JavaScript games*

Build your own `Programming Language`

- **(any)**: *mal - Make a Lisp*
- **Assembly**: *Jonesforth*
- **C**: *Baby's First Garbage Collector*
- **C**: *Build Your Own Lisp: Learn C and build your own programming language in 1000 lines of code*
- **C**: *Writing a Simple Garbage Collector in C*
- **C**: *C interpreter that interprets itself.*
- **C**: *A C & x86 version of the "Let's Build a Compiler" by Jack Crenshaw*
- **C**: *A journey explaining how to build a compiler from scratch*
- **C++**: *Writing Your Own Toy Compiler Using Flex*
- **C++**: *How to Create a Compiler* [video]
- **C++**: *Kaleidoscope: Implementing a Language with LLVM*
- **F#**: *Understanding Parser Combinators*
- **Elixir**: *Demystifying compilers by writing your own* [video]
- **Go**: *The Super Tiny Compiler*
- **Go**: *Lexical Scanning in Go* [video]
- **Haskell**: *Let's Build a Compiler*
- **Haskell**: *Write You a Haskell*
- **Haskell**: *Write Yourself a Scheme in 48 Hours*
- **Haskell**: *Write You A Scheme*
- **Java**: *Crafting interpreters: A handbook for making programming languages*
- **Java**: *Creating JVM Language*

- **JavaScript**: *The Super Tiny Compiler*
- **JavaScript**: *The Super Tiny Interpreter*
- **JavaScript**: *Little Lisp interpreter*
- **JavaScript**: *How to implement a programming language in JavaScript*
- **JavaScript**: *Let’s go write a Lisp*
- **OCaml**: *Writing a C Compiler*
- **OCaml**: *Writing a Lisp, the series*
- **Pascal**: *Let's Build a Compiler*
- **Python**: *A Python Interpreter Written in Python*
- **Python**: *lisp.py: Make your own Lisp interpreter*
- **Python**: *How to Write a Lisp Interpreter in Python*
- **Python**: *Let’s Build A Simple Interpreter*
- **Python**: *Make Your Own Simple Interpreted Programming Language* [video]
- **Python**: *From Source Code To Machine Code: Build Your Own Compiler From Scratch*
- **Racket**: *Beautiful Racket: How to make your own programming languages with Racket*
- **Ruby**: *A Compiler From Scratch*
- **Ruby**: *Markdown compiler from scratch in Ruby*
- **Rust**: *So You Want to Build a Language VM*
- **Rust**: *Learning Parser Combinators With Rust*
- **Swift**: *Building a LISP from scratch with Swift*
- **TypeScript**: *Build your own WebAssembly Compiler*

Build your own `Regex Engine`

- **C**: *A Regular Expression Matcher*
- **C**: *Regular Expression Matching Can Be Simple And Fast*
- **Go**: *How to build a regex engine from scratch*
- **JavaScript**: *Build a Regex Engine in Less than 40 Lines of Code*
- **JavaScript**: *How to implement regular expressions in functional javascript using derivatives*
- **JavaScript**: *Implementing a Regular Expression Engine*
- **Perl**: *How Regexes Work*

- **Python**: *Build Your Own Regular Expression Engines: Backtracking, NFA, DFA*
- **Scala**: *No Magic: Regular Expressions*

Build your own `Search Engine`

- **CSS**: *A search engine in CSS*
- **Python**: *Building a search engine using Redis and redis-py*
- **Python**: *Building a Vector Space Indexing Engine in Python*
- **Python**: *Building A Python-Based Search Engine* [video]
- **Python**: *Making text search learn from feedback*
- **Python**: *Finding Important Words in Text Using TF-IDF*

Build your own `Shell`

- **C**: *Tutorial - Write a Shell in C*
- **C**: *Let's build a shell!*
- **C**: *Writing a UNIX Shell*
- **C**: *Build Your Own Shell*
- **C**: Write a shell in C
- **Go**: *Writing a simple shell in Go*
- **Rust**: *Build Your Own Shell using Rust*

Build your own `Template Engine`

- **JavaScript**: *JavaScript template engine in just 20 lines*
- **JavaScript**: *Understanding JavaScript Micro-Templating*
- **Python**: *Approach: Building a toy template engine in Python*
- **Python**: *A Template Engine*
- **Ruby**: *How to write a template engine in less than 30 lines of code*

Build your own `Text Editor`

- **C**: *Build Your Own Text Editor*
- **C++**: *Designing a Simple Text Editor*

- **Python**: *Python Tutorial: Make Your Own Text Editor* [video]
- **Python**: *Create a Simple Python Text Editor!*
- **Ruby**: *Build a Collaborative Text Editor Using Rails*
- **Rust**: *Hecto: Build your own text editor in Rust*

Build your own `Visual Recognition System`

- **Python**: *Developing a License Plate Recognition System with Machine Learning in Python*
- **Python**: *Building a Facial Recognition Pipeline with Deep Learning in Tensorflow*

Build your own `Voxel Engine`

- **C++**: *Let's Make a Voxel Engine*
- **Java**: *Java Voxel Engine Tutorial* [video]

Build your own `Web Browser`

- **Rust**: *Let's build a browser engine*
- **Python**: *Browser Engineering*

Build your own `Web Server`

- **C#**: *Writing a Web Server from Scratch*
- **Node.js**: *Build Your Own Web Server From Scratch In JavaScript*
- **Node.js**: *Let's code a web server from scratch with NodeJS Streams*
- **Node.js**: *lets-build-express*
- **PHP**: *Writing a webserver in pure PHP*
- **Python**: *A Simple Web Server*
- **Python**: *Let’s Build A Web Server.*
- **Python**: *Web application from scratch*
- **Python**: *Building a basic HTTP Server from scratch in Python*
- **Python**: *Implementing a RESTful Web API with Python & Flask*
- **Ruby**: *Building a simple websockets server from scratch in Ruby*

Uncategorized

- **(any)**: *From NAND to Tetris: Building a Modern Computer From First Principles*
- **Alloy**: *The Same-Origin Policy*
- **C**: *How to Write a Video Player in Less Than 1000 Lines*
- **C**: *Learn how to write a hash table in C*
- **C**: *The very basics of a terminal emulator*
- **C**: *Write a System Call*
- **C**: *Sol - An MQTT broker from scratch*
- **C++**: *Build your own VR headset for $200*
- **C++**: *How X Window Managers work and how to write one*
- **C++**: *Writing a Linux Debugger*
- **C++**: *How a 64k intro is made*
- **C++**: *Make your own Game Engine*
- **C#**: *C# Networking: Create a TCP chater server, TCP games, UDP Pong and more*
- **C#**: *Loading and rendering 3D skeletal animations from scratch in C# and GLSL*
- **Clojure**: *Building a spell-checker*
- **Go**: *Build A Simple Terminal Emulator In 100 Lines of Golang*
- **Go**: *Let's Create a Simple Load Balancer*
- **Go**: *Video Encoding from Scratch*
- **Java**: *How to Build an Android Reddit App* [video]
- **JavaScript**: *Build Your Own Module Bundler - Minipack*
- **JavaScript**: *Learn JavaScript Promises by Building a Promise from Scratch*
- **JavaScript**: *Implementing promises from scratch (TDD way)*
- **JavaScript**: *Implement your own—call(), apply() and bind() method in JavaScript*
- **JavaScript**: *JavaScript Algorithms and Data Structures*
- **JavaScript**: *Build a ride hailing app with React Native*
- **JavaScript**: *Build Your Own AdBlocker in (Literally) 10 Minutes*
- **Kotlin**: *Build Your Own Cache*

- **Lua**: *Building a CDN from Scratch to Learn about CDN*
- **Nim**: *Writing a Redis Protocol Parser*
- **Nim**: *Writing a Build system*
- **Nim**: *Writing a MiniTest Framework*
- **Nim**: *Writing a DMIDecode Parser*
- **Nim**: *Writing a INI Parser*
- **Nim**: *Writing a Link Checker*
- **Nim**: *Writing a URL Shortening Service*
- **Node.js**: *Build a static site generator in 40 lines with Node.js*
- **Node.js**: *Building A Simple Single Sign On(SSO) Server And Solution From Scratch In Node.js.*
- **Node.js**: *How to create a real-world Node CLI app with Node*
- **Node.js**: *Build a DNS Server in Node.js*
- **PHP**: *Write your own MVC from scratch in PHP*
- **PHP**: *Make your own blog*
- **PHP**: *Modern PHP Without a Framework*
- **PHP**: *Code a Web Search Engine in PHP*
- **Python**: *Build a Deep Learning Library* [video]
- **Python**: *How to Build a Kick-Ass Mobile Document Scanner in Just 5 Minutes*
- **Python**: *Continuous Integration System*
- **Python**: *Recommender Systems in Python: Beginner Tutorial*
- **Python**: *Write SMS-spam detector with Scikit-learn*
- **Python**: *A Simple Content-Based Recommendation Engine in Python*
- **Python**: *Stock Market Predictions with LSTM in Python*
- **Python**: *Building a simple Generative Adversarial Network (GAN) using Tensorflow*
- **Python**: *Learn ML Algorithms by coding: Decision Trees*
- **Python**: *JSON Decoding Algorithm*
- **Python**: *Build your own Git plugin with python*
- **Ruby**: *A Pedometer in the Real World*
- **Ruby**: *Creating a Linux Desktop application with Ruby*
- **Rust**: *Building a DNS server in Rust*

- **Rust**: *Writing Scalable Chat Service from Scratch*
- **Rust**: *WebGL + Rust: Basic Water Tutorial*
- **TypeScript**: *Tiny Package Manager: Learns how npm or Yarn works*

Contribute

- Submissions welcome, just send a PR, or create an issue
- Help us review pending submissions by leaving comments and "reactions"