NODE.JS GLOBAL

NODE.JS INTRODUCTION

APRIL, 2018

AGENDA

Agenda

- Introduction & Prerequisites
- What is Node.js
- V8: The JavaScript Engine
- The Node Core
- Install & launch
- Node.js & ECMAScript / ESNext
- Sources & Docs
- Summary & Q&A

INTRODUCTION & PREREQUISITES

1 NODEJS INTRODUCTION

2 NODEJS MODULES. NPM

3 NODEJS EVENTS

4 ASYNC DEVELOPMENT INTRODUCTION

5 COMMAND LINE. DEBUGGING. ERRORS HANDLING

6 FILESYSTEM AND STREAMS

7 ASYNCHRONOUS NETWORK API

8 HTTP MODULE

9 MIDDLEWARE. FRAMEWORKS

10 AUTHORIZATION. VALIDATION. SECURITY

11 SQL DATABASES. ORM

12 NOSQL DATABASES. ODM

13 NODEJS. TESTING

14 DEPLOY AND TOOLS

15 SWAGGER. DOCS

https://kb.epam.com/display/EUXDCC/NodeJS+Schedule+2018

All lectures will be conducted twice in two languages (RU/ENG)

All lectures will be recorded

RU start: 10 am / EN start: 2 pm + 1d

INTRODUCTION & PREREQUISITES

Prerequisites

- JavaScript Core concepts
- ES6
- Attitude and dedication

Software & tools we’ll use

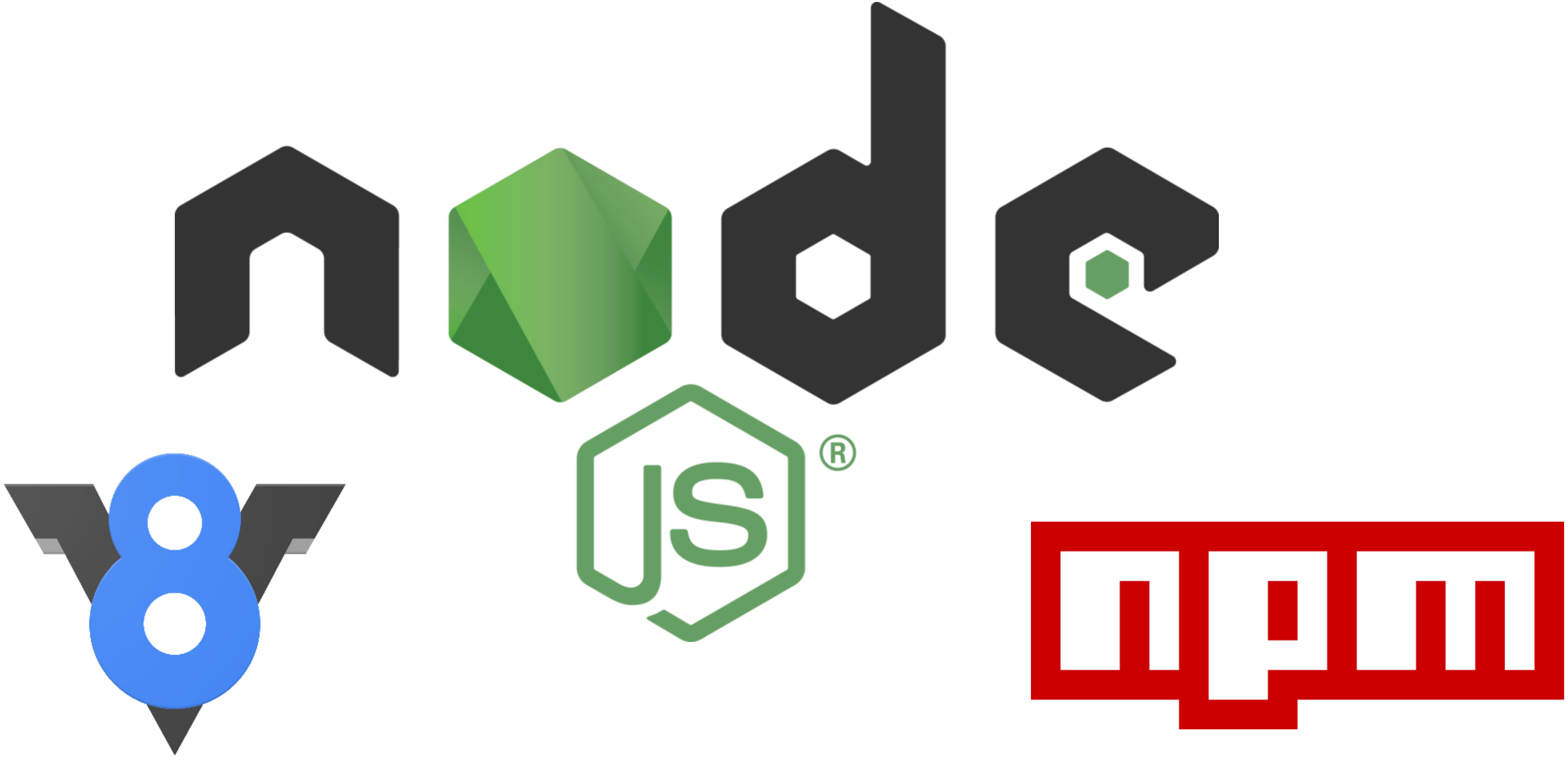
- Atom / VSCode / WebStorm
- Git
- Command line

INTRODUCTION & PREREQUISITES

What am I going to get from this course?

- Grasp **how Node.js works** under the hood
- Understand the JavaScript and technical concepts behind Node.js
- Structure a Node application in **modules**
- Understand and use the **Event Emitter**
- Understand **Buffers, Streams, and Pipes**
- Build a **Web Server** in Node and understand how it really works
- Use **npm** and manage node packages
- Build a web application and API more easily using Express
- Connect to a SQL or Mongo database in Node

WHAT IS NODE.JS?



WHAT IS NODE.JS?

Node.js:

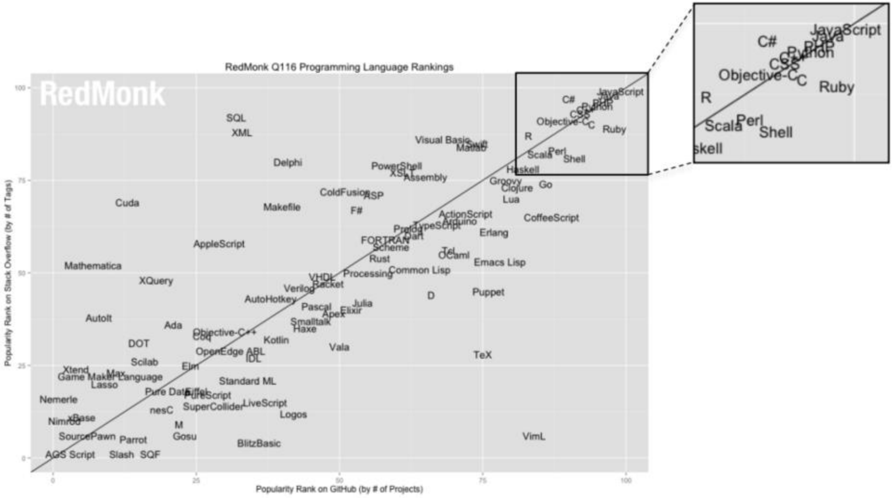
- Server-side JavaScript 😐
- ***Asynchronous event driven JavaScript runtime*** *designed to build scalable network applications*
- Open source & cross-platform project
- Built on Chrome's V8 JavaScript engine
- Non-blocking IO
- Single threaded
- There is no DOM implementation provided by Node.js

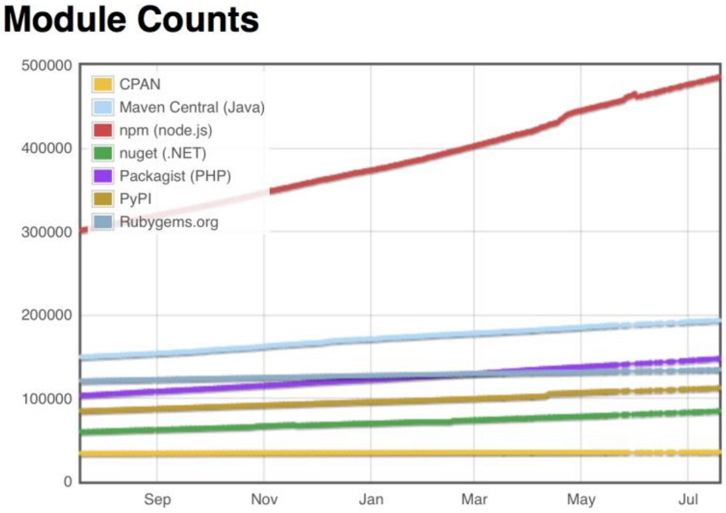
WHAT IS NODE.JS?

History:

- Created by Ryan Dahl, first 2009 for only Linux.
- Sponsored by Joyent
- June 2011, Microsoft partnered with Joyent to help create a native Windows version of Node.js.
- January 2012, Ryan stepped aside, npm creator Isaac Schlueter manage the project
- January 2014, Timothy J. Fontaine became new project lead.
- December 2014, Fedor Indutny started IO.js
- September 2015, Node.js v0.12 and io.js v3.3 were merged back together into Node v4.0
- August 2017, Node.js Forked Again Over Complaints of Unresponsive Leadership – Ayo.js

WHAT IS NODE.JS?





Fastest growing and most significant development language right now.
With 3.5 million users and an annual growth rate of 100%

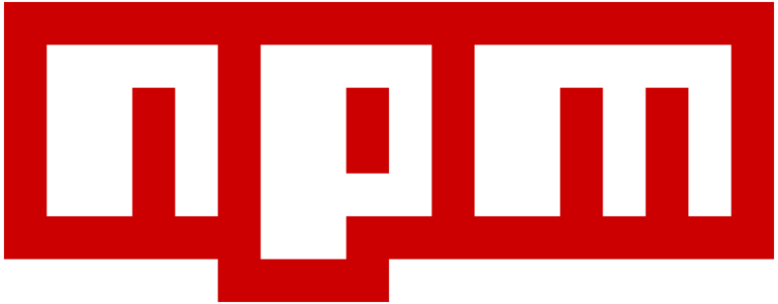
WHAT IS NODE.JS?

Node.js ecosystem:

- Node.js heavily relies on modules
- Libraries in Node.js are called packages and they can be installed differently:
- Three sources of modules could be used:
  - Built-in
  - Custom (your files)
  - Global package registry (npmjs)
- Package manager comes bundled with Node.js installation

WHAT IS NODE.JS?

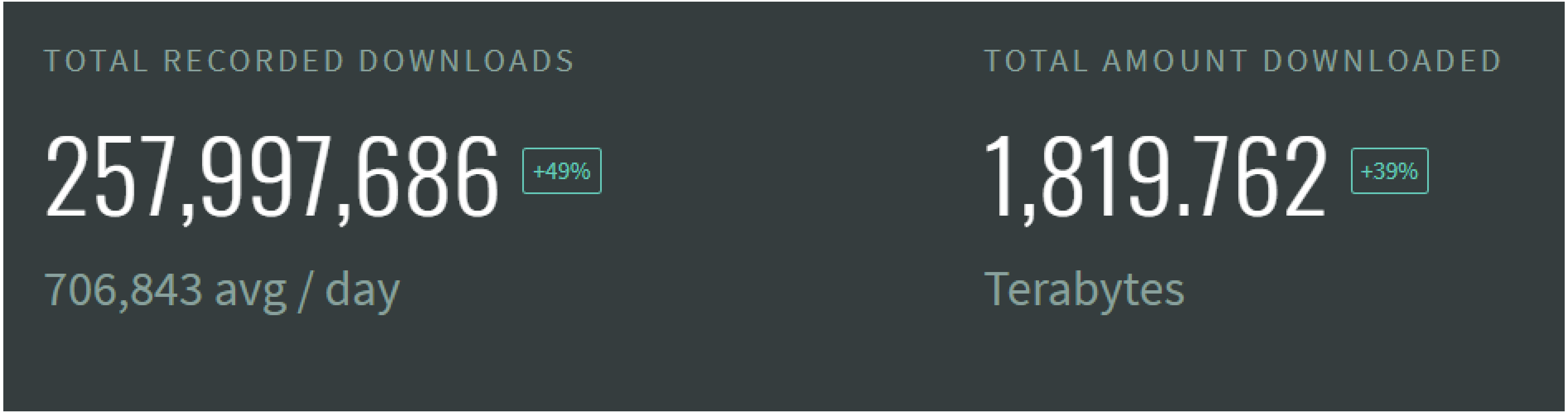
NPM - the package manager for JavaScript and the world’s largest software registry. Discover packages of reusable code — and assemble them in powerful new ways.



WHAT IS NODE.JS?

- "At over 350,000 packages, the npm registry contains more than double the next most populated package registry (which is the Apache Maven repository). In fact, it is currently the largest package registry in the world."
- In the preceding four weeks, users installed 18 billion packages.
- This translates into 6 billion downloads, "because approximately 66 percent of the installs are now being served from the cache.”
- ping.npmjs.com "shows that the registry's services offer a 99.999 uptime.”
- Every week roughly 160 people publish their first package in the registry

WHAT IS NODE.JS?



TOTAL RECORDED DOWNLOADS

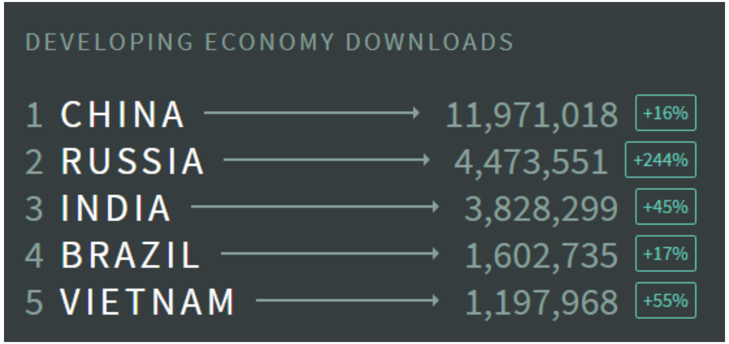
257,997,686 +49%

706,843 avg / day

TOTAL AMOUNT DOWNLOADED

1,819.762 +39%

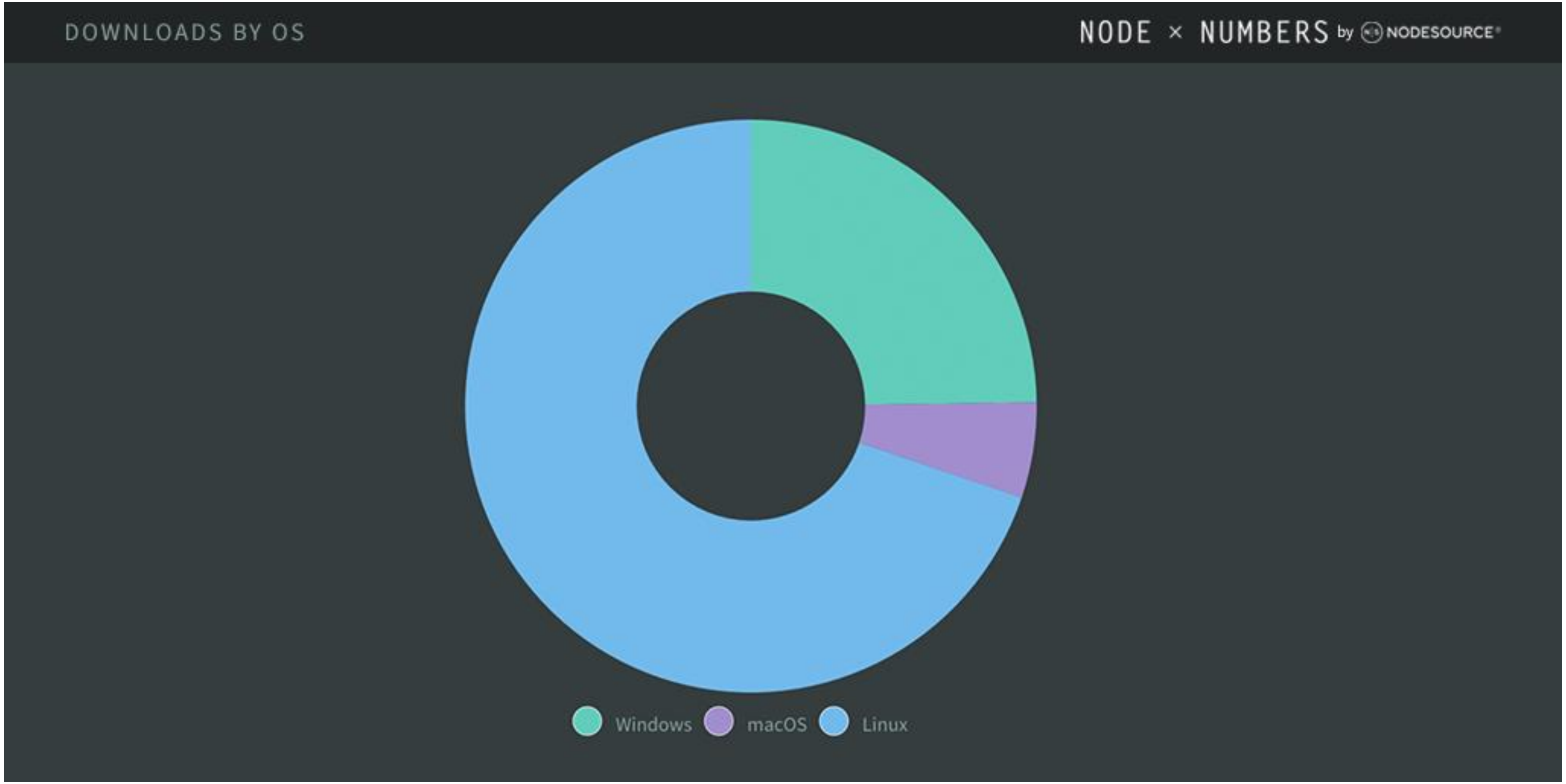
Terabytes



DEVELOPING ECONOMY DOWNLOADS

1	CHINA →	11,971,018	+16%
2	RUSSIA →	4,473,551	+244%
3	INDIA →	3,828,299	+45%
4	BRAZIL →	1,602,735	+17%
5	VIETNAM →	1,197,968	+55%

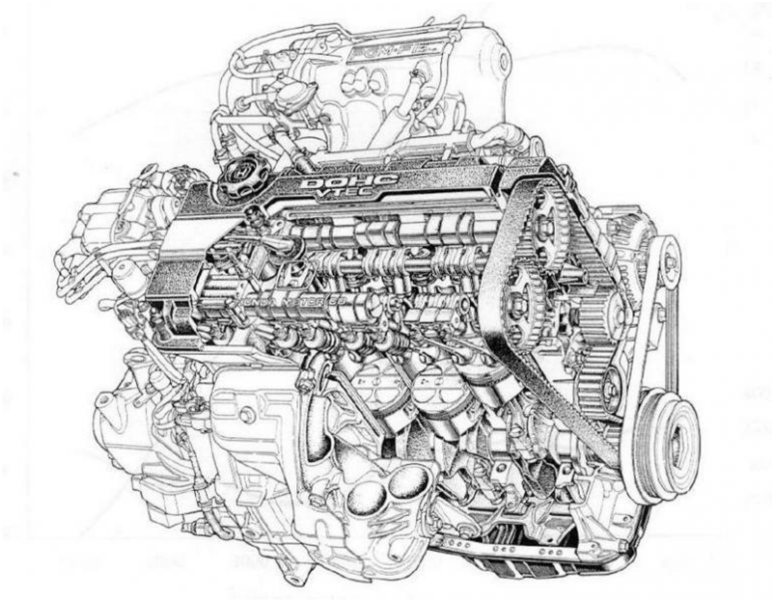
WHAT IS NODE.JS?



V8: THE JAVASCRIPT ENGINE

An **ECMAScript engine** is a program that executes source code written in a version of the ECMAScript language standard, for example, JavaScript.

JavaScript Engine – a program that converts JavaScript code into something the computer processor can understand. It should follow the ECMAScript standard on how the language should work and what features it should have



Take a look at list of JavaScript engines

V8: THE JAVASCRIPT ENGINE

ECMAScript (or ES) is a trademarked scripting-language specification standardized by Ecma International in ECMA-262 and ISO/IEC 16262. It was created to standardize JavaScript, so as to foster multiple independent implementations.

Take a look at ECMAScript specification

V8: THE JAVASCRIPT ENGINE

- ECMA - European Computer Manufacturers Association
- ECMA International has been the standards body for JavaScript since 1996 and work to keep the language modern and relevant.
- The **ECMAScript** specification 2015, a document outlining new features for JavaScript and how they should be implemented was finalized in the middle of 2015. The latest standard version is 8th – ECMAScript 2017.
- ECMA TC39 committee is working on new ECMAScript features.

Take a look at ECMAScript specification

V8: THE JAVASCRIPT ENGINE

V8 is Google’s open source high-performance **JavaScript engine**, written in C++ and used in Google Chrome, the open source browser from Google. It implements **ECMAScript** as specified in **ECMA-262**, and runs on Windows 7 or later, macOS 10.5+, and Linux systems that use IA-32, ARM, or MIPS processors.

V8 can run standalone, or can be embedded into any C++ application

V8: THE JAVASCRIPT ENGINE

What do we know about V8?

- **V8** is an open source JavaScript engine developed by Google. Its written in C++ and is used in Google Chrome Browser
- Implements latest ECMAScript standard
- Node.js runs on **V8**
- Ryan Dahl: ”Node.js is a set of bindings to the V8 JavaScript VM”

V8: THE JAVASCRIPT ENGINE

V8 Under the Hood

Let’s demystify the V8 magic

I BETTER USE MY SPECIAL ROBOT VISION TO SEE WHAT'S INSIDE
memecenter.com MemeCenter

V8: THE JAVASCRIPT ENGINE

THE NODE CORE

What Does JavaScript Need to Manage a Server?

- Ways to organize code into reusable pieces
- Ways to deal with **files**
- Ways to deal with **databases**
- The ability to **communicate** over the internet
- The ability to accept **requests** and send **responses**
- A way to deal with work that takes a long time

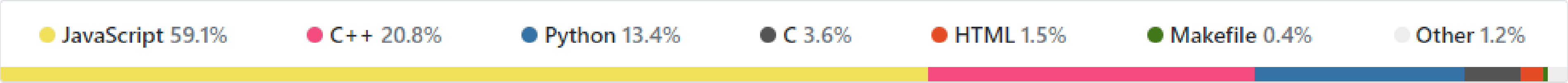
THE NODE CORE

Node is similar in design to and influenced by systems like Ruby's event machine or Python's twisted. Node takes the event model a bit further—it presents the event loop as a language construct instead of as a library.

THE NODE CORE

In Node.js '.js' doesn't mean that its solely written JavaScript. It is 40% JS and 60% C++

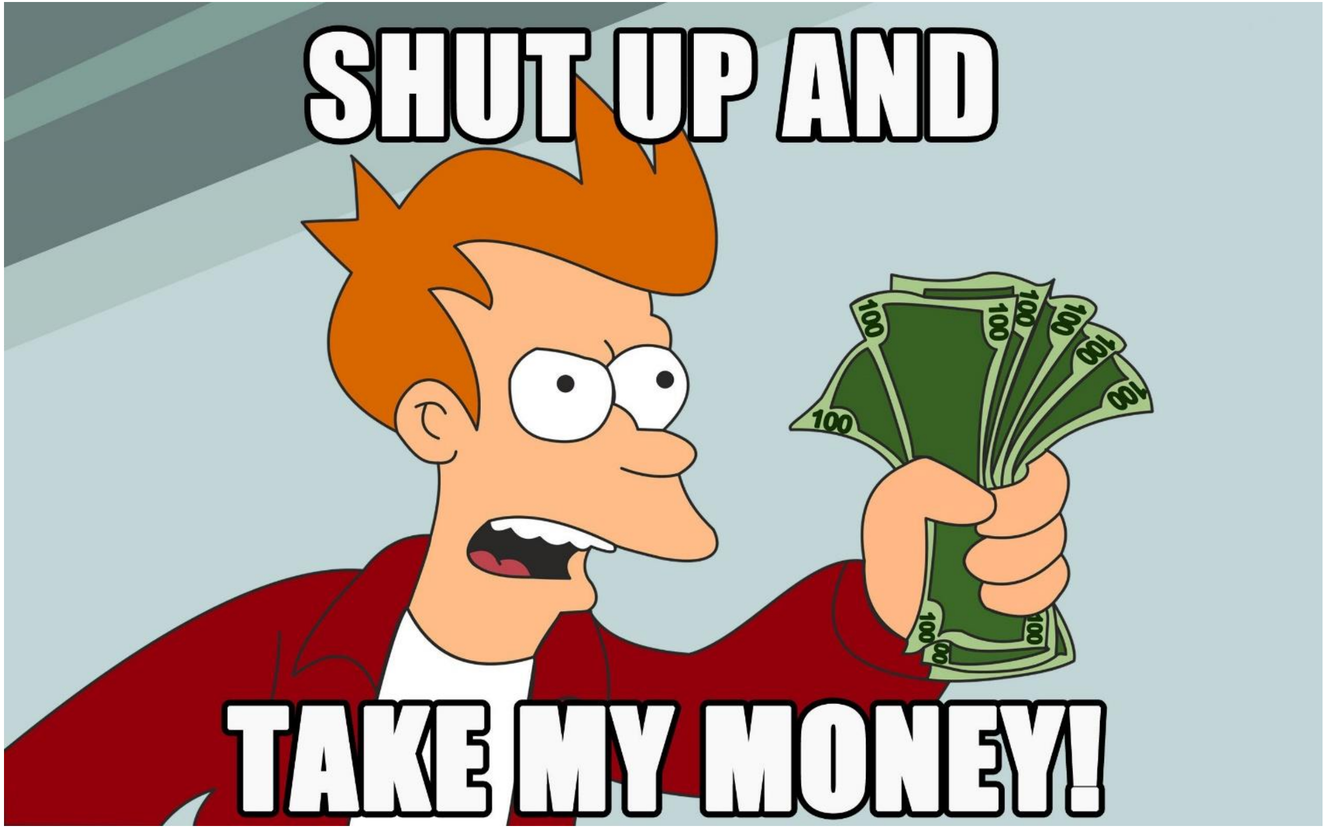
That is why on github statistics is different:



● JavaScript 59.1% ● C++ 20.8% ● Python 13.4% ● C 3.6% ● HTML 1.5% ● Makefile 0.4% ● Other 1.2%

THE NODE CORE

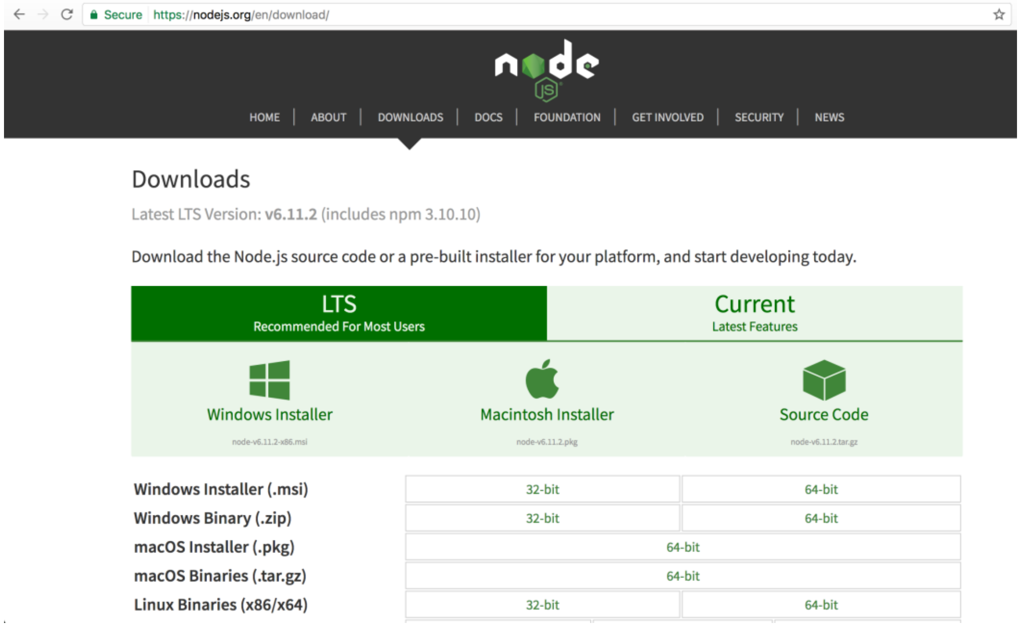
INSTALL AND LAUNCH



INSTALL AND LAUNCH

In order to get Node.js you should:

- Go to the official website and download the executable installer: https://nodejs.org/en/download/
- Or Install it from CLI via “homebrew”, “nvm”, etc.
- And check the installed version with commands: ***node -v*** and ***npm -v***



Secure https://nodejs.org/en/download/
node JS
HOME | ABOUT | DOWNLOADS | DOCS | FOUNDATION | GET INVOLVED | SECURITY | NEWS

Downloads

Latest LTS Version: **v6.11.2** (includes npm 3.10.10)

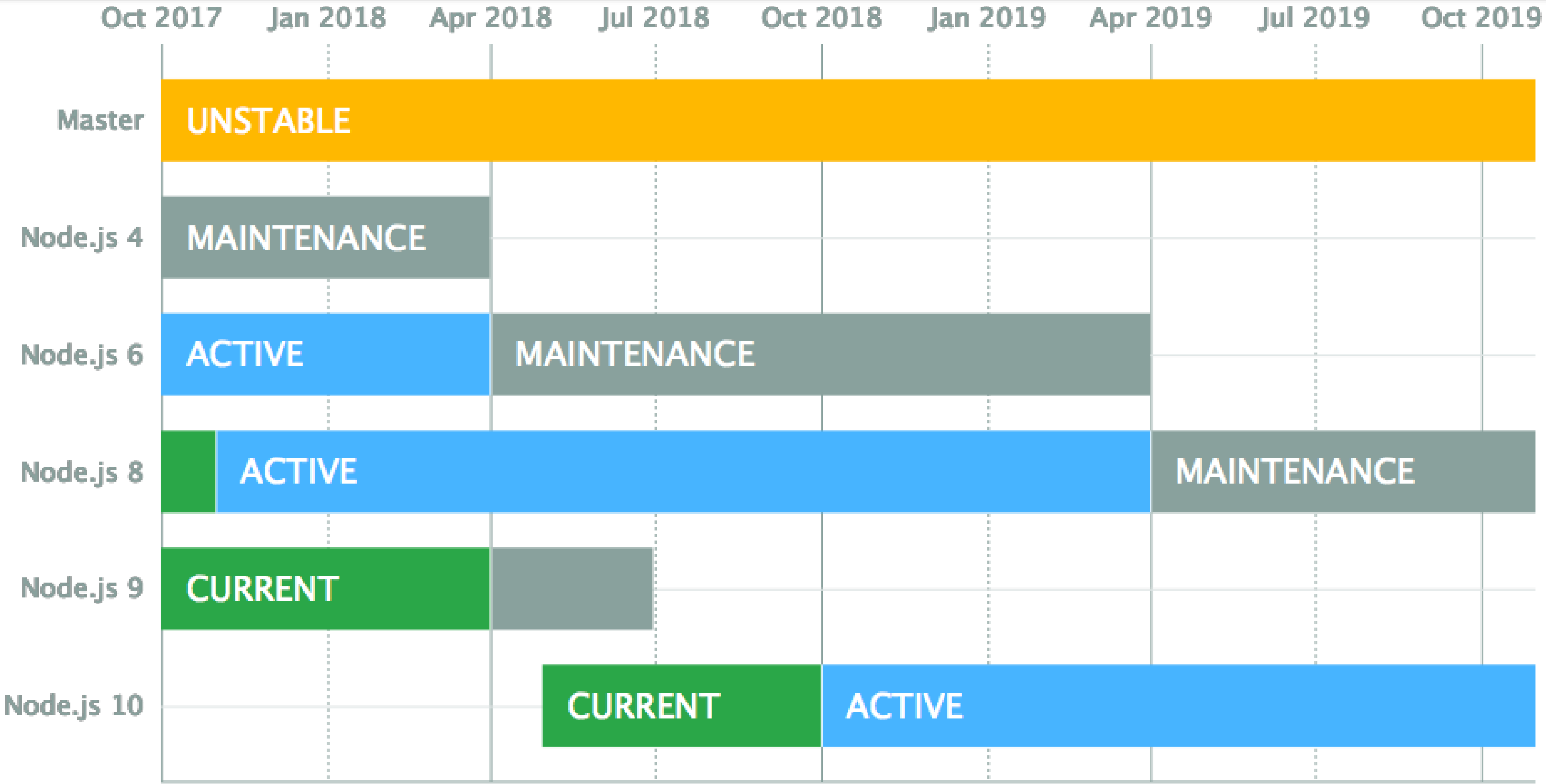
Download the Node.js source code or a pre-built installer for your platform, and start developing today.

LTS Recommended For Most Users	Current Latest Features

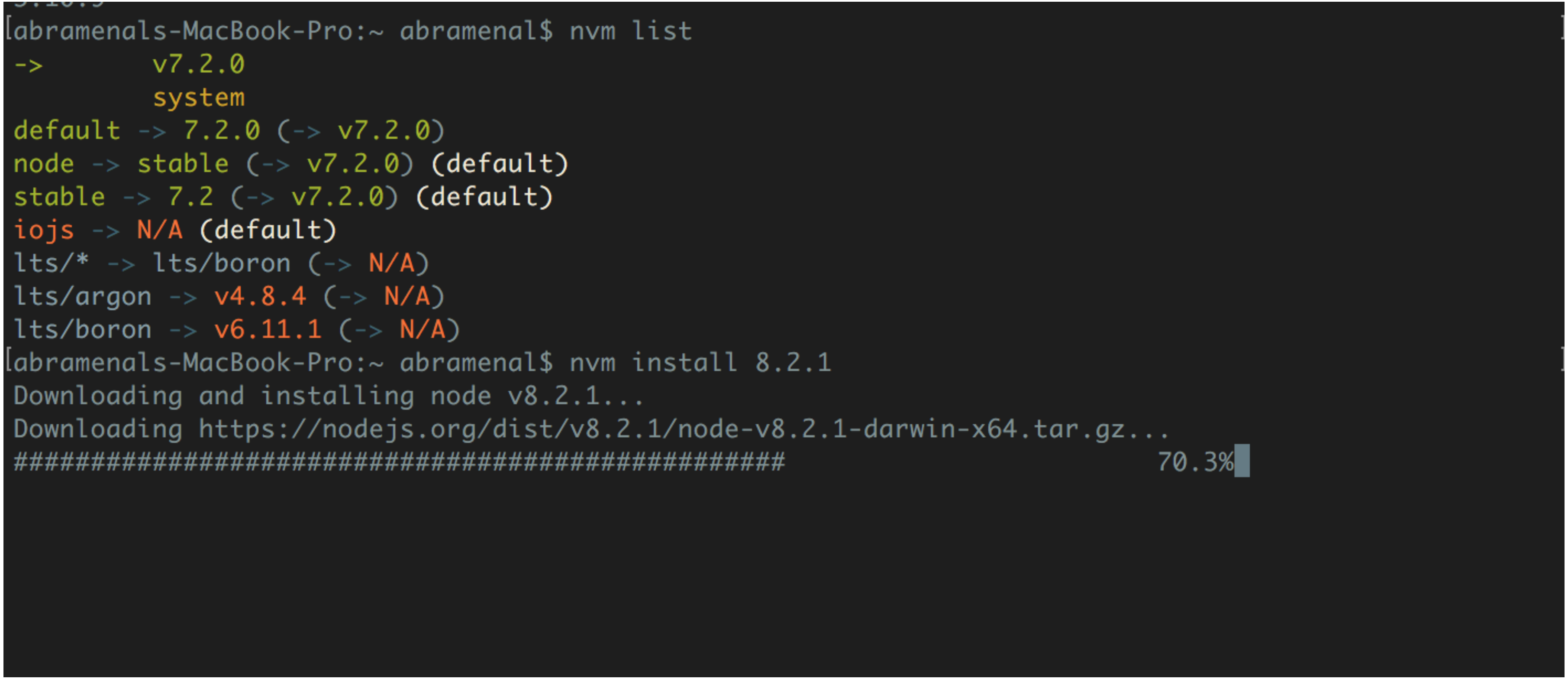
Windows Installer node-v6.11.2-x86.msi	Macintosh Installer node-v6.11.2.pkg	Source Code node-v6.11.2.tar.gz

Windows Installer (.msi)	32-bit	64-bit
Windows Binary (.zip)	32-bit	64-bit
macOS Installer (.pkg)	64-bit	
macOS Binaries (.tar.gz)	64-bit	
Linux Binaries (x86/x64)	32-bit	64-bit

Node.js Release plan



INSTALL AND LAUNCH

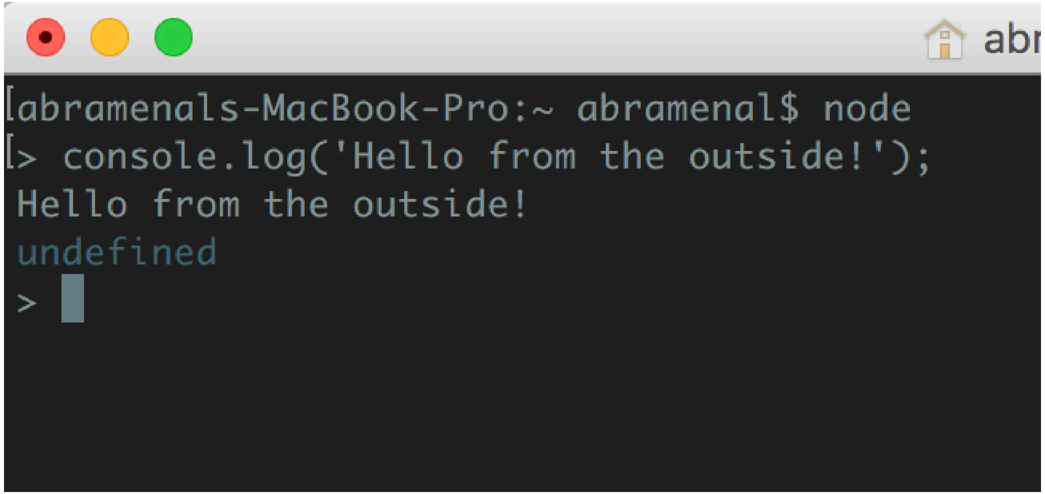


```
[abramenals-MacBook-Pro:~ abramenal$ nvm list
->       v7.2.0
         system
default -> 7.2.0 (-> v7.2.0)
node -> stable (-> v7.2.0) (default)
stable -> 7.2 (-> v7.2.0) (default)
iojs -> N/A (default)
lts/* -> lts/boron (-> N/A)
lts/argon -> v4.8.4 (-> N/A)
lts/boron -> v6.11.1 (-> N/A)
[abramenals-MacBook-Pro:~ abramenal$ nvm install 8.2.1
Downloading and installing node v8.2.1...
Downloading https://nodejs.org/dist/v8.2.1/node-v8.2.1-darwin-x64.tar.gz...
##################################################                        70.3%
```

INSTALL AND LAUNCH

To launch the Node.js CLI

- Open the terminal (PowerShell) window
- Type ***node*** to get into the REPL
- Check any command



```
[abramenals-MacBook-Pro:~ abramenal$ node
[> console.log('Hello from the outside!');
 Hello from the outside!
 undefined
 >
```

NODE.JS AND ECMAScript 2015-16-17 / ESNEXT

- To check any ES feature availability per version - simply go to http://node.green/
- To check any ESNext feature availability - http://kangax.github.io/compat-table/esnext/

NODE.JS AND ECMAScript

All ECMAScript features are split into three groups for **shipping**, **staged**, and **in progress** features:

- All **shipping** features, which V8 considers stable, are turned **on by default on Node.js** and do **NOT** require any kind of runtime flag.
- **Staged** features, which are almost-completed features that are not considered stable by the V8 team, require a runtime flag: **--harmony**.
- **In progress** features can be activated individually by their respective harmony flag, although this is highly discouraged unless for testing purposes. Note: these flags are exposed by V8 and will potentially change without any deprecation notice.

SOURCES AND DOCS

- Official Node.js repository: https://github.com/nodejs/node
- Official Node.js Documentation set: NodeJS.org

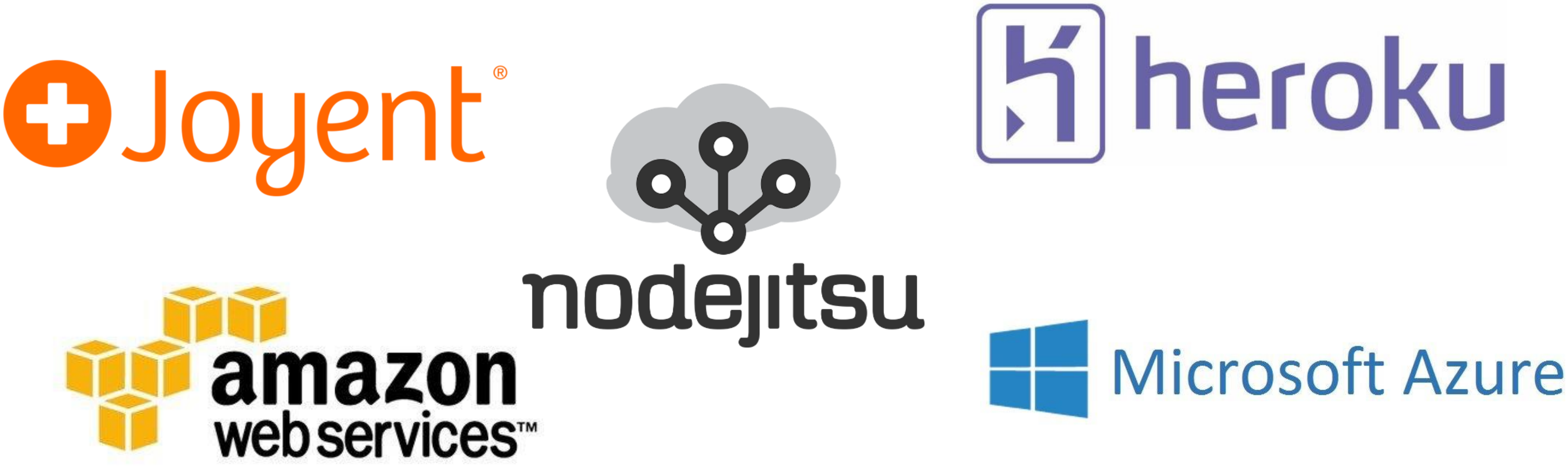
SUMMARY AND Q&A

Companies using Node.js

ebay tm
StrongLoop TM
PayPal TM
Linked in
Walmart ®
UBER
YAHOO!

SUMMARY AND Q&A

Node.js hosting companies



SUMMARY Q&A

Useful links:

- Node.js mentoring program on KB
- Node.js official website (visit download and documentation pages)
- List of JavaScript engines
- ECMAScript specification
- V8 source code and V8 Wiki
- Node.js source code
- Node green (for monitoring ECMAScript features support) and Kangax compat-able (for ES Next)
- Libuv website and GitHub

NODE.JS GLOBAL

NODE.JS INTRODUCTION
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