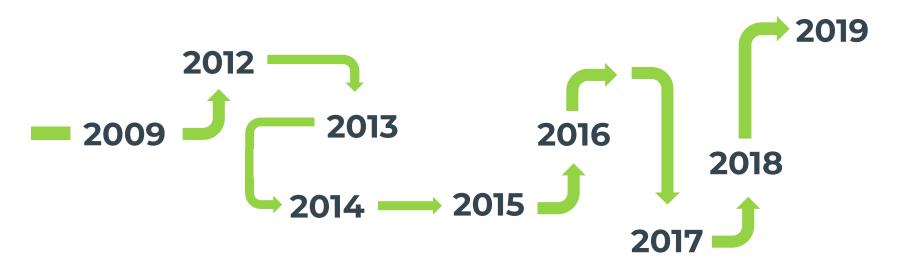# CHRONICLES OF NODE.JS
COMMUNITY & ENTERPRISE

Nikolay Matvienko

Senior Software Engineer and Node.js expert at Grid Dynamics

Node.js diagnostics, performance improvement consultant.

You can find me at twitter.com/**matvi3nko**

github.com/**matvi3nko**

PLAN

10 YEARS OF NODE.JS

Breaking the Open Web

Dan Shaw - Node.JS and the web platform
https://youtu.be/thCFBOs54AE

HTML5

2000 – 2009

2012

THE FIRST NODE.JS SUMMIT
https://www.nodesummit.com/videos/

2013

Node.js Helps NASA Keep Astronauts Safe and Data Accessible

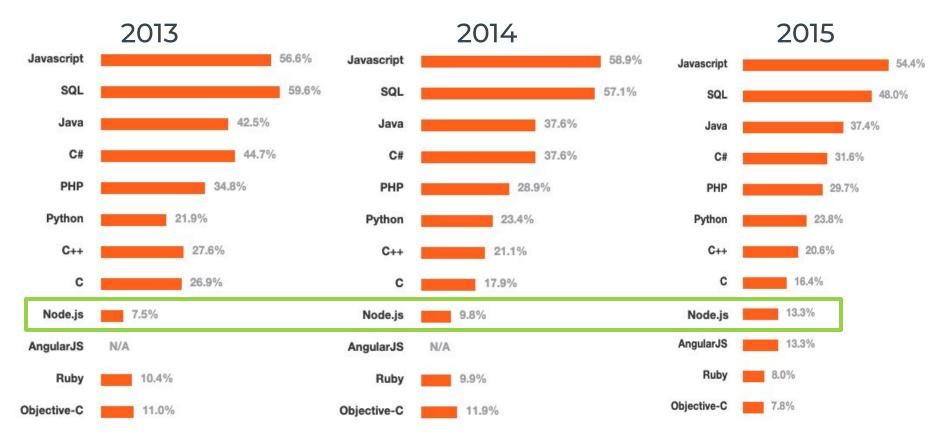https://foundation.nodejs.org/wp-content/uploads/sites/50/2017/09/Node_CaseStudy_Nasa_FNL.pdf

> Not surprisingly Estes' Node.js system rapidly won hearts and minds of NASA's engineers and developers.

Node.js Brings Big Data to the Cloud, so Astronauts Can Live and Work in Space

MOST POPULAR TECHNOLOGIES (stackoverflow)

2013

Technology	Percentage
Javascript	56.6%
SQL	59.6%
Java	42.5%
C#	44.7%
PHP	34.8%
Python	21.9%
C++	27.6%
C	26.9%
Node.js	7.5%
AngularJS	N/A
Ruby	10.4%
Objective-C	11.0%

2014

Technology	Percentage
Javascript	58.9%
SQL	57.1%
Java	37.6%
C#	37.6%
PHP	28.9%
Python	23.4%
C++	21.1%
C	17.9%
Node.js	9.8%
AngularJS	N/A
Ruby	9.9%
Objective-C	11.9%

2015

Technology	Percentage
Javascript	54.4%
SQL	48.0%
Java	37.4%
C#	31.6%
PHP	29.7%
Python	23.8%
C++	20.6%
C	16.4%
Node.js	13.3%
AngularJS	13.3%
Ruby	8.0%
Objective-C	7.8%

Online Only Black Friday and Thanksgiving 2014 Sales (Figures are in Billions)

$1.0B

+30%/y

$2.5B

	2010	2011	2012	2013	2014
Black Friday	$0.648	$0.816	$1.042	$1.198	$1.505
Thanksgiving	$0.407	$0.479	$0.633	$0.766	$1.009

https://bestblackfriday.com/blog/black-friday-2014-sales-figures-numbers-recap/

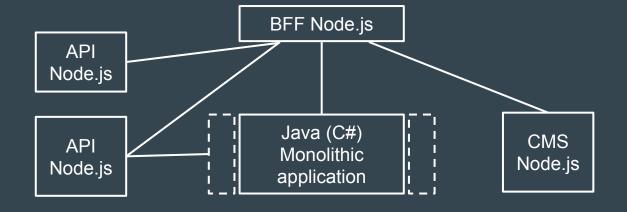Retail sites crash under weight of
online Black Friday shoppers

Lowe's website goes down temporarily on
Black Friday

Black Friday – Cyber Monday Weekend: Mobile
Traffic Soars But Overall Sales Down

wasted

J.Crew's website **customers try to
shop Black Friday deals, and experts say it could
have cost the company over $700,000 in sales**

**Facebook's ad platform has crashed — causing chaos just
days before Black Friday**

YEAR OF DIGITAL TRANSFORMATIONS WITH NODE.JS

2014


```
                    ┌──────────────┐
                    │  BFF Node.js │
                    └──────────────┘
┌──────────┐
│   API    │
│  Node.js │
└──────────┘

┌──────────┐      ┌─────────────┐      ┌──────────┐
│   API    │      │  Java (C#)  │      │   CMS    │
│  Node.js │      │  Monolithic │      │  Node.js │
└──────────┘      │ application │      └──────────┘
                  └─────────────┘
```

- ISOMORPHIC
- FAST RELEASE CYCLES
- HIGHT APPLICATION
- **PERFORMANCE** & **UPTIME**
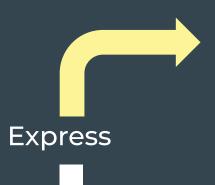
JOYENT
SPLIT
FORK IO.JS
NO NODE.JS SUMMIT

https://blog.risingstack.com/what-is-nodejs-used-for-the-2015-nodejs-overview-report/

@matvi3nko

Hapi

"Originally developed to handle Walmart's **Black Friday scale"**

https://hapi.dev/

Express

Custom framework

IoC, MIddlewares, Adapter, Strategy, ...
(like NestJS now)

FRAMEWORKS

Node.js Design Patterns 2nd
https://www.oreilly.com/library/view/nodejs-design-patterns/9781785885587/

I DEVELOP ON NODE.JS
WENT-LIVE / PRODUCTION

2015

AWS
Lambda

λ

Popularity in the world:

Java – **36%**

C# – **30%**

PHP – **25%**

Node.js – **17%**

Backend for frontend:
Node.js
caught up with
PHP
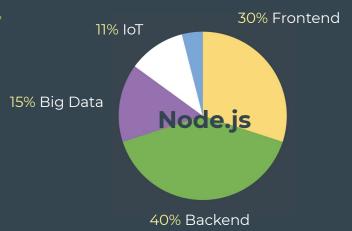
➡ **2016**

WIDELY USED AND MOSTLY IN ENTERPRISE AND WEB DEVELOPMENT

At Node Summit 2016:
- Netflix
- Google
- IBM
- Nasa
- Disney
- Walmart Labs
- eBay
- ...

shared success stories of switching to Node.js

11% IoT

30% Frontend

15% Big Data

Node.js

40% Backend

and **40%** of all PROJECTS USE MESSAGE QUEUES

https://nodejs.org/static/documents/2016-survey-report.pdf   https://blog.risingstack.com/node-js-developer-survey-results-2016/

RESULTS OF USING NODE.JS

100% Business Availability, even with Extreme Load

Around 1.5 billion dollars are being spent online in the US on a single day on Black Friday, each year.

It is crucial that your site can keep up with the traffic. This is why **Walmart**, one of the biggest retailers is **using Node.js to serve 500 million pageviews on Black Friday, without a hitch.**

When **PayPal** started using Node.js, they reported an **2x increase in productivity** compared to the previous Java stack. How is that even possible?
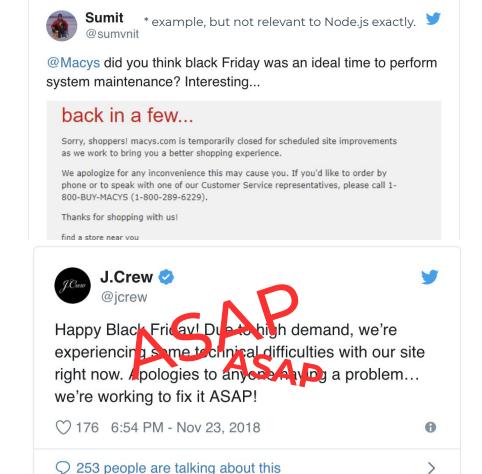
https://blog.risingstack.com/digital-transformation-with-the-node-js-stack/

WITH GROWTH OF PROJECTS:

1. BEST PRACTICES OF BIG PROJECTS
2. ASYNCHRONOUS / EVENT LOOP
3. DEVELOPERS AND TECH LEADERS
   ARE MORE INTERESTED IN TOOLS
   and ENTERPRISE TOOLS

@matvi3nko

14

Sumit
@sumvnit

* example, but not relevant to Node.js exactly.

@Macys did you think black Friday was an ideal time to perform system maintenance? Interesting...

back in a few...

Sorry, shoppers! macys.com is temporarily closed for scheduled site improvements as we work to bring you a better shopping experience.

We apologize for any inconvenience this may cause you. If you'd like to order by phone or to speak with one of our Customer Service representatives, please call 1-800-BUY-MACYS (1-800-289-6229).

Thanks for shopping with us!

find a store near you

J.Crew
@jcrew

Happy Black Friday! Due to high demand, we're experiencing some technical difficulties with our site right now. Apologies to anyone having a problem... we're working to fix it ASAP!

ASAP ASAP

♡ 176   6:54 PM - Nov 23, 2018

💬 253 people are talking about this

WITH GROWTH OF PROJECTS:

1. BEST PRACTICES OF BIG PROJECTS
2. ASYNCHRONOUS / EVENT LOOP
3. DEVELOPERS AND TECH LEADERS ARE MORE INTERESTED IN **TOOLS**

and **ENTERPRISE TOOLS**

LACK OF TOOLS EFFICIENT IN PRODUCTION

PROFILING
D scripts, System profilers

THE MOST ACUTE PROBLEM IN 2016 –
DEBUGGING
81.97% used console.log
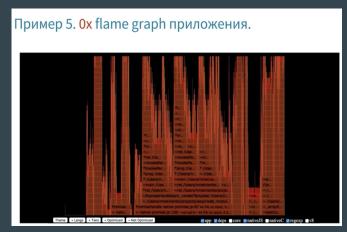https://blog.risingstack.com/node-js-developer-survey-results-2016/

2017

V8 API CHANGES:

1. INSTRUMENTS or NODE UPGRADE
2. WE HAD TO KNOW JIT
3. APPLY OPTIMIZATIONS IN CODE
4. PROFILE LIBRARIES

0x FLAME GRAPH

LLNODE

TONS OF ANONYMOUS FUNCTIONS

HEAVY FLAME GRAPHS

Пример 5. 0x flame graph приложения.

https://youtu.be/_qzFJ2MPVWQ

"Grokking Asynchronous Work in Node.js - Thorsten Lorenz" https://youtu.be/8Xoht4J6Jjw
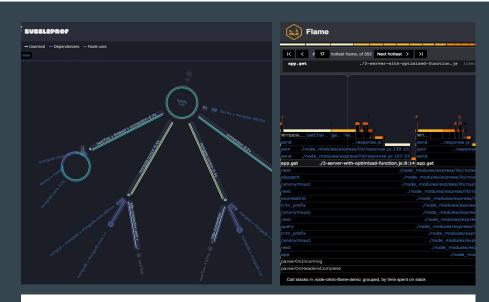
AUTOMATED DIAGNOSTICS TOOLS:

Node-clinic – Clinic.js (2019)

https://clinicjs.org/

"I initially didn't use Clinic.js because I thought that I could get all the results with other tools. Boy was I wrong! I was also really amazed by the UI and responsiveness of all the Clinic.js tools"

- Nikolay Matvienko, Software Engineer at Grid Dynamics
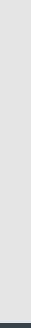
USAGE APPLICATION

Node.js users span a variety of industries
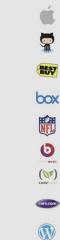
THE YEAR OF MULTITHREADED NODE.JS PLATFORMS

1. Napa.js
   https://github.com/microsoft/napajs
2. AliOS-nodejs
   https://github.com/alibaba/AliOS-nodejs/wiki/Workers-in-Node.js-based-on-multithreaded-V8
3. Ayo
   https://github.com/ayojs/ayo

WORKER-THREADS
RELEASE & FIRST USAGE

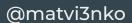**Patric-robot & Anna**

Decomposition of the Main Thread in Node.js
https://youtu.be/Mfz1_blLl9Q
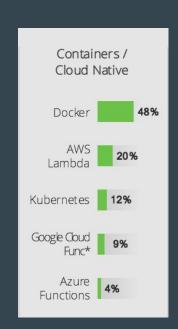
WORKER
[FEATURE REQUEST]
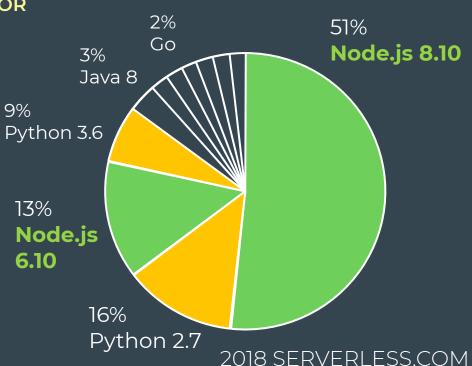
USER FEEDBACK SESSION WG

2018

FAAS NOT VULNERABLE FOR
CPU intensive tasks

~75%
DEPLOYS TO CLOUD

and **33%**

IS FAAS / SERVERLESS

BIG DATA ANALYTICS

Containers /
Cloud Native

Docker	**48%**
AWS Lambda	**20%**
Kubernetes	**12%**
Google Cloud Func*	**9%**
Azure Functions	**4%**
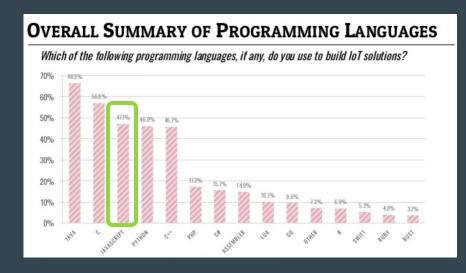
https://blog.risingstack.com/takeaways-node-js-survey-2018/

2% Go

3% Java 8

9% Python 3.6

13% **Node.js 6.10**

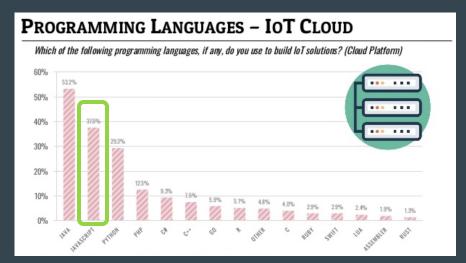51% **Node.js 8.10**

16% Python 2.7

2018 SERVERLESS.COM

2018

IoT PLATFORMS

THE 3RD PLACE OVERALL

THE 2ND PLACE ON CLOUD

IoT Developer Survey 2018. Eclipse Foundation

https://www.slideshare.net/kartben/iot-developer-survey-2018

& NEXT 2019

- Startup time increased + new proposals
- Memory snapshots (core userland)
  https://github.com/joyeecheung/talks/blob/master/openjs_collab_summit_201905/bootstrap-of-node-core.pdf
- Diagnostics tools in the core
- TypeScript integration discussion

1st place most popular framework tool, instruments

Node.js 50% (.Net 38%, .Net Core 24%)
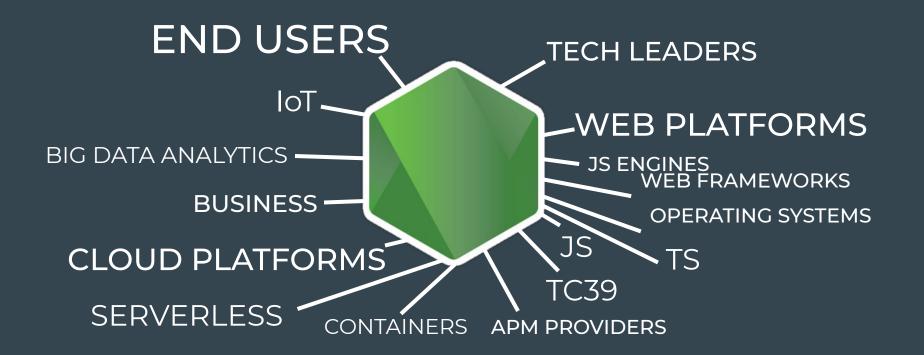
1st place most wanted technology

Node.js 17% (TensorFlow 16%, React Native 13%)

https://insights.stackoverflow.com/survey/2019

GD CLIENTS

THANKS!

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github.com/**matvi3nko**