Node.js

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Node.js is an open source, cross-platform runtime environment for server-side and networking applications. Node.js applications are written in JavaScript, and can be run within the Node.js runtime on OS X, Microsoft Windows, Linux, FreeBSD, NonStop, IBM AIX, IBM System z and IBM i. Its work is hosted and supported by the Node.js Foundation,[4] a Collaborative Project at Linux Foundation.[5]

Node.js provides an event-driven architecture and a non-blocking I/O API that optimizes an application's throughput and scalability. These technologies are commonly used for real-time web applications.

Node.js uses the Google V8 JavaScript engine to execute code, and a large percentage of the basic modules are written in JavaScript. Node.js contains a built-in library to allow applications to act as a Web server without software such as Apache HTTP Server or IIS.

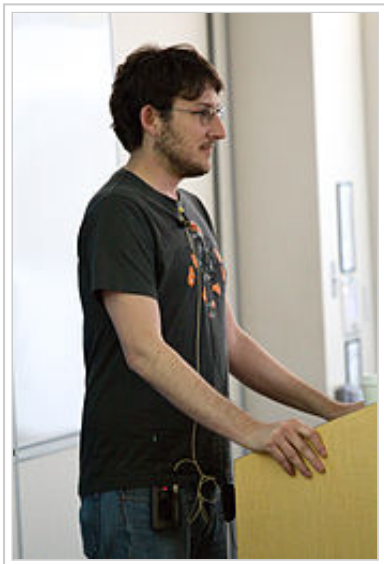
node.js

Original author(s)	Ryan Dahl
Developer(s)	Node.js Developers (https://github.com/ry/node/blob/master/AUTHORS), Joyent, GitHub Contributors (https://github.com/joyent/node/graphs/contributors)
Initial release	May 27, 2009[1]
Stable release	0.12.4 / May 23, 2015[2]
Preview release	0.11.16 / January 29, 2015[3]
Development status	Active
Written in	C, C++, JavaScript
Operating system	OS X, Linux, Solaris, FreeBSD, OpenBSD, Microsoft Windows (older versions require Cygwin), webOS, NonStop OS
Type	Event-driven networking
License	MIT
Website	nodejs.org (https://nodejs.org)

Node.js is gaining adoption as a server-side platform[6] and is used by IBM,[7] Microsoft,[8][9] Yahoo!,[10] Walmart,[11] Groupon,[12] SAP,[13] LinkedIn,[14][15] Rakuten, PayPal,[16][17] Voxer,[18] and GoDaddy.[19]

Contents

History



Ryan Dahl, creator of Node.js

Node.js was invented in 2009 by Ryan Dahl, and other developers working at Joyent.[20] Node.js was created and first published for Linux use in 2009. Its development and maintenance was spearheaded by Ryan Dahl and sponsored by Joyent, the firm where Dahl worked.[21]

Dahl was inspired to create Node.js after seeing a file upload progress bar on Flickr. The browser did not know how much of the file had been uploaded and had to query the Web server. Dahl desired an easier way.[22]

It garnered international attention after its debut at the inaugural European JSConf on November 8, 2009.[23][24][25] Dahl presented Node.js, which combined Google's V8 JavaScript engine, an event-loop, and a low-level I/O API.[20] The project received a standing ovation, and has since then experienced significant growth, popularity and adoption.[20]

In 2011, a package manager was introduced for Node.js library, called *npm*. The package manager allows publishing and sharing of open-source Node.js libraries by the community, and simplifies installation, updating and uninstallation of libraries.[20]

In June 2011, Microsoft partnered with Joyent to implement a native Windows version of Node.js.[26] The first Node.js build to support Windows was released in July.

In January 2012, Dahl stepped aside, promoting coworker and *npm* creator Isaac Schlueter to manage the project.[27]

In January 2014, Schlueter announced Timothy J. Fontaine would be Node.js's new project lead.[28]

In December 2014, Fedor Indutny started io.js, a fork of Node.js. Due to internal conflict over Joyent's governance, io.js was created as an open governance alternative with a separate technical committee.[29]

In February 2015, the intent to form a neutral Node.js Foundation was announced. By June 2015, the Node.js and io.js community voted to work together under the Node.js Foundation [30]

Overview

Node.js allows the creation of web servers and networking tools, using JavaScript and a collection of "modules" that handle various core functionality.[20][23][31][32][33] Modules handle file system I/O, networking (HTTP, TCP, UDP, DNS, or TLS/SSL), binary data (buffers), cryptography functions, data streams, and other core functions.[20][32][34] Node's modules have a simple and elegant API, reducing the complexity of writing server applications.[20][32]

Frameworks can be used to accelerate the development of applications, and common frameworks are Express.js, Socket.io and Connect.[20][35] Node.js applications can run on Microsoft Windows, Unix and Mac OS X servers. Node.js applications can alternatively be written with CoffeeScript[36] (a more readable form of JavaScript), Dart or Microsoft TypeScript (strongly typed forms of JavaScript), or any language that can compile to JavaScript.[36]

Node.js is primarily used to build network programs such as web servers, making it similar to PHP and Python.[31] The biggest difference between PHP and Node.js is that PHP is a blocking language (commands execute only after the previous command has completed), while Node.js is a non-blocking language (commands execute in parallel, and use callbacks to signal completion).[31]

Node.js brings event-driven programming to web servers, enabling development of fast web servers in JavaScript.[20] Developers can create highly scalable servers without using threading, by using a simplified model of event-driven programming that uses callbacks to signal the completion of a task.[20] Node.js was created because concurrency is difficult in many server-side programming languages, and often leads to poor performance.[23] Node.js connects the ease of a scripting language (JavaScript) with the power of Unix network programming.[20]

Node.js is built on the Google V8 JavaScript engine, because:[23]

- V8 is open-source under the BSD license
- V8 is extremely fast
- V8 is focused on the web, so is proficient with internet fundamentals like HTTP, DNS, TCP
- JavaScript is a well-known language within web development, making it accessible to many web developers

Thousands of open-source libraries have been built for Node.js, and can be downloaded for free from the npm website. Node.js has a developer community centered around two mailing lists and the IRC channel #node.js on freenode. The community gathers at NodeConf (http://nodeconf.com/), an annual developer conference focused on Node.js.[37]

Technical

Threading

Node.js operates on a single thread, using non-blocking I/O calls, allowing it to support tens of thousands of concurrent connections without incurring the cost of thread context-switching. The design of sharing a single thread between all the requests means it can be used to build highly concurrent applications. The design goal of a Node.js application is that any function performing I/O must use a callback.

A downside of this approach is that Node.js doesn't allow scaling with the number of CPU cores of the machine it is running on without using an additional module such as cluster (https://nodejs.org/api/cluster.html), StrongLoop Process Manager (http://strong-pm.io/), or pm2 (https://github.com/Unitech/pm2).

V8

V8 is the JavaScript execution engine built for Google Chrome, open-sourced by Google in 2008. Written in C++, V8 compiles JavaScript source code to native machine code instead of interpreting it in real time.

Node.js contains libuv to handle asynchronous events. V8 provides the run-time for JavaScript. Libuv is an abstraction layer for network and file system functionality on both Windows and POSIX-based systems like Linux, Mac OS X and Unix.

The core functionality of Node.js resides in a JavaScript library. The Node.js bindings, written in C++, connect these technologies to each other and to the operating system.

Package management

npm is the pre-installed package manager for the Node.js server platform. It is used to install Node.js programs from the npm registry. By organizing the installation and management of third-party Node.js programs, it helps developers build faster. npm is not to be confused with the CommonJS require() statement. It is not used to load code: instead, it is used to install code and manage code dependencies from the command line. The packages found in the npm registry can range from simple helper libraries like Underscore.js to task runners like Grunt (http://gruntjs.com/)..

Unified API

Node.js combined with a browser, a document DB (such as MongoDB or CouchDB) and JSON offers a unified JavaScript development stack. With the increased attention to client-side frameworks and the adaptation of what were essentially server-side development patterns like MVC, MVP, MVVM, etc., Node.js allows the reuse of the same model and service interface between client-side and server-side.

Event loop

Node.js registers itself with the operating system so that it is notified when a connection is made. When a connection is made, the operating system will issue a callback. Within the Node.js runtime, each connection is a small heap allocation. Traditionally, relatively heavyweight OS processes or threads handled each connection. Node.js, however, uses an event loop, instead of processes or threads, to scale to millions of connections happening at the same time.[38] In contrast to other event-driven servers, Node.js's event loop does not need to be called explicitly. Instead callbacks are defined, and the server automatically enters the event loop at the end of the callback definition. Node.js exits the event loop when there are no further callbacks to be performed.

Tools

Desktop IDEs

- Atom (free open-source)
- Brackets (free open-source)
- Sublime Text (commercial)
- JetBrains IntelliJ IDEA (commercial)
- JetBrains WebStorm (commercial)
- Microsoft Visual Studio with Node.js Tools for Visual Studio[39] (commercial)
- Microsoft Visual Studio with TypeScript (commercial)
- Nodeclipse Enide Studio (free open-source, Eclipse-based)
- NoFlo – flow-based programming environment integrated with GNOME APIs[40]
- Visual Studio Code (cross platform, free)

Online code editors

- Koding (cloud service)
- Codenvy IDE (cloud service)
- Cloud9 IDE (cloud service)
- Codiad (http://codiad.com/) (Self hosted service)

Runtimes and debuggers

- Microsoft Visual Studio (commercial) with Node.js Tools for Visual Studio (free)
- Microsoft WebMatrix (free)

Application performance management

- ruxit (https://ruxit.com/features/apm/nodejs.html) (cloud service, commercial) – SaaS based APM solution[41]

Frameworks

- Server frameworks : Express.js, Socket.io, Koa.js (http://koajs.com/), Hapi.js (http://hapijs.com/), Total.js[42][43]
- MVC frameworks : Meteor (http://www.meteor.com), Derby (http://derbyjs.com/), Sails (http://sailsjs.org/), Mean (http://mean.io), MeanJS (http://meanjs.org), Tower.js (http://towerjs.org/), Nombo (http://nombo.io/), Geddy (http://geddyjs.org), Compound (http://compoundjs.com/), Yahoo! Mojito (https://developer.yahoo.com/cocktails/mojito/)

Social network

- Node.js World (http://nodejsworld.com/) is a social networking website where Node.js developers can interact, chat, follow each other, desktop notification, share tutorials, etc.

Alternatives

io.js

io.js is a fork of Node.js, started in December 2014,[29] by a contributor to the Node.js project.[47] It is expected to be marked stable in March 2015.[48] The reason for forking away from Node.js, was that the authors wanted a project outside corporate governance, and have therefore created an "open governance" system consisting of a technical committee which the authors are part of.[47]

Like Node.js, it is an open source, cross-platform runtime environment for server-side and networking applications. io.js applications are written in JavaScript, and can be run within the io.js runtime on OS X, Microsoft Windows, and Linux. io.js provides an event-driven architecture and a non-blocking I/O API that optimizes an application's throughput and scalability.

io.js uses the Google V8 JavaScript engine to execute code, but unlike Node.js[49] plans are to keep it up-to-date with latest releases of this engine.[48]

As of the week of May 15, 2015, the io.js organization has voted and officially agreed to merge back with the Node.js project under the rubric of a new foundation, the Node Foundation.[50] The combined organization will be named 'nodejs'.

io.js

Original author(s)	Fedor Indutny
Developer(s)	io.js Developers (https://github.com/iojs/io.js/blob/master/AUTHORS), GitHub Contributors (https://github.com/iojs/io.js/graphs/contributors)
Initial release	January 14, 2015[44]
Stable release	2.0.1 / May 7, 2015[45]
Preview release	2.0.2-nightly20150512c58264e58b / May 12, 2015[46]
Development status	Active
Written in	C, C++, JavaScript
Operating system	OS X, Linux, Microsoft Windows
Type	Event-driven networking
License	MIT
Website	iojs.org (https://iojs.org/)

Wikimedia Commons has media related to ***io.js***.

JXcore

JXcore is a fork of Node.js targeting mobile devices and IoTs. Its first beta was released in January 2014. It was open sourced[51] on February 13, 2015 and made available through a GitHub repository (https://github.com/jxcore/jxcore). JXcore can use both Google V8 and Mozilla SpiderMonkey as its JavaScript engine. As a result, JXcore can run Node applications on iOS devices using Mozilla SpiderMonkey.

Wikimedia Commons has media related to ***JXcore***.

Other languages

Similar environments available for other programming languages include:

- Tornado and Twisted for Python
- Perl Object Environment for Perl
- libevent for C
- Vert.x for Java, JavaScript, Groovy, Python, Scala, Clojure and Ruby
- Akka for Java and Scala
- EventMachine for Ruby
- vibe.d for D
- Luvit (http://luvit.io/) for Lua
- Ocsigen for OCaml
- Node-julia allows using Julia (programming language) with Node.js/io.js[52] using no-overhead calling from either language

See also

- V8 (JavaScript engine)
- SpiderMonkey (software)
- Rhino (JavaScript engine)
- CommonJS
- MongoDB
- Server-side scripting
- MEAN (software bundle)
- Twisted (software)
- EventMachine
- Vert.x
- Online JavaScript IDE
- JavaScript
- List of JavaScript libraries

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External links

- Official website (http://nodejs.org)
- GitHub Repository (https://github.com/joyent/node)
- Node.js real time mailing list discussions (http://qnalist.com/g/nodejs)

Wikimedia Commons has media related to ***Node.js***.

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Categories: JavaScript libraries | Free software programmed in JavaScript | Free software programmed in C++ | Joyent

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