

NODE

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JS

12/ 2025

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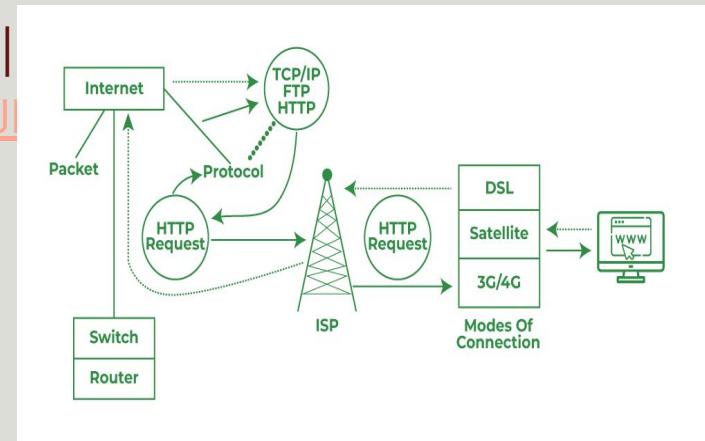
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How does the Internet Work?

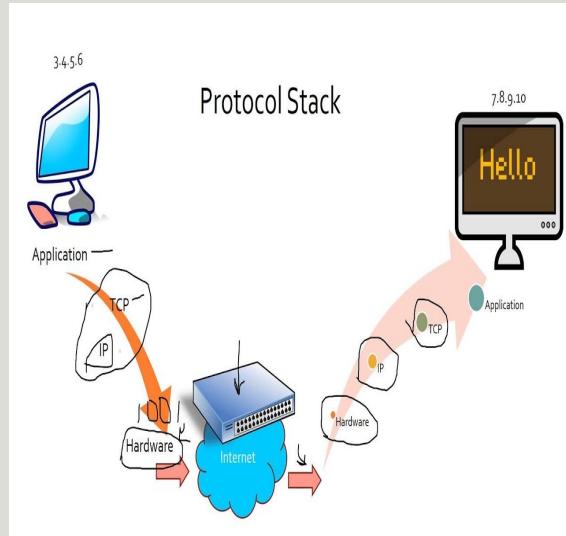
- The internet is a global network of interconnected computers that uses a standard set of communication protocols to exchange data.

<https://cs.fyi/guide/how-does-internet-work>

<https://www.youtube.com/watch?v=x3c1ih2NJI>

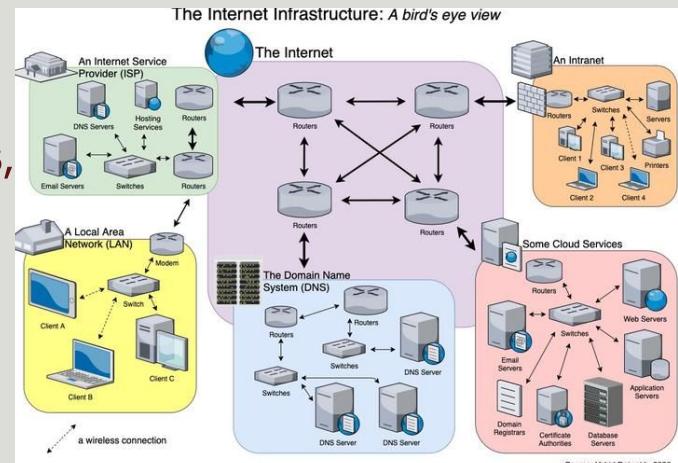


The basic concept of Intern:



Answer. To understand the internet, it's important to be familiar with some basic concepts and terminology. Here are some key terms and concepts to be aware of:

Packet , router,
ip address,
domain name, dns,
http, https, ssl, tsl



Source: Vahid Dejwakh, 2020

What is HTTP

Internet

The Hypertext Transfer Protocol (HTTP) is the foundation of the World Wide Web, and is used to load webpages using hypertext links. HTTP is an **application layer** protocol designed to transfer information between networked devices and runs on top of other layers of the network **protocol** stack. A typical flow over HTTP involves a client machine making a request to a server, which then sends a response message.

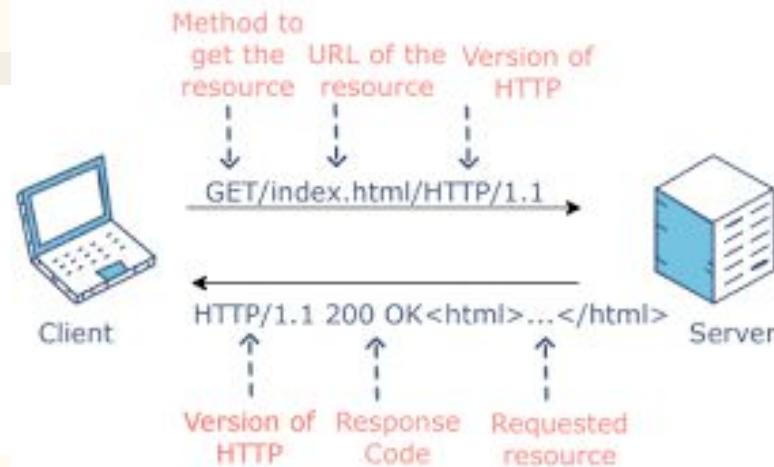
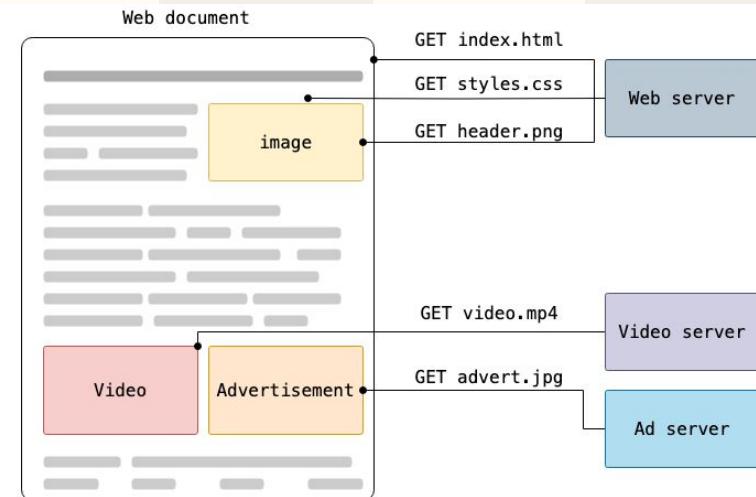
<https://developer.mozilla.org/en-US/docs/Web/HTTP/Guides/Overview>

▼ Request Headers

:authority: www.google.com
:method: GET
:path: /
:scheme: https
accept: text/html
accept-encoding: gzip, deflate, br
accept-language: en-US,en;q=0.9
upgrade-insecure-requests: 1
user-agent: Mozilla/5.0

▼ Response Headers

cache-control: private, max-age=0
content-encoding: br
content-type: text/html; charset=UTF-8
date: Thu, 21 Dec 2017 18:25:08 GMT
status: 200
strict-transport-security: max-age=86400
x-frame-options: SAMEORIGIN

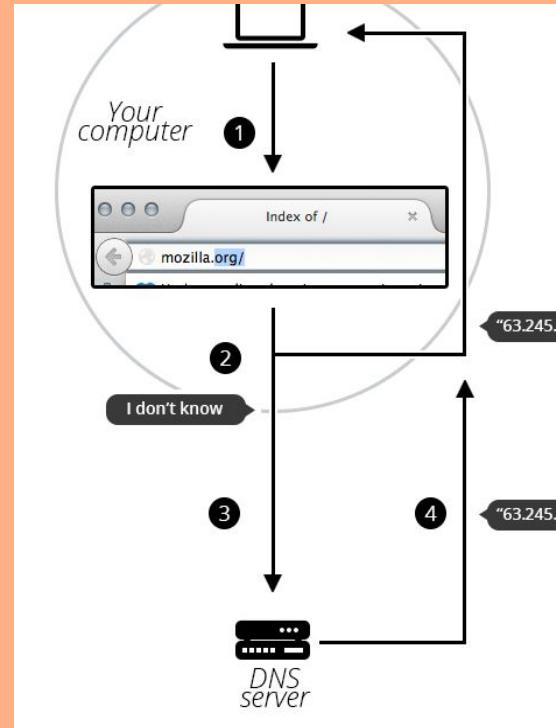


What is a Domain Name?

Structure of domain names

TLDs tell users the general purpose of the service behind the domain name. The most generic TLDs ([.com](#), [.org](#), [.net](#)) don't require web services to meet any particular criteria, but some TLDs enforce stricter policies so it is clearer what their purpose is. For example:

- Local TLDs such as [.us](#), [.fr](#), [.or](#), [.se](#) can require the service to be provided in a given language or hosted in a certain country — they are supposed to indicate a resource in a particular language or country.
- TLDs containing [.gov](#) are only allowed to be used by government departments.
- The [.edu](#) TLD is only for use by educational and academic institutions.



https://developer.mozilla.org/en-US/docs/Learn_Web_Development/Howto/Web_mechanics/What_is_a_domain_name#structure_of_domain_names

Node.js Foundation



+



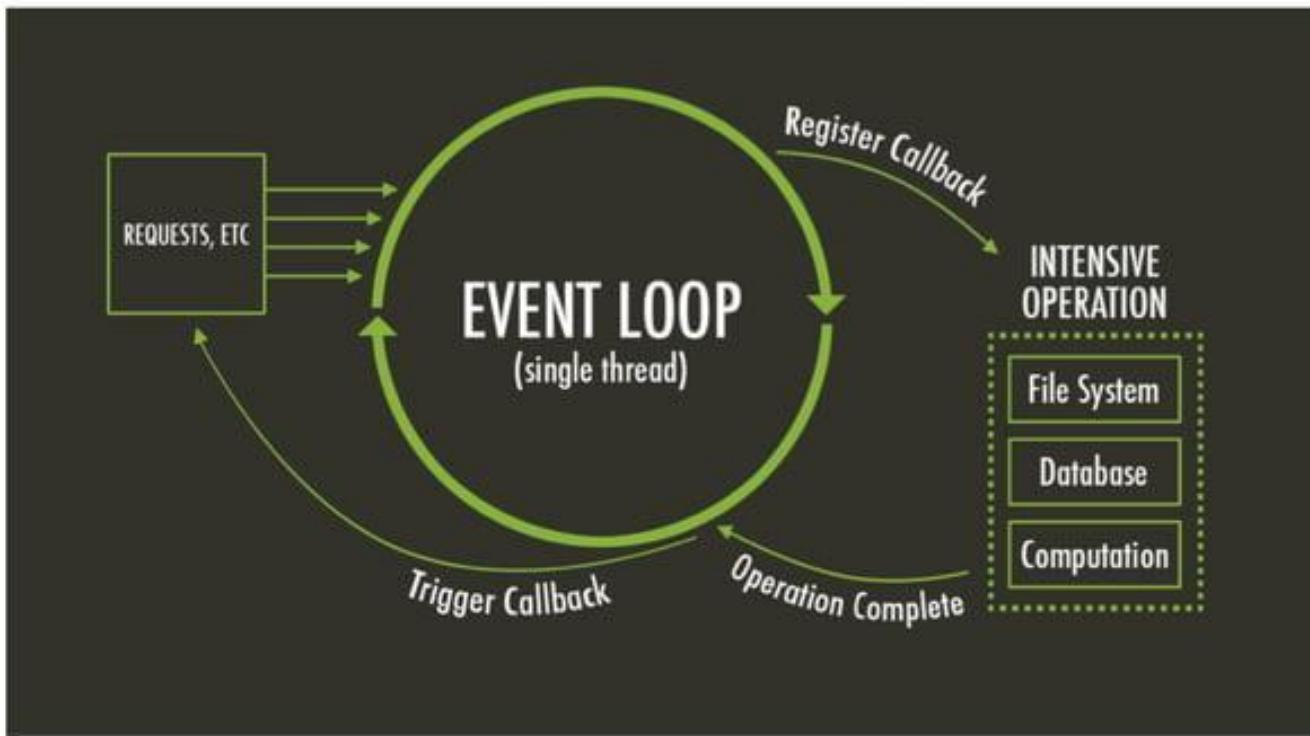
Fork of Node.js

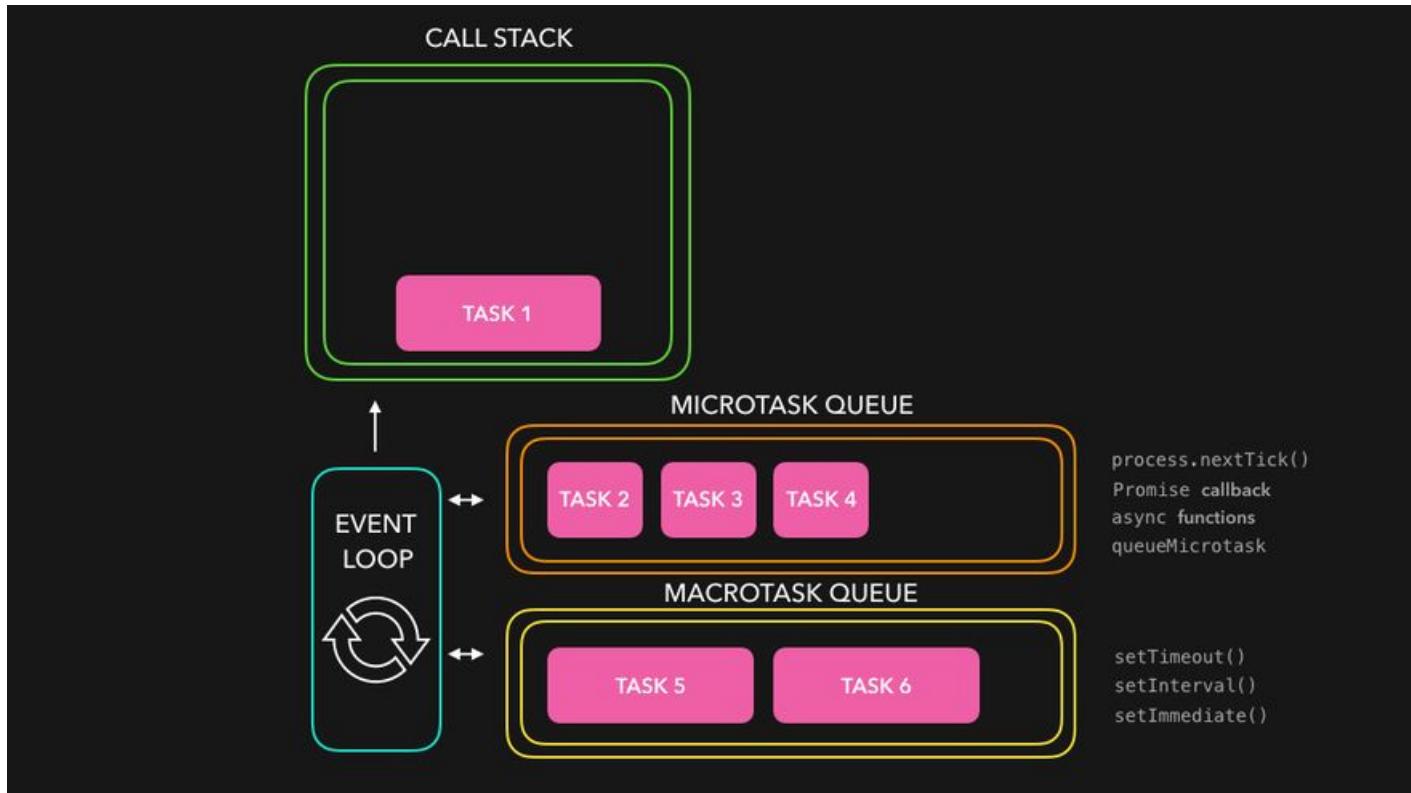


Microsoft



Node.js Event loop





Blocking I/O

```
1 var users = db.query("SELECT * FROM users")
2 console.log('All users:', users);
3
4 var posts = db.query("SELECT * FROM post")
5 console.log('All posts:', posts);|
6
```

Blocking I/O

```
1 var users = db.query("SELECT * FROM users")
2 console.log('All users:', users);           ← 10 Sec
3
4 var posts = db.query("SELECT * FROM post")
5 console.log('All posts:', posts);           ← 30 Sec
6
```

Blocking I/O

```
1 var posts = db.query("SELECT * FROM post")
2 console.log('All posts:', posts);
3
4 var users = db.query("SELECT * FROM users")
5 console.log('All users:', users);
6
```

The diagram illustrates two sequential blocking I/O operations. Operation 1, which queries the 'post' table, takes 30 seconds. Operation 2, which queries the 'users' table, takes 10 seconds. Both operations return to the same execution context, indicated by green arrows pointing back to the code line after each query.

$$\text{Sum} = 30 + 10$$

Non-Blocking I/O

```
1 var posts = db.query("SELECT * FROM post", function(posts) {  
2   console.log('All posts:', posts);  
3 })  
4  
5 var users = db.query("SELECT * FROM users", function(users) {  
6   console.log('All users:', users);  
7 })  
8
```

Non-Blocking I/O

```
1 var posts = db.query("SELECT * FROM post", function(posts) {  
2   console.log('All posts:', posts);  
3 })  
4  
5 var users = db.query("SELECT * FROM users", function(users)  
6   console.log('All users:', users);  
7 })  
8
```



min=10
max=30

Asynchronous programming techniques

The two model of Async Processing

- **Callback function** generally define logic for one-off responses. –
Ex: perform a database query
- **Event listeners**, are essentially callbacks that are associated with
a conceptual entity (an event). – Respond to repeating events – EX:
HTTP server emits a request event when an HTTP request is made

What is callback function?

- A **callback** is a function, passed as an argument to an **asynchronous** function
- It describes what to do **after** the **asynchronous** operation has completed



```
1 var fs = require('fs')
2
3 fs.readFile('./resource.json', function (error, data) {
4   console.log(data)
5 })
```

What is event-listeners?

```
1 //jQuery
2 $("#dataTable tbody tr").on("click", function() {
3     console.log( $( this ).text() );
4 });
5
6 $("div").on("mouseenter mouseleave", function() {
7     console.log("mouse hovered over or left a div");
8 });
9
```

What is event-listeners?

```
10 //Node.js
11
12 var req = http.request({hostname:'www.google.com'}, function(res) {
13   res.setEncoding('utf8');
14 });
15
16 req.on('response', function (response) {
17
18   var data = "";
19   |
20   response.on('data', function (chunk) {
21     console.log(chunk);
22     data += chunk;
23   });
24
25   response.on('end', function(){
26     callback(data);
27   })
28
29 });
```

Stream

```
1 var fs = require('fs');
2 var readableStream = fs.createReadStream('japan.avi');
3 var data = '';
4
5 readableStream.on('data', function(chunk) {
6     data+=chunk;
7     //compress file
8     //convert to other extension
9     //upload to backup server
10 });
11
12 readableStream.on('end', function() {
13     console.log(data);
14 });
```

When to use Node.js?

- Creating streaming based real-time services, web chat applications, static file servers etc.
- Applications that have a lot of **concurrent** connections and each request only needs **very few CPU cycles**

The Essence of Node

- JavaScript on the Server
- More than server-side JavaScript
- Fabulous framework
- Asynchronous programming
- Module-driven development

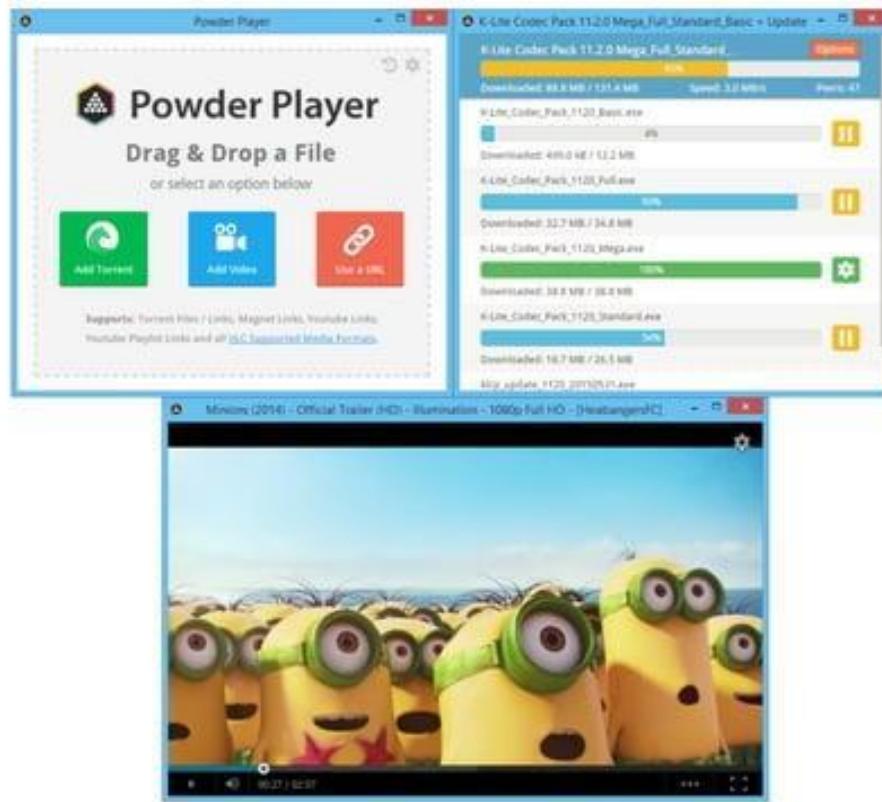
It's is JavaScript

- Easy to learn
- Lets you unify your client/server logic
- Productivity
- Already in the Enterprise (Paypal, Netflix, Walmart, IBM)

More than server-side JavaScript

- Web server
- Robot controller ([tessel.io](#))
- Command line application
- Proxy server
- Music machine
- Desktop application tooling: NW.js

Desktop Application (torrent)



Desktop Application (editor)

The screenshot shows a desktop application window titled "Boson Editor". It has two main panes. The left pane displays the content of the file "editor.html", which contains the HTML structure for a sidebar and an editor wrapper. The right pane displays the content of the file "boson.js", which contains the JavaScript code for the Boson.js core application, including modules, plugins, and configuration settings.

```
File Edit View Preferences Boson
```

```
editor.html | boson.js
```

```
<!DOCTYPE html>
<html lang="en">
<head id="head-entrypoint">
  <link rel="stylesheet" href="assets/boson/css/boson.css">
  <link rel="stylesheet" href="assets/codemirror/lib/codemirror.css">
  <link rel="stylesheet" href="assets/codemirror/addon/fold/foldgutter.css">
</head>
<body id="body-entrypoint">

<aside id="sidebar-entrypoint">
  <div id="module-project" class="module module-project">
    <ul id="project-root-list">
      <ul>
    </ul>
  </div>
</aside>
<section id="topbar-entrypoint">
  <ul id="tabs-entrypoint">
    <li>
      </li>
    </li>
  </ul>
</section>
<section id="editor-wrapper">
  <div id="editor-entrypoint" class="single">
    <div id="viewport-1">
    </div>
    <div id="viewport-2">
    </div>
    <div id="viewport-3">
    </div>
    <div id="viewport-4">
    </div>
  </div>
</section>
```

```
1  /* Boson.js core
2   * This handles all core app things.
3   */
4   var gui = require('nw.gui');
5   var fs = require('fs');
6   var path = require('path');
7   var args = window.gui.App.argv;
8   var child = require('child_process');
9
10  var modules = {};
11  var plugins = {};
12
13  (function(window, config) {
14
15    var elements = {},
16        editor = [],
17        tabs = [],
18        dom, editorData = [],
19        win, cancelEvents = {},
20        cm = {
21          themes: []
22        };
23
24    var boson = {
25      current_editor: null,
26      title: 'Boson Editor',
27      working_dir: process.env.PWD,
28      maxFileSize: 5242880,
29      version: '0.1.0',
30      sidebarActive: true,
31      currentViewport: 1,
32      currentSubview: [],
33      currentPaneMode: 'single',
34      app_dir: path.resolve(path.dirname()),
35      calHeme: false,
```

Desktop Application (music)

ATRAC

Search ...
Sort by Default

The interface is a music application with a sidebar on the left and a main content area on the right.

Left Sidebar:

- ATRAC
- My Tracks
- Featured Artist
- History
- Settings
- Donate
- New Playlist

Main Content Area:

Grid of music tracks:

Image	Title	Artist
	Good for You (Remix)	Tedrina Gomes
	Cheerleader (Felix...)	Chee
	Fight Song	Rachel Platten
	Can't Feel My Face	The Weeknd
	Bad Blood (Feat. K...)	Taylor Swift
	Honey, I'm Good.	Andy Grammer
	Watch Me (Whip /...)	Silento
	Lean On (Feat. M.D...)	Marcus Lemon
	Shut Up and Dance (WALK THE MOON)	WALK THE MOON
	See You Again (Fea...)	Wiz Khalifa
	Wreck It (Feat. Kid...)	Pharrell Williams
	Where Are U Now...	Jessie & Diplo
	Hey Mama (feat. ...)	Demi Lovato
	Girl Crush	Little Big Town
	Trap Queen,	Fetty Wap
	Kick the Dust Up	Luke Bryan
	You Know You Like It...	DJ Snake & Aliejah
	The Hills	The Weeknd
	Want to Want Me	jason Derulo
	Photograph	Ed Sheeran
	Take Your Time	Sam Hunt

Bottom navigation bar:

- Home
- Search
- Playlists
- Artists
- Albums
- Songs
- Discover
- Settings

Player controls:

- Play/Pause
- Previous
- Next
- Volume
- Progress Bar (0:00 - 4:15)
- Shuffle
- Repeat
- Add to Queue

Desktop Application (game)



Fabulous framework

- Express
- Restify (for building REST APIs, automatic DTrace support)
- Hapi (configuration-centric framework)
- Sails (fast production-ready)
- Meteor (realtime application)

Module-driven development

- Node Package Manager (NPM)
- 180,000++ packages
- 90,000,000++ downloads per day
- Simplicity
- Decoupled and reusable coding



```
module.exports = function archy (obj, prefix, opts) {
  if (prefix === undefined) prefix = '';
  if (!opts) opts = {};
  var chr = function (s) {
    var chars = {
      '0': '0000',
      '1': '0001',
      '2': '0010',
      '3': '0011',
      '4': '0100',
      '5': '0101',
      '6': '0110',
      '7': '0111',
      '8': '1000',
      '9': '1001',
      'A': '1010',
      'B': '1011',
      'C': '1100',
      'D': '1101',
      'E': '1110',
      'F': '1111'
    };
    return opts.unicode === false ? chars[s] : s;
  };
  if (typeof obj === 'string') obj = {label: obj};

  var nodes = obj.nodes || [];
  var lines = (obj.label || '').split('\n');
  var splitter = '\n' + prefix + (nodes.length ? chr('1') : '') + '';

  return prefix
    + lines.join(splitter) + '\n'
    + nodes.map(function (node, ix) {
      var last = ix === nodes.length - 1;
      var more = node.nodes && node.nodes.length;
      var prefix_ = prefix + (last ? '' : chr('1')) + '';
      return prefix_
        + (last ? chr('L') : chr('1')) + chr('1')
        + (more ? chr('Y') : chr('1')) + ''
        + archy(node, prefix_, opts).slice(prefix_.length + 2)
      ;
    }).join('');
};
```

```
└── asynd@0.9.0
├── basic-auth-connect@1.0.0
├── body-parser@1.0.0
|   └── qs@0.6.6
|       └── raw-body@1.1.7
|           ├── bytes@1.0.0
|           └── string_decoder@0.10.31
├── bundle-up3@1.1.1
|   └── async@0.1.22
├── autoprefixer-stylus@0.5.0
|   ├── autoprefixer-core@4.0.2
|   └── caniuse-db@1.0.30000092
|       └── postcss@3.0.7
|           ├── js-base64@2.1.7
|           └── source-map@0.1.43
|               └── amdefine@0.1.0
└── multi-stage-sourcemap@0.2.1
    ├── source-map@0.1.43
    |   └── amdefine@0.1.0
    └── clean-css@0.8.3
        └── optimist@0.3.7
            └── wordwrap@0.0.2
└── lodash@0.9.2
└── mkdirp@0.3.5
└── stylus@0.19.8
    ├── cssom@0.2.0
    └── growl@1.1.0
    └── mkdirp@0.0.7
    └── uglify-js@1.2.6
└── bunnycron@0.2.7 -> /Users/Saronyhot/Jitta/git/bunnycron@0.2.7
```

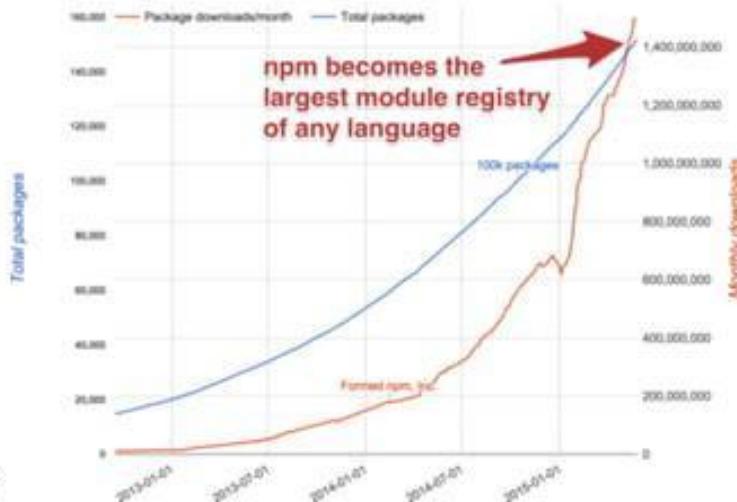
```
module.exports = function archy (obj, prefix, opts) {
  if (prefix === undefined) prefix = '';
  if (!opts) opts = {};
  var chr = function (s) {
    var chars = [
      '\u0000': '\u0000',
      '\u0001': '\u0001',
      '\u0002': '\u0002',
      '\u0003': '\u0003',
      '\u0004': '\u0004',
      '\u0005': '\u0005',
      '\u0006': '\u0006',
      '\u0007': '\u0007',
      '\u0008': '\u0008',
      '\u0009': '\u0009',
      '\u000a': '\u000a',
      '\u000b': '\u000b',
      '\u000c': '\u000c',
      '\u000d': '\u000d',
      '\u000e': '\u000e',
      '\u000f': '\u000f'
    ];
    return opts.unicode === false ? chars[s] : s;
  };
  if (typeof obj === 'string') obj = { label : obj };

  var nodes = obj.nodes || [];
  var lines = (obj.label || '').split('\n');
  var splitter = '\n' + prefix + (nodes.length ? chr('`') : '') + ' ';

  return prefix
    + lines.join(splitter) + '\n'
    + nodes.map(function (node, ix) {
      var last = ix === nodes.length - 1;
      var more = node.nodes && node.nodes.length;
      var prefix_ = prefix + (last ? '' : chr('`')) + ' ';
      return prefix_
        + (last ? chr('`') : chr('`')) + chr('`')
        + (more ? chr('`') : chr('`')) + ' '
        + archy(node, prefix_, opts).slice(prefix_.length + 2)
    })
    .join('');
};
```

The state of the registry

- 1400MM package downloads last month
- 150,000 packages in the registry
- 'Node' is moving faster than 'Node.js'



Module-driven development

- npm focused on module-driven development
- ES6 Modules
- Module-driven development for the browser
 - Browser tools: Browserify

Module-driven development for the browser

```
bower install moment --save  
npm install moment --save
```

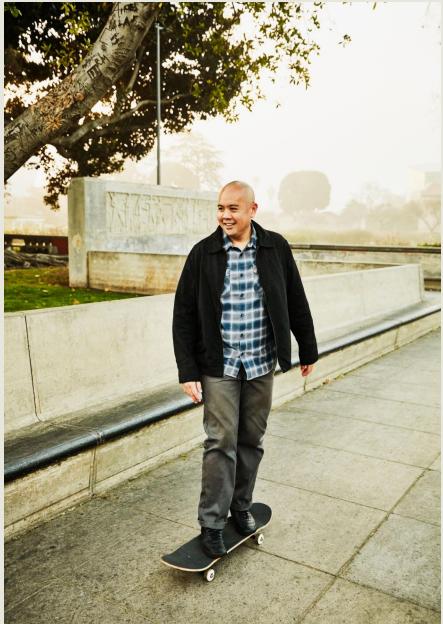
DEMO

Where can learn more?

- <http://nodeschool.io>
- <http://www.codewars.com>
- <https://www.codeschool.com/courses/real-time-web-with-node-js>
- <http://nodeup.com/>

HOW TO JOIN

THANK



YOU