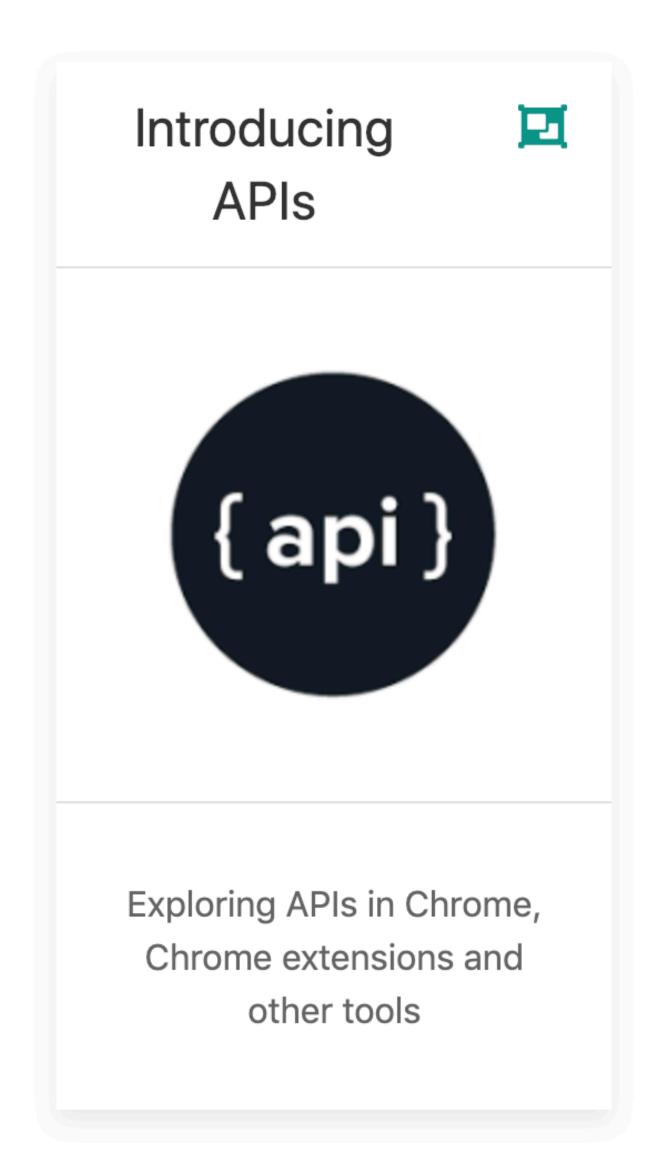
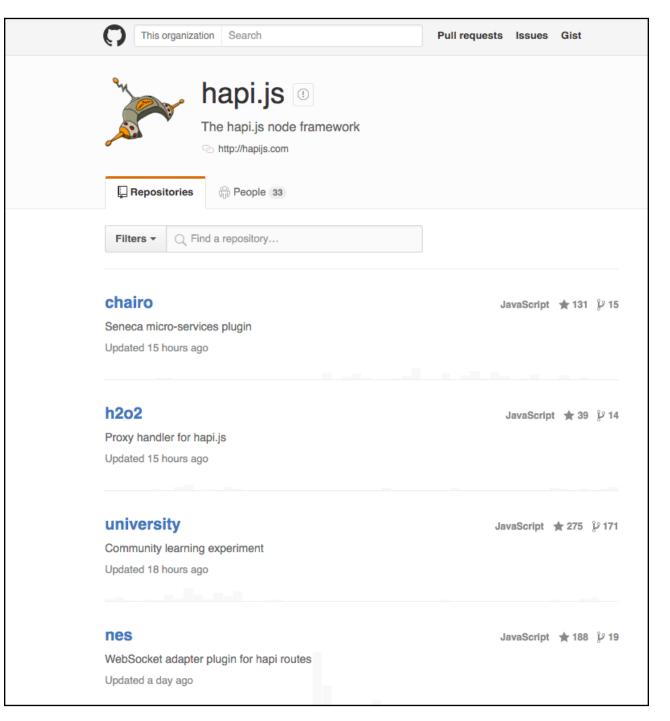
Introducing APIs

- Web vs APIs
- API data exchange Formats
- API Exploration Tools (Chrome, Curl)



Web vs API

- Web HTML Response
- API JSON Response
- Both use HTTP:
 - GET, PUT, POST, DELETE etc...
- Web
 - request formulated by browser
 - response rendered by browser
- API
 - request formulated by script,
 - response interpreted by script

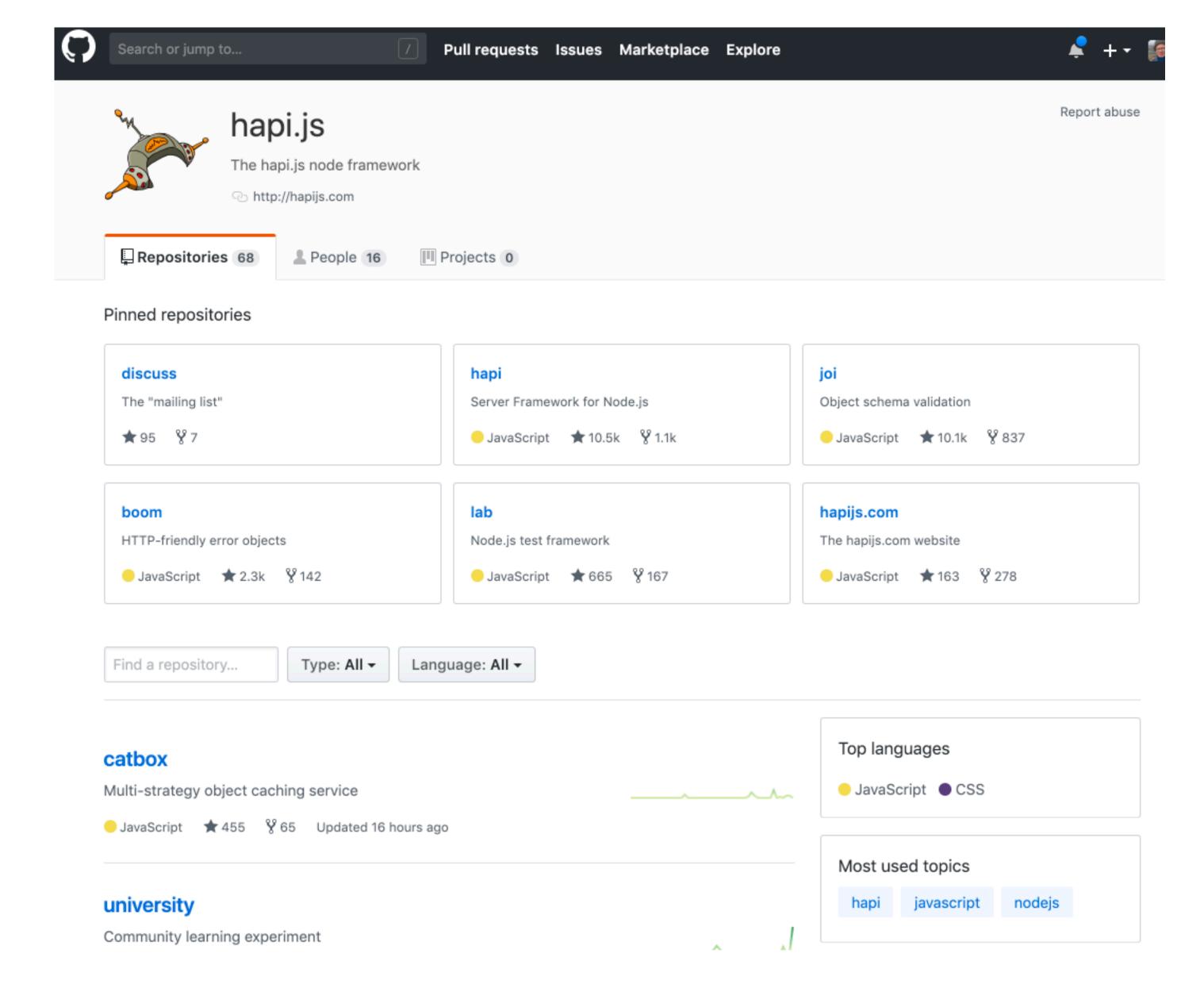


Web

```
"id": 24743682,
"name": "accept",
"full_name": "hapijs/accept",
 "login": "hapijs",
"id": 3774533,
  "avatar_url": "https://avatars.githubusercontent.com/u/3774533?v=3",
  "url": "https://api.github.com/users/hapijs",
  "html_url": "https://github.com/hapijs",
"followers_url": "https://api.github.com/users/hapijs/followers",
  "following_url": "https://api.github.com/users/hapijs/following{/other_user}",
  "gists_url": "https://api.github.com/users/hapijs/gists{/gist_id}",
"starred_url": "https://api.github.com/users/hapijs/starred{/owner}{/repo}"
  "subscriptions_url": "https://api.github.com/users/hapijs/subscriptions",
  "organizations_url": "https://api.github.com/users/hapijs/orgs",
  "repos_url": "https://api.github.com/users/hapijs/repos",
"events_url": "https://api.github.com/users/hapijs/events{/privacy}",
  "received_events_url": "https://api.github.com/users/hapijs/received_events",
  "type": "Organization",
  "site_admin": false
"private": false,
"html_url": "https://github.com/hapijs/accept",
"description": "HTTP Accept-* headers parsing",
"fork": false,
"url": "https://api.github.com/repos/hapijs/accept",
"forks_url": "https://api.github.com/repos/hapijs/accept/forks"
"keys_url": "https://api.github.com/repos/hapijs/accept/keys{/key_id}",
"collaborators_url": "https://api.github.com/repos/hapijs/accept/collaborators{/collaborator}",
"teams_url": "https://api.github.com/repos/hapijs/accept/teams"
"hooks_url": "https://api.github.com/repos/hapijs/accept/hooks"
"issue_events_url": "https://api.github.com/repos/hapijs/accept/issues/events{/number}",
"events url": "https://api.github.com/repos/hapijs/accept/events",
"assignees_url": "https://api.github.com/repos/hapijs/accept/assignees{/user}"
"branches_url": "https://api.github.com/repos/hapijs/accept/branches{/branch}",
"tags url": "https://api.github.com/repos/hapijs/accept/tags",
"blobs url": "https://api.github.com/repos/hapijs/accept/git/blobs{/sha}"
"git_tags_url": "https://api.github.com/repos/hapijs/accept/git/tags{/sha}"
git_refs_url": "https://api.github.com/repos/hapijs/accept/git/refs{/sha}",
statuses_url": "https://api.github.com/repos/hapijs/accept/statuses/{sha}";
 'languages_url": "https://api.github.com/repos/hapijs/accept/languages",
"stargazers_url": "https://api.github.com/repos/hapijs/accept/stargazers",
"contributors url": "https://api.github.com/repos/hapijs/accept/contributors",
"subscribers_url": "https://api.github.com/repos/hapijs/accept/subscribers",
"subscription_url": "https://api.github.com/repos/hapijs/accept/subscription"
"commits_url": "https://api.github.com/repos/hapijs/accept/commits{/sha}",
"git commits url": "https://api.github.com/repos/hapijs/accept/git/commits{/sha}"
 comments_url": "https://api.github.com/repos/hapijs/accept/comments{/number}",
"issue_comment_url": "https://api.github.com/repos/hapijs/accept/issues/comments{/number}",
"contents url": "https://api.github.com/repos/hapijs/accept/contents/{+path}"
"compare url": "https://api.github.com/repos/hapijs/accept/compare/{base}...{head}"
"merges_url": "https://api.github.com/repos/hapijs/accept/merges",
archive_url": "https://api.github.com/repos/hapijs/accept/{archive_format}{/ref}",
"downloads_url": "https://api.github.com/repos/hapijs/accept/downloads",
"issues_url": "https://api.github.com/repos/hapijs/accept/issues{/number}",
"pulls_url": "https://api.github.com/repos/hapijs/accept/pulls{/number}",
"milestones_url": "https://api.github.com/repos/hapijs/accept/milestones{/number}",
"notifications url": "https://api.github.com/repos/hapijs/accept/notifications{?since,all,participating}"
```

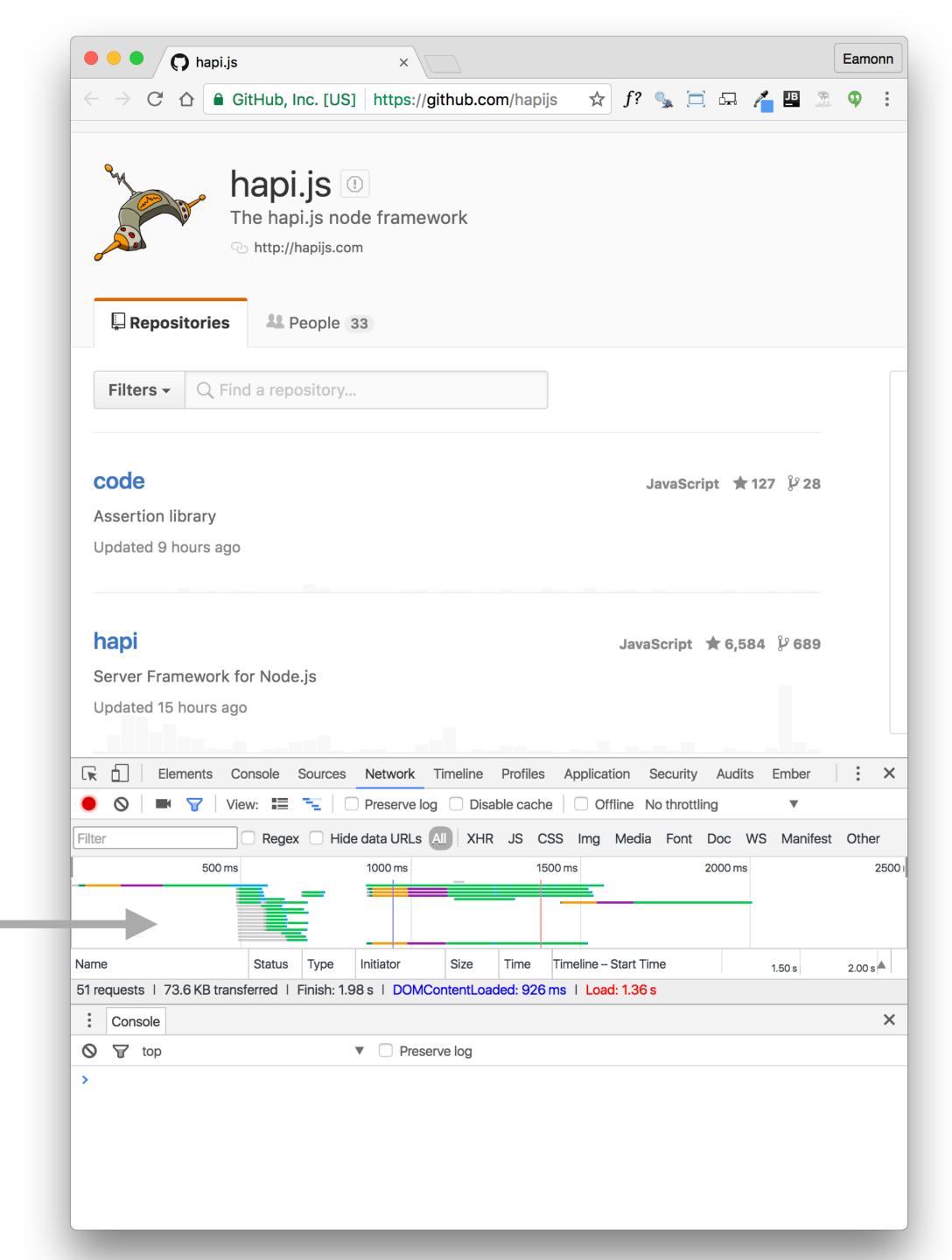


Web



https://github.com/hapijs

- Single page but note multiple http requests for various assets, images etc...
- What might be going on here?



API Data Interchanges Formats

- Comma Separated Values (CSV)
- Name/Value Pairs
- YAML
- XML
- JSON

http://en.wikipedia.org/wiki/Comma-separated_values

A comma-separated values (CSV)

(also sometimes called *character*separated values, because the separator character does not have to be a comma) file stores tabular data (numbers and text) in plain-text form. Plain text means that the file is a sequence of <u>characters</u>, with no data that has to be interpreted instead, as binary numbers. A CSV file consists of any number of records, separated by line breaks of some kind; each record consists of <u>fields</u>, separated by some other character or string, most commonly a literal comma or tab. Usually, all records have an identical sequence of fields.

```
"mocha", "costa", 2.0, 3.5, 0
"americano", "costa", 3.0, 4.5, 1
"cappucino", "starbucks", 4.0, 1.5, 0
```

coffees.csv

Name/Value Pairs

A name-value pair, key-value pair, field-value pair or attribute-value pair is a fundamental data representation in computing systems and applications. Designers often desire an open-ended data structure that allows for future extension without modifying existing code or data. In such situations, all or part of the data model may be expressed as a collection of <u>tuples</u> < attribute name, value>; each element is an attributevalue pair. Depending on the particular application and the implementation chosen by programmers, attribute names may or may not be unique.

http://en.wikipedia.org/wiki/Attribute-value_pair

```
db.url=jdbc:cloudbees://pacemaker
db.driver=com.mysql.jdbc.Driver
db.user=pacemaker
db.pass=pacemaker
jpa.ddl=create
```

application .conf

```
name="mocha"
shop="costa"
rating=3.5
price=2.0
favourite=0
id=1
```

coffees.conf

YAML

http://en.wikipedia.org/wiki/YAML

YAML (/ˈjæməl/, rhymes with camel) is a human-readable data serialization format that takes concepts from programming languages such as C, Perl, and Python, and ideas from XML and the data format of electronic mail (RFC 2822). YAML was first proposed by Clark Evans in 2001,[1] who designed it together with Ingy döt Net[2] and Oren Ben-Kiki.[2] It is available for several programming languages.

YAML is a recursive acronym for "YAML Ain't Markup Language". Early in its development, YAML was said to mean "Yet Another Markup Language",[3] but it was then reinterpreted (backronyming the original acronym) to distinguish its purpose as data-oriented, rather than document markup.

```
Coffee(c1):
              : mocha
    name
    shop
              : costa
              : 2.0
    price
   rating
              : 3.5
   favourite: 0
Coffee(c2):
              : americano
    name
    shop
              : costa
    price
              : 3.0
   rating
              : 4.5
   favourite: 1
Coffee(c3):
              : cappucino
    name
              : starbucks
    shop
              : 4.0
    price
   rating
              : 1.5
    favourite: 0
```

http://en.wikipedia.org/wiki/XML

Extensible Markup Language (XML) is a markup language that defines a set of rules for encoding documents in aformat that is both human-readable and machine-readable. It is defined in the XML 1.0

Specification[3] produced by the W3C, and several

other related specifications,[4] all free open

example in web services.

Standards.[5]
The design goals of XML emphasize simplicity, generality, and usability over the Internet.[6] It is a textual data format with strong support via Unicode for the languages of the world. Although the design of XML focuses on documents, it is widely used for the representation of arbitrary data structures, for

Many <u>application programming interfaces</u> (APIs) have been developed to aid software developers with processing XML data, and several <u>schema systems</u> exist to aid in the definition of XML-based languages.

```
<?xml version="1.0"</pre>
encoding="UTF-8"?>
<coffee objname="c1">
    <name> mocha </name>
    <shop> costa </shop>
    <price> 2.0 </price>
    <rating> 3.5</rating>
    <favourite> 0 </favourite>
</coffee>
<coffee objname="c1">
    <name> americano </name>
    <shop> costa </shop>
    <price> 3.0 </price>
    <rating> 4.5 </rating>
    <favourite> 1 </favourite>
</coffee>
<coffee objname="c1">
    <name> cappucino </name>
    <shop> starbucks </shop>
    <price> 4.0 </price>
    <rating> 1.5 </rating>
    <favourite> 0 </favourite>
</coffee>
```

http://en.wikipedia.org/wiki/JSON

JSON

JSON (/ˈdʒeɪsɒn/ jay-sawn, /ˈdʒeɪsən/ jay-sun), or JavaScript Object Notation, is a text-based open standard designed for human-readable data interchange. Derived from the JavaScript scripting language, JSON is a language for representing simple data structures and associative arrays, called objects. Despite its relationship to JavaScript, JSON is language-independent, with parsers available for many languages.

The JSON format was originally specified by <u>Douglas Crockford</u>, and is described in <u>RFC</u> <u>4627</u>. The official <u>Internet media type</u> for JSON is application/json. The JSON filename extension is .json.

The JSON format is often used for <u>serializing</u> and transmitting structured data over a network connection. It is used primarily to transmit data between a server and web application, serving as an alternative to <u>XML</u>.

```
"name": "mocha",
"shop":"costa",
"rating": 3.5,
"price":2.0,
"favourite":0,
"id":1
"name": "americano",
"shop":"costa",
"rating":4.5,
"price":3.0,
"favourite":1,
"id":2
"name": "cappuccino lite",
"shop": "starbucks",
"rating":1.5,
"price":4.0,
"favourite":1,
"id":3
```

Exploring APIs

```
"id": 24743682,
"name": "accept",
"full_name": "hapijs/accept",
"owner": {
 "login": "hapijs",
  "id": 3774533,
  "avatar url": "https://avatars.githubusercontent.com/u/3774533?v=3",
  "gravatar id": "",
  "url": "https://api.github.com/users/hapijs",
  "html url": "https://github.com/hapijs",
  "followers_url": "https://api.github.com/users/hapijs/followers",
  "following_url": "https://api.github.com/users/hapijs/following{/other_user}",
  "gists_url": "https://api.github.com/users/hapijs/gists{/gist_id}",
  "starred_url": "https://api.github.com/users/hapijs/starred{/owner}{/repo}",
  "subscriptions_url": "https://api.github.com/users/hapijs/subscriptions",
  "organizations_url": "https://api.github.com/users/hapijs/orgs",
  "repos_url": "https://api.github.com/users/hapijs/repos",
  "events url": "https://api.github.com/users/hapijs/events{/privacy}",
  "received events url": "https://api.github.com/users/hapijs/received events",
  "type": "Organization",
  "site admin": false
"private": false,
"html url": "https://github.com/hapijs/accept",
"description": "HTTP Accept-* headers parsing",
"fork": false,
"url": "https://api.github.com/repos/hapijs/accept",
"forks url": "https://api.github.com/repos/hapijs/accept/forks",
"keys url": "https://api.github.com/repos/hapijs/accept/keys{/key id}",
"collaborators url": "https://api.github.com/repos/hapijs/accept/collaborators{/collaborator}",
"teams_url": "https://api.github.com/repos/hapijs/accept/teams",
"hooks_url": "https://api.github.com/repos/hapijs/accept/hooks",
"issue events url": "https://api.github.com/repos/hapijs/accept/issues/events{/number}",
"events url": "https://api.github.com/repos/hapijs/accept/events",
"assignees_url": "https://api.github.com/repos/hapijs/accept/assignees{/user}",
"branches url": "https://api.github.com/repos/hapijs/accept/branches{/branch}",
"tags url": "https://api.github.com/repos/hapijs/accept/tags",
"blobs url": "https://api.github.com/repos/hapijs/accept/git/blobs{/sha}",
"git tags url": "https://api.github.com/repos/hapijs/accept/git/tags{/sha}",
"git refs url": "https://api.github.com/repos/hapijs/accept/git/refs{/sha}",
"trees_url": "https://api.github.com/repos/hapijs/accept/git/trees{/sha}",
"statuses_url": "https://api.github.com/repos/hapijs/accept/statuses/{sha}",
"languages_url": "https://api.github.com/repos/hapijs/accept/languages",
"stargazers_url": "https://api.github.com/repos/hapijs/accept/stargazers",
"contributors_url": "https://api.github.com/repos/hapijs/accept/contributors",
"subscribers_url": "https://api.github.com/repos/hapijs/accept/subscribers",
"subscription_url": "https://api.github.com/repos/hapijs/accept/subscription",
"commits_url": "https://api.github.com/repos/hapijs/accept/commits{/sha}",
"git commits url": "https://api.github.com/repos/hapijs/accept/git/commits{/sha}",
"comments url": "https://api.github.com/repos/hapijs/accept/comments{/number}",
"issue_comment_url": "https://api.github.com/repos/hapijs/accept/issues/comments{/number}",
"contents url": "https://api.github.com/repos/hapijs/accept/contents/{+path}",
"compare_url": "https://api.github.com/repos/hapijs/accept/compare/{base}...{head}",
"merges_url": "https://api.github.com/repos/hapijs/accept/merges",
"archive_url": "https://api.github.com/repos/hapijs/accept/{archive_format}{/ref}",
"downloads_url": "https://api.github.com/repos/hapijs/accept/downloads",
"issues_url": "https://api.github.com/repos/hapijs/accept/issues{/number}"
"pulls_url": "https://api.github.com/repos/hapijs/accept/pulls{/number}",
"milestones_url": "https://api.github.com/repos/hapijs/accept/milestones{/number}",
"notifications_url": "https://api.github.com/repos/hapijs/accept/notifications{?since,all,participating}",
```

https://api.github.com/users/hapijs/repos

Curl: https://curl.haxx.se/



command line tool and library for transferring data with URLs

Supports...

DICT, FILE, FTP, FTPS, Gopher, HTTP, HTTPS, IMAP, IMAPS, LDAP, LDAPS, POP3, POP3S, RTMP, RTSP, SCP, SFTP, SMB, SMTP, SMTPS, Telnet and TFTP. curl supports SSL certificates, HTTP POST, HTTP PUT, FTP uploading, HTTP form based upload, proxies, HTTP/2, cookies, user+password authentication (Basic, Plain, Digest, CRAM-MD5, NTLM, Negotiate and Kerberos), file transfer resume, proxy tunneling and more.

What's curl used for?

curl is used in command lines or scripts to transfer data. It is also used in cars, television sets, routers, printers, audio equipment, mobile phones, tablets, settop boxes, media players and is the internet transfer backbone for thousands of software applications affecting *billions of humans* daily.

Who makes curl?

curl is free and open source software and exists thanks to thousands of contributors. The curl project follows well established open source best practises.

What's the latest curl?

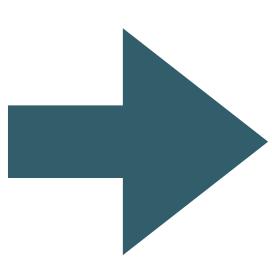
The most recent stable version is **7.50.2**, released on 7th of September 2016. Currently, 87 of the listed downloads are of the latest version.

Where's the code?

Check out the latest source code from github.

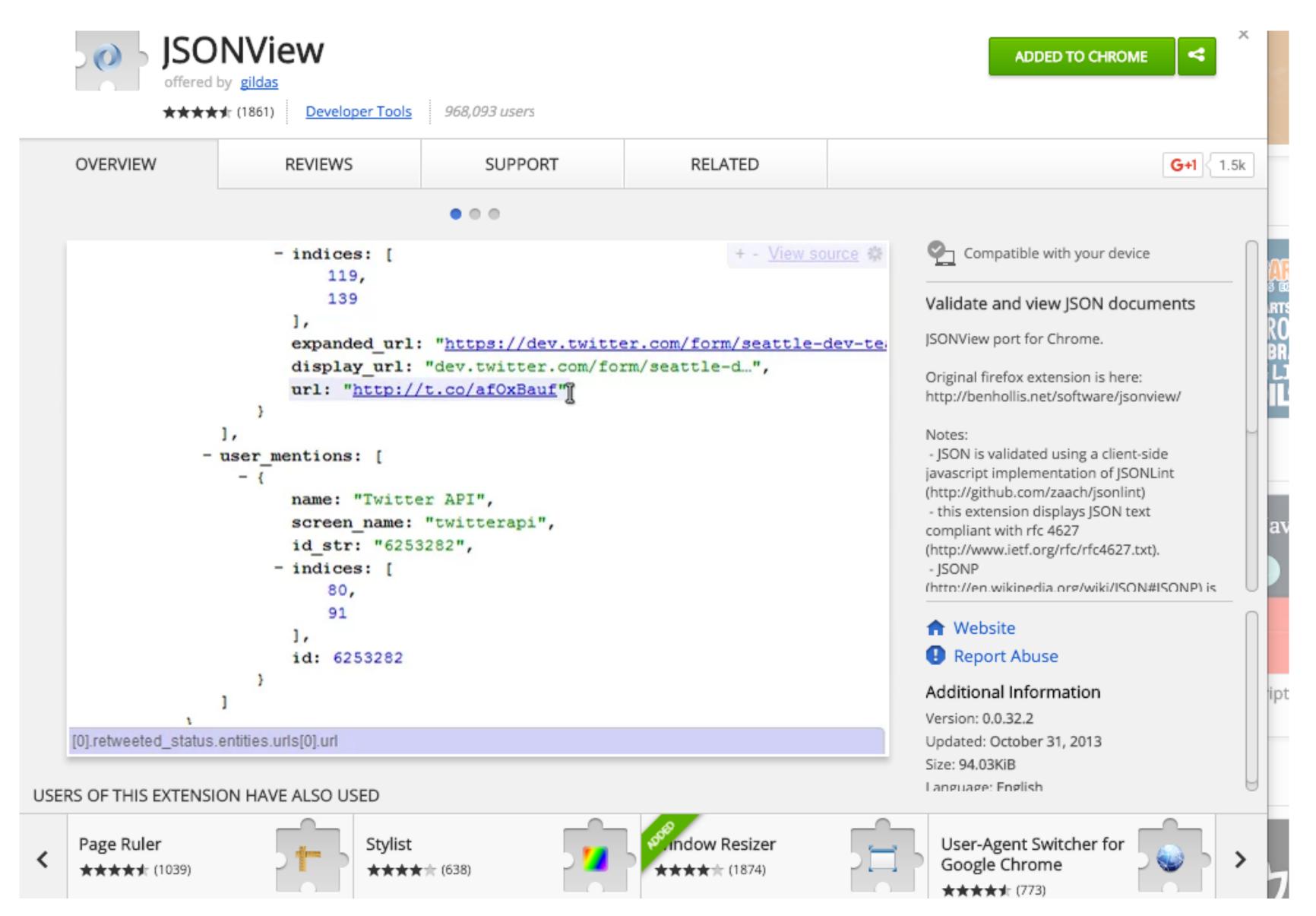
\$ curl https://api.github.com/users/hapijs/repos

\$ curl https://api.github.com/users/hapijs/repos



```
1. bash
"fork": false,
"url": "https://api.github.com/repos/hapijs/cryptiles",
"forks_url": "https://api.github.com/repos/hapijs/cryptiles/forks",
"keys_url": "https://api.github.com/repos/hapijs/cryptiles/keys{/key_id}",
"collaborators_url": "https://api.github.com/repos/hapijs/cryptiles/collaborators{/collaborator}",
"teams_url": "https://api.github.com/repos/hapijs/cryptiles/teams",
"hooks_url": "https://api.github.com/repos/hapijs/cryptiles/hooks",
"issue_events_url": "https://api.github.com/repos/hapijs/cryptiles/issues/events{/number}",
"events_url": "https://api.github.com/repos/hapijs/cryptiles/events",
"assignees_url": "https://api.github.com/repos/hapijs/cryptiles/assignees{/user}",
"branches_url": "https://api.github.com/repos/hapijs/cryptiles/branches{/branch}",
"tags_url": "https://api.github.com/repos/hapijs/cryptiles/tags",
"blobs_url": "https://api.github.com/repos/hapijs/cryptiles/git/blobs{/sha}",
"git_tags_url": "https://api.github.com/repos/hapijs/cryptiles/git/tags{/sha}",
"git_refs_url": "https://api.github.com/repos/hapijs/cryptiles/git/refs{/sha}",
"trees_url": "https://api.github.com/repos/hapijs/cryptiles/git/trees{/sha}",
"statuses_url": "https://api.github.com/repos/hapijs/cryptiles/statuses/{sha}",
"languages_url": "https://api.github.com/repos/hapijs/cryptiles/languages",
"stargazers_url": "https://api.github.com/repos/hapijs/cryptiles/stargazers",
"contributors_url": "https://api.github.com/repos/hapijs/cryptiles/contributors",
"subscribers_url": "https://api.github.com/repos/hapijs/cryptiles/subscribers",
"subscription_url": "https://api.github.com/repos/hapijs/cryptiles/subscription",
"commits_url": "https://api.github.com/repos/hapijs/cryptiles/commits{/sha}",
"git_commits_url": "https://api.github.com/repos/hapijs/cryptiles/git/commits{/sha}",
"comments_url": "https://api.github.com/repos/hapijs/cryptiles/comments{/number}",
"issue_comment_url": "https://api.github.com/repos/hapijs/cryptiles/issues/comments{/number}",
"contents_url": "https://api.github.com/repos/hapijs/cryptiles/contents/{+path}",
"compare_url": "https://api.github.com/repos/hapijs/cryptiles/compare/{base}...{head}",
"merges_url": "https://api.github.com/repos/hapijs/cryptiles/merges",
"archive_url": "https://api.github.com/repos/hapijs/cryptiles/{archive_format}{/ref}",
"downloads_url": "https://api.github.com/repos/hapijs/cryptiles/downloads",
"issues_url": "https://api.github.com/repos/hapijs/cryptiles/issues{/number}",
"pulls_url": "https://api.github.com/repos/hapijs/cryptiles/pulls{/number}",
"milestones_url": "https://api.github.com/repos/hapijs/cryptiles/milestones{/number}",
"notifications_url": "https://api.github.com/repos/hapijs/cryptiles/notifications{?since,all,participating}",
"labels_url": "https://api.github.com/repos/hapijs/cryptiles/labels{/name}",
"releases_url": "https://api.github.com/repos/hapijs/cryptiles/releases{/id}",
"deployments_url": "https://api.github.com/repos/hapijs/cryptiles/deployments",
"created_at": "2013-01-13T07:36:52Z",
"updated_at": "2019-01-11T11:30:29Z",
"pushed_at": "2018-12-15T00:55:54Z",
"git_url": "git://github.com/hapijs/cryptiles.git",
"ssh_url": "git@github.com:hapijs/cryptiles.git",
"clone_url": "https://github.com/hapijs/cryptiles.git",
"svn_url": "https://github.com/hapijs/cryptiles",
"homepage": null,
"size": 40,
"stargazers_count": 164,
 'watchers_count": 164,
"language": "JavaScript",
"has_issues": true,
"has_projects": true,
"has_downloads": true,
"has_wiki": true,
"has_pages": false,
"forks_count": 17,
"mirror_url": null,
```

Rendering JSON in Chrome



API Endpoints in a Browser

- Foldable sections
- Links for further api 'Endpoint' exploration

```
+ {...},
     id: 20395079,
     name: "bell",
     full_name: "hapijs/bell",
     owner: {...},
     private: false,
     html_url: "https://github.com/hapijs/bell",
     description: "Third-party login plugin for hapi",
     fork: false,
     url: "https://api.github.com/repos/hapijs/bell",
     forks_url: "https://api.github.com/repos/hapijs/bell/forks",
     keys_url: "https://api.github.com/repos/hapijs/bell/keys{/key_id}",
     collaborators_url: "https://api.github.com/repos/hapijs/bell/collaborators{/collaborator
     teams_url: "https://api.github.com/repos/hapijs/bell/teams",
     hooks_url: "https://api.github.com/repos/hapijs/bell/hooks",
     issue_events_url: "https://api.github.com/repos/hapijs/bell/issues/events{/number}",
     events_url: "https://api.github.com/repos/hapijs/bell/events",
     assignees_url: "https://api.github.com/repos/hapijs/bell/assignees{/user}",
     branches_url: "https://api.github.com/repos/hapijs/bell/branches{/branch}",
     tags_url: "https://api.github.com/repos/hapijs/bell/tags",
     blobs_url: "https://api.github.com/repos/hapijs/bell/git/blobs{/sha}",
     git_tags_url: "https://api.qithub.com/repos/hapijs/bell/qit/tags{/sha}",
     git_refs_url: "https://api.github.com/repos/hapijs/bell/git/refs{/sha}",
     trees_url: "https://api.github.com/repos/hapijs/bell/git/trees{/sha}",
     statuses_url: "https://api.github.com/repos/hapijs/bell/statuses/{sha}",
     languages_url: "https://api.github.com/repos/hapijs/bell/languages",
     stargazers_url: "https://api.qithub.com/repos/hapijs/bell/stargazers",
     contributors url: "https://api.github.com/repos/hapijs/bell/contributors",
     subscribers url: "https://api.github.com/repos/hapijs/bell/subscribers"
     subscription_url: "https://api.github.com/repos/hapijs/bell/subscription",
     commits_url: "https://api.qithub.com/repos/hapijs/bell/commits{/sha}",
```