An Introduction to

{ json:api }

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RESTful APIs using JSON

This does not tell us about how to design our APIs.

Problem #1

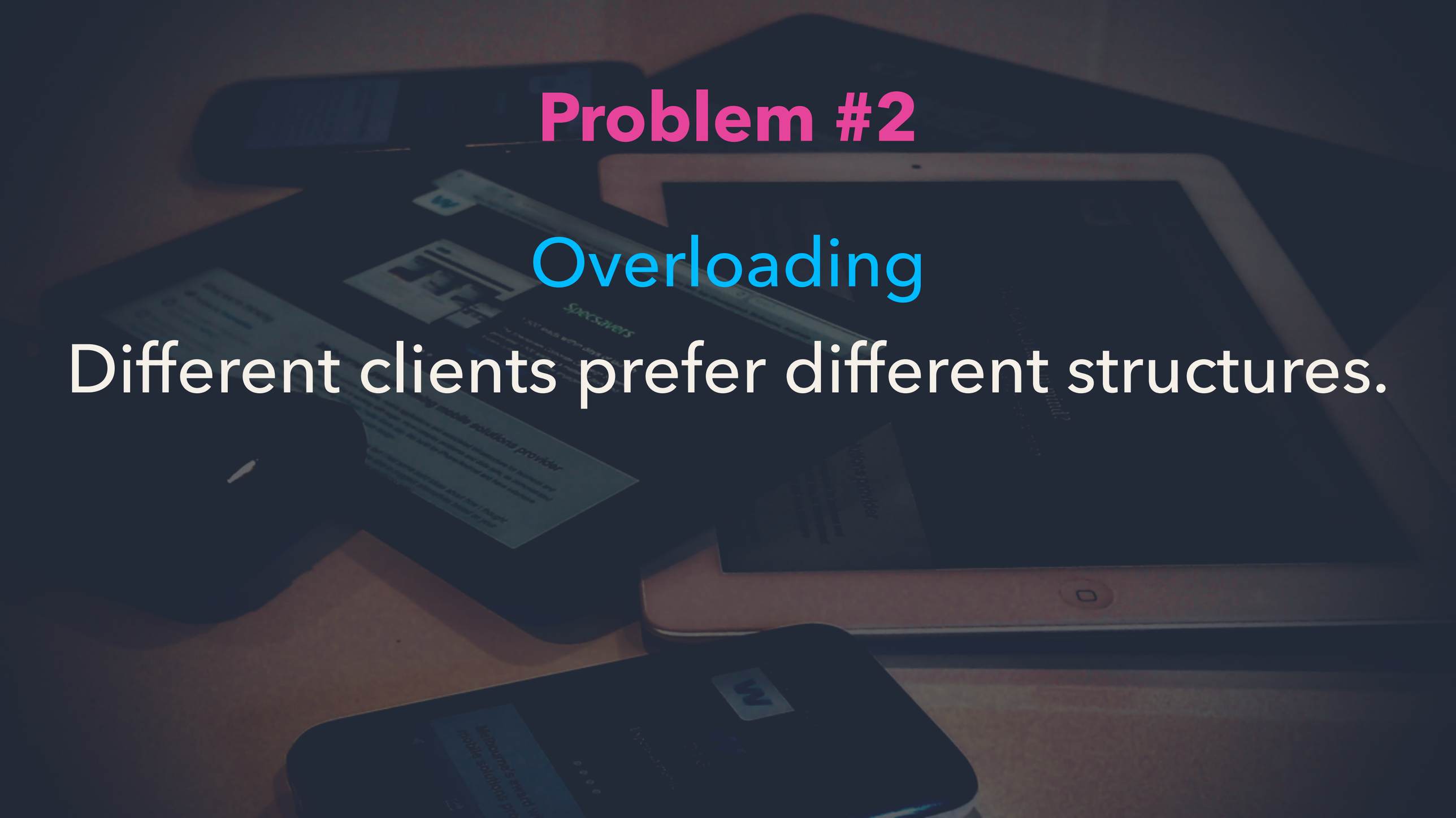
Bikeshedding

Problem #1

Bikeshedding

Futile investment of time and energy in discussion of marginal technical issues.

– Wiktionary



Problem #2

Overloading

Different clients prefer different structures.

Solution

{ json:api }

A Specification for Building APIs in JSON

{ json:api }

{ json:api }

How a client should request for resources to be fetched or modified.

{ json:api }

How a client should request for resources to be fetched or modified.

How a server should respond to those requests.

{ json:api }

2013-05-03 Yehuda Katz released initial the draft

2013-07-21 registration of the media type:
application/vnd.api+json

2015-05-29 `v1.0stable` released

Today `v1.1` still in draft

A Simple Resource Object

A Simple Resource Object

```
User(id: integer, name: string)
```

Fetching a User

```
GET /users/1 HTTP/1.1
Accept: application/vnd.api+json
```

Fetching a User

```
GET /users/1 HTTP/1.1
Accept: application/vnd.api+json

HTTP/1.1 200 OK
Content-Type: application/vnd.api+json,
```

Fetching a User

```
GET /users/1 HTTP/1.1
Accept: application/vnd.api+json

HTTP/1.1 200 OK
Content-Type: application/vnd.api+json,

{
  "data": {
    "id": "1",
    "type": "users",
    "attributes": { "name": "Steve Klabnik" }
  }
}
```

```
{
  "data": {
    "id": "1",
    "type": "users",
    "attributes": { "name": "Steve Klabnik" }
  }
}
```

```
{
  "data": {
    "id": "1",
    "type": "users",
    "attributes": { "name": "Steve Klabnik" }
  }
}
```

```
{
  "data": {
    "id": "1",
    "type": "users",
    "attributes": { "name": "Steve Klabnik" }
  }
}
```

```
{
  "data": {
    "id": "1",
    "type": "users",
    "attributes": { "name": "Steve Klabnik" }
  }
}
```

Creating a User

Creating a User

```
POST /users HTTP/1.1
Accept: application/vnd.api+json
Content-Type: application/vnd.api+json
```

Creating a User

```
POST /users HTTP/1.1
Accept: application/vnd.api+json
Content-Type: application/vnd.api+json,

{
  "data": {
    "type": "users",
    "attributes": { "name": "Yehuda Katz" }
  }
}
```

Creating a User

```
POST /users HTTP/1.1
Accept: application/vnd.api+json
Content-Type: application/vnd.api+json,

{
  "data": {
    "type": "users",
    "attributes": { "name": "Yehuda Katz" }
  }
}
```

Creating a User

```
POST /users HTTP/1.1
Accept: application/vnd.api+json
Content-Type: application/vnd.api+json,

{
  "data": {
    "type": "users",
    "attributes": { "name": "Yehuda Katz" }
  }
}
```

Creating a User

```
POST /users HTTP/1.1
Accept: application/vnd.api+json
Content-Type: application/vnd.api+json,

{
  "data": {
    "type": "users",
    "attributes": { "name": "Yehuda Katz" }
  }
}
```

Creating a User

```
HTTP/1.1 201 Created
Location: http://example.com/users/2
Content-Type: application/vnd.api+json,
```

Creating a User

```
HTTP/1.1 201 Created
Location: http://example.com/users/2
Content-Type: application/vnd.api+json,

{
  "data": {
    "id": "1",
    "type": "users",
    "attributes": { "name": "Yehuda Katz" }
  }
}
```

Updating a User

```
PATCH /users/2
```

Updating a User

```
PATCH /users/2,

{
  "data": {
    "id": "2",
    "type": "users",
    "attributes": { "name": "Dan Gebhardt" }
  }
}
```

Fetching a List of Users

```
GET /users
```

GET /users


```
{
  "data": [
    {
      "id": "1",
      "type": "users",
      "attributes": { "name": "Steve Klabnik" }
    },
    {
      "id": "2",
      "type": "users",
      "attributes": { "name": "Dan Gebhardt" }
    }
  ]
}
```

GET /users


```
{
  "data": [
    {
      "id": "1",
      "type": "users",
      "attributes": { "name": "Steve Klabnik" }
    },
    {
      "id": "2",
      "type": "users",
      "attributes": { "name": "Dan Gebhardt" }
    }
  ]
}
```

GET /users


```
{
  "data": [
    {
      "id": "1",
      "type": "users",
      "attributes": { "name": "Steve Klabnik" }
    },
    {
      "id": "2",
      "type": "users",
      "attributes": { "name": "Dan Gebhardt" }
    }
  ]
}
```

GET /users


```
{
  "data": [
    {
      "id": "1",
      "type": "users",
      "attributes": { "name": "Steve Klabnik" }
    },
    {
      "id": "2",
      "type": "users",
      "attributes": { "name": "Dan Gebhardt" }
    }
  ]
}
```

Deleting a User

```
DELETE /users/1
```

Relationships

Relationships

```
User(id: integer, name: string)
```

Relationships

```
User(id: integer, name: string)

Article(
  id: integer,
  title: string,
  content: text,
  user_id: integer
)
```

Fetching a User

```
GET /users/1
```

GET /users/1


```
{
  "data": {
    "id": "1",
    "type": "users",
    "attributes": { "name": "Steve Klabnik" },
    "relationships": {
      "articles": {
        "data": [
          { "id": "2", "type": "articles" },
          { "id": "5", "type": "articles" }
        ]
      }
    }
  }
}
```

GET /users/1


```
{
  "data": {
    "id": "1",
    "type": "users",
    "attributes": { "name": "Steve Klabnik" },
    "relationships": {
      "articles": {
        "data": [
          { "id": "2", "type": "articles" },
          { "id": "5", "type": "articles" }
        ]
      }
    }
  }
}
```

GET /users/1


```
{
  "data": {
    "id": "1",
    "type": "users",
    "attributes": { "name": "Steve Klabnik" },
    "relationships": {
      "articles": {
        "data": [
          { "id": "2", "type": "articles" },
          { "id": "5", "type": "articles" }
        ]
      }
    }
  }
}
```

GET /users/1

```
{
  "data": {
    "id": "1",
    "type": "users",
    "attributes": { "name": "Steve Klabnik" },
    "relationships": {
      "articles": {
        "data": [
          { "id": "2", "type": "articles" },
          { "id": "5", "type": "articles" }
        ]
      }
    }
  }
}
```

GET /users/1


```
{
  "data": {
    "id": "1",
    "type": "users",
    "attributes": { "name": "Steve Klabnik" },
    "relationships": {
      "articles": {
        "data": [
          { "id": "2", "type": "articles" },
          { "id": "5", "type": "articles" }
        ]
      }
    }
  }
}
```

GET /users/1


```
{
  "data": {
    "id": "1",
    "type": "users",
    "attributes": { "name": "Steve Klabnik" },
    "relationships": {
      "articles": {
        "data": [
          { "id": "2", "type": "articles" },
          { "id": "5", "type": "articles" }
        ]
      }
    }
  }
}
```

GET /users/1


```
{
  "data": {
    "id": "1",
    "type": "users",
    "attributes": { "name": "Steve Klabnik" },
    "relationships": {
      "articles": {
        "data": [
          { "id": "2", "type": "articles" },
          { "id": "5", "type": "articles" }
        ]
      }
    }
  }
}
```

Compound Documents

Compound Documents

n+1 requests

GET /users/1

GET /articles/2

GET /articles/5

...

Compound Documents

n+1 requests

GET /users/1

GET /articles/2

GET /articles/5

...

1 request

Compound Documents

n+1 requests

GET /users/1

GET /articles/2

GET /articles/5

...

1 request

GET /users/1?include=articles

GET /users/1?include=articles


```
{
  "data": {
    "id": "1",
    "type": "users",
    "attributes": { "name": "Steve Klabnik" },
    "relationships": {
      "articles": {
        "data": [
          { "id": "2", "type": "articles" },
          { "id": "5", "type": "articles" }
        ]
      }
    },
    "included": [
      {
        "id": "2",
        "type": "articles",
        "attributes": { "title": "Intro to JSON API", "content": "Lorem opossum ..." }
      },
      {
        "id": "5",
        "type": "articles",
        "attributes": { "title": "Anti-Bikeshedding", "content": "Marsupial fur trees ..." }
      }
    ]
  }
}
```

GET /users/1


```
{
  "data": {
    "id": "1",
    "type": "users",
    "attributes": { "name": "Steve Klabnik" },
    "relationships": {
      "articles": {
        "data": [
          { "id": "2", "type": "articles" },
          { "id": "5", "type": "articles" }
        ]
      }
    },
    "included": [
      {
        "id": "2",
        "type": "articles",
        "attributes": { "title": "Intro to JSON API", "content": "Lorem opossum ..." }
      },
      {
        "id": "5",
        "type": "articles",
        "attributes": { "title": "Anti-Bikeshedding", "content": "Marsupial fur trees ..." }
      }
    ]
  }
}
```

GET /users/1?include=articles


```
{
  "data": {
    "id": "1",
    "type": "users",
    "attributes": { "name": "Steve Klabnik" },
    "relationships": {
      "articles": {
        "data": [
          { "id": "2", "type": "articles" },
          { "id": "5", "type": "articles" }
        ]
      }
    },
    "included": [
      {
        "id": "2",
        "type": "articles",
        "attributes": { "title": "Intro to JSON API", "content": "Lorem opossum ..." }
      },
      {
        "id": "5",
        "type": "articles",
        "attributes": { "title": "Anti-Bikeshedding", "content": "Marsupial fur trees ..." }
      }
    ]
  }
}
```

GET /users/1?include=articles


```
{
  "data": {
    "id": "1",
    "type": "users",
    "attributes": { "name": "Steve Klabnik" },
    "relationships": {
      "articles": {
        "data": [
          { "id": "2", "type": "articles" },
          { "id": "5", "type": "articles" }
        ]
      }
    },
    "included": [
      {
        "id": "2",
        "type": "articles",
        "attributes": { "title": "Intro to JSON API", "content": "Lorem opossum ..." }
      },
      {
        "id": "5",
        "type": "articles",
        "attributes": { "title": "Anti-Bikeshedding", "content": "Marsupial fur trees ..." }
      }
    ]
  }
}
```

GET /users/1?include=articles


```
{
  "data": {
    "id": "1",
    "type": "users",
    "attributes": { "name": "Steve Klabnik" },
    "relationships": {
      "articles": {
        "data": [
          { "id": "2", "type": "articles" },
          { "id": "5", "type": "articles" }
        ]
      }
    },
    "included": [
      {
        "id": "2",
        "type": "articles",
        "attributes": { "title": "Intro to JSON API", "content": "Lorem opossum ..." }
      },
      {
        "id": "5",
        "type": "articles",
        "attributes": { "title": "Anti-Bikeshedding", "content": "Marsupial fur trees ..." }
      }
    ]
  }
}
```

GET /users/1?include=articles


```
{
  "data": {
    "id": "1",
    "type": "users",
    "attributes": { "name": "Steve Klabnik" },
    "relationships": {
      "articles": {
        "data": [
          { "id": "2", "type": "articles" },
          { "id": "5", "type": "articles" }
        ]
      }
    },
    "included": [
      {
        "id": "2",
        "type": "articles",
        "attributes": { "title": "Intro to JSON API", "content": "Lorem opossum ..." }
      },
      {
        "id": "5",
        "type": "articles",
        "attributes": { "title": "Anti-Bikeshedding", "content": "Marsupial fur trees ..." }
      }
    ]
  }
}
```

GET /users/1?include=articles


```
{
  "data": {
    "id": "1",
    "type": "users",
    "attributes": { "name": "Steve Klabnik" },
    "relationships": {
      "articles": {
        "data": [
          { "id": "2", "type": "articles" },
          { "id": "5", "type": "articles" }
        ]
      }
    },
    "included": [
      {
        "id": "2",
        "type": "articles",
        "attributes": { "title": "Intro to JSON API", "content": "Lorem opossum ..." }
      },
      {
        "id": "5",
        "type": "articles",
        "attributes": { "title": "Anti-Bikeshedding", "content": "Marsupial fur trees ..." }
      }
    ]
  }
}
```

GET /users/1?include=articles&fields[articles]=title


```
{
  "data": {
    "id": "1",
    "type": "users",
    "attributes": { "name": "Steve Klabnik" },
    "relationships": {
      "articles": {
        "data": [
          { "id": "2", "type": "articles" },
          { "id": "5", "type": "articles" }
        ]
      }
    },
    "included": [
      {
        "id": "2",
        "type": "articles",
        "attributes": { "title": "Intro to JSON API", "content": "Lorem opossum ..." }
      },
      {
        "id": "5",
        "type": "articles",
        "attributes": { "title": "Anti-Bikeshedding", "content": "Marsupial fur trees ..." }
      }
    ]
  }
}
```

GET /users/1?include=articles&fields[articles]=title


```
{
  "data": {
    "id": "1",
    "type": "users",
    "attributes": { "name": "Steve Klabnik" },
    "relationships": {
      "articles": {
        "data": [
          { "id": "2", "type": "articles" },
          { "id": "5", "type": "articles" }
        ]
      }
    },
    "included": [
      {
        "id": "2",
        "type": "articles",
        "attributes": { "title": "Intro to JSON API" }
      },
      {
        "id": "5",
        "type": "articles",
        "attributes": { "title": "Anti-Bikeshedding" }
      }
    ]
  }
}
```

Sparse Fieldsets

```
GET /users/1?include=articles&fields[articles]=title
```

Updating a User with Relationships

```
PATCH /users/1
```

☝ PATCH /users/1

```
{
  "data": {
    "id": "1",
    "type": "users",
    "attributes": { "name": "Dan Gebhardt" },
    "relationships": {
      "articles": {
        "data": [
          { "id": "3", "type": "articles" },
          { "id": "6", "type": "articles" }
        ]
      }
    }
  }
}
```

☝ PATCH /users/1

```
{
  "data": {
    "id": "1",
    "type": "users",
    "attributes": { "name": "Dan Gebhardt" },
    "relationships": {
      "articles": {
        "data": [
          { "id": "3", "type": "articles" },
          { "id": "6", "type": "articles" }
        ]
      }
    }
  }
}
```

☝ PATCH /users/1

```
{
  "data": {
    "id": "1",
    "type": "users",
    "attributes": { "name": "Dan Gebhardt" },
    "relationships": {
      "articles": {
        "data": []
      }
    }
  }
}
```

☝ PATCH /users/1

```
{
  "data": {
    "id": "1",
    "type": "users",
    "attributes": { "name": "Dan Gebhardt" },
    "relationships": {
      "articles": {
        "data": []
      }
    }
  }
}
```

Manipulating a User's Relationships

Manipulating a User's Relationships

POST and DELETE on Relationship Links:

Manipulating a User's Relationships

POST and DELETE on Relationship Links:

```
/users/1/relationships/articles
```

Adding Relationships to a User

Adding Relationships to a User

```
POST /users/1/relationships/articles
```

Adding Relationships to a User

```
POST /users/1/relationships/articles

{
  "data": [
    { "id": "3", "type": "articles" },
    { "id": "7", "type": "articles" }
  ]
}
```

Adding Relationships to a User

```
POST /users/1/relationships/articles
```

```
{
  "data": [
    { "id": "3", "type": "articles" },
    { "id": "7", "type": "articles" }
  ]
}
```

Deleting a User's Relationships

```
DELETE /users/1/relationships/articles
```

```
{
  "data": [
    { "id": "3", "type": "articles" },
    { "id": "7", "type": "articles" }
  ]
}
```

Deleting a User's Relationships

```
DELETE /users/1/relationships/articles
```

```
{
  "data": [
    { "id": "3", "type": "articles" },
    { "id": "7", "type": "articles" }
  ]
}
```

There is More ...

- meta objects, links objects
- pagination, sorting, filtering
- error objects
- n:m relationships
- does not support creating nested resources

Tooling

gems codifying { json:api }

- 👀 active_model_serializers
- 👀 fast_jsonapi
- 💓 jsonapi_resources
- 🦄 jsonapi_suite

Client libraries

JavaScript

- ember-data is one of the original exemplar implementations. There is now an offical adapter to support json-api.
- backbone-jsonapi is a Backbone adapter for JSON API. Supports fetching Models & Collections from a JSON API source.
- backbone-relational-jsonapi is a parsing layer for Backbone.Relational. Entities specified in JSON API are automatically parsed to be injected into Backbone.Relational relations.
- orbit.js is a standalone library for coordinating access to data sources and keeping their contents synchronized. Orbit's Common Library includes JSONAPISource for accessing JSON API servers. Orbit can be used independently or with Ember.js through the ember-orbit integration library.
- YAYSON is an isomorphic library for serializing and reading JSON API data. Extend it to fit your models or just use it with plain objects.
- Ember JSON API Resources is an Ember CLI Addon for a lightweight solution for data persistence in an Ember.js application.
- hapi-json-api Plugin for the hapi framework; enforces Accept/Content-type rules and rewrites Boom errors to be spec compliant.
- jsonapi-datastore is a lightweight standalone library for reading, serializing, and synchronizing relational JSON API data.
- json-api-store A lightweight JavaScript library for using JSON API in the browser.
- superagent-jsonapify A really lightweight (50 lines) JSON-API client addon for superagent, the isomorphic ajax client.
- angular-jsonapi An AngularJS JSON API client
- redux-json-api A library which integrated JSON APIs with Redux store

To Summarise ...

- anti-bikeshedding
- one endpoint to serve different client needs
- tight coupling between API and underlying data structure
- community and tooling support
- 🍰 leverages HTTP content negotiation mechanism

References

Website Media Type Specs

Talk JSON API: convention driven API design by Steve Klabnik

Talk Past, Present and Future of JSON API by Steve Klabnik

Talk The Road to JSON API 1.0 by Steve Klabnik

Talk "The JSON API Spec" by Marco Otto-Witte

Talk "Pragmatic JSON API Design" by Jeremiah Lee

Podcast "Dan Gebhard - json-api, jsonapi-resources, orbit.js & Ember Data" by Byle Daigle

Podcast "Data Loading Patterns with the JSON API with Balint Erdi" by The Frontside Podcast

Podcast "JSON API and API Design" by The Changelog

Images Bikeshed, Devices, Hamster BandConfetti


Thanks!

Create your new Rails API

```
rails new my-new-json-api --api

rails g scaffold user name:string

rails g scaffold article title:string content:text

rails db:setup
```

Add `gem "jsonapi-resource"` to your Gemfile

```
bundle install
```

Generate JSONAPI::Resources

Generate JSONAPI::Resources

```
rails g jsonapi:resource user
```

Generate JSONAPI::Resources

```
rails g jsonapi:resource user
  create  app/resources/user_resource.rb
```

Generate JSONAPI::Resources

```
rails g jsonapi:resource user
  create  app/resources/user_resource.rb

class UserResource < JSONAPI::Resource; end
```

Generate JSONAPI::Resources

```
rails g jsonapi:resource user
  create  app/resources/user_resource.rb

class UserResource < JSONAPI::Resource



end
```

Generate JSONAPI::Resources

```
rails g jsonapi:resource user
  create  app/resources/user_resource.rb

class UserResource < JSONAPI::Resource
  attribute :name


end
```

Generate JSONAPI::Resources

```
rails g jsonapi:resource user
  create  app/resources/user_resource.rb

class UserResource < JSONAPI::Resource
  attribute :name
  has_many :articles,
           always_include_linkage_data: true
end
```

```ruby
# app/resources/article_resource.rb

class ArticleResource < JSONAPI::Resource
  attributes :title, :content
  has_one :author,
          always_include_linkage_data: true,
          foreign_key: :user_id
end
```

```ruby
# app/resources/article_resource.rb

class ArticleResource < JSONAPI::Resource
  attributes :title, :content
  has_one :author,
          always_include_linkage_data: true,
          foreign_key: :user_id
end
```

```ruby
# app/resources/user_resource.rb

class UserResource < JSONAPI::Resource
  attributes :name, :first_name, :last_name

  has_many :articles, always_include_linkage_data: true

  def name
    "#{@model.first_name} #{@model.last_name}"
  end

  def fetchable_fields
    %i(name articles)
  end

  def self.creatable_fields(_context)
    %i(first_name last_name articles)
  end

  def self.updatable_fields(_context)
    %i(first_name last_name articles)
  end
end
```

```ruby
# config/routes.rb

Rails.application.routes.draw do
  resources :articles
  resources :users
end
```

```ruby
# config/routes.rb

Rails.application.routes.draw do
  resources :articles
  resources :users
end
```

```ruby
# config/routes.rb

Rails.application.routes.draw do
  jsonapi_resources :articles
  jsonapi_resources :users
end
```

```ruby
# app/controllers/application_controller.rb

class ApplicationController < ActionController::API

end
```

```ruby
# app/controllers/application_controller.rb

class ApplicationController < ActionController::API
  include JSONAPI::ActsAsResourceController
end
```

```ruby
# app/controllers/users_controller.rb

class UsersController < ApplicationController
  def index
    ...
  def create
    ...
  def update
    ...
    ...
end
```

```ruby
# app/controllers/users_controller.rb

class UsersController < ApplicationController; end
```

```ruby
# app/controllers/users_controller.rb

class UsersController < ApplicationController; end


# app/controllers/articles_controller.rb

class ArticlesController < ApplicationController; end
```


You've just created a JSON API!

Yehuda Katz

{ json:api } is a wire protocol for incrementally fetching and updating a graph over HTTP.

https://twitter.com/wycats/status/925847356532125696

json:api vs GraphQL

GraphQL is protocol agnostic

JSON API leverages HTTP functionalities, such as:

json:api vs GraphQL

```
GET /users/1 HTTP/1.1
Accept: application/vnd.api+json

HTTP/1.1 200 OK
Content-Type: application/vnd.api+json
ETag: "bf3291afe28105e12b9ff5941a3cf6d7"
```

json:api vs GraphQL

```
GET /users/1 HTTP/1.1
Accept: application/vnd.api+json
If-None-Match: "bf3291afe28105e12b9ff5941a3cf6d7"

HTTP/1.1 305 Not Modified
```