WORKING WITH REST APIS

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ABOUT ME

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REST?

REPRESENTATIONAL

STATE

TRANSFER

WHAT IS REST?

- Software architecture
- Resource based (using URIs)
- Communication over HTTP
- Introduced by Roy Fielding in 2000

http://www.ics.uci.edu/~fielding/pubs/dissertation/rest_arch_style.htm

WHY USE REST?

- Standard CRUD implementation
- Easy to use
- Widely supported
- Built in to popular JS frameworks

CRUD OVER HTTP

- Create: POST
- Read: GET
- Update: PATCH (or PUT)
- Delete: DELETE

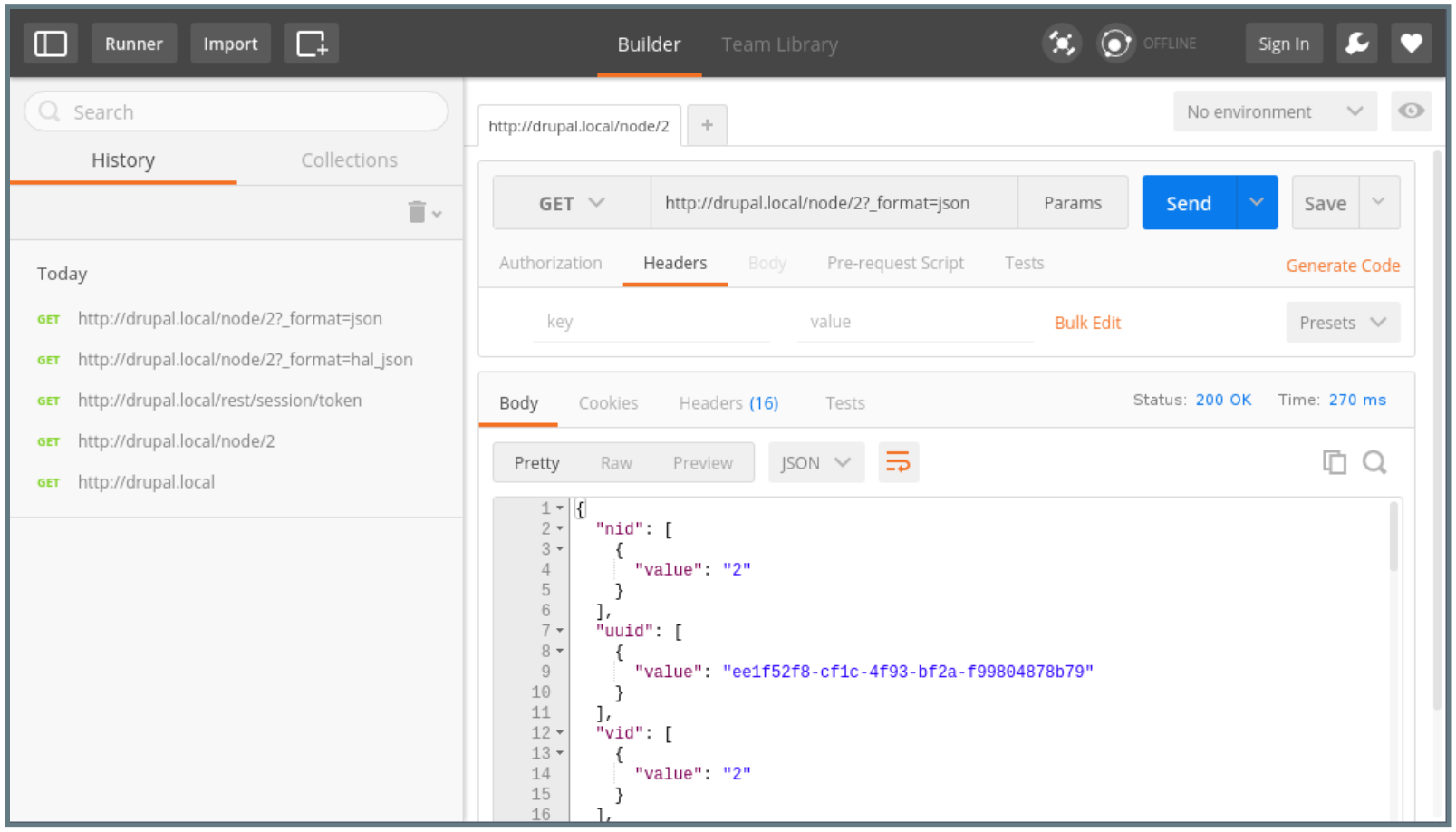
HTTP REST CLIENT

- Desktop application
- Browser plugin
- IDE plugin
- Command line client
- Curl

BROWSER PLUGINS

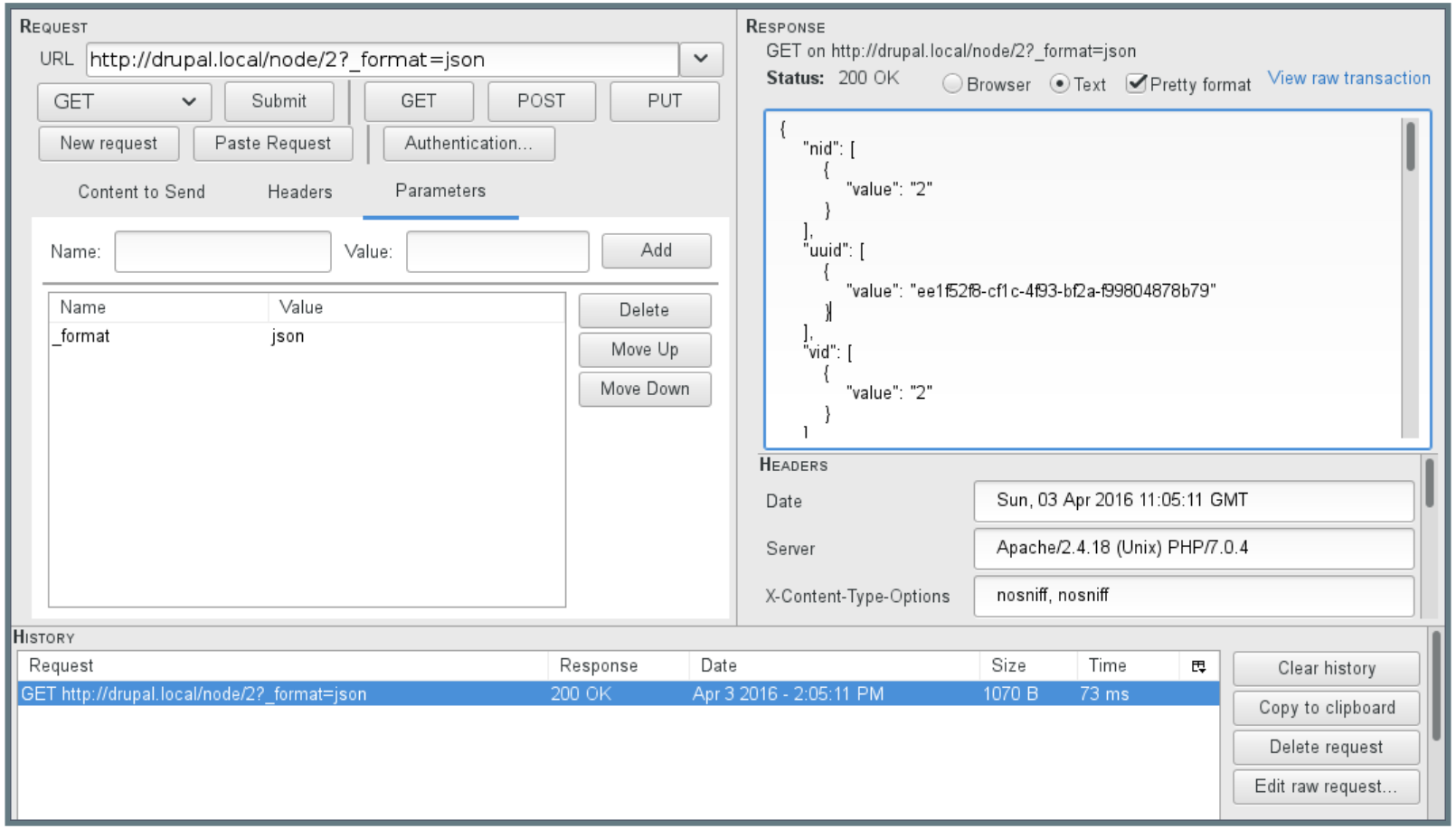
POSTMAN FOR CHROMIUM

https://www.getpostman.com/


Runner
Import
Builder
Team Library
OFFLINE
Sign In
Search
History
Collections
Today
GET http://drupal.local/node/2?_format=json
GET http://drupal.local/node/2?_format=hal_json
GET http://drupal.local/rest/session/token
GET http://drupal.local/node/2
GET http://drupal.local
http://drupal.local/node/2
No environment
GET
http://drupal.local/node/2?_format=json
Params
Send
Save
Authorization
Headers
Body
Pre-request Script
Tests
Generate Code
key
value
Bulk Edit
Presets
Body
Cookies
Headers (16)
Tests
Status: 200 OK
Time: 270 ms
Pretty
Raw
Preview
JSON
{
"nid": [
{
"value": "2"
}
],
"uuid": [
{
"value": "ee1f52f8-cf1c-4f93-bf2a-f99804878b79"
}
],
"vid": [
{
"value": "2"
}
],

HTTPREQUESTER FOR FIREFOX

https://addons.mozilla.org/firefox/addon/httprequester



VIEWING JSON IN-BROWSER

- Chromium: JSON Formatter
- Firefox: JSONView

REST API FIRST LOOK: DRUPAL.ORG

- https://www.drupal.org/drupalorg/docs/api
- Exposes projects, issues, users, nodes, comments, ...
- Read-only
- Anonymous access (fair use)
- Returns data in JSON and XML formats
- Supports pagination and sorting
- Built in Drupal 7 with the RESTful Web Services module

AN EXAMPLE REQUEST

https://www.drupal.org/api-d7/user.json?field_country=Belgium&sort=uid&limit=10

- A JSON object is returned
- Contains pagination data and a list of users
- User objects contain many fields
- Can be filtered and sorted by field
- Do all fields make sense?

PROVIDING A REST API IN DRUPAL

- Why use Drupal?
- Designing a REST API
- REST modules
- Programmatically creating endpoints
- ~~Headless Drupal~~

WHY USE DRUPAL?

- No need to write custom code
- Powerful data modeling UI
- Versioning
- Caching
- Pagination
- Flood control
- Sorting
- Filtering
- Awesome content authoring tools

DESIGNING A REST API

- `GET /api/v1/books` - Lists books
- `GET /api/v1/books/123` - Retrieve a book
- `POST /api/v1/books` - Create a book
- `PATCH /api/v1/books/123` - Update a book
- `DELETE /api/v1/books/123` - Delete a book

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CHILD ENTITIES

- `GET /api/v1/books/123/chapters` - Lists chapters
- `GET /api/v1/books/123/chapters/456` - Retrieve a chapter
- `POST /api/v1/books/123/chapters` - Create a chapter
- `PATCH /api/v1/books/123/chapters/456` - Update a chapter
- `DELETE /api/v1/books/123/chapters/456` - Delete a chapter

RETURN CORRECT HTTP RESPONSES

- `200 OK` - Successful GET or PATCH
- `201 Created` - Successful POST
- `204 No Content` - Successful DELETE
- `400 Bad Request` - Invalid data received
- `401 Unauthorized` - Not authenticated
- `403 Forbidden` - Successfully authenticated, no access
- `404 Not Found` - Resource does not exist
- `405 Method Not Allowed` - Successfully authenticated, wrong HTTP method
- `410 Gone` - API version is deprecated
- `422 Unprocessable Entity` - Validation error
- `429 Too Many Requests` - Exceeded rate limiting

JSON OR XML?

JSON

- Compact
- Easy to read
- Still reasonably hipster

XML

- Totally enterprise

REST RELATED MODULES

- RESTful Web Services
- REST UI
- HAL
- HTTP Basic Authentication
- Views
- Services
- JSON API

RESTFUL WEB SERVICES

- Part of Drupal 8 core
- Depends on Serialization
- No user interface
- Pluggable formats (JSON, XML, ...)
- Pluggable authentication methods

REST UI MODULE

- User interface for the REST module
- Supports all content entities
- Optional alternative to raw config

USING REST UI

/admin/config/services/rest

Enabled

RESOURCE NAME	PATH	DESCRIPTION	OPERATIONS
Content	/node/{node}	GET authentication: cookie formats: json POST authentication: cookie formats: json	Edit

Disabled

RESOURCE NAME	PATH	DESCRIPTION	OPERATIONS
Action	/entity/action/{action}		Enable
Base field override	/entity/base_field_override/{base_field_override}		Enable
Block	/entity/block/{block}		Enable

PERMISSIONS

- Available for every enabled entity
- Separate permission per HTTP method

PERMISSION	ANONYMOUS USER	AUTHENTICATED USER	ADMINISTRATOR
RESTful Web Services			
Access DELETE on *Content* resource	☐	☐	☑
Access GET on *Content* resource	☑	☑	☑
Access PATCH on *Content* resource	☐	☐	☑
Access POST on *Content* resource	☐	☐	☑

HAL

- Adds support for Hypertext Application Language
- Adds formats "application/hal+json" & "application/hal+xml"
- Provides location of itself and relations (_links)
- Describes embedded resources (_embedded)

HAL LINKS

Always provide a link to yourself with `self`

```
"_links": {
    "self": {
        "href": "http://my.domain/users?page=3"
    }
}
```

HAL LINKS

Paging

```
"_links": {
    "first": {
        "href": "http://my.domain/users"
    },
    "prev": {
        "href": "http://my.domain/users?page=2"
    },
    "next": {
        "href": "http://my.domain/users?page=4"
    },
    "last": {
        "href": "http://my.domain/users?page=133"
    }
}
```

HAL EMBEDDED RESOURCES

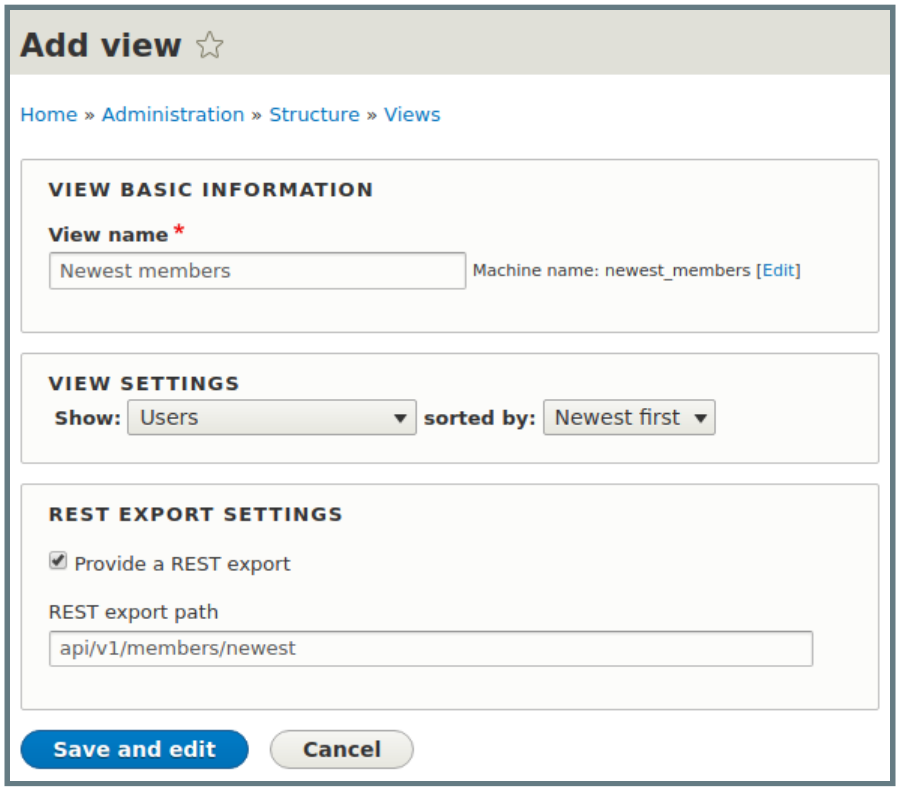
```
"_embedded": {
    "profile_pictures": [
        {
            "_links": {
                "self": {
                    "href": "http://my.domain/files/123"
                }
            },
        }
    ],
}
```

HTTP BASIC AUTHENTICATION

- Small core module
- Allows to authenticate over HTTP Basic Auth
- `Authorization: Basic dXNlcjpwYXNz`
- Credentials are base 64 encoded: only use over HTTPS!

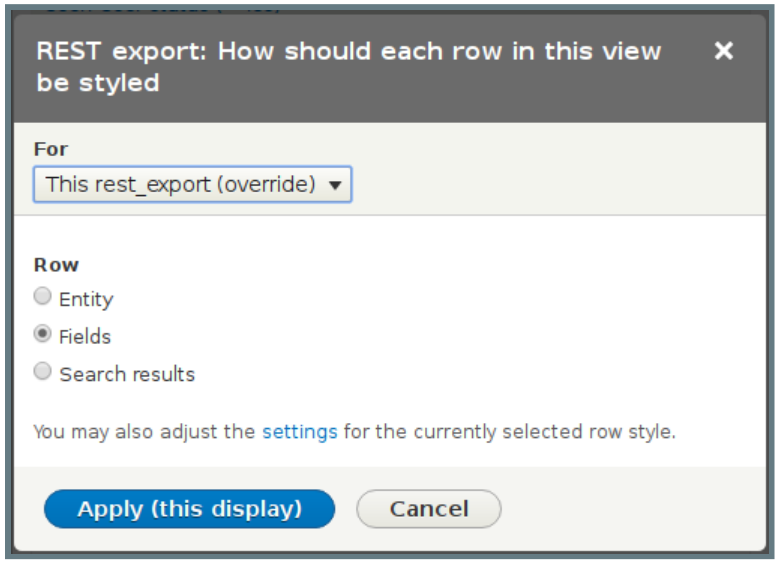
VIEWS

Create REST endpoint through UI



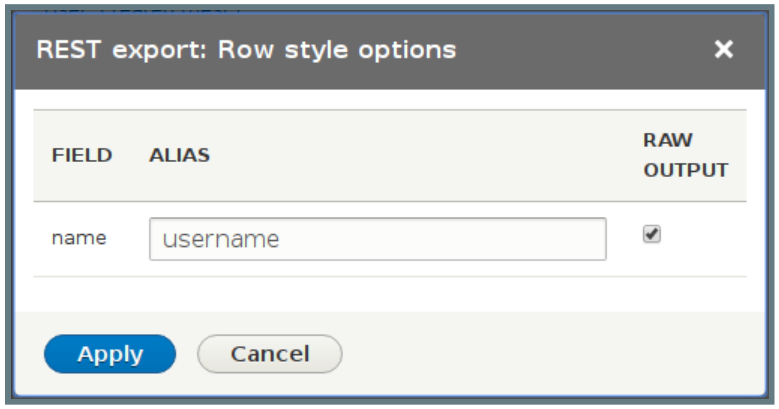
SELECT DATA TO EXPOSE

Display 'fields'



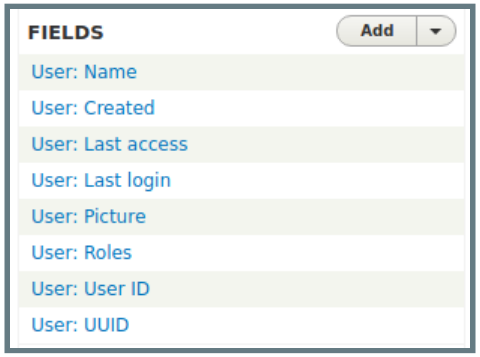
OUTPUT RAW DATA

Edit field settings



FLESHING OUT THE DATA

Add more fields

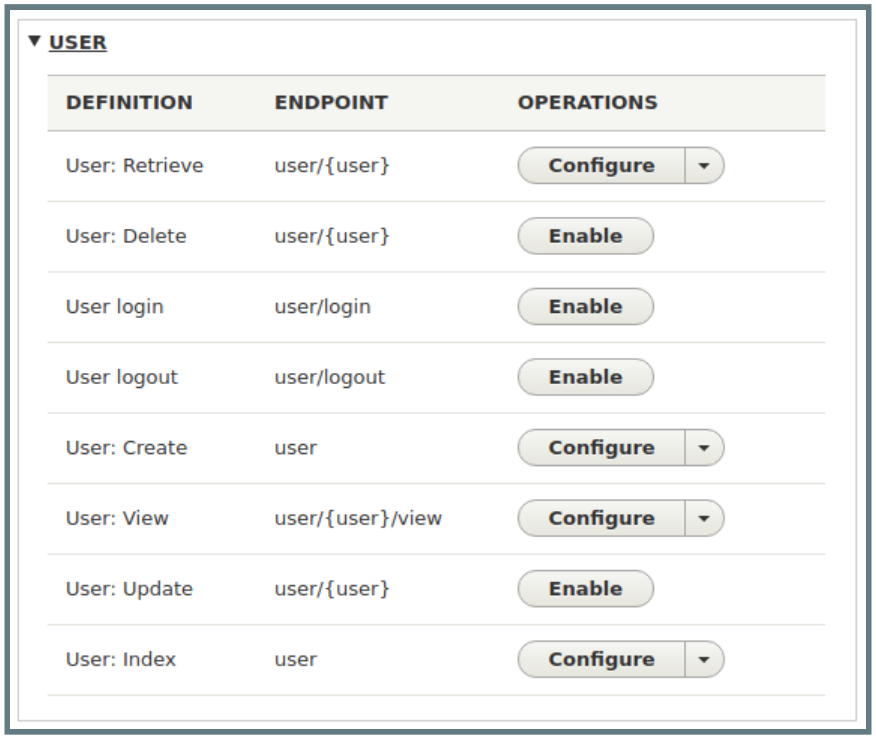


RESULT

/api/v1/members/newest

SERVICES

- Port of the D7 modlie
- Define end points
- Expose data



▼ USER

DEFINITION	ENDPOINT	OPERATIONS
User: Retrieve	user/{user}	Configure
User: Delete	user/{user}	Enable
User login	user/login	Enable
User logout	user/logout	Enable
User: Create	user	Configure
User: View	user/{user}/view	Configure
User: Update	user/{user}	Enable
User: Index	user	Configure

JSON API

- JSON formatter
- Follows best practices
- Provides resources and links

PROGRAMMATICALLY CREATING AN ENDPOINT

- Create a Controller
- Return a JsonResponse object

RETURNING A JSON RESPONSE

```
class RestApiController extends ControllerBase {

  use Symfony\Component\HttpFoundation\JsonResponse;

  public function getStats($date_range) {
    $data = [
      'unique_visitors' => 100,
      'page_views' => 3440,
      'date_range' => ['2016-03-15T08:14:45Z', '2016-04-15T08:14:45Z'],
    ];
    return new JsonResponse($data);
  }

}
```

CONSUMING A REST SERVICE WITH DRUPAL

- No modules yet
- Easy to do programmatically

EXAMPLE IMPLEMENTATION

- Use the Drupal.org REST API
- Retrieve 5 change records with Guzzle
- Display results in a block

INJECTING GUZZLE

Example implementation in a block

```
class ChangeRecordsBlock extends BlockBase implements ContainerFactoryPluginInterface {

  public function __construct(array $configuration, $plugin_id, $plugin_definition, Client $http_
    parent::__construct($configuration, $plugin_id, $plugin_definition);
    $this->httpClient = $http_client;
  }

  public static function create(ContainerInterface $container, array $configuration, $plugin_id,
    return new static(
      $configuration,
      $plugin_id,
      $plugin_definition,
      $container->get('http_client')
    );
  }
}
```

REQUESTING DATA FROM THE REST API

```
public function build() {
  $options = [
    'query' => [
      'type' => 'changenotice',
      'limit' => 5,
      'status' => 1,
      'sort' => 'created',
      'direction' => 'DESC',
    ],
  ];
  $result = $this->httpClient->get( 'https://www.drupal.org/api-d7/node.json' , $options);
  $change_records = json_decode($result->getBody())->list;
  // ...
}
```

RETURNING THE DATA

```
public function build() {
  // ...
  $items = [];
  foreach ($change_records as $change_record) {
    $items[] = [
      '#type' => 'link',
      '#title' => $change_record->title,
      '#url' => Url::fromUri($change_record->url),
    ];
  }
  return [
    '#theme' => 'item_list',
    '#items' => $items,
    '#list_type' => 'ol',
  ];
}
```

THE RESULT

Change records block

1. New templates introduced for views listing, old ones deprecated
2. Menu links that point to nodes now reference the node UUID in normalized representation
3. Simplified Views listing page so it is consistent with other admin listings
4. Add security coverage indicators to project pages
5. Search box being moved to an icon in the top nav

MODELING REST DATA AS ENTITIES

- json_decode() returns a plain (meh) object
- Entities are the ideal match in Drupal
- Integrates well with everything
- Local caching
- Importing / exporting
- Requires the Serialization module

HOW TO MODEL REST DATA

- Create custom entity representing REST data
- Inject the 'serializer' service
- Deserialize the REST data into an entity

```
$data = $this->httpClient->get('https://www.drupal.org/api-d7/node/2692565.json');
$serializer = \Drupal::service('serializer');
$entity = $serializer->deserialize($data, 'Drupal\change_records\Entity\ChangeRecord', 'json');
```

RESOURCES

- RESTful Web Services module documentation
- REST: top priorities for Drupal 8.4.x