Building an API with Slim 3

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What makes a good API?

A good API

- HTTP method negotiation
- Content-type handling
- Honour the Accept header
- Error handling
- Versions
- Filtering & validation

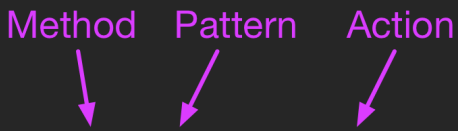
Hello world

```php
<?php
require 'vendor/autoload.php';
$app = new \Slim\App();


$app->get('/ping', function ($request, $response) {
    $body = json_encode(['ack' => time()]);
    $response->write($body);
    $response = $response->withHeader(
        'Content-Type', 'application/json');
    return $response;
});

$app->run();
```

Hello world




```
$app->get('/ping', function ($request, $response) {
    $body = json_encode(['ack' => time()]);
    $response->write($body);
    $response = $response->withHeader(
        'Content-Type', 'application/json');
    return $response;
});
```

Hello world

```
$ http --json http://localhost:8888/ping
HTTP/1.1 200 OK
Connection: close
Content-Length: 18
Content-Type: application/json
Host: localhost:8888
X-Powered-By: PHP/5.6.14

{
    "ack": 1445111794
}
```

PSR-7?

It's all about HTTP

Request:

```
{METHOD} {URI} HTTP/1.1
Header: value1,value2
Another-Header: value

Message body
```

Response:

```
HTTP/1.1 {STATUS_CODE} {REASON_PHRASE}
Header: value

Message body
```

Current PHP

Request:

- `$_SERVER`, `$_GET`, `$_POST`, `$_COOKIE`, `$_FILES`
- `apache_request_headers()`
- `php://input`

Response:

- `header()`
- `echo` (& `ob_*()` family)

PSR 7: HTTP messaging

It’s just some interfaces

- `RequestInterface` (& `ServerRequestInterface`)
- `ResponseInterface`
- `UriInterface`
- `UploadedFileInterface`

Key feature 1: Immutability

`Request`, `Response`, `Uri` & `UploadFile` are *immutable*

```
$uri = new Uri('https://api.joind.in/v2.1/events');
$uri2 = $uri->withQuery('?filter=upcoming');

$request = (new Request())
    ->withMethod('GET')
    ->withUri($uri2)
    ->withHeader('Accept', 'application/json')
    ->withHeader('Authorization', 'Bearer 0873418d');
```

Key feature 2: Streams

Message bodies are *streams*

```
$body = new Stream();
$body->write('<p>Hello');
$body->write('World</p>');

$response = (new Response())
    ->withStatus(200, 'OK')
    ->withHeader('Content-Type', 'application/header')
    ->withBody($body);
```

Let’s talk APIs

HTTP method negotiation

HTTP method negotiation

```
$ http --json PUT http://localhost:8888/ping
HTTP/1.1 405 Method Not Allowed
Allow: GET
Connection: close
Content-Length: 53
Content-type: application/json
Host: localhost:8888
X-Powered-By: PHP/5.6.14

{
    "message": "Method not allowed. Must be one of: GET"
}
```

HTTP method routing

```
$app->get('/author', function($req, $res) {});
$app->post('/author', function($req, $res) {});

$app->get('/author/{id}', function($req, $res) {});
$app->put('/author/{id}', function($req, $res) {});
$app->patch('/author/{id}', function($req, $res) {});
$app->delete('/author/{id}', function($req, $res) {});

$app->any('/author', function($req, $res) {});
$app->map(['GET', 'POST'], '/author', /* … */);
```

Dynamic routes

```
$app->get('/author/{id}',
  function($request, $response, $args) {
    $id = $args['id'];
    $author = $this->authors->loadById($id);

    $body = json_encode(['author' => $author]);
    $response->getBody()->write($body);

    $response = $response->withHeader(
          'Content-Type', 'application/json');

    return $response;
});
```

It's just Regex

```
// numbers only
$app->get('/author/{id:\d+}', $callable);

// optional segments
$app->get('/author[/{id:\d+}]', $callable);
$app->get('/news[/{y:\d{4}}[/{m:\d{2}}]]', $callable);
```

Content-type handling

Content-type handling

The *Content-type* header specifies the format of the incoming data

```
$ curl -X "POST" "http://localhost:8888/author" \
  -H "Content-Type: application/json" \
  -d '{ "name":"Terry Pratchett" }'
```

Read with getBody()

```
$app->post('/author',
  function ($request, $response, $args) {
    $data = (string)$request->getBody();

    return $response->write(print_r($data, true));
  }
);
```

Output:

```
{ "name":"Terry Pratchett" }
```

Read with getParsedBody()

```
$app->post('/author',
  function ($request, $response, $args) {
    $data = (array)$request->getParsedBody();

    return $response->write(print_r($data, true));
  }
);
```

Output:

```
Array
(
    [name] => Terry Pratchett
)
```

This also works with XML

```
curl -X "POST" "http://localhost:8888/author" \
  -H "Content-Type: application/xml" \
  -d "<author><name>Terry Pratchett</name></author>"
```

Output:

```
Array
(
    [name] => Terry Pratchett
)
```

And form data

```
curl -X "POST" "http://localhost:8888/author" \
  -H "Content-Type: application/x-www-form-urlencoded" \
  --data-urlencode "name=Terry Pratchett"
```

Output:

```
Array
(
    [name] => Terry Pratchett
)
```

Other formats? e.g. CSV

```
name,dob
Terry Pratchett,1948-04-28
Andy Weir,1972-06-17
```

as curl:

```
curl -X "POST" "http://localhost:8888/author" \
  -H "Content-Type: text/csv" \
  -d $'name,dob
Terry Pratchett,1948-04-28
Andy Weir,1972-06-17'
```

Register media type

```
$request->registerMediaTypeParser(
  'text/csv',
  function ($input) {
    $data = str_getcsv($input, "\n");
    $keys = str_getcsv(array_shift($data));

    foreach ($data as &$row) {
      $row = str_getcsv($row);
      $row = array_combine($keys, $row);
    }

    return $data;
  }
);
```

Result

```
Array
(
    [0] => Array
        (
            [name] => Terry Pratchett
            [dob] => 1948-04-28
        )

    [1] => Array
        (
            [name] => Andy Weir
            [dob] => 1972-06-17
        )

)
```

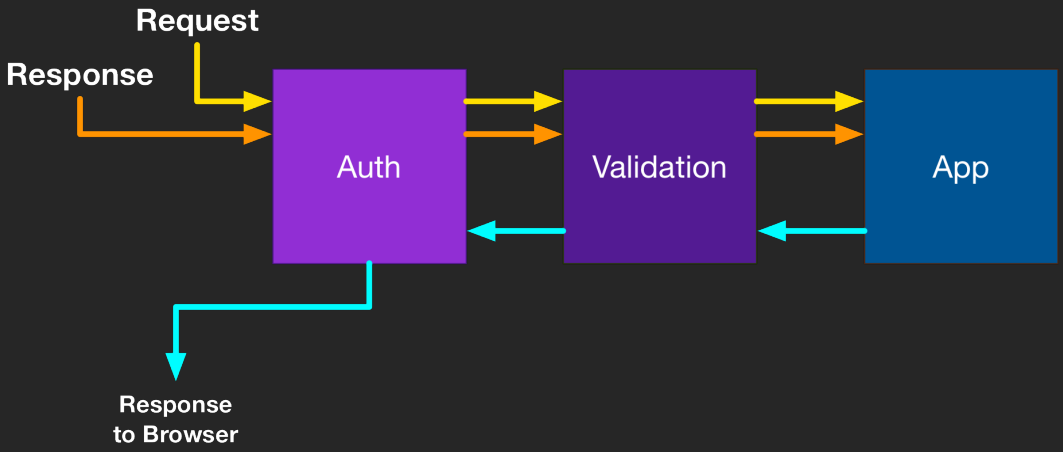
Middleware

Middleware is code that exists between the request and response, and which can take the incoming request, perform actions based on it, and either complete the response or pass delegation on to the next middleware in the queue.

Matthew Weier O'Phinney

Middleware

Manipulation of



Middleware

```
function ($request, $response, callable $next = null)
{
    // do something before

    // call through to next middleware
    if ($next) {
        $response = $next($request, $response);
    }

    // do something with $response after

    return $response;
}
```

Media type middleware

```
$app->add(function ($request, $response, $next) {

  $request->registerMediaTypeParser('text/csv',
    function ($input) {
      $data = explode("\n", $input);
      $keys = str_getcsv(array_shift($data));
      foreach ($data as &$row) {
        $row = str_getcsv($row);
        $row = array_combine($keys, $row);
      }
      return $data;
    }
  );

  return $next($request, $response);
});
```

Honour the Accept header

Honour the Accept header

Return data in the format the client expects

```
curl -X "POST" "http://localhost:8888/author" \
  -H "Accept: application/json" \
  -H "Content-Type: application/json" \
  -d '{ "name":"Terry Pratchett" }'
```

Returning JSON

```
$app->post(
  '/author',
  function ($request, $response, $args) {
    $author = new Author($request->getParsedBody());
    $this->authors->save($author);

    $response = $response->withJson($author->asArray());
    $response = $response->withStatus(201);
    return $response;
  }
);
```

Returning JSON

```
HTTP/1.1 201 Created
Content-type: application/json
Content-Length: 106

{
  "id":"2ff815ad-491d-4db8-a025-363516e7c27e",
  "name":"Terry Pratchett",
  "biography":null
}
```

Returning XML

```
curl -X "POST" "http://localhost:8888/author" \
  -H "Accept: application/xml"                \
  -H "Content-Type: application/json"         \
  -d '{ "name":"Terry Pratchett" }'
```

Determine media type

```
$ composer require willdurand/negotiation
```

```
// find preferred format from Accept header
function determineMediaType($acceptHeader)
{
  $negotiator = new \Negotiation\Negotiator();
  $known = ['application/json', 'application/xml'];

  $mediaType = $negotiator->getBest($acceptHeader, $known);
  if ($mediaType) {
    return $mediaType->getValue();
  }
  return 'application/json';
}
```

Format output

```
$acceptHeader = $request->getHeaderLine('Accept')
$mediaType = determineMediaType($acceptHeader);

switch ($mediaType) {
  case 'application/xml':
    $response->getBody()->write(arrayToXml($data));
    break;

  case 'application/json':
    $response->getBody()->write(json_encode($data));
    break;
}

return $response->withHeader("Content-Type", $mediaType);
```

XML output

```
HTTP/1.1 201 Created
Content-type: application/xml
Content-Length: 131

<?xml version="1.0"?>
<root>
  <id>98c22fa3-bf97-48c8-accd-025470c34b46</id>
  <name>Terry Pratchett</name>
  <biography/>
</root>
```

There’s a component for this!

```
$ composer require akrabat/rka-content-type-renderer
```

To use:

```
$renderer = new RKA\ContentTypeRenderer\Renderer();
$response = $renderer->render($request, $response, $data);
return $response->withStatus(201);
```

Error handling

Error handling

- Method not allowed
- Not found
- Generic error

Method not allowed

```
curl -X "PUT" "http://localhost:8888/ping"

HTTP/1.1 405 Method Not Allowed
Content-type: text/html;charset=UTF-8
Allow: GET

<html>
    <body>
        <h1>Method not allowed</h1>
        <p>Method not allowed. Must be one of:
           <strong>GET</strong></p>
    </body>
</html>
```

Not found

```
curl -X "GET" "http://localhost:8888/foo" \
     -H "Accept: application/xml"

HTTP/1.1 404 Not Found
Content-Type: application/xml
Allow: GET

<root><message>Not found</message></root>
```

Raise your own

```
$app->get(
  '/author/{id}',
  function ($request, $response, $args) {
    $author = $this->authors->loadById($args['id']);
    if (!$author) {

      return $this->notFoundHandler($request, $response);

    }

    // continue with $author
  }
);
```

Generic error

```
$app->get('/error',
  function ($request, $response, $args) {
    throw new \Exception("Something has gone wrong!");
  }
);
```

```
curl -X "GET" "http://localhost:8888/error" \
  -H "Accept: application/json"

HTTP/1.1 500 Internal Server Error
Content-type: application/json
Content-Length: 43

{
    "message": "Slim Application Error"
}
```

Exception information

```
$settings = [
  'settings' => [
    'displayErrorDetails' => true,
  ]
];

$app = new Slim\App($settings);
```

Exception information

```
HTTP/1.1 500 Internal Server Error
Content-type: application/json

{
  "message": "Slim Application Error",
  "exception": [
    {
      "type": "Exception",
      "code": 0,
      "message": "Something has gone wrong!",
      "file": "/dev/an-api/app/routes.php",
      "line": 8,
      "trace": [
          "#0 [internal function]: Closure->{closure} …
          "#2 /dev/an-api/vendor/slim/slim/Slim/Route.php(…
          …
```

Handle warnings

```
$app->get('/error',
  function ($request, $response, $args) {
    ini_get(); // will generate a warning
  }
);


// convert errors into exceptions
set_error_handler(function ($level, $msg, $file, $ln) {
    if (!(error_reporting() & $level)) { return; }
    throw new \Exception($msg, $level);
});
```

Versions

Versions

Two choices:

- Segment within URL:
  `http://api.example.com/v1/author`
- Media type:
  `Accept: application/vnd.rka.author.v1+json`

URL segment

Use route groups:

```
$app->group('/v1', function () {

  // http://api.example.com/v1/author
  $this->get('/author',
    function ($request, $response) { /*…*/ }
  );

  // http://api.example.com/v1/author/123
  $this->get('/author/{id}',
    function ($request, $response, $args) { /*…*/ }
  );

});
```

Media type versioning

Firstly, let’s look at Slim’s dependency injection support

The container

Register services with the DIC

```
$settings = ['settings' => [
    'dsn' => 'sqlite:data/bookshelf.db',
]];
$app = new Slim\App($settings);
$container = app->getContainer();

$container['pdo'] = function ($c) {
    return new PDO($c['settings']['dsn']);
};

$container['authors'] = function ($c) {
  return new Bibliotheque\AuthorMapper($c['pdo']);
};
```

Controller classes

Register your controller with the container

```
$container['AuthorController'] = function ($c) {
  $renderer = $c->get('renderer');
  $authors = $c->get('authors');
  return new App\AuthorController($renderer, $authors);
}


// Register with router:
$app->get('/author', 'AuthorController:listAll');
```

Author controller

```
class AuthorController
{
  public function __construct($renderer, $authors)
  {
    $this->renderer = $renderer;
    $this->authors = $authors;
  }

  public function listAll($req, $res)
  {
    $authors = $this->authors->fetchAll();
    $data = ['authors' => $authors];
    return $this->renderer->render($req, $res, $data);
  }
}
```

Media type versioning

Select controller based on Accept header

```
$container['AuthorController'] = function ($c) {

  $request = $c->get('request');
  $acceptHeader = $request->getHeaderLine('Accept');

  if (strpos($acceptHeader,
    'application/vnd.rka.author.v2') !== false) {
    return new App\V2\AuthorController(/*…*/);
  }

  return new App\V1\AuthorController(/*…*/);
};
```

Filtering & validation

Filtering & validation

Route middleware keeps your callable clean!

```
$app->post(
  '/author',
  'AuthorController:addNewAuthor'
)->add('AuthorValidator');
```

AuthorValidator

```php
class AuthorValidator {
  public function __invoke($req, $res, $next)
  {
    $data = $req->getParsedBody();
    $validator = new \Valitron\Validator($data);
    $validator->rule('required', 'name');

    if (!$validator->validate()) {
      $e = ['errors' => $validator->errors()];
      $response = $this->renderer->render($req, $res, $e);
      return $response->withStatus(422);
    }

    return $next($req, $res);
  }
}
```

Validation

```
curl -X "POST" "http://localhost:8888/author" \
  -H "Content-Type: application/json" \
  -H "Accept: application/json" \
  -d '{"name":""}'

HTTP/1.1 422 Unprocessable Entity
Content-type: application/json
Content-Length: 84

{
    "errors": {
        "name": [
            "Name is required"
        ]
    }
}
```

To sum up

Summary

A good API deals with:

- HTTP method negotiation
- Content-type handling
- Honour the Accept header
- Error handling
- Versions
- Filtering & validation

Resources

- http://phptherightway.com

- http://slimframework.com/docs
- https://github.com/slimphp/Slim
- http://akrabat.com/category/slim-framework/
- http://ryanszrama.com/topics/slim

Questions?

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Thank you!

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