Building Better REST APIs

in ASP.NET and ASP.NET Core

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Hi, I'm J.

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github.com/jonathantower/dotnet-apis

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Overview

Quick Refresher on RESTful

Routing

Inputs and Outputs

Validation

Error Handling

Authentication

3rd Party tools

Performance tips

If You Give $80, So Will I!

bit.ly/ccc-water

"charity:water is a non-profit organization that provides clean and safe drinking water to people in developing nations. The organization was founded in 2006 and has helped fund 22,936 projects in 24 countries, benefiting over 4.6 million people." - Wikipedia

"4/4 Stars"
- CharityNavigator.org

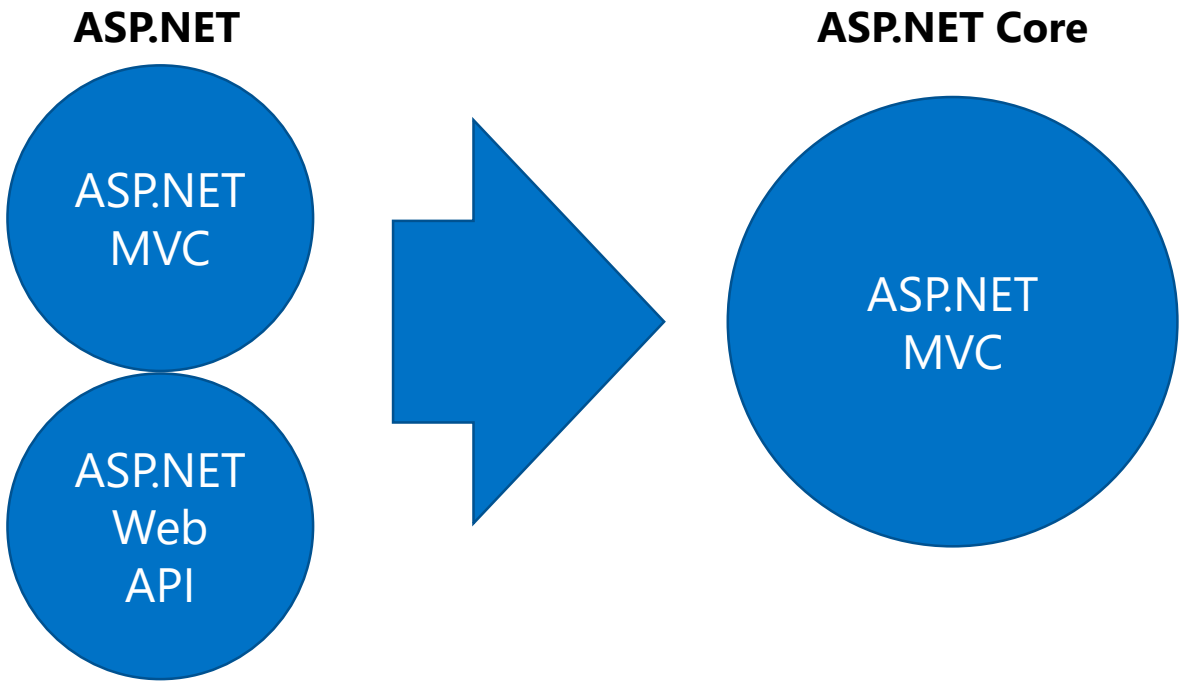
A Note about .NET Core…

ASP.NET *and* ASP.NET Core

Where is Web API in .NET Core?

Web API is dead; long live Web API!

ASP.NET vs ASP.NET Core



.NET –
System.Web.Mvc.Controller
System.Web.Http.ApiController

.NET Core -
Microsoft.AspNetCore.Mvc

RESTful Refresher

Representations

XML

```
<Person>
    <ID>1</ID>
    <Name>M Vaqqas</Name>
    <Email>m.vaqqas@gmail.com</Email>
    <Country>India</Country>
</Person>
```

JSON

```
{
    "ID": "1",
    "Name": "M Vaqqas",
    "Email": "m.vaqqas@gmail.com",
    "Country": "India"
}
```

Headers

Request

Accepts: application/json

Response

Content-Type: application/json

Both

Authorization

HTTP Methods

GET – Provides a read only access to a resource.

POST – Used to create a new resource.

DELETE – Used to remove a resource.

PUT – Used to update an existing resource or create a new resource.

OPTIONS – Used to get the supported operations on a resource (CORS).

URIs

GET	http://www.example.com/customers
GET	http://www.example.com/customers/33245
POST	http://www.example.com/customers
PUT	http://www.example.com/products/66432
DELETE	http://www.example.com/products/66432

HTTP Response Codes

200 OK

201 Created

400 Bad Request

401 Unauthorized

403 Forbidden

404 Not Found

500 Internal Server Error

Routing

Routing Rules

```
routes.MapRoute(
    name: "default",
    template: "{controller=Home}/{action=Index}/{id?}");

routes.MapRoute(
    name: "default",
    template: "{controller=Home}/{action=Index}/{id:int}");

routes.MapRoute(
    name: "us_english_products",
    template: "en-US/Products/{id}",
    defaults: new { controller = "Products", action = "Details" },
    constraints: new { id = new IntRouteConstraint() },
    dataTokens: new { locale = "en-US" });
```

Attribute Routing

```
public class MyDemoController : Controller
{
    [Route("")]
    [Route("Home")]
    [Route("Home/Index")]
    public IActionResult MyIndex()
    {
        return View("Index");
    }
    [Route("Home/About")]
    public IActionResult MyAbout()
    {
        return View("About");
    }
}
```

Attribute Routing

```
[Route("products")]
public class ProductsApiController : Controller
{
    [HttpGet]
    public IActionResult ListProducts() { ... }

    [HttpGet("{id}")]
    public ActionResult GetProduct(int id) { ... }
}
```

Global Config in .NET

```
var settings = GlobalConfiguration.Configuration.Formatters
       .JsonFormatter.SerializerSettings;

settings.DateTimeZoneHandling = DateTimeZoneHandling.Utc

settings.DateFormatHandling =
       DateFormatHandling.MicrosoftDateFormat;

settings.ContractResolver =
       new CamelCasePropertyNamesContractResolver();


settings.Formatting = Newtonsoft.Json.Formatting.Indented;

settings.ReferenceLoopHandling =
       ReferenceLoopHandling.Ignore;
```

DTOs

Mapping Models to DTOs

```
var config = new MapperConfiguration(cfg =>
     cfg.CreateMap<Order, OrderDto>());

var mapper = config.CreateMapper();

OrderDto dto = mapper.Map<OrderDto>(order);
```

Parameters

Overriding Mapping Conventions

Conventions

Method Names and HTTP Verb

GetXYZ()

PostXYZ()

Parameter Name and Type

GET widgets/{id:int} or *GET widgets/{id}*

GetWidget(int id)

Body

{ id: 1, name: “name” }

PostWidget(Widget body)

[FromBody]

```
[HttpPost]
public void Post(AddValueCommand command)
{
}

[HttpPost]
public void Post([FromBody]AddValueCommand command)
{
}
```

[FromUri]

```
public ValuesController : Controller
{
    public IActionResults Get([FromUri]GeoPoint loc) { ... }
}

// http://localhost/api/values/?Latitude=47.678558&Longitude=-122.130989
```

Override Convention

```
public class BodyParameterBindingConvention : IActionModelConvention
{
    public void Apply(ActionModel action)
    {
        if (action == null)
            throw new ArgumentNullException(nameof(action));


        foreach (var parameter in action.Parameters)
        {
            parameter.BindingInfo = parameter.BindingInfo ?? new BindingInfo();
            parameter.BindingInfo.BindingSource = BindingSource.Body;
        }
    }
}
```

Override Convention

```
public void ConfigureServices(IServiceCollection services)
{
    services.AddMvc(options =>
    {
        options.Conventions.Add(
          new BodyParameterBindingConvention());
    });
}
```

Changes in ASP.NET Core

[FromUri]

[FromBody]

[RoutePrefix] => [Route]

Changes in ASP.NET Core 2.1

~~[FromUri]~~

~~[FromBody]~~

[ApiController]

Responses

Types of Responses

void

Single object

List of objects

HttpActionResult or ActionResult in Core

HttpResponseMessage in ASP.NET (but not Core)

Exception

Helper methods in base class

Using IHttpActionResult (IActionResult in Core)

Generic and allows for all kinds of different responses

- 200 – object results
- 401 – Unauthorized
- 400 – BadRequest with validation errors

ASP.NET Core 2.1: ActionResult<T>

```
public ActionResult<Widget> Get(long id)
{
    if(id <= 0) return BadRequest();

    var w = GetWidget(id);

    if(w == null) return NotFound();

    return w;
}
```

Using Base Helper Methods

ViewResult

JsonResult

Ok

Unauthroized

BadRequest

ContentResult

FileResults

...

Using Exceptions

ASP.NET HttpReponseMessage

ASP.NET Core – custom handler

Validation

Validation

```
using System.ComponentModel.DataAnnotations;

public class LoginDto
{
    [Required]
    public string Username { get; set; }

    [Required]
    [RegularExpression(@"^[a-zA-Z0-9]$",
         ErrorMessage = "Non-alphanumeric characters are not allowed.")]
    public string Password { get; set; }
}
```

Validation

```
public IActionResult Login([FromBody]LoginDto req)
{
    if (!ModelState.IsValid) return BadRequest(ModelState);

    if (req.Username != "jtower" || req.Password == "Password")
        return Unauthorized();

    return Ok();
}
```

Error Handling

Throwing HttpResponseException

```
public Widget GetWidget(int id)
{
    Widget w =
            ctx.Employees. FirstOrDefault(k => k.Id == id);
    if (w == null)
        throw new HttpResponseException(HttpStatusCode.NotFound);
    return data;
}
```

Try…Catch

Catch “expected” errors in Try…Catch block

Return meaningful error message and HTTP code

Global Error Handling

Handle unexpected errors centrally

Log and alert sysadmin

Filter some exceptions (HTTP redirect, thread abort, etc…)

Global Error Handling

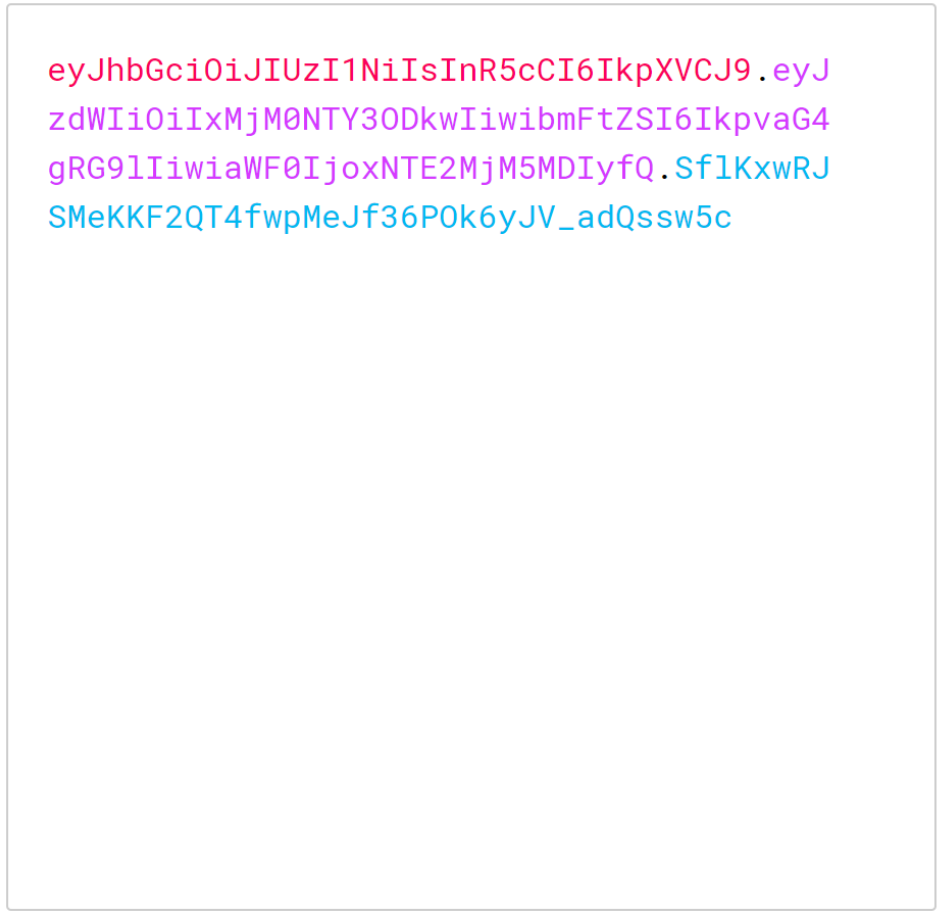
```
public class UnhandledExceptionLogger : ExceptionLogger
{
    public override void Log(ExceptionLoggerContext context)
    {
        var exceptionString = context.Exception.ToString();
        // log exceptionString
    }
}

config.Services.Replace(typeof(IExceptionLogger),
       new UnhandledExceptionLogger());
```

Global Error Handling

```
GlobalConfiguration.Configuration.IncludeErrorDetailPolicy
    = IncludeErrorDetailPolicy.Always;
```

Authentication

JSON Web Tokens (JWT)



3rd Party Tools

Microsoft.AspNet.WebApi.Versioning & Microsoft.AspNetCore.Mvc.Versioning

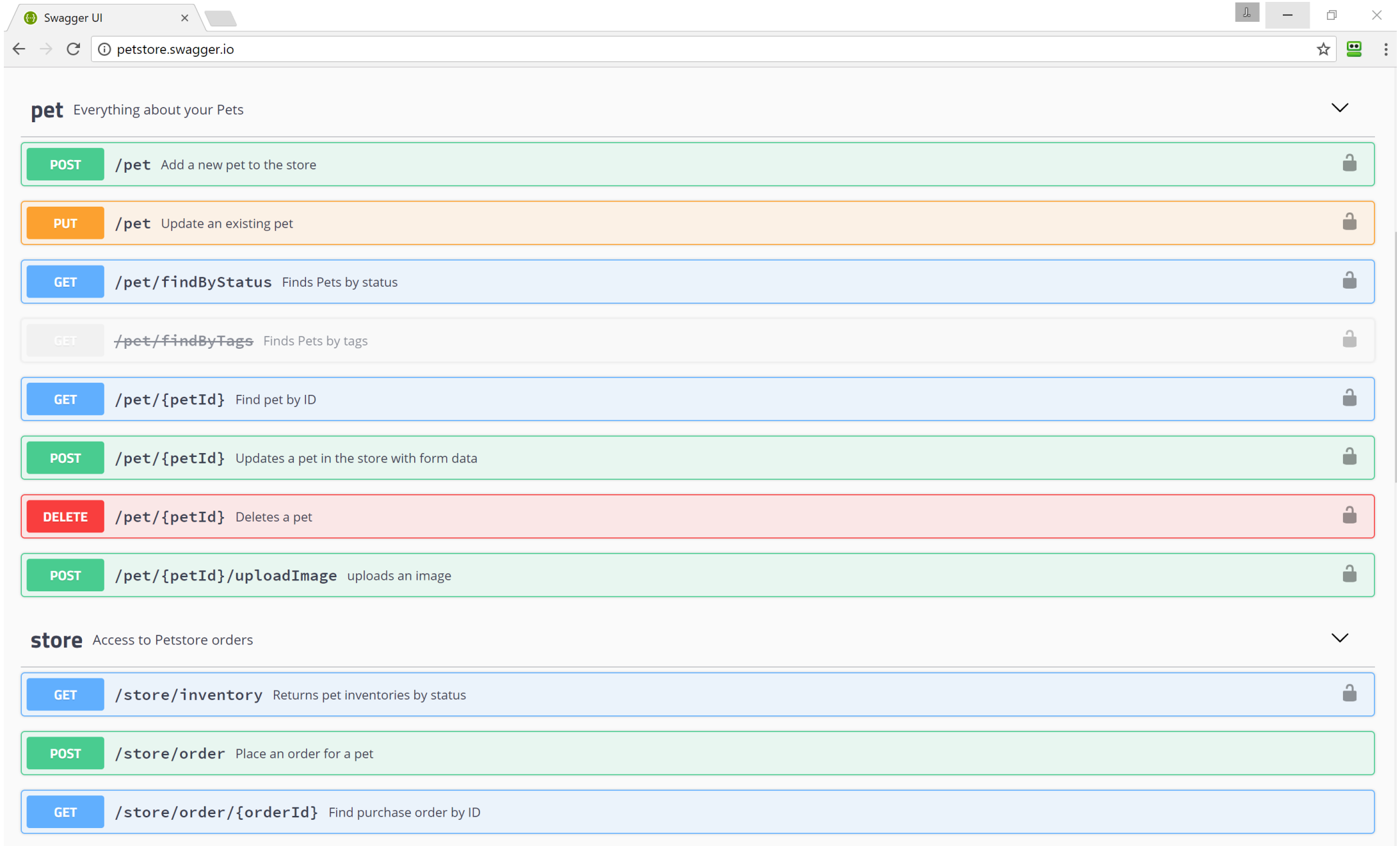
```
[ApiVersion( "1.0" )]
[Route( "api/v{version:apiVersion}/helloworld" )]
public class PeopleController : ApiController

// api/helloworld?api-version=1.0
```

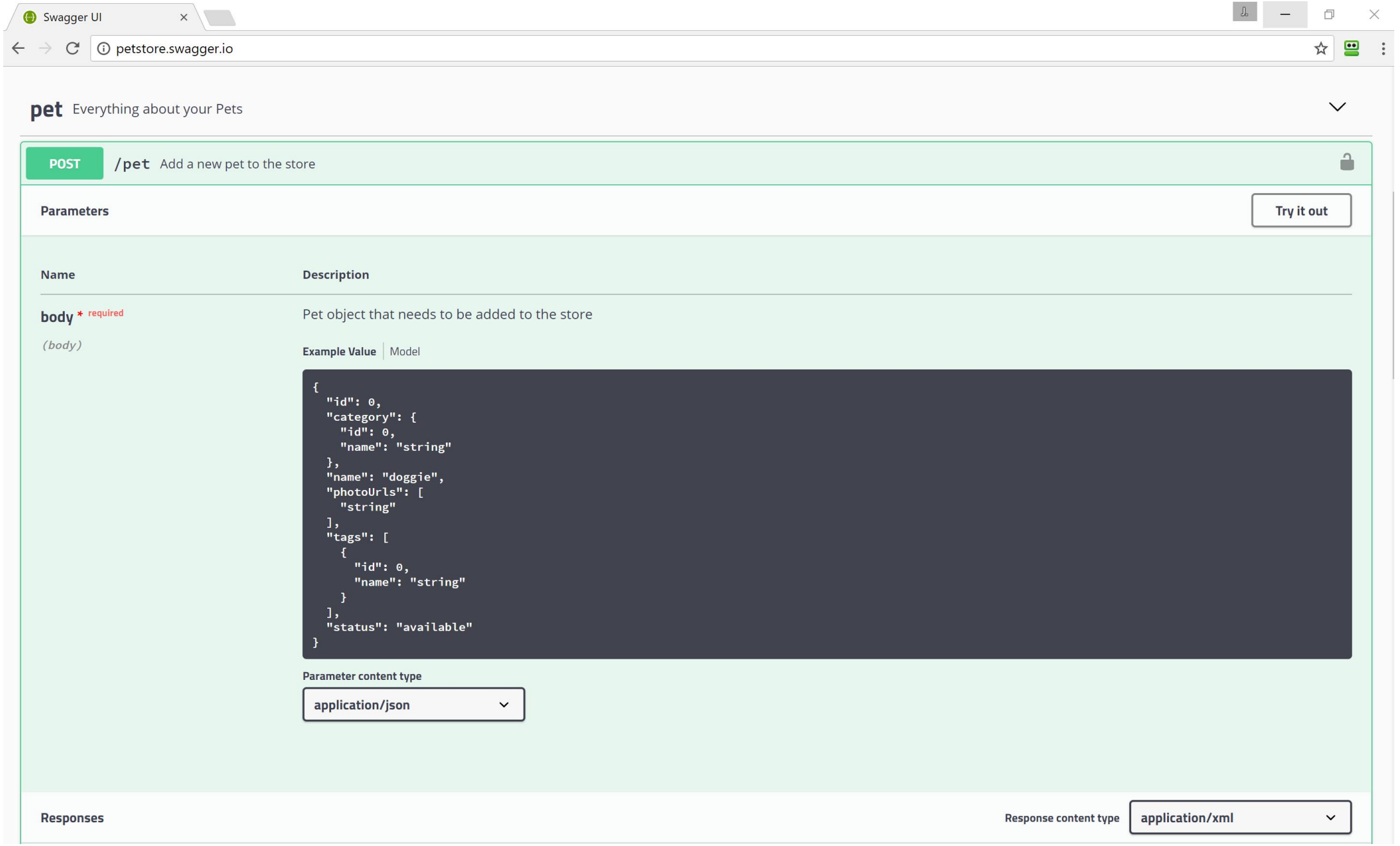
SDammann.WebApi.Versioning

```
config.Routes.MapHttpRoute(
       name: "DefaultApi",
       routeTemplate: "api/v{version}/{controller}/{id}",
       defaults: new { id = RouteParameter.Optional }
);

ApiVersioning.Configure(config)
       .ConfigureRequestVersionDetector<DefaultRouteKeyVersionDetector>();

// Namespace MyApi.Version1_1
```

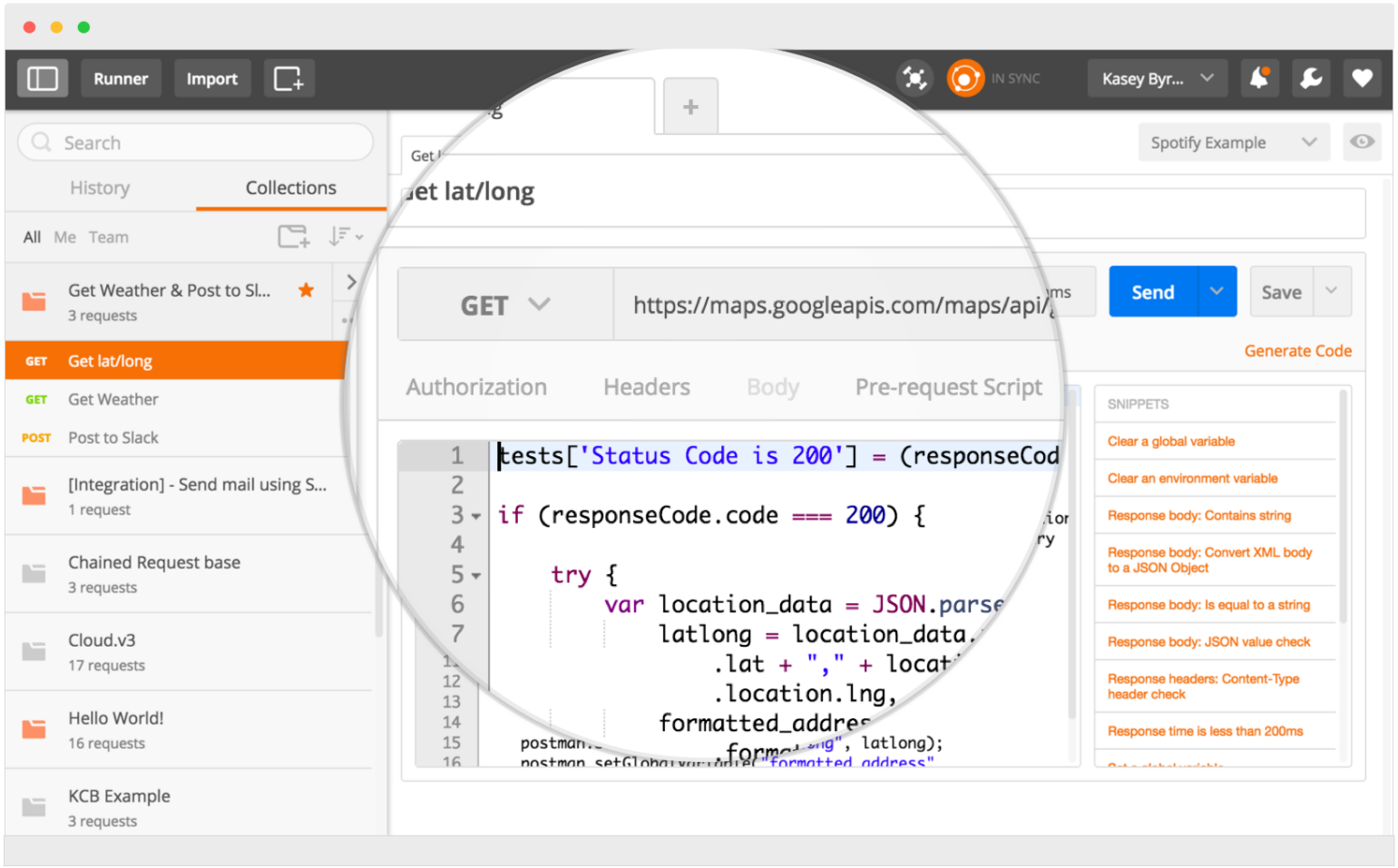
Swashbuckle (Swagger)

```
// .NET
httpConfiguration
      .EnableSwagger(c => c.SingleApiVersion("v1", "My API"))
      .EnableSwaggerUi();

// .NET Core
services.AddMvc();
services.AddSwaggerGen(c =>
{
    c.SwaggerDoc("v1", new Info { Title = "My API", Version = "v1" });
});
```


Swagger UI
petstore.swagger.io
pet Everything about your Pets
POST /pet Add a new pet to the store
PUT /pet Update an existing pet
GET /pet/findByStatus Finds Pets by status
GET /pet/findByTags Finds Pets by tags
GET /pet/{petId} Find pet by ID
POST /pet/{petId} Updates a pet in the store with form data
DELETE /pet/{petId} Deletes a pet
POST /pet/{petId}/uploadImage uploads an image
store Access to Petstore orders
GET /store/inventory Returns pet inventories by status
POST /store/order Place an order for a pet
GET /store/order/{orderId} Find purchase order by ID

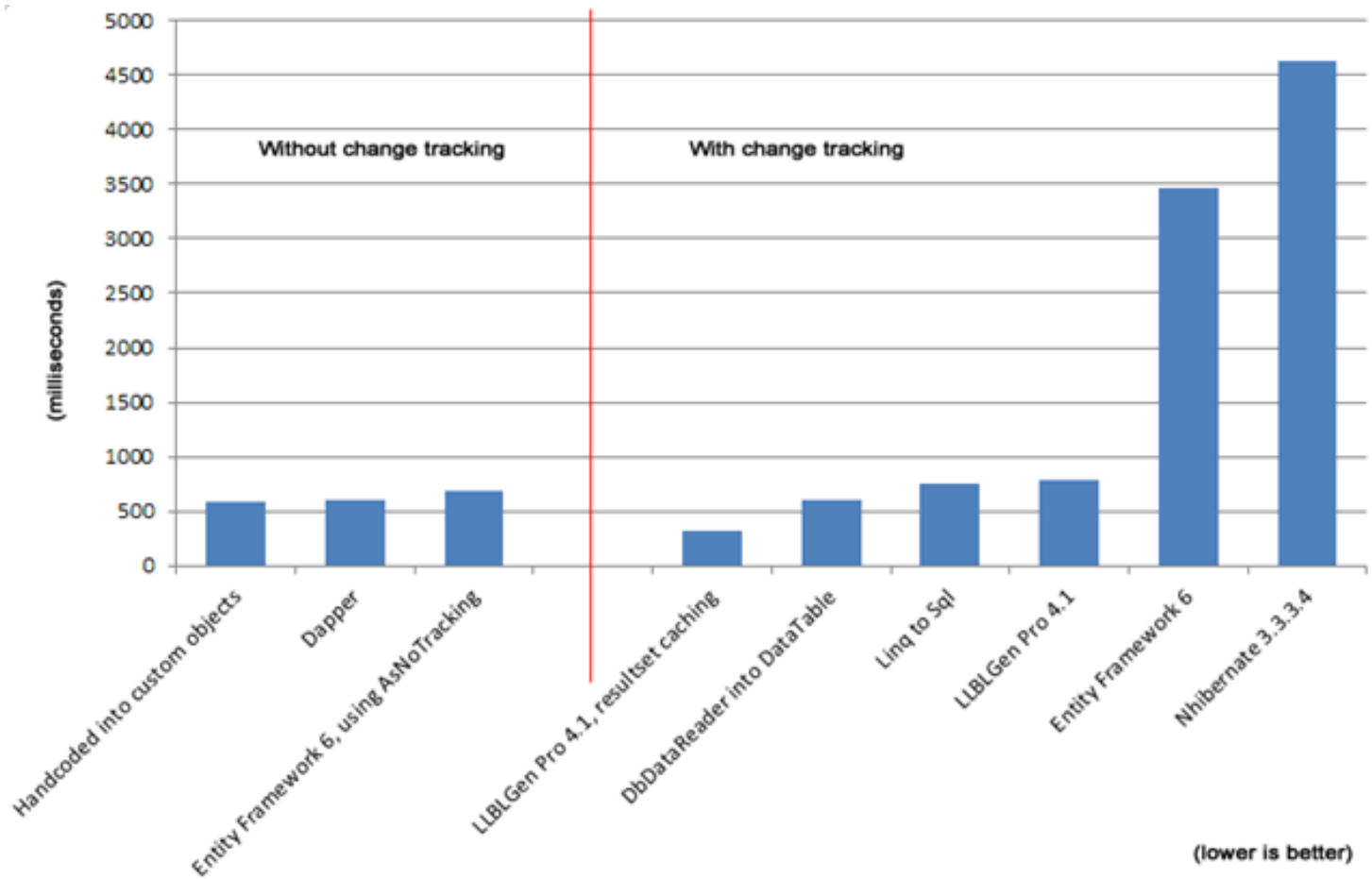

Swagger UI
petstore.swagger.io
pet Everything about your Pets
POST /pet Add a new pet to the store
Parameters
Try it out
Name
Description
body * required
(body)
Pet object that needs to be added to the store
Example Value | Model
{
"id": 0,
"category": {
"id": 0,
"name": "string"
},
"name": "doggie",
"photoUrls": [
"string"
],
"tags": [
{
"id": 0,
"name": "string"
}
],
"status": "available"
}
Parameter content type
application/json
Responses
Response content type
application/xml

Postman


Runner
Import
IN SYNC
Kasey Byr...
Search
History
Collections
All Me Team
Spotify Example
Get Weather & Post to Sl...
3 requests
Get lat/long
GET
https://maps.googleapis.com/maps/api/
Send
Save
Generate Code
Authorization
Headers
Body
Pre-request Script
Get Weather
Post to Slack
[Integration] - Send mail using S...
1 request
Chained Request base
3 requests
Cloud.v3
17 requests
Hello World!
16 requests
KCB Example
3 requests
SNIPPETS
Clear a global variable
Clear an environment variable
Response body: Contains string
Response body: Convert XML body to a JSON Object
Response body: Is equal to a string
Response body: JSON value check
Response headers: Content-Type header check
Response time is less than 200ms
tests['Status Code is 200'] = (responseCod
if (responseCode.code === 200) {
try {
var location_data = JSON.parse
latlong = location_data.
.lat + "," + locat
.location.lng,
formatted_addres
postman
latlong);

Performance

AsNoTracking()



Async/Await

Some tasks require waiting (database access, http calls)

More simultaneous requests!

Analogy: making breakfast

Caching

```
var key = "someKey";
MemoryCache memoryCache = MemoryCache.Default;

var item = memoryCache.Get(key);
if (item == null)
{
    item = new { }; // todo – go get item
    memoryCache.Add(key, value, DateTimeOffset.Now.AddMinutes(30));
}

return item;
```

Recap

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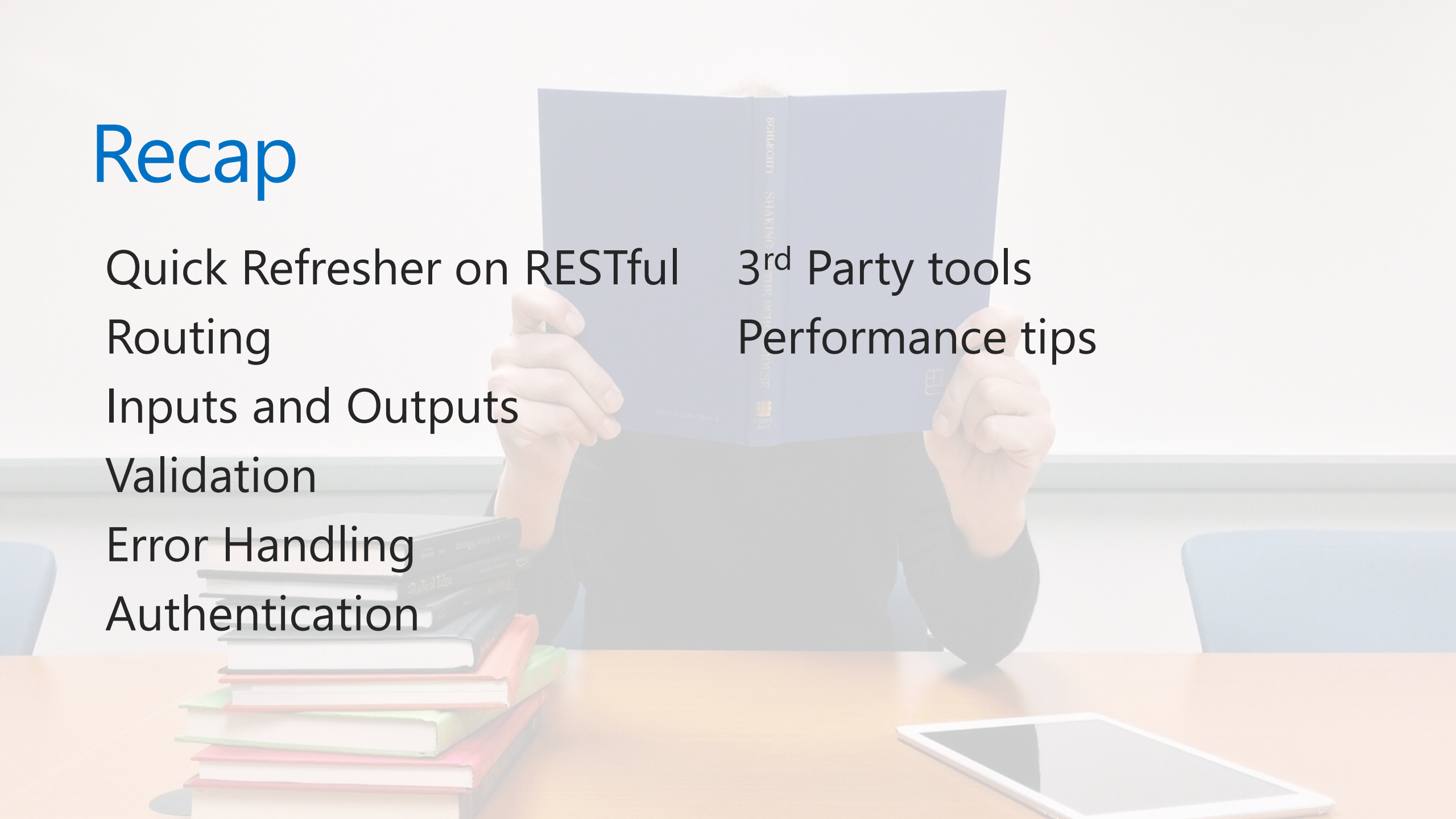

Thanks You! Questions?

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