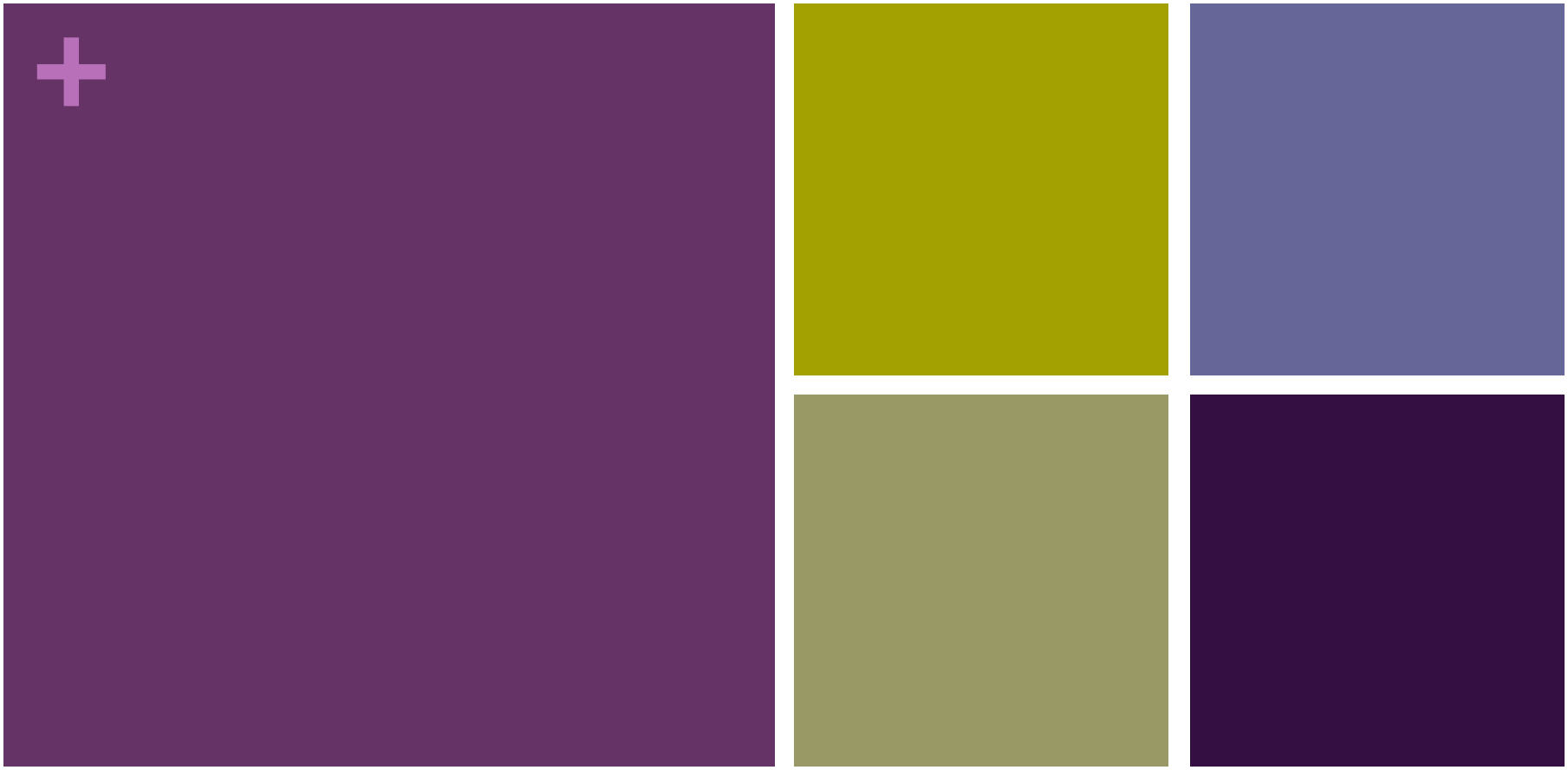

REST API Development

B. Mason
Netapp E-Series

Disclaimer

Opinion expressed here are mine and do not necessarily represent Netapp

Who am I??

- Software Engineer at Netapp E-Series AppAware
- Designer and lead for the REST API for E-Series
- Have done various API in C/C++/Java/SOAP/REST
- I am not selling a book or anything

Agenda

- What is a REST API?
  - How are they different from previous API protocols?
  - Why are they so useful?
- Technology Primer for REST
- How to build a REST API
- Documentation Standards
- Using a REST API as a client

Why we do care about the API?

- Integration, Integration, Integration
- IDC Predicts we are in the "Golden Age of APIs"
- "We don't need a fancy GUI" we need it to plugin to X
- Enterprises don't care about GUI, they want hardware to plugin to their Enterprise systems
  - CINDER
  - VASA
  - Etc.…
- Classically handled by CLI

What is a REST API?

- Wikipedia: **Representational State Transfer** (**REST**) is a software architecture style for building scalable web services.
- Objects are exposed as Uniform Resource Identifier (URI/URL)
- Object data is accessed via HTTP(S) and encoded in something easy to parse (Plain Text/JSON/XML)
- Other attributes
  - Client/Server
  - Stateless
  - Cacheable
  - Uniform

Why are they different/more useful ?

- REST IS SIMPLE
- Like SOAP and XMLRPC , its "Text Based"
  - No weird binary formats to parse
  - Easy to consume by any language
  - Relies on standard compression algorithms for speed
- Unlike SOAP, it is not overdesigned
  - Its not even designed, it's a pattern
  - No committees, grass roots
- It does not have a standard description language
  - No IDL, WSDL, MIDL

Explore Simple Web Service

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Lets look at a Demo

Technology Primer for REST

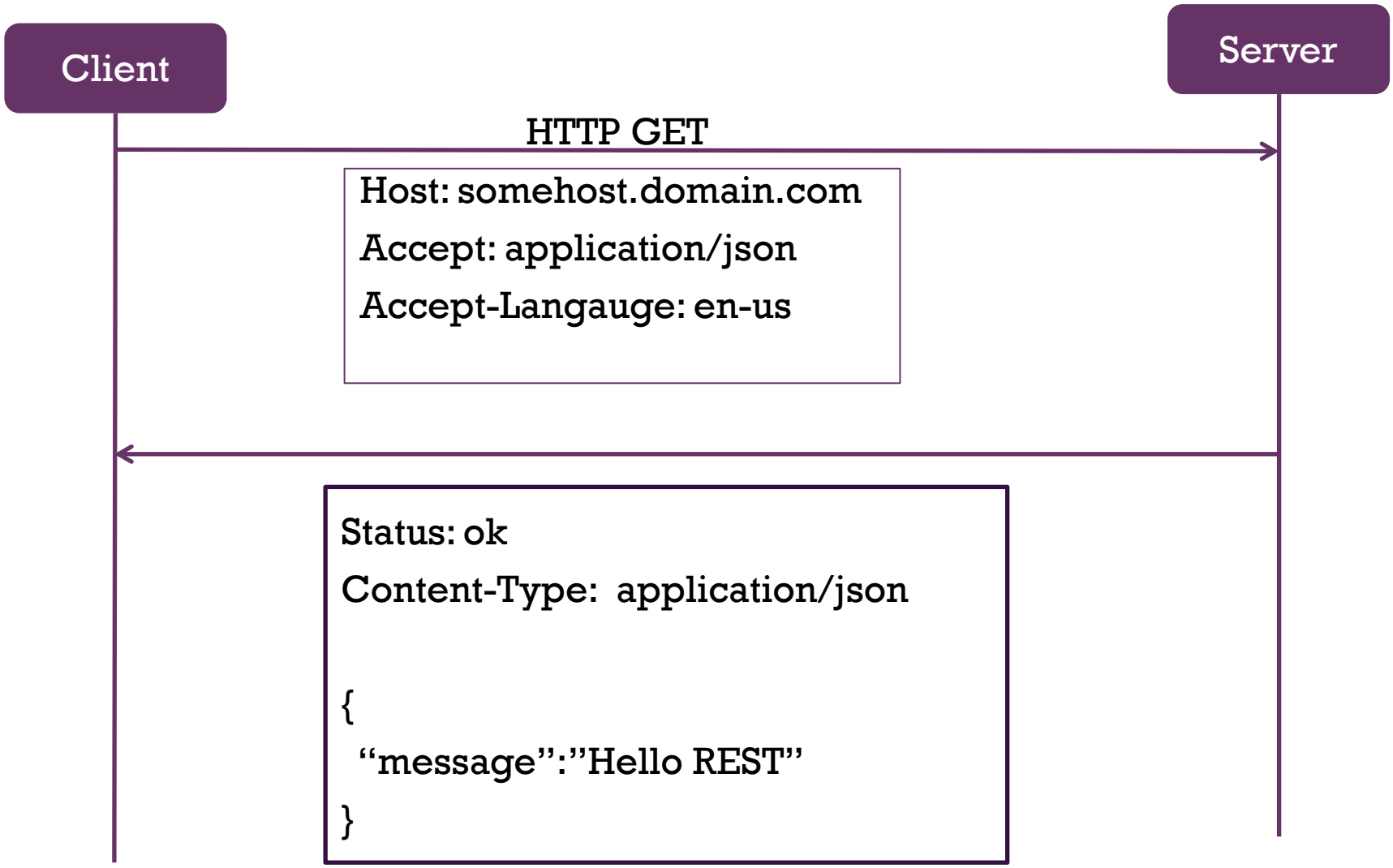
Definitions

- HTTP – Hyper Text Transfer Protocol
- HTTPS – Secure HTTP (AKA, HTTP over SSL)
- Mime Type - is a two-part identifier to standardize file-formats across the Internet: (text/plain , text/html, application/json)
- SSL /TLS – Secure Socket Layer / Transport Layer Security
- URL/URI – The address of a resource (http://host:port/path)
- Query String – Part of the URL after the question mark. Contains key/value data
  - http://somehost.com/resource?key=value&key=value
- JSON – Java Script Object Notation

HTTP Verbs

- GET – Gets a Resource (What happens when you surf)
- POST – Creates a new Sub Resource
- PUT – Updates a resource
- DELETE – Deletes or Resets a Resource
- HEAD – Like GET but just gets the HEADERS
- OPTION – Used in CORS
- TRACE / CONNECT – Not really used in REST

Sample GET Request



Common HTTP Headers

- Host – Target Host
- Content-Type – Mime Type for the inbound content
- Accept – Mime Types that are acceptable responses
- Accept-Encoding – Acceptable Encoding (zip, etc…)
- Status – The Status code for the response (200,400,500…)

How to build a REST API

Building a REST Server

- All you really need is a way to generate dynamic content
- Frameworks can be a huge help
  - Handles URL mapping to handlers
  - Handles Language Object to Payload and back (JSON, XML etc…)
- REST Frameworks are everywhere
  - Django for Python
  - Certainly ones for .net
  - Several Java Frameworks
- We will focus on Java because that is what I know

Simple Servlet

```
@WebServlet(value ="/test", name = "SimpleRest")
public class SimpleRest extends HttpServlet {

protected void doGet(HttpServletRequest req,

                     HttpServletResp  resp) {
  PrintWriter out;

  out=new PrintWriter(response.getOutputStream());
  resp.setHeader("Content-Type","application/json");
  out.println("{\"message\":\"Hello World\"}");

  out.flush();
  out.close();
 }
}
```

JAX-RS

- Java Specification for REST API
- JSR 339
- Set of annotations to define REST API
- Makes creating REST APIs pretty easy
  - Don't tell my boss
- Jersey is an implementation of JSR 339
- Jersey with Jackson is a frequent combination

JAX RS for Java Quick Example

```
@Path("hello")
public class HelloJersey {
    @GET
    @Produces("application/json")
    public ResponseOne handleGet(){
                ResponseOne ret;

        ret=new ResponseOne("Hello Jersey")

        return ret;
    }
}
```

Response Class - POJO

```
@XmlRootElement
public class ResponseOne implements Serializable{
   private String message;

   public ResponseOne() {
   }

   public ResponseOne(String message) {
      this.message = message;
   }

   public String getMessage() {
      return message;
   }

   public void setMessage(String message) {
      this.message = message;
   }
}
```

Documenting REST APIs

- Good documentation is a Key to user acceptance!
- Quick search will find many options
- WADL – Web Application Description Language
- Swagger – A Open Source project for REST
- Various commercial offerings

Swagger World

- Swagger has a language neutral JSON representation of REST API
- There are tools to produce the JSON
- There is a Web UI project
  - Reads the Swagger JSON definition of your API
  - Presents interactive documentation
- Integrates with various languages

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Swagger UI demo

Question? Do you start with documentation or do you start with code?

Embedding Docs in Code

- How this works is obviously language specific
- For Java, Swagger tools read JAX-RS annotations and custom Swagger annotations
- Python's Django Framework uses Swagger

Using a REST API

Lets start with a demo

- The Advance REST Client is a plugin for Chrome to test REST APIs
- cURL is a command Unix command line for accessing web resources

SDK For REST APIs

- You don't need any special SDKs to consume a REST Server!
  - All modern languages have libraries for HTTP.
  - JSON processing is ubiquitous
- SDKs are a nice to have
  - For strongly type languages like Java, having class definition is nice
  - Swagger provides tools to generate client SDKs

Questions?

Links

- https://jax-rs-spec.java.net/
- http://www.django-rest-framework.org/
- http://swagger.io/
- http://www.w3.org/Protocols/rfc2616/rfc2616.html
- https://jcp.org/en/jsr/detail?id=339
- https://jersey.java.net/
- http://wiki.fasterxml.com/JacksonHome