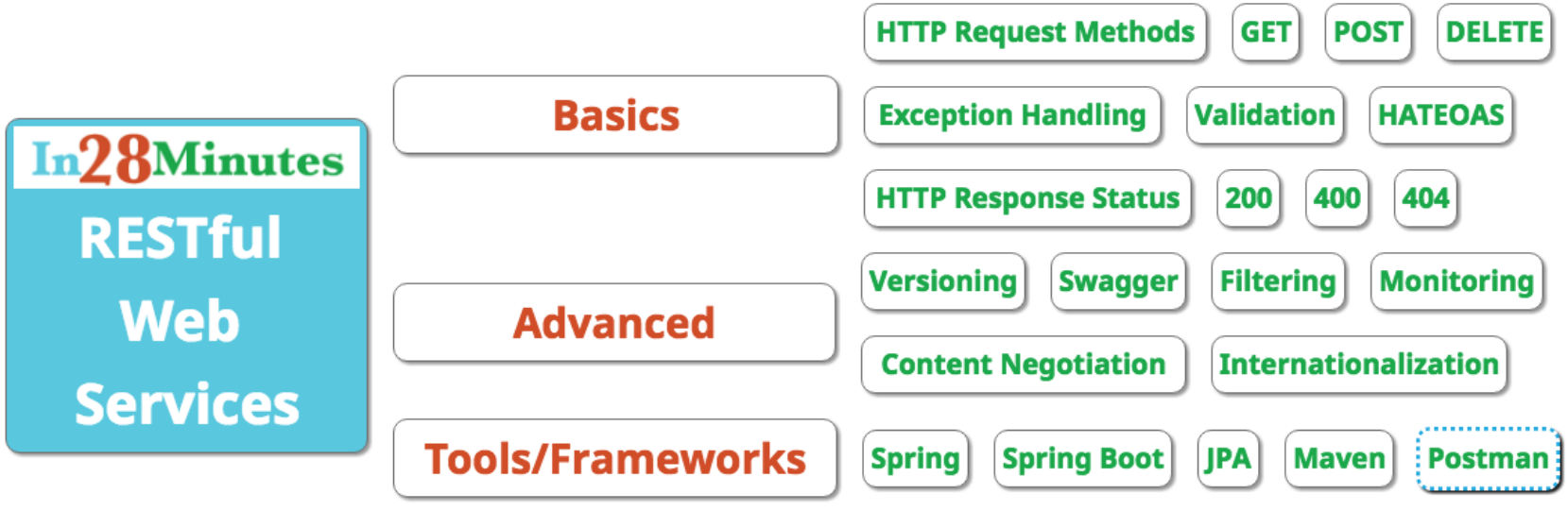
In28Minutes

SPRING MICROSERVICES

In28Minutes Spring Microservices

1. Introduction To Web Services
2. RESTful Web Services - 35 Steps
3. Microservices with Spring Cloud - 45 Steps
4. Introduction to Spring Boot in 10 Steps
5. Introduction to JPA in 10 Steps

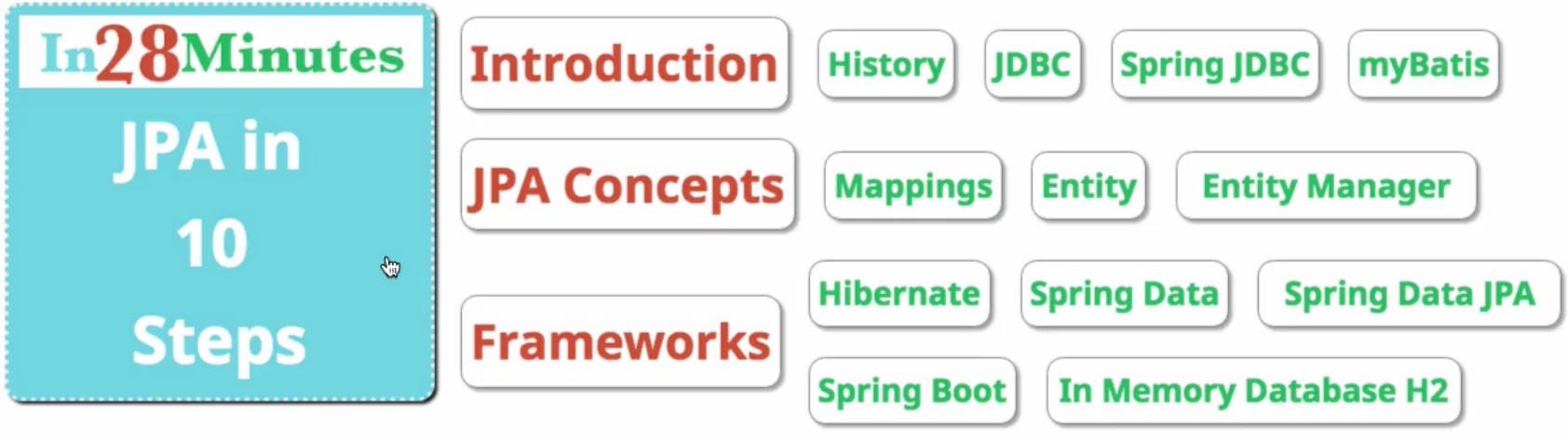

In28Minutes
RESTful Web Services
Basics
HTTP Request Methods
GET
POST
DELETE
Exception Handling
Validation
HATEOAS
HTTP Response Status
200
400
404
Advanced
Versioning
Swagger
Filtering
Monitoring
Content Negotiation
Internationalization
Tools/Frameworks
Spring
Spring Boot
JPA
Maven
Postman

In28Minutes

Microservice with Spring Cloud

1. Spring Cloud Config Server and Bus
2. Load Balancing with Ribbon and Feign
3. Implement Naming Server with Eureka
4. Implementing API Gateway with Zuul
5. Distributed Tracing with Zipkin
6. Fault Tolerance with Hystrix


In28Minutes
Spring Boot
1
Goals and Feature Overview
2
World Before Spring Boot
3
Magic of Spring Initializr
4
Simple REST Controller
5
Spring Boot Auto Configuration
6
vs Spring & Spring MVC
7
Introduction to Starter Projects
8
10 Starter Project Examples
9
Spring Boot Actuator
10
Spring Boot Developer Tools


In28Minutes
JPA in
10
Steps
Introduction
History
JDBC
Spring JDBC
myBatis
JPA Concepts
Mappings
Entity
Entity Manager
Frameworks
Hibernate
Spring Data
Spring Data JPA
Spring Boot
In Memory Database H2

MICROSERVICES

Small autonomous services that work together - Sam Newman

In short, the microservice architectural style is an approach to developing a single application as a suite of small services, each running in its own process and communicating with lightweight mechanisms, often an HTTP resource API....contd

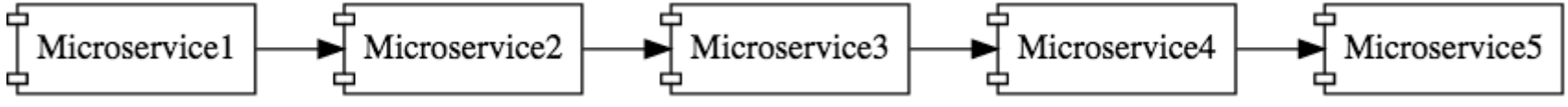
These services are built around business capabilities and independently deployable by fully automated deployment machinery...contd

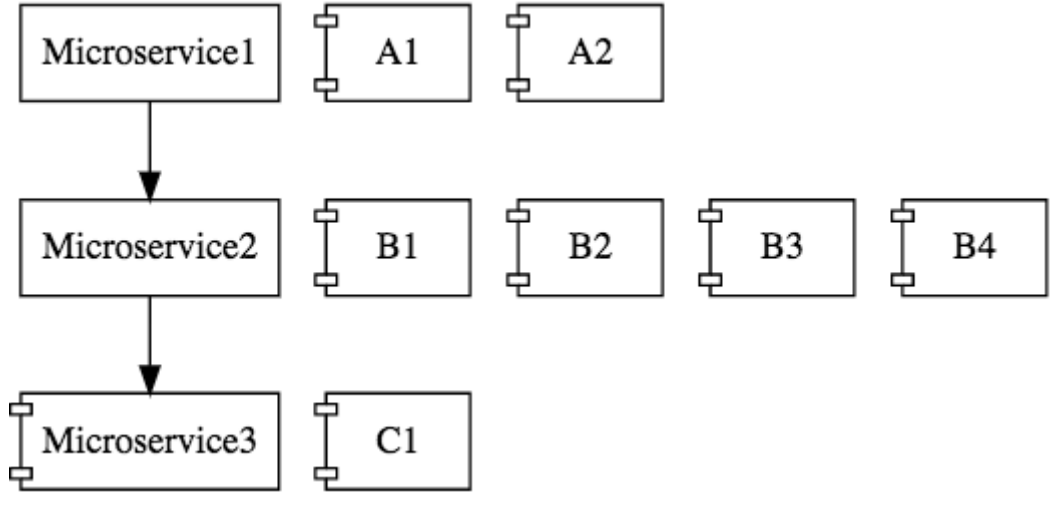
There is a bare minimum of centralized management of these services, which may be written in different programming languages and use different data storage technologies - James Lewis and Martin Fowler

MICROSERVICES

- REST
- & Small Well Chosen Deployable Units
- & Cloud Enabled

HOW DOES IT LOOK?


Microservice1
Microservice2
Microservice3
Microservice4
Microservice5


Microservice1
A1
A2
Microservice2
B1
B2
B3
B4
Microservice3
C1

CHALLENGES

BOUNDED CONTEXT

CONFIGURATION MANAGEMENT

DYNAMIC SCALE UP AND SCALE DOWN

VISIBILITY

PACK OF CARDS

SOLUTIONS

CENTRALIZED CONFIGURATION MANAGEMENT

- Spring Cloud Config Server

LOCATION TRANSPARANCY

- Naming Server (Eureka)

LOAD DISTRIBUTION

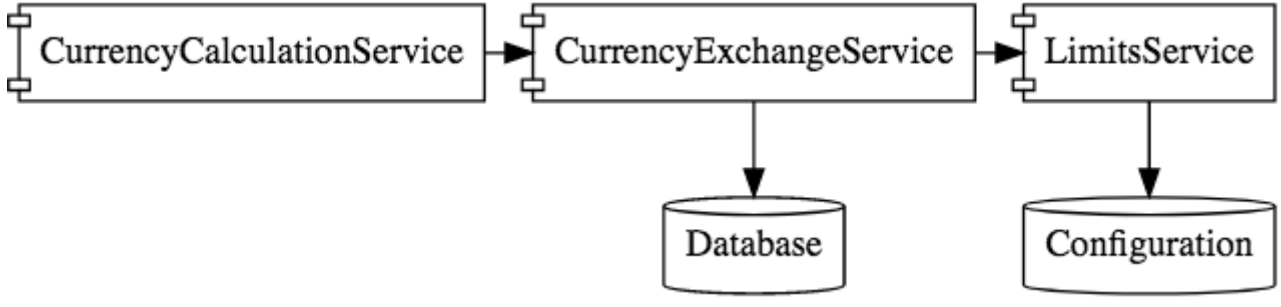
- Ribbon (Client Side)

VISIBILITY AND MONITORING

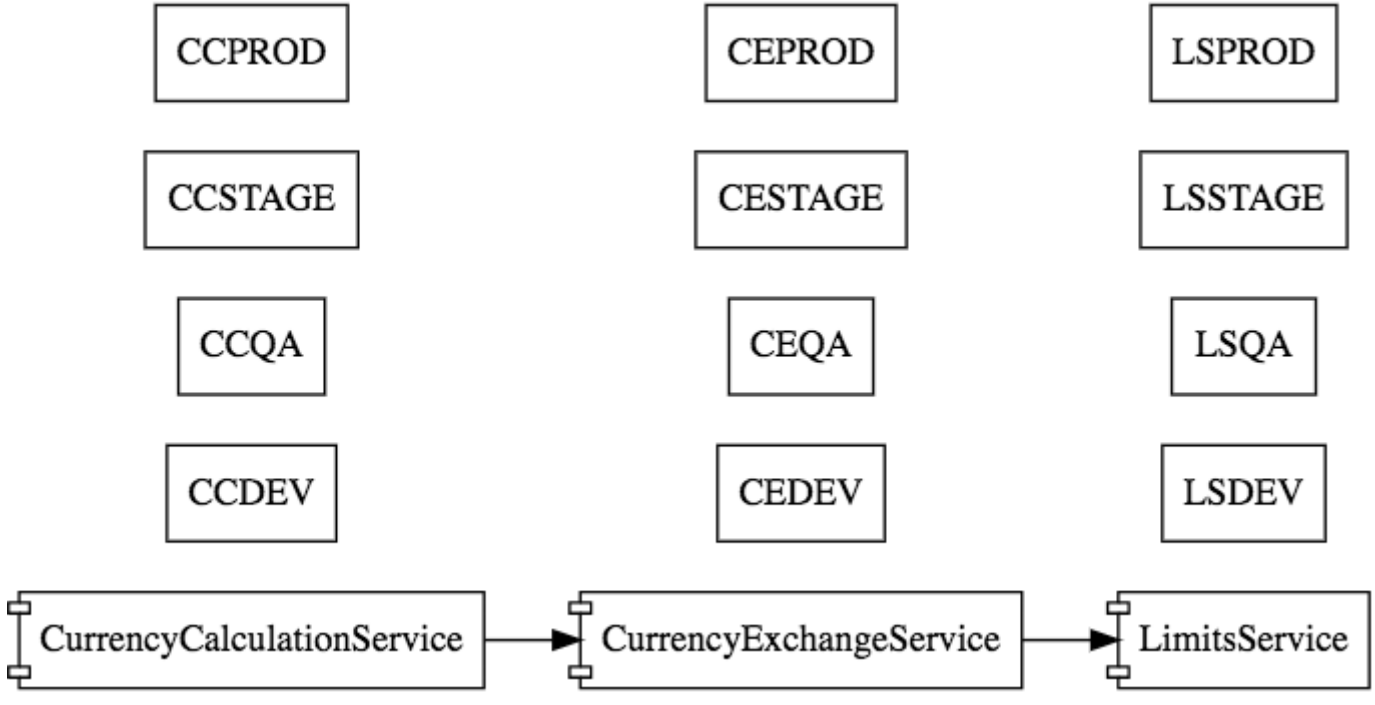
- Zipkin Distributed Tracing
- Netflix API Gateway

FAULT TOLERANCE

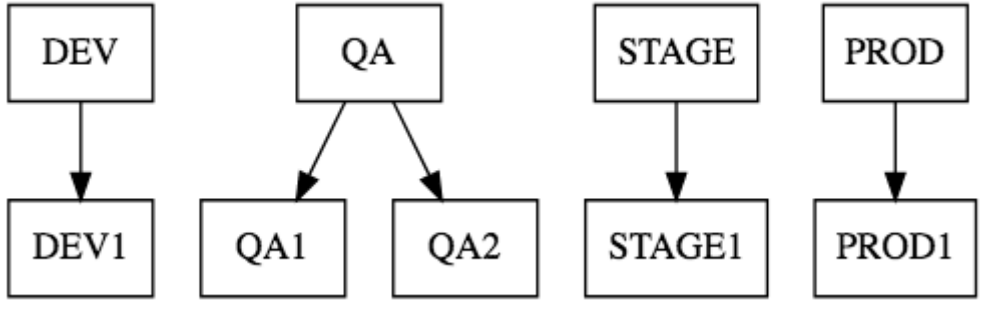
- Hystrix



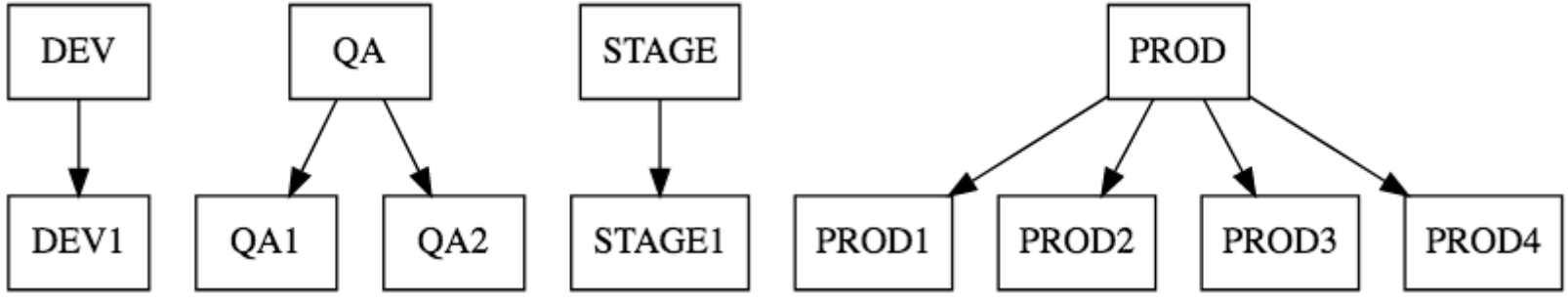
Microservices



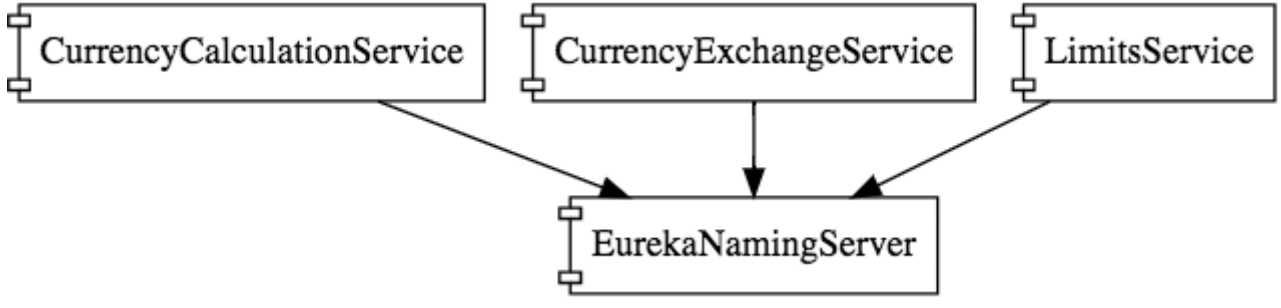
Microservices Environments



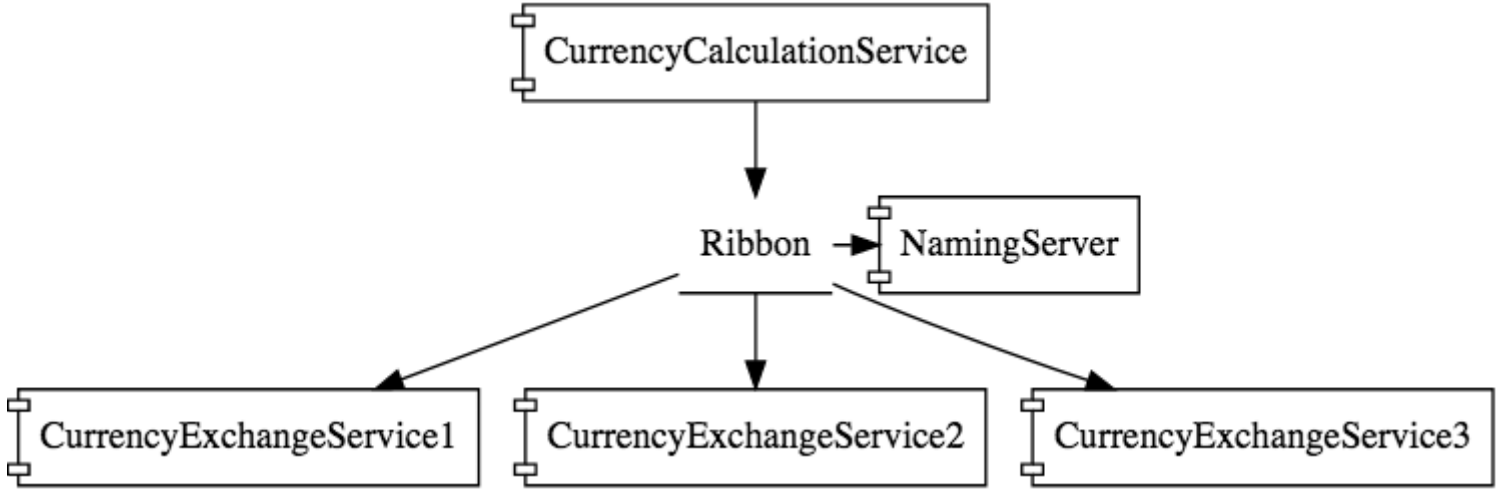
Currency Conversion Service



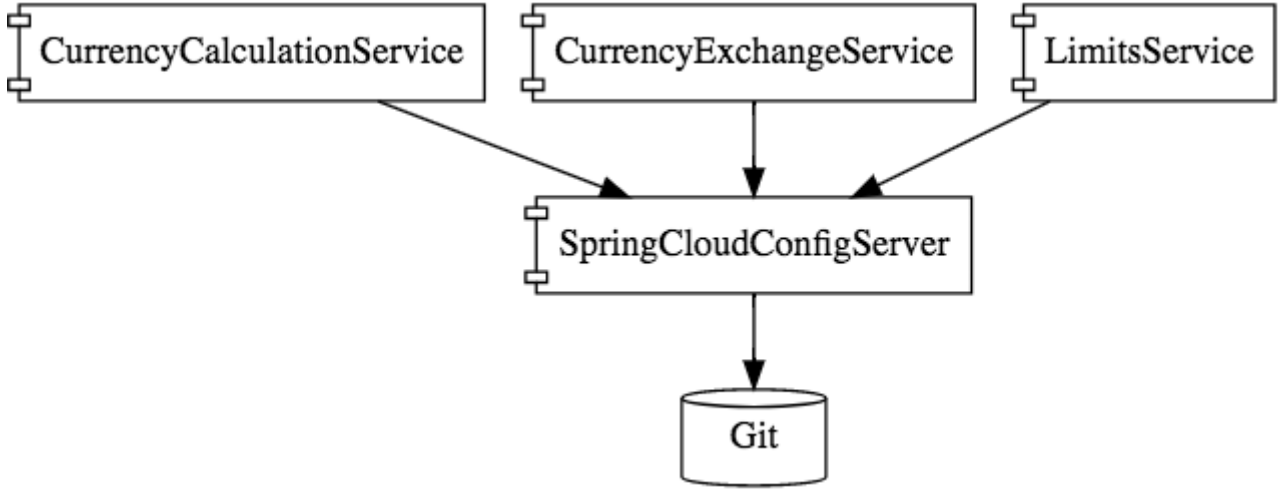
Currency Exchange Service



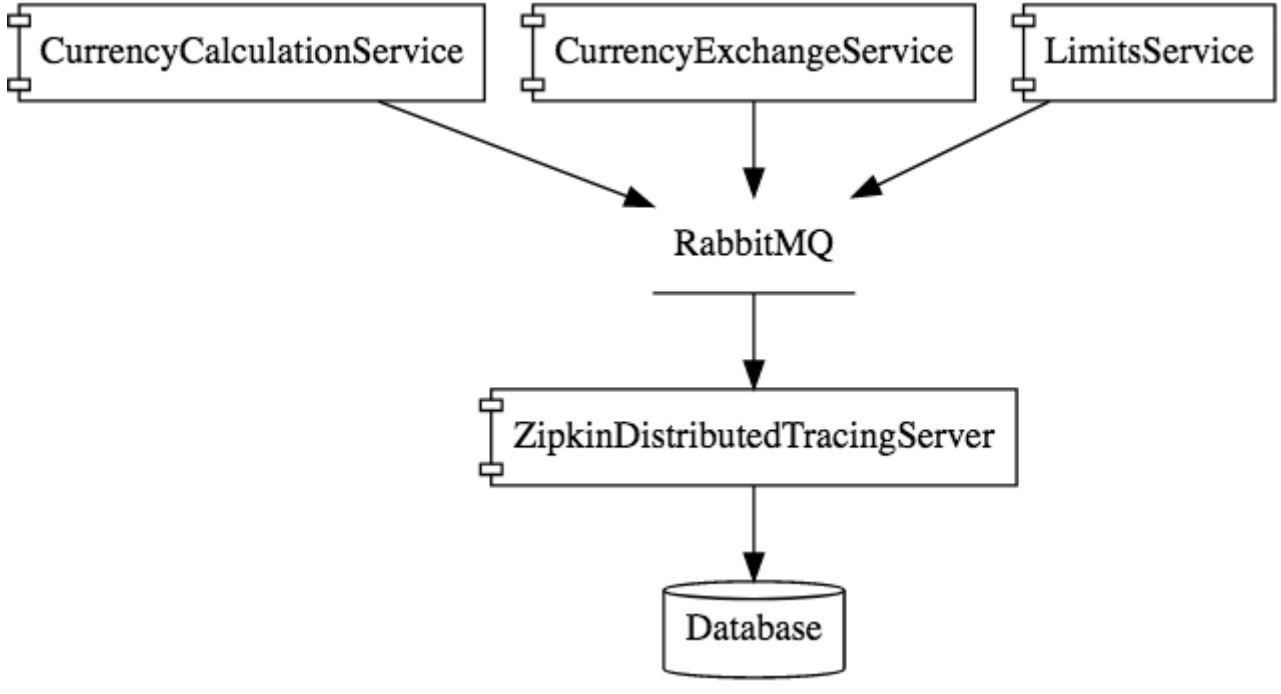
Eureka Naming Server



Ribbon Load Balancing



Spring Cloud Config Server



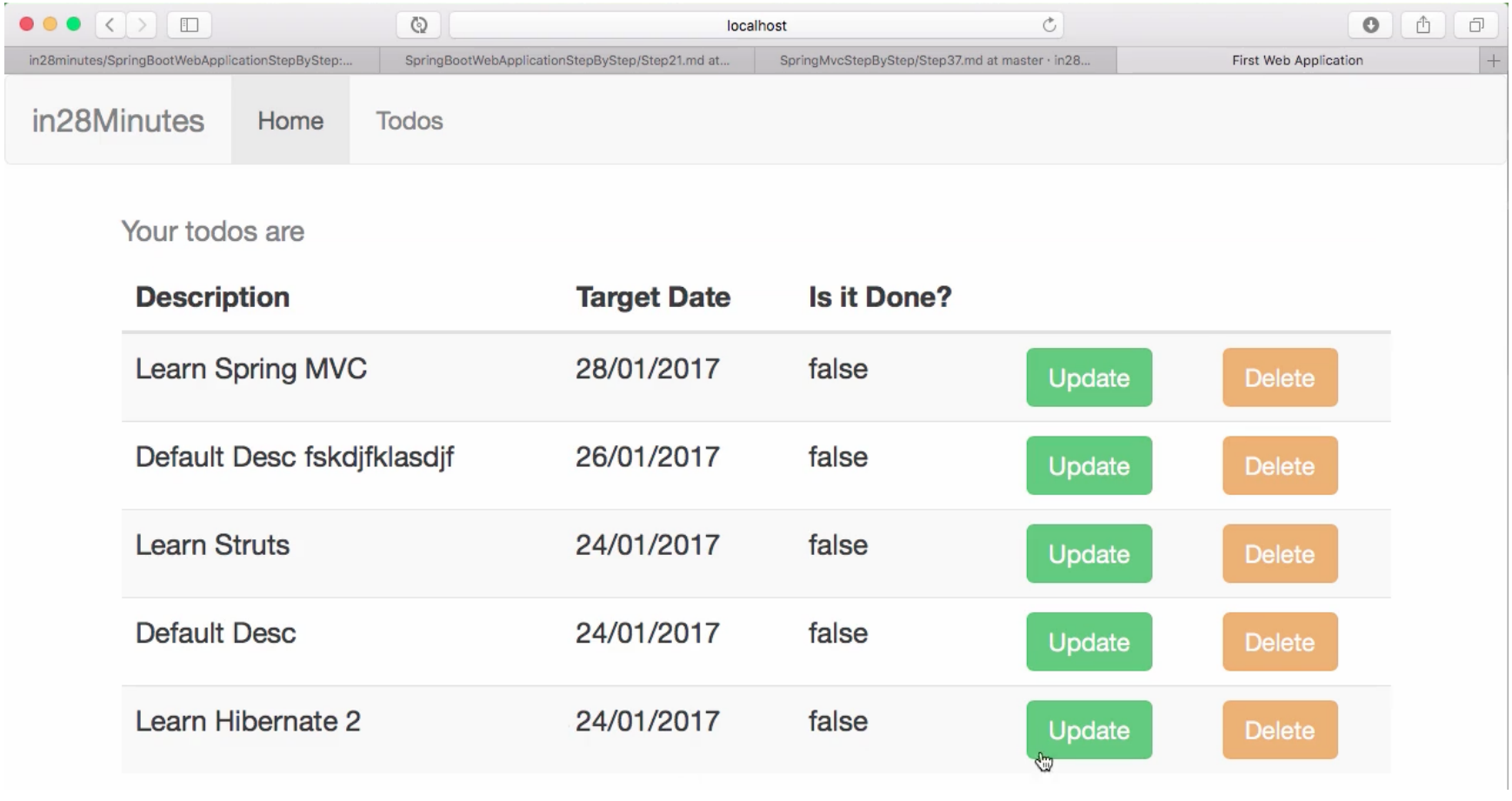
Zipkin Distributed Tracing

API GATEWAYS

- Authentication, authorization and security
- Rate Limits
- Fault Tolerance
- Service Aggregation

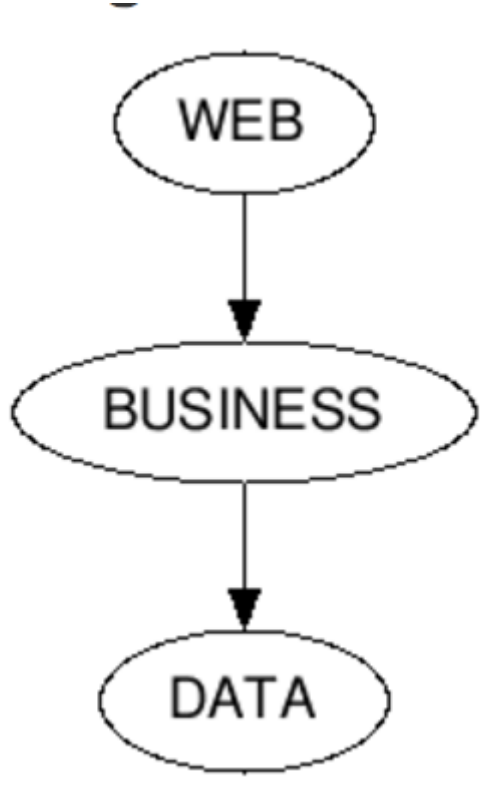
WEB SERVICE

Service delivered over the web?


localhost
in28minutes/SpringBootWebApplicationStepByStep:...
SpringBootWebApplicationStepByStep/Step21.md at...
SpringMvcStepByStep/Step37.md at master · in28...
First Web Application
in28Minutes
Home
Todos
Your todos are
Description
Target Date
Is it Done?
Learn Spring MVC
28/01/2017
false
Update
Delete
Default Desc fskdjfklasdjf
26/01/2017
false
Update
Delete
Learn Struts
24/01/2017
false
Update
Delete
Default Desc
24/01/2017
false
Update
Delete
Learn Hibernate 2
24/01/2017
false
Update
Delete

Is the Todo Management Application a Web Service?

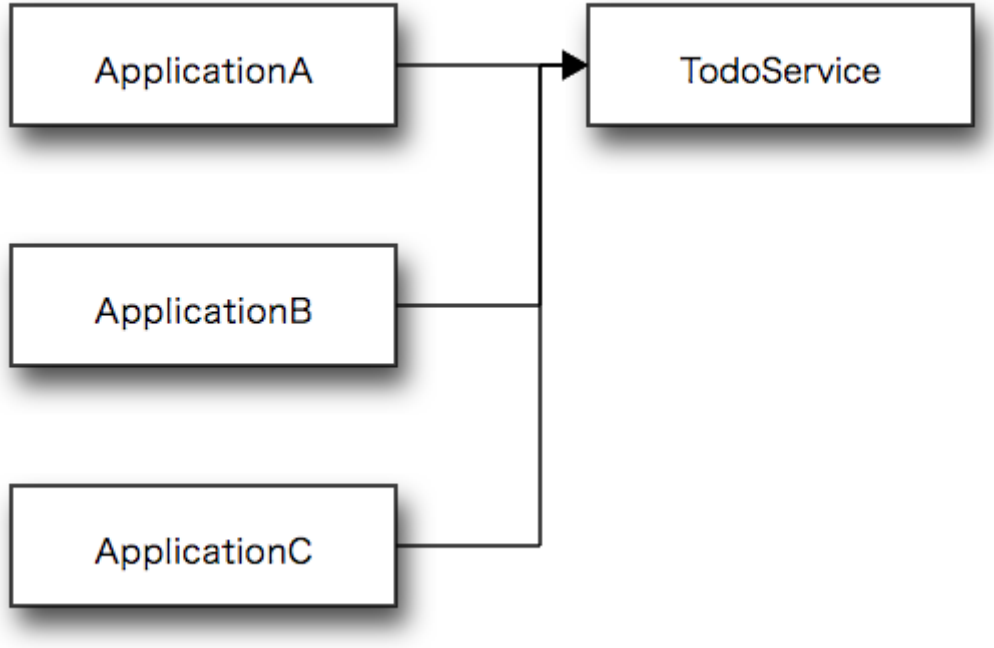
- It delivers HTML output - Not consumable by other applications.


WEB
BUSINESS
DATA

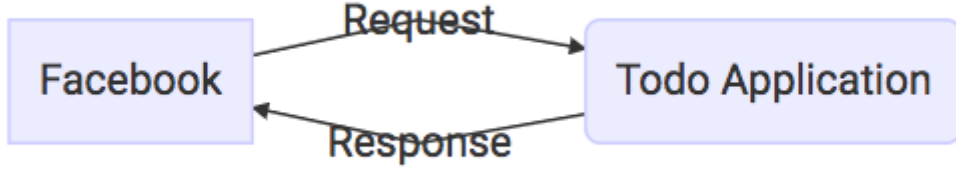
- Can I reuse the Business Layer by creating a JAR?
  - Not Platform independent
  - Communication of Changes
  - Managing Dependencies - like Database

How can I make my Todo application consumable by other applications?

That where we get into the concept of a web service!


ApplicationA
ApplicationB
ApplicationC
TodoService


ApplicationA
TodoService


Facebook
Request
Response
Todo Application

WEB SERVICE - W3C DEFINITION

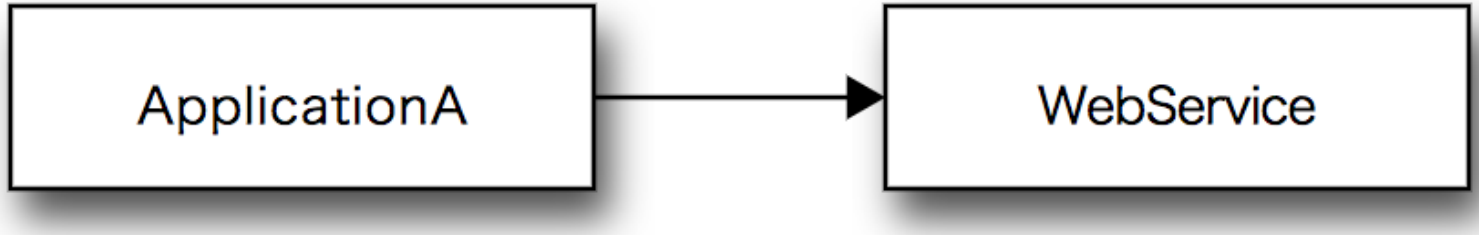
Software system designed to support interoperable machine-to-machine interaction over a network.

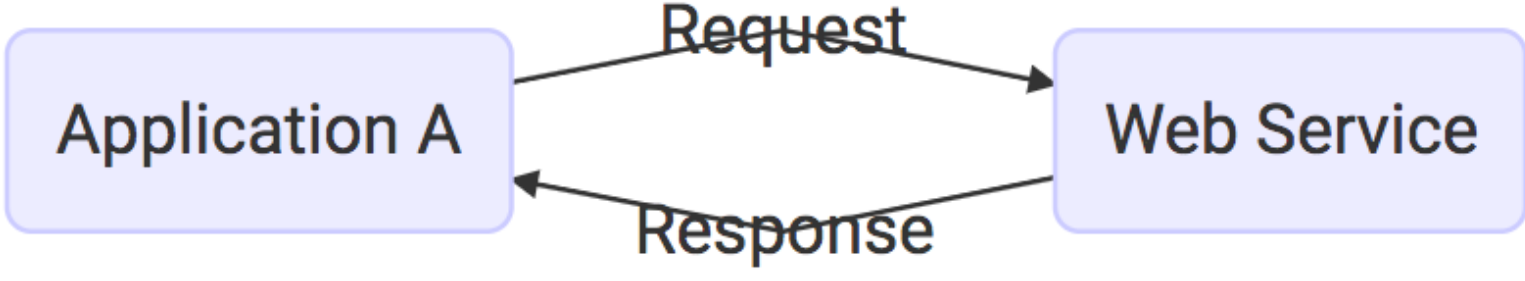
3 KEYS

- Designed for machine-to-machine (or application-to-application) interaction
- Should be interoperable - Not platform dependent
- Should allow communication over a network

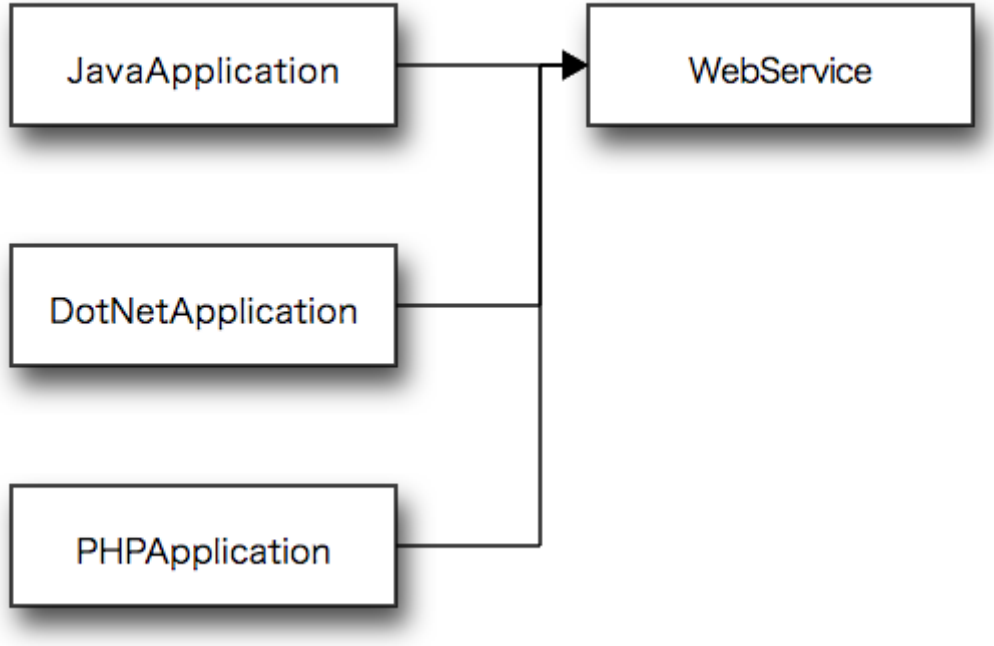
HOW?

How does data exchange between applications take place?


ApplicationA
WebService


Application A
Request
Response
Web Service

How can we make web services platform independent?


JavaApplication
DotNetApplication
PHPApplication
WebService

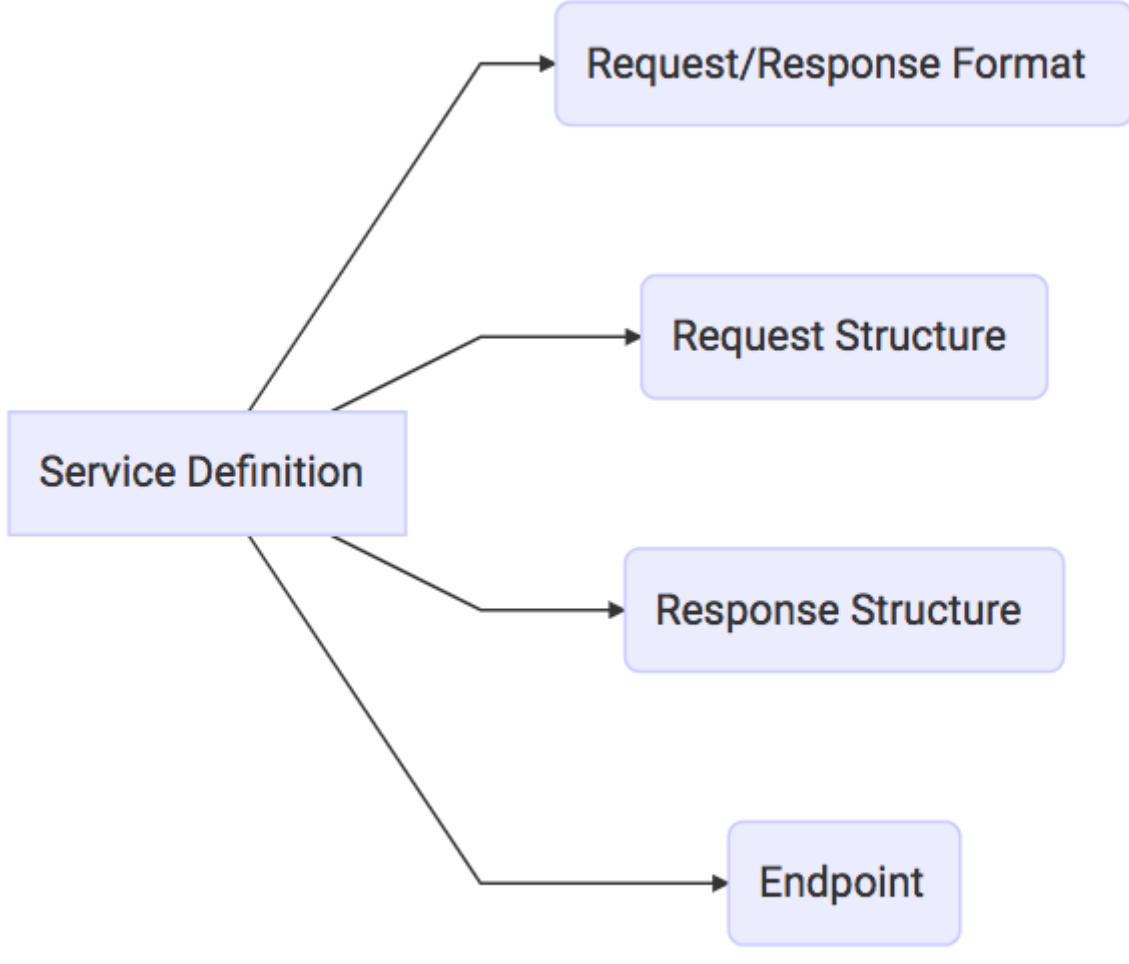
XML

```
<getCourseDetailsRequest>
    <id>Course1</id>
</getCourseDetailsRequest>
```

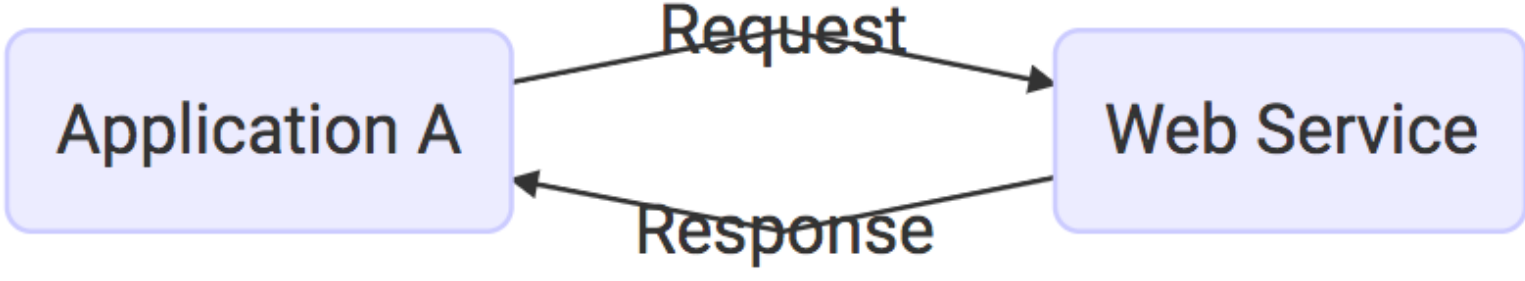
JSON

```
[
  {
    "id": 1,
    "name": "Even",
    "birthDate": "2017-07-10T07:52:48.270+0000"
  },
  {
    "id": 2,
    "name": "Abe",
    "birthDate": "2017-07-10T07:52:48.270+0000"
  }
]
```

How does the Application A know the format of Request and Response?


Request/Response Format
Request Structure
Service Definition
Response Structure
Endpoint

How does Application A and Web Service convert its internal data to (XML or JSON)?


Application A
Request
Response
Web Service

KEY TERMINOLOGY

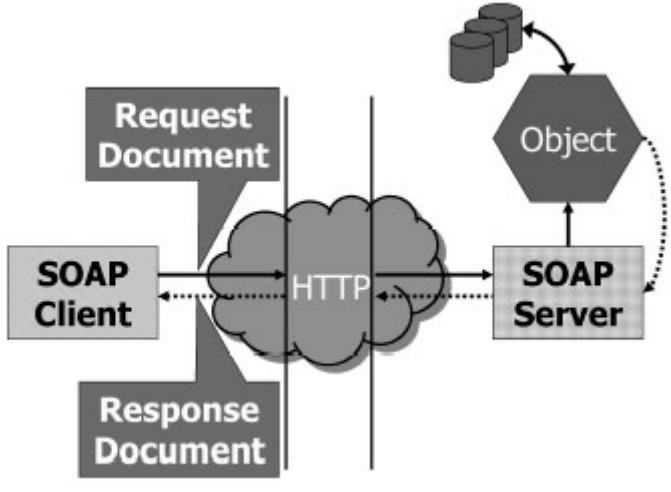
- Request and Response
- Message Exchange Format
  - XML and JSON

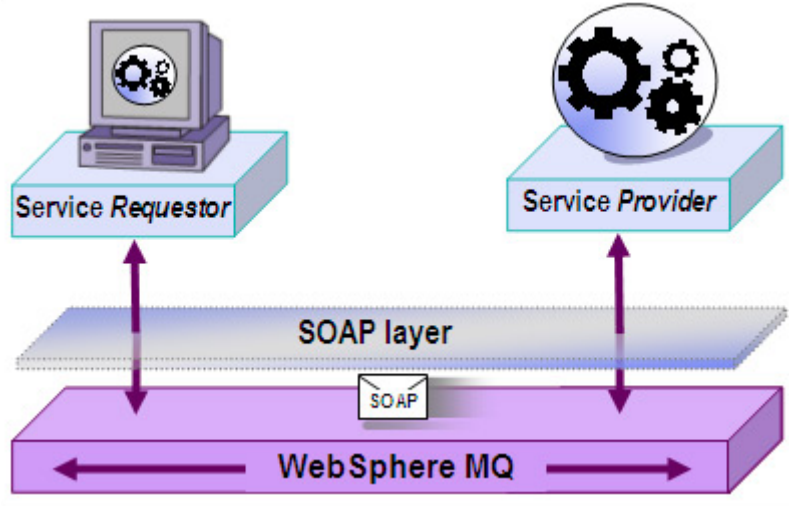
KEY TERMINOLOGY

- Service Provider or Server
- Service Consumer or Client
- Service Definition

KEY TERMINOLOGY

- Transport
  - HTTP and MQ


Request
Document
Object
SOAP
Client
HTTP
SOAP
Server
Response
Document


Service Requestor
Service Provider
SOAP layer
SOAP
WebSphere MQ

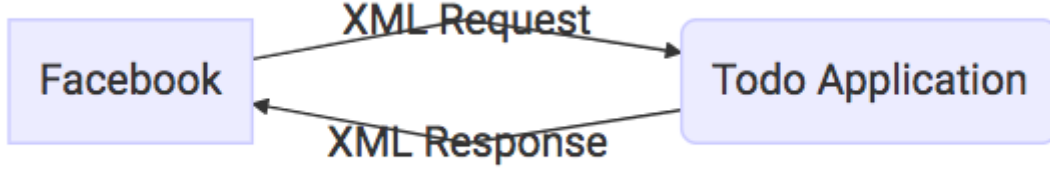
WEB SERVICE GROUPS

- SOAP-based
- REST-styled

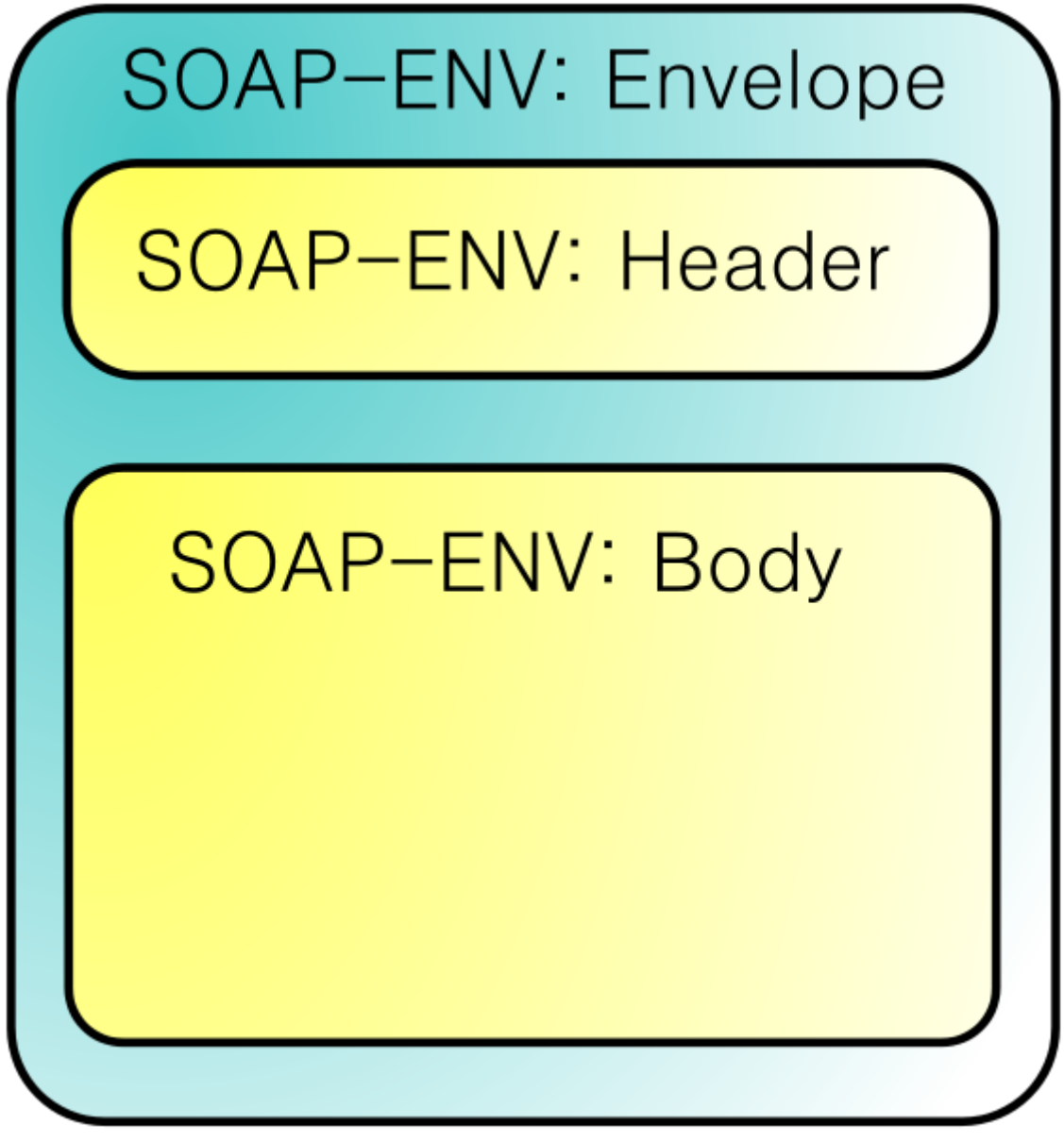
SOAP and REST are not really comparable.

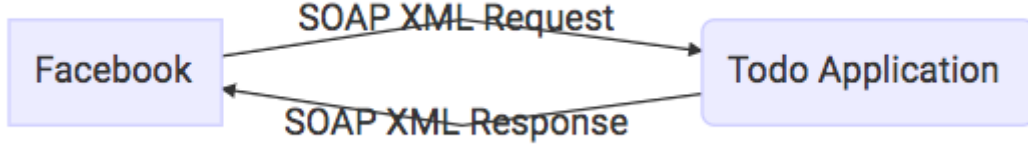
SOAP

SOAP?




```
<getCourseDetailsRequest>
    <id>Course1</id>
</getCourseDetailsRequest>
```


SOAP-ENV: Envelope
SOAP-ENV: Header
SOAP-ENV: Body

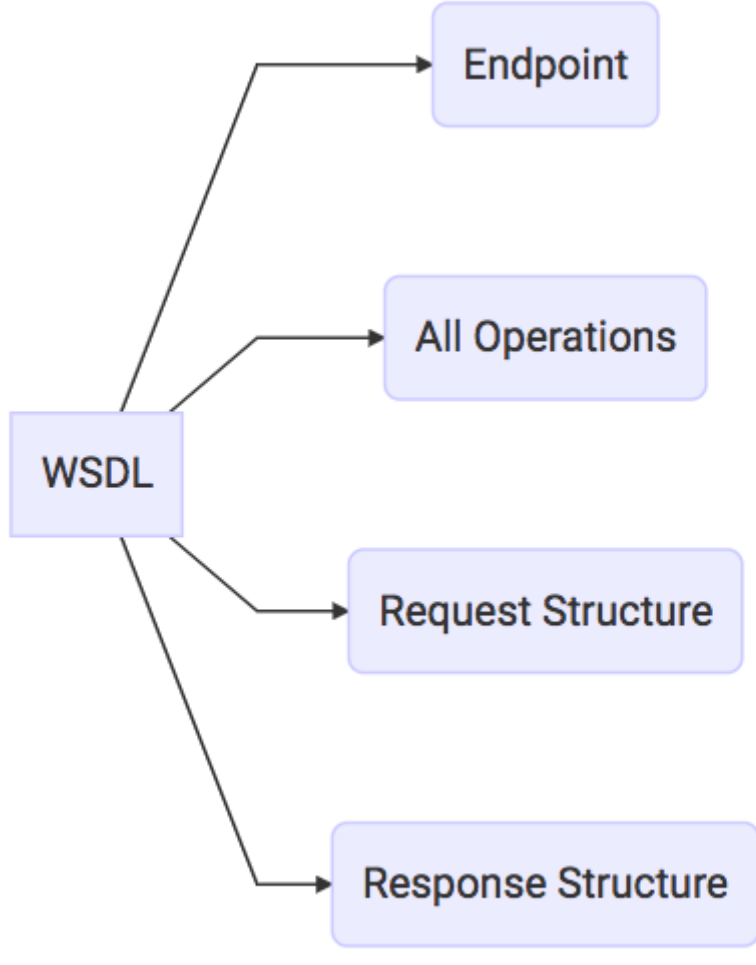

Facebook
SOAP XML Request
SOAP XML Response
Todo Application

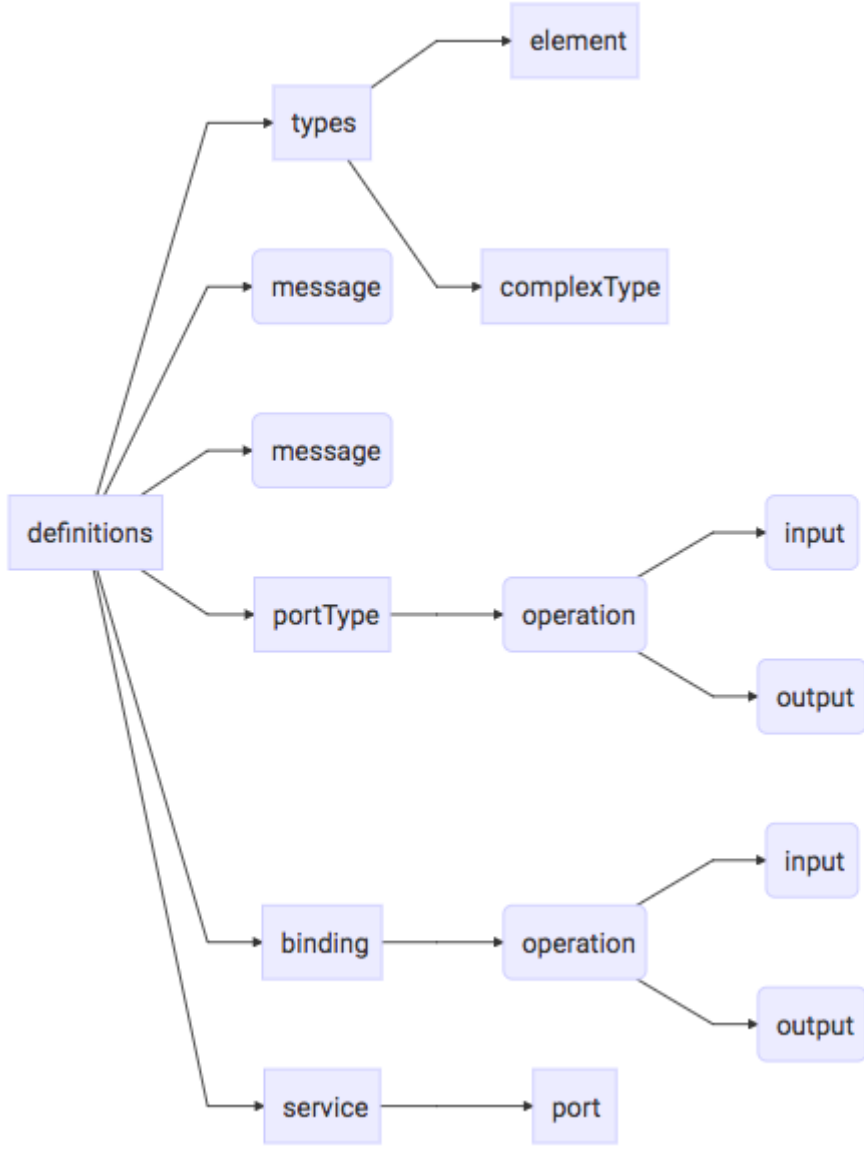
```
<SOAP-ENV:Envelope xmlns:SOAP-ENV="http://schemas.xmlsoap.org/
    <SOAP-ENV:Header/>
    <SOAP-ENV:Body>
        <ns2:getCourseDetailsResponse xmlns:ns2="http://in28mi
            <ns2:course>
                <ns2:id>Course1</ns2:id>
                <ns2:name>Spring</ns2:name>
                <ns2:description>10 Steps</ns2:description>
            </ns2:course>
        </ns2:getCourseDetailsResponse>
    </SOAP-ENV:Body>
</SOAP-ENV:Envelope>
```

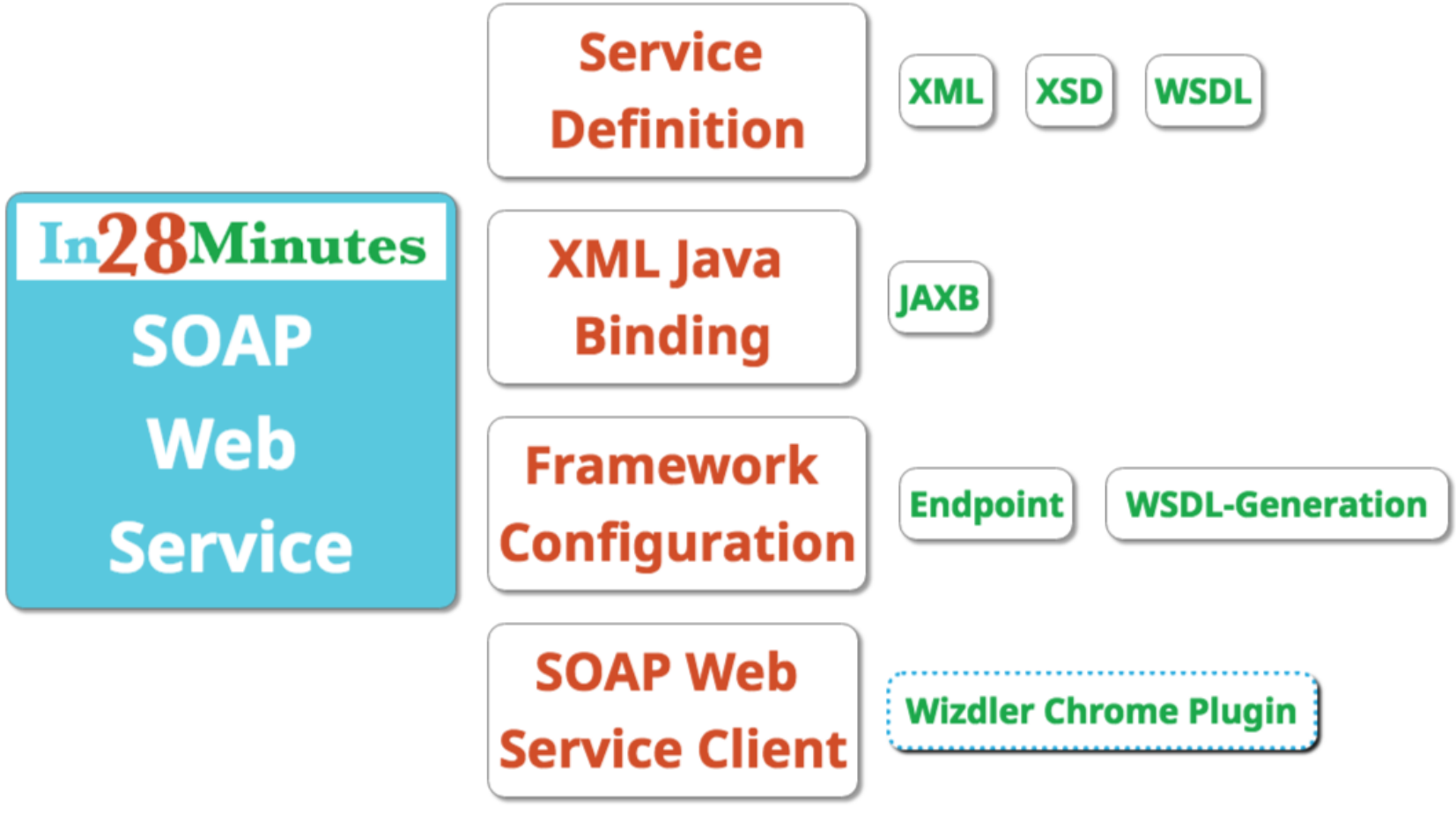
SOAP

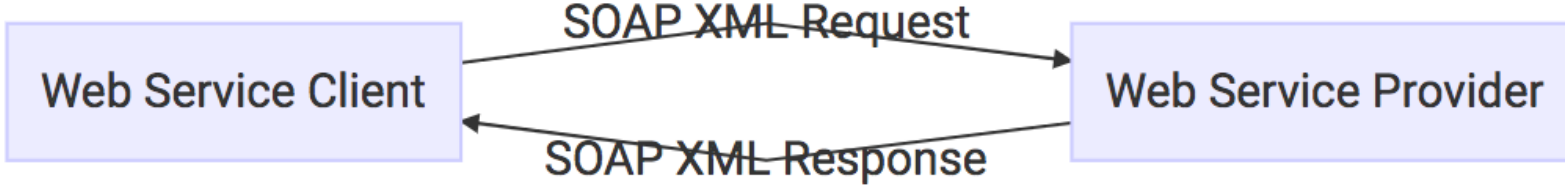
- Format
  - SOAP XML Request
  - SOAP XML Response
- Transport
  - SOAP over MQ
  - SOAP over HTTP
- Service Definition
  - WSDL

WSDL


Endpoint
All Operations
WSDL
Request Structure
Response Structure


element
types
message
complexType
message
definitions
input
portType
operation
output
input
binding
operation
output
service
port


In28Minutes
SOAP
Web
Service
Service Definition
XML
XSD
WSDL
XML Java Binding
JAXB
Framework Configuration
Endpoint
WSDL-Generation
SOAP Web Service Client
Wizdler Chrome Plugin

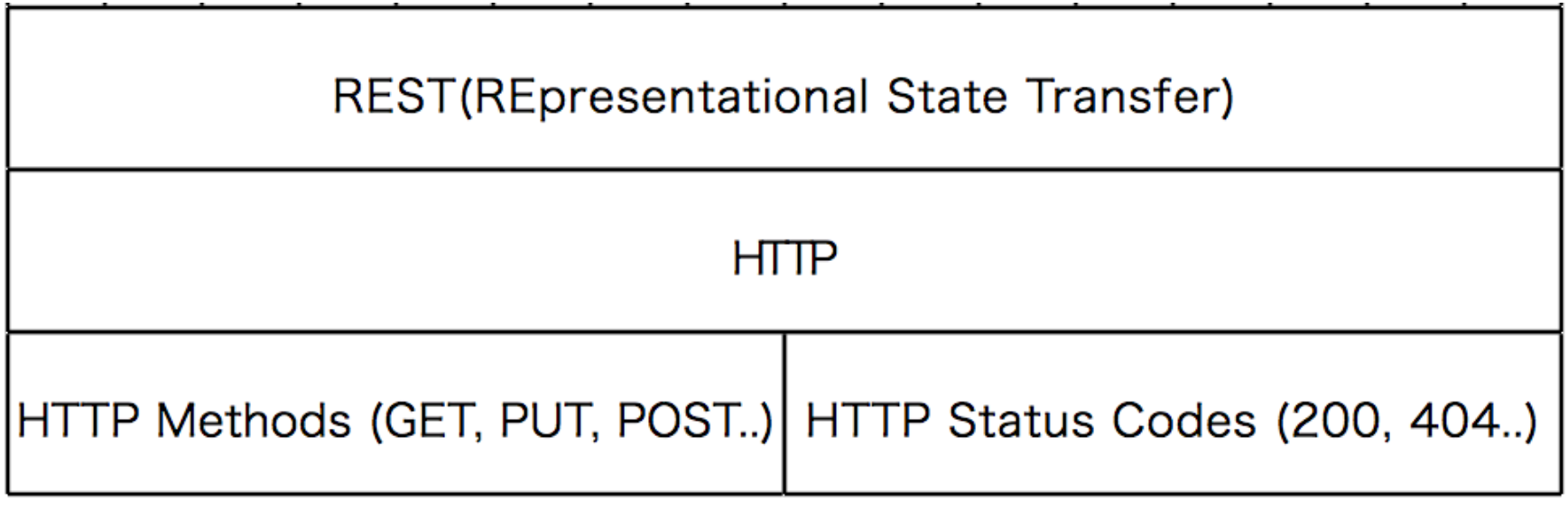

Web Service Client
SOAP XML Request
SOAP XML Response
Web Service Provider

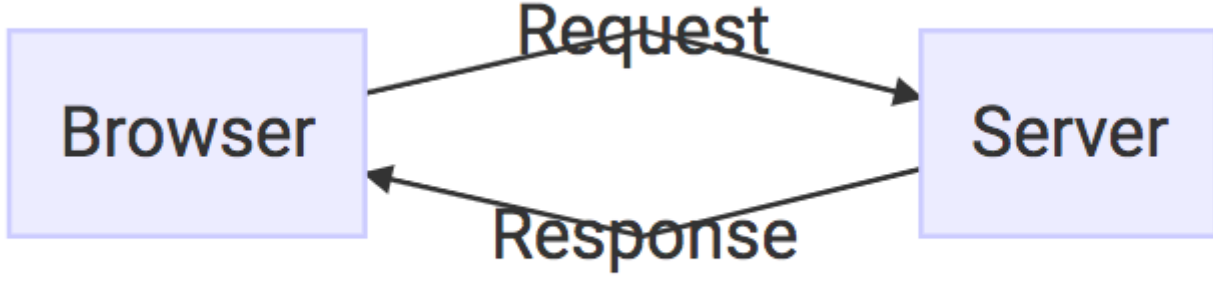
REST

REpresentational State Transfer

REST is a style of software architecture for distributed hypermedia systems

MAKE BEST USE OF HTTP




Browser
Request
Response
Server

KEY ABSTRACTION - RESOURCE

- A resource has an URI (Uniform Resource Identifier)
  - /users/Ranga/todos/1
  - /users/Ranga/todos
  - /users/Ranga
- A resource can have different representations
  - XML
  - HTML
  - JSON

EXAMPLE

- Create a User - POST /users
- Delete a User - DELETE /users/1
- Get all Users - GET /users
- Get one Users - GET /users/1

REST

- Data Exchange Format
  - No Restriction. JSON is popular
- Transport
  - Only HTTP
- Service Definition
  - No Standard. WADL/Swagger/...

REST VS SOAP

- Restrictions vs Architectural Approach
- Data Exchange Format
- Service Definition
- Transport
- Ease of implementation

```
<SOAP-ENV:Envelope xmlns:SOAP-ENV="http://schemas.xmlsoap.org/
    <SOAP-ENV:Header/>
    <SOAP-ENV:Body>
        <ns2:GetCourseDetailsRequest xmlns:ns2="http://in28min
                <ns2:id>Course1</ns2:id>
        </ns2:GetCourseDetailsRequest>
    </SOAP-ENV:Body>
</SOAP-ENV:Envelope>
```

```
<SOAP-ENV:Envelope xmlns:SOAP-ENV="http://schemas.xmlsoap.org/
    <SOAP-ENV:Header/>
    <SOAP-ENV:Body>
        <ns2:GetCourseDetailsResponse xmlns:ns2="http://in28mi
            <ns2:CourseDetails>
                <ns2:id>Course1</ns2:id>
                <ns2:name>Spring</ns2:name>
                <ns2:description>10 Steps</ns2:description>
            </ns2:CourseDetails>
        </ns2:GetCourseDetailsResponse>
    </SOAP-ENV:Body>
</SOAP-ENV:Envelope>
```

RICHARDSON MATURITY MODEL

LEVEL 0

EXPOSE SOAP WEB SERVICES IN REST STYLE

- http://server/getPosts
- http://server/deletePosts
- http://server/doThis

LEVEL 1

EXPOSE RESOURCES WITH PROPER URI

- http://server/accounts
- http://server/accounts/10

NOTE : IMPROPER USE OF HTTP METHODS

LEVEL 2

LEVEL 1 + HTTP METHODS

LEVEL 3

LEVEL 2 + HATEOAS

DATA + NEXT POSSIBLE ACTIONS

BEST PRACTICES IN RESTFUL DESIGN

CONSUMER FIRST

MAKE BEST USE OF HTTP

REQUEST METHODS

- GET
- POST
- PUT
- DELETE

RESPONSE STATUS

- 200 - SUCCESS
- 404 - RESOURCE NOT FOUND
- 400 - BAD REQUEST
- 201 - CREATED
- 401 - UNAUTHORIZED
- 500 - SERVER ERROR

NO SECURE INFO IN URI

USE PLURALS

- Prefer /users to /user
- Prefer /users/1 to /user/1

USE NOUNS FOR RESOURCES

FOR EXCEPTIONS

DEFINE A CONSISTENT APPROACH

- /search
- PUT /gists/{id}/star
- DELETE /gists/{id}/star

CONSUMER FIRST

ARCHITECTURAL STANDARDS

DEFINE ORGANIZATIONAL STANDARDS

- YARAS - https://github.com/darrin/yaras

NAMING RESOURCES

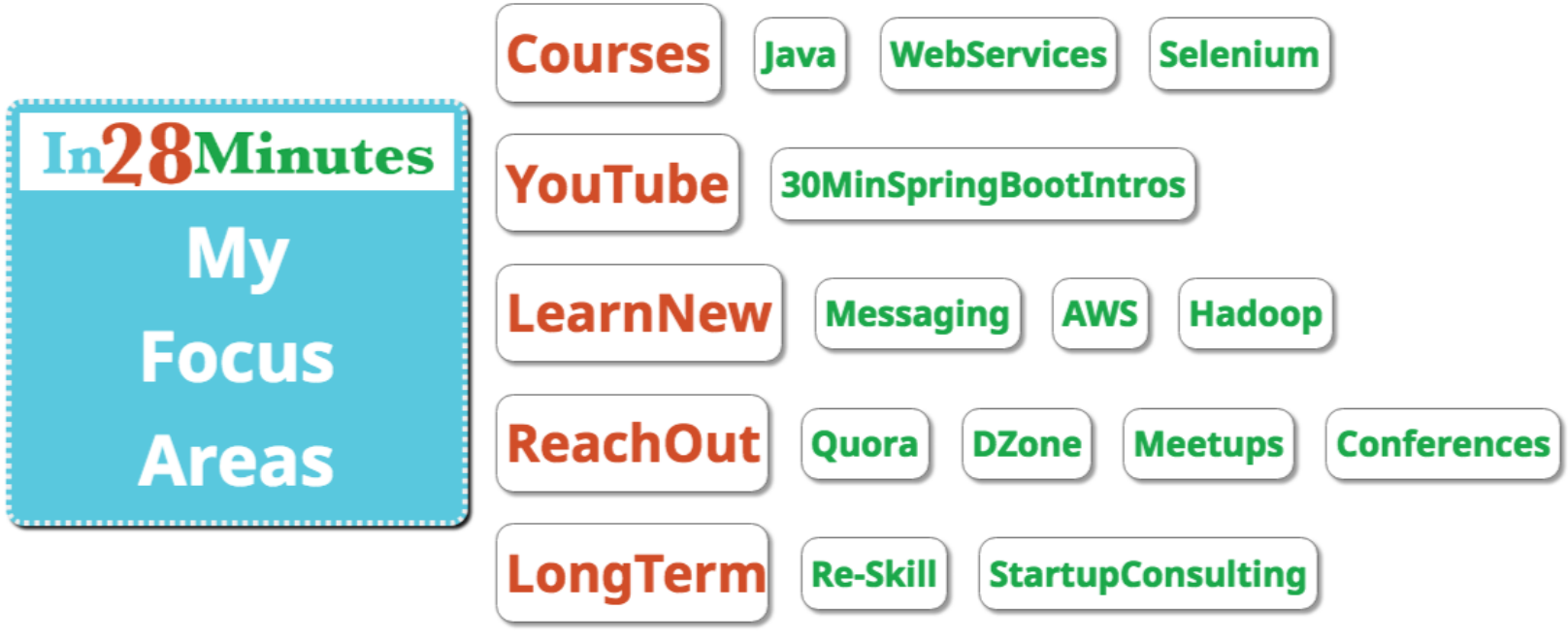
REQUEST RESPONSE STRUCTURES

COMMON FEATURES STANDARDIZATION

- Error Handling
- Versioning
- Searching
- Filtering
- Support for Mock Responses
- HATEOAS

BUILD A FRAMEWORK

FOCUS ON DECENTRALIZED GOVERNANCE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My
Focus
Areas
Courses
Java
WebServices
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AWS
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ReachOut
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Meetups
Conferences
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AutomationTesting
CodeQuality