Mobile Application Development

Higher Diploma in Science in Computer Science

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eLearning support unit

Application Programmer Interfaces

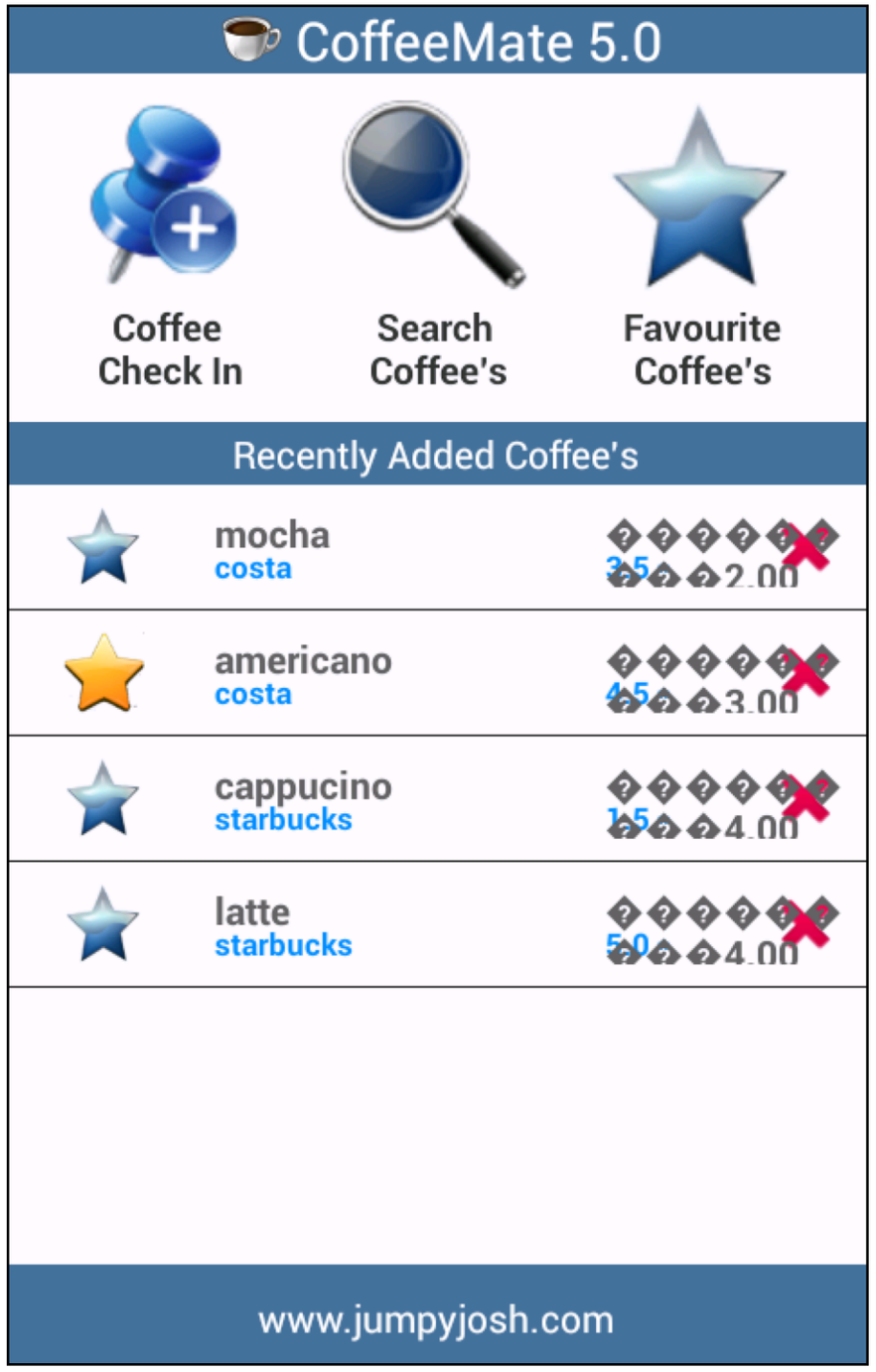
API Introduction

- User Experience vs Developer Experience
- Common Information Formats
- donation-play-service V1

User Experience

http://en.wikipedia.org/wiki/User_experience

User experience (**UX**) involves a person's behaviors, attitudes, and emotions about using a particular product, system or service. User experience includes the practical, experiential, affective, meaningful and valuable aspects of human-computer interaction and product ownership. Additionally, it includes a person's perceptions of system aspects such as utility, ease of use and efficiency. User experience may be considered subjective in nature to the degree that it is about individual perception and thought with respect to the system. User experience is dynamic as it is constantly modified over time due to changing usage circumstances and changes to individual systems as well as the wider usage context in which they can be found.



Developer Experience

http://uxmag.com/articles/effective-developer-experience

http://ieeexplore.ieee.org/xpl/articleDetails.jsp?reload=true&arnumber=6225984

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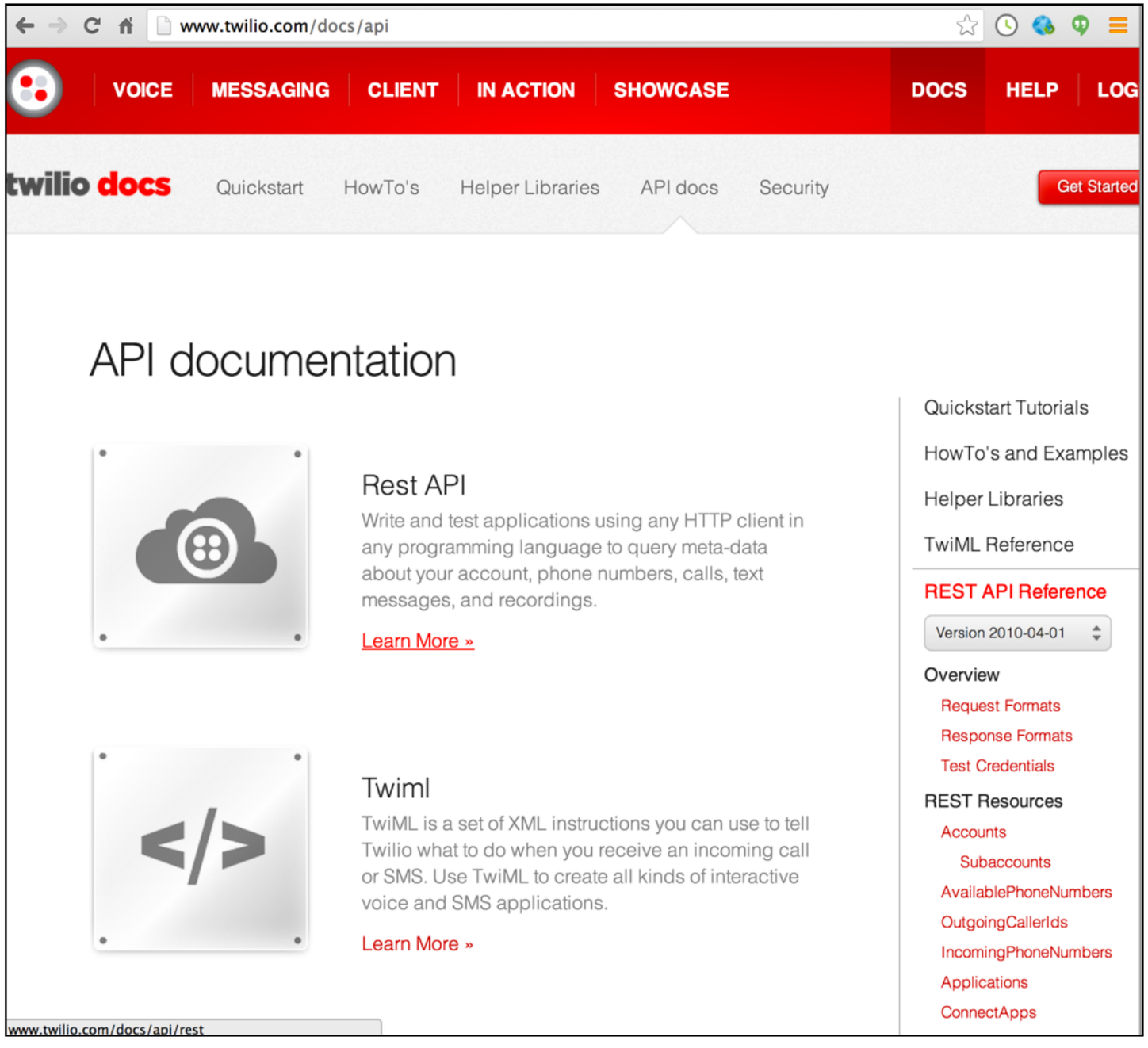
http://blog.pusher.com/getting-the-developer-experience-right/

"For all the abundance of APIs, there are multiple ways of getting a user up to speed with your product. The experience of learning how to use an API is very similar to that of using a consumer facing website or application. Indeed your conversion rate is likely to be higher if you remove as much friction as possible.

There has been a huge amount of literature produced to make those kind of consumer user experiences better, but only limited information about what the ingredients of a highly successful onboarding experience for an API product are. The principles are generally very similar...



http://www.twilio.com/docs/api

Common Formats

- Comma Separated Values (CSV)
- Name/Value Pairs
- YAML
- XML
- JSON

CSV

http://en.wikipedia.org/wiki/Comma-separated_values

A **comma-separated values** (**CSV**) (also sometimes called *character-separated values,* because the separator character does not have to be a comma) file stores tabular data (numbers and text) in plain-text form. Plain text means that the file is a sequence of characters, with no data that has to be interpreted instead, as binary numbers. A CSV file consists of any number of records, separated by line breaks of some kind; each record consists of fields, separated by some other character or string, most commonly a literal comma or tab. Usually, all records have an identical sequence of fields.

```
“mocha”, “costa”, 2.0,  3.5,  0
“americano”, “costa”, 3.0, 4.5, 1
“cappucino”, “starbucks”, 4.0, 1.5, 0
```

coffees.csv

Name/Value Pairs

http://en.wikipedia.org/wiki/Attribute-value_pair

A **name–value pair**, **key–value pair**, **field–value pair** or **attribute–value pair** is a fundamental data representation in computing systems and applications. Designers often desire an open-ended data structure that allows for future extension without modifying existing code or data. In such situations, all or part of the data model may be expressed as a collection of tuples <*attribute name*, *value*>; each element is an attribute–value pair. Depending on the particular application and the implementation chosen by programmers, attribute names may or may not be unique.

```
db.url=jdbc:cloudbees://pacemaker
db.driver=com.mysql.jdbc.Driver
db.user=pacemaker
db.pass=pacemaker
jpa.ddl=create
```

application .conf

```
name="mocha"
shop="costa"
rating=3.5
price=2.0
favourite=0
id=1
```

coffees.conf

YAML

http://en.wikipedia.org/wiki/YAML

YAML (/ˈjæməl/, rhymes with *camel*) is a human-readable data serialization format that takes concepts from programming languages such as C, Perl, and Python, and ideas from XML and the data format of electronic mail (RFC 2822). YAML was first proposed by Clark Evans in 2001,[1] who designed it together with Ingy döt Net[2] and Oren Ben-Kiki.[2] It is available for several programming languages.

YAML is a recursive acronym for "YAML Ain't Markup Language". Early in its development, *YAML* was said to mean "Yet Another Markup Language",[3] but it was then reinterpreted (backronyming the original acronym) to distinguish its purpose as data-oriented, rather than document markup.

```
Coffee(c1):
    name       : mocha
    shop       : costa
    price      : 2.0
    rating     : 3.5
    favourite  : 0

Coffee(c2):
    name       : americano
    shop       : costa
    price      : 3.0
    rating     : 4.5
    favourite  : 1


Coffee(c3):
    name       : cappucino
    shop       : starbucks
    price      : 4.0
    rating     : 1.5
    favourite  : 0
```

data.yaml

XML

http://en.wikipedia.org/wiki/XML

Extensible Markup Language (**XML**) is a markup language that defines a set of rules for encoding documents in aformat that is both human-readable and machine-readable. It is defined in the XML 1.0 Specification[3] produced by theW3C, and several other related specifications,[4] all free open standards.[5]

The design goals of XML emphasize simplicity, generality, and usability over the Internet.[6] It is a textual data format with strong support via Unicode for the languages of the world. Although the design of XML focuses on documents, it is widely used for the representation of arbitrary data structures, for example in web services.

Many application programming interfaces (APIs) have been developed to aid software developers with processing XML data, and several schema systems exist to aid in the definition of XML-based languages.

```xml
<?xml version="1.0"
encoding="UTF-8"?>

<coffee objname="c1">
    <name> mocha </name>
    <shop> costa </shop>
    <price> 2.0 </price>
    <rating> 3.5</rating>
    <favourite> 0 </favourite>
</coffee>

<coffee objname="c1">
    <name> americano </name>
    <shop> costa </shop>
    <price> 3.0 </price>
    <rating> 4.5 </rating>
    <favourite> 1 </favourite>
</coffee>

<coffee objname="c1">
    <name> cappucino </name>
    <shop> starbucks </shop>
    <price> 4.0 </price>
    <rating> 1.5 </rating>
    <favourite> 0 </favourite>
</coffee>
```

data.xml

JSON

http://en.wikipedia.org/wiki/JSON

JSON (/ˈdʒeɪsɒn/ ***jay-sawn***, /ˈdʒeɪsən/ ***jay-sun***), or **JavaScript Object Notation**, is a text-based open standard designed for human-readable data interchange. Derived from the JavaScript scripting language, JSON is a language for representing simple data structures and associative arrays, called objects. Despite its relationship to JavaScript, JSON is language-independent, with parsers available for many languages.

The JSON format was originally specified by Douglas Crockford, and is described in RFC 4627. The official Internet media type for JSON is `application/json`. The JSON filename extension is `.json`.

The JSON format is often used for serializing and transmitting structured data over a network connection. It is used primarily to transmit data between a server and web application, serving as an alternative to XML.

```
{
  "name":"mocha",
  "shop":"costa",
  "rating":3.5,
  "price":2.0,
  "favourite":0,
  "id":1
},
{
  "name":"americano",
  "shop":"costa",
  "rating":4.5,
  "price":3.0,
  "favourite":1,
  "id":2
},
{
  "name":"cappuccino lite",
  "shop":"starbucks",
  "rating":1.5,
  "price":4.0,
  "favourite":1,
  "id":3
}
```

APIs

- An application programming interface (API) specifies how some software components should interact with each other.

- An API often encapsulates a service, capability or system, and will ideally do so in a coherent, elegant and reliable manner.

- APIs are documented, presented and packaged for consumption by programmers.

- Programmers can then integrate new service and capabilities into their systems.

Examples - General

- Java SDK
    - collections API (java.util)
    - DateTime
    - Sockets (java.net)
- OpenGL (for graphics / Visualization / Games)
- Windows SDK

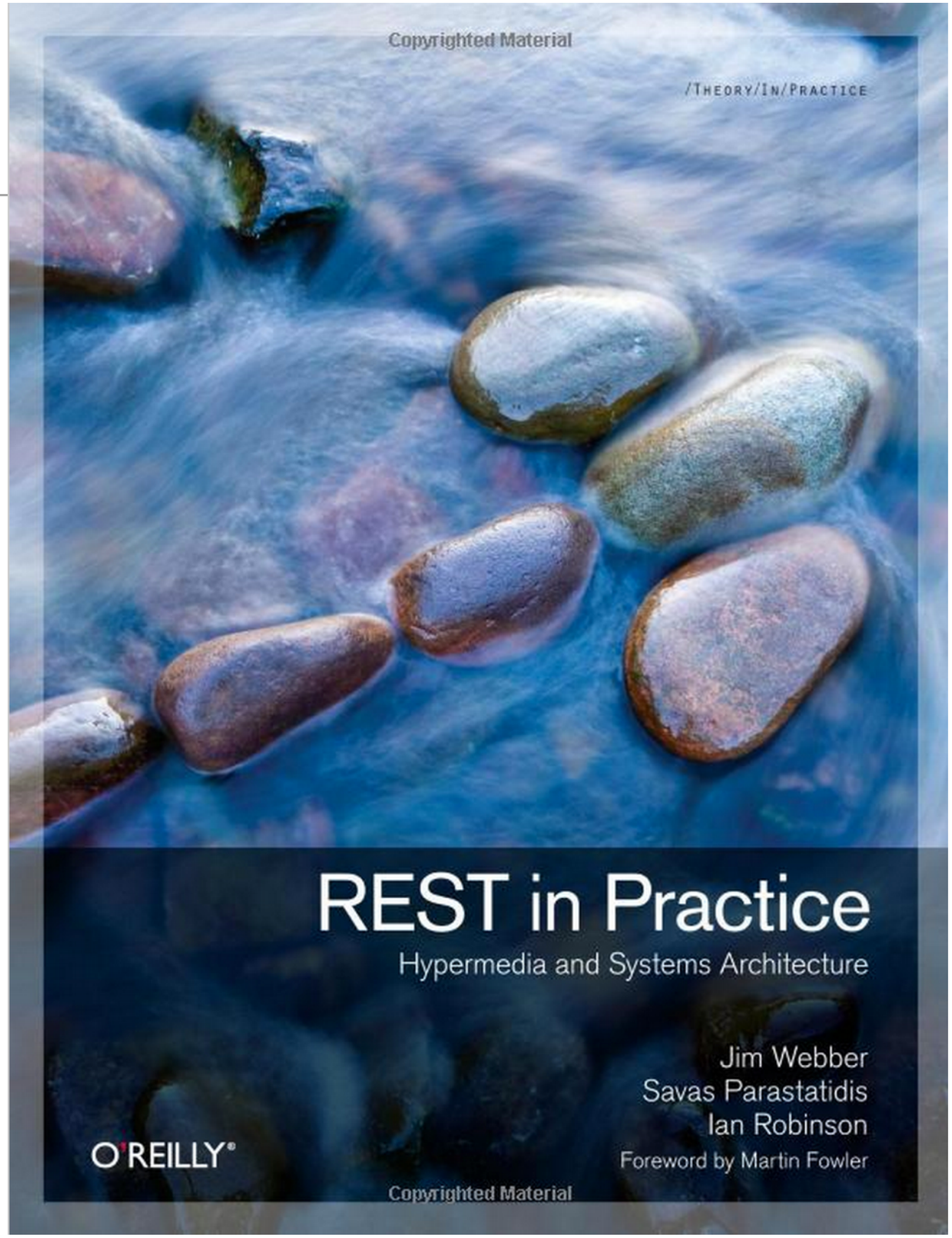
Examples 2 - REST

- Twitter API
- Google Maps
- Twillio
- Blogger.com
- App.net
- SupportFu
- Gist

- REST is an “Architectural Style” - enumerating an approach to building distributed systems.
- It embodies an approach that aims to maximize the infrastructure of http infrastructure deployed in the public internet, enabling secure, scalable distributed systems that do not require expensive, complex alternative infrastructure.

REST

Representational State Transfer (**REST**) is an architectural style that abstracts the architectural elements within a distributed hypermedia system.[1] REST ignores the details of component implementation and protocol syntax in order to focus on the roles of components, the constraints upon their interaction with other components, and their interpretation of significant data elements.[2]REST has emerged as a predominant web API design model



REST:The Web Used Correctly

- A system or application architecture
- ... that uses HTTP, URI and other Web standards “correctly”
- ... is “on” the Web, not tunneled through it ... also called ““RESTful HTTP”

(see http://www.slideshare.net/deimos/stefan-tilkov-pragmatic-intro-to-rest?qid=bf0300ad-6e68-4faa-bac7-0f77424ec093&v=qf1&b=&from_search=1)

Rest Principles

- 1: Give Everything and ID
- 2: Link Things Together
- 3: Use Standard HTTP Methods
- 4: Allow for Multiple Representations
- 5: Communicate Statelessly

1: Give Every Thing and ID

- http://example.com/customers/1234
- http://example.com/orders/2007/10/776654
- http://example.com/products/4554
- http://example.com/processes/sal-increase-234

2: Link Things Together

```
<order self='http://example.com/orders/1234'>
  <amount>23</amount>
  <product ref='http://example.com/products/4554' />
  <customer ref='http://example.com/customers/1234' />
</order>
```

3: Use Standard HTTP Methods

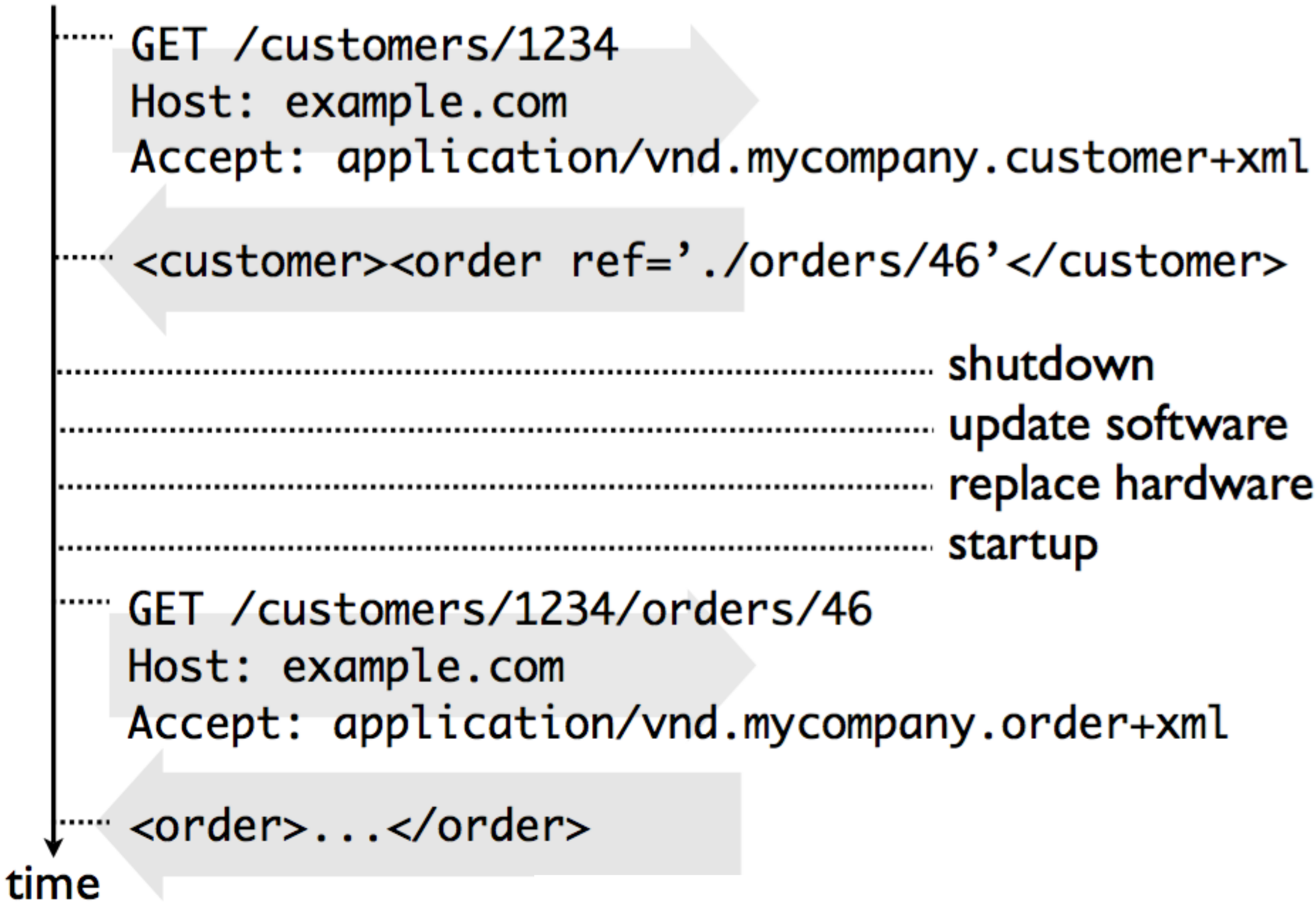
GET	retrieve information, possibly cached
PUT	Update or create with known ID
POST	Create or append sub-resource
DELETE	(Logically) remove

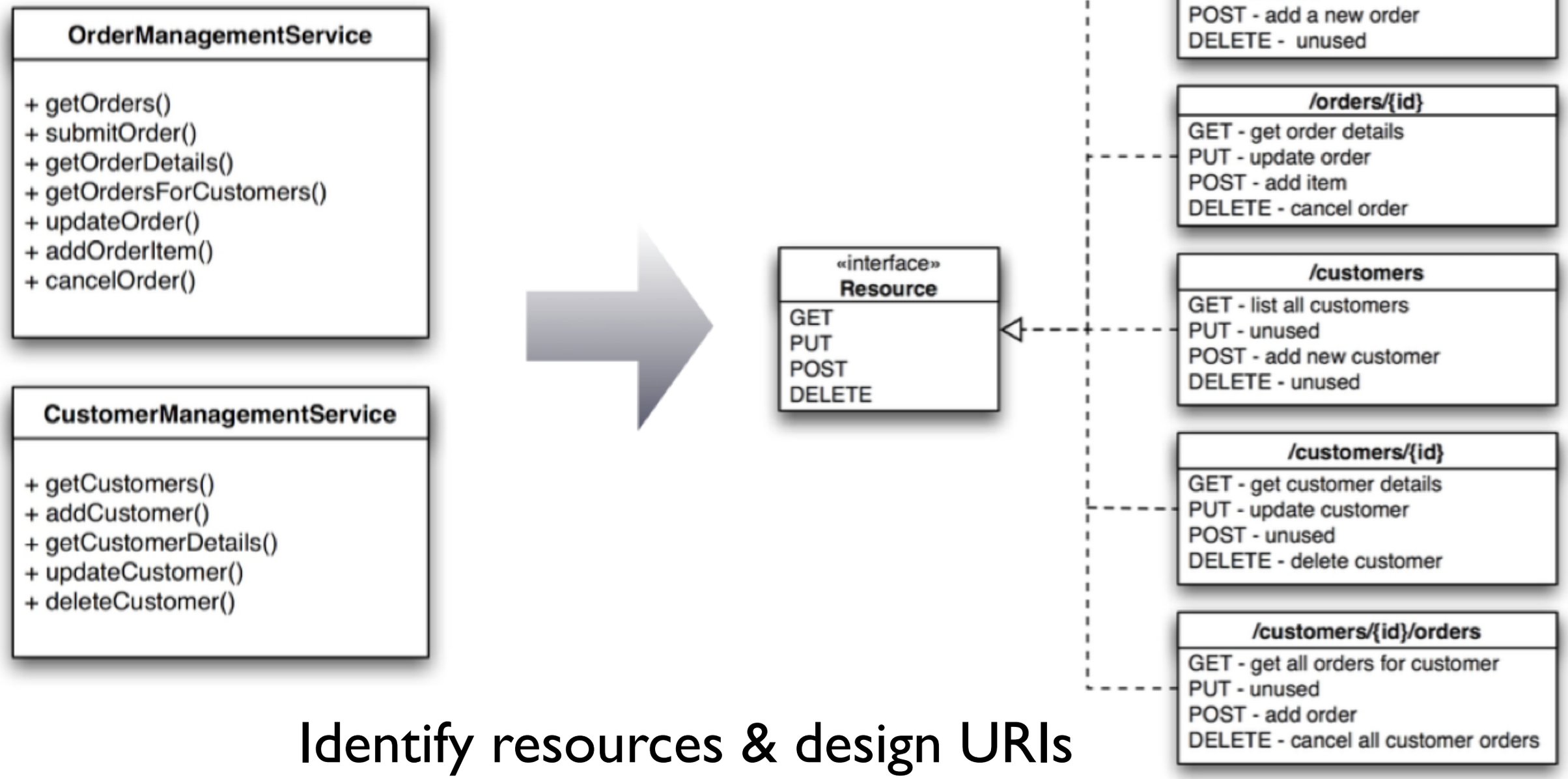
4: Allow for Multiple Representations

```
GET /donors/1234

Host: example.com

Accept: application/json

{  "firstName" : "fred",
  "lastName"  : "simpson",
  "email"     : "fred@simpson.com",
  "password"  : "secret"
}
```

```
GET /donors/1234

Host: example.com

Accept: application/xml

<donor>
  <firstName> “fred” </firstName>
  <lastName> “simpson” </lastName>
  <email> “fred@simpson.com” </email>
  <password> “secret” </password>
</donor>
```

5: Communicate Statelessly





Identify resources & design URIs

Select format (Json)

Identify method semantics

Select response codes

Donation Applications

- Multiple applications needed to develop a robust approach
- **Application 1: donation-service (Labs: Donation-04, 06, 07)**
    - A standard Play web app + a REST based API to enable access to the models over HTTP
- **Application 2: donation-service-test (Labs: Donation-05, 07)**
    - The Test App is to independently verify the correct operation of the API
    - Its purpose is to support orderly evolution of a robust service
- **Application 3: donation-android-04 (Labs: Donation 08)**
    - An android app to consumes the API to deliver enhanced features