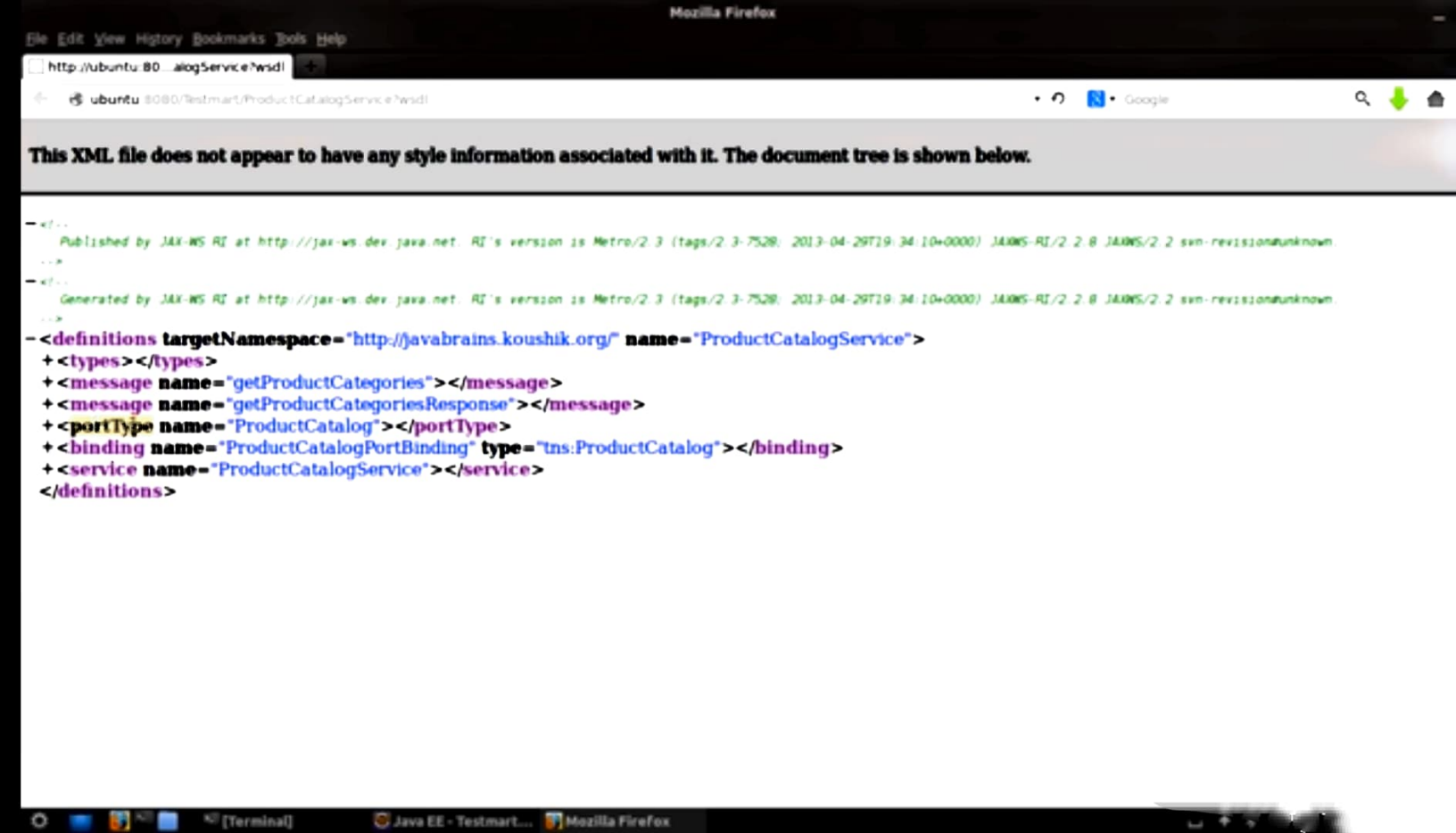
Mozilla Firefox
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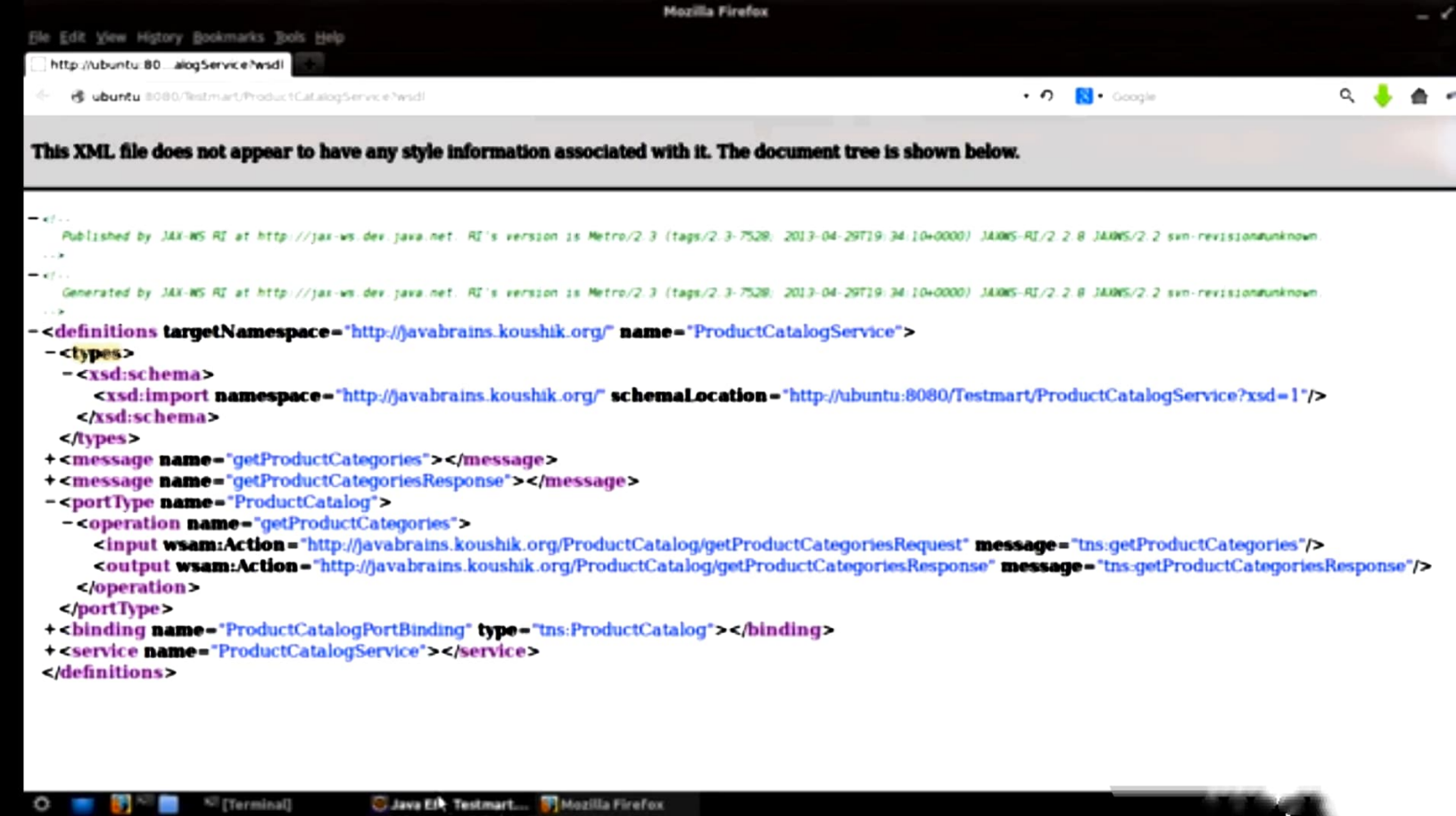
http://ubuntu:80...alogService?wsdl
ubuntu:8080/Testmart/ProductCatalogService?wsdl
Google
This XML file does not appear to have any style information associated with it. The document tree is shown below.
<!-- Published by JAX-WS RI at http://jax-ws.dev.java.net. RI's version is Metro/2.3 (tags/2.3-7528; 2013-04-29T19:34:10+0000) JAXWS-RI/2.2.8 JAXWS/2.2 svn-revision#unknown. -->
<!-- Generated by JAX-WS RI at http://jax-ws.dev.java.net. RI's version is Metro/2.3 (tags/2.3-7528; 2013-04-29T19:34:10+0000) JAXWS-RI/2.2.8 JAXWS/2.2 svn-revision#unknown. -->
<definitions targetNamespace="http://javabrains.koushik.org/" name="ProductCatalogService">
<types></types>
<message name="getProductCategories"></message>
<message name="getProductCategoriesResponse"></message>
<portType name="ProductCatalog"></portType>
<binding name="ProductCatalogPortBinding" type="tns:ProductCatalog"></binding>
<service name="ProductCatalogService"></service>
</definitions>
[Terminal]
Java EE - Testmart...
Mozilla Firefox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-->
<definitions targetNamespace="http://javabrains.koushik.org/" name="ProductCatalogService">
<types>
<xsd:schema>
<xsd:import namespace="http://javabrains.koushik.org/" schemaLocation="http://ubuntu:8080/Testmart/ProductCatalogService?xsd=1"/>
</xsd:schema>
</types>
<message name="getProductCategories"></message>
<message name="getProductCategoriesResponse"></message>
<portType name="ProductCatalog">
<operation name="getProductCategories">
<input wsam:Action="http://javabrains.koushik.org/ProductCatalog/getProductCategoriesRequest" message="tns:getProductCategories"/>
<output wsam:Action="http://javabrains.koushik.org/ProductCatalog/getProductCategoriesResponse" message="tns:getProductCategoriesResponse"/>
</operation>
</portType>
<binding name="ProductCatalogPortBinding" type="tns:ProductCatalog"></binding>
<service name="ProductCatalogService"></service>
</definitions>
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Java EE - Testmart...
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What are RESTful Web Services ?

A *web service* that communicates / exchanges information between *2 applications* using REST architecture/principles is called a ***RESTful Web Service***.

What are RESTful Web Services ?

What is REST

REST (REpresentational State Transfer)
Is an architectural style.

REST defines a set of principles to be followed while designing a service for communication / data exchange between 2 applications.

When these principles are applied while designing web services (for client - server interactions) we get :
RESTful Web Services.

What are RESTful Web Services ?

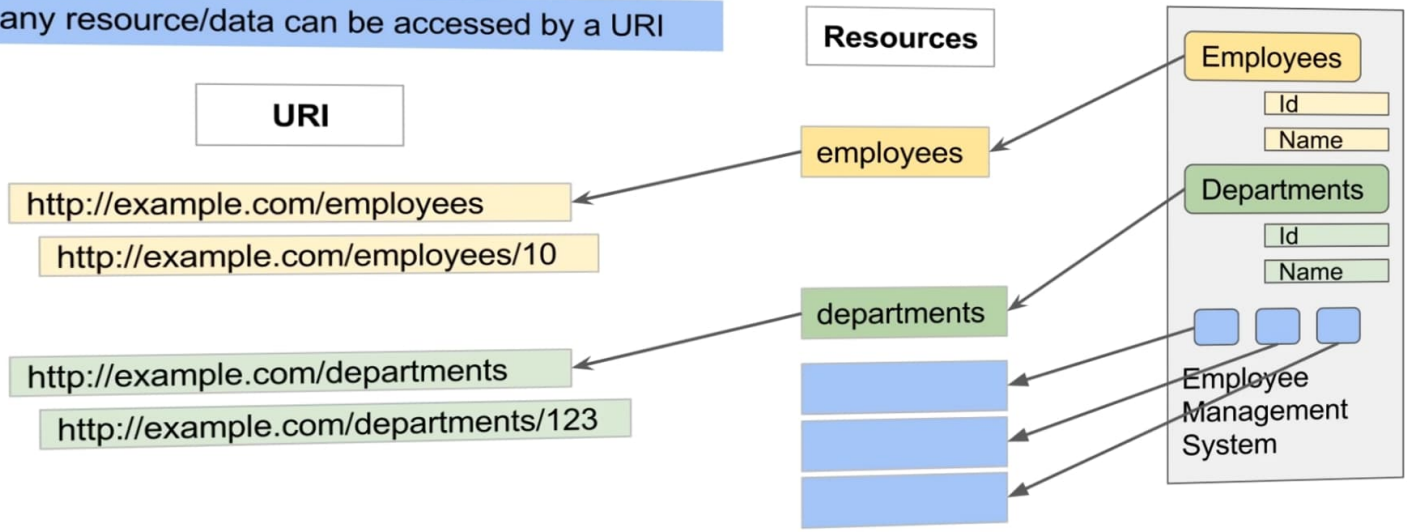
What are the p

Uniform Interface	**1. Resource :** everything is a resource **2. URI :** any resource/data can be accessed by a URI **3. HTTP :** make explicit use of HTTP methods
Stateless	**4. Stateless :** all client-server communications are stateless
Cacheable	**5. Caching :** happens at client side
Layered System	**6. Layering :** layers can exist between client and server
Code On Demand (*Optional*)	**7. Code-On-Demand :** ability to download and execute code on client side.

What are RESTful Web Services ?

1. Resource : everything is a resource

2. URI : any resource/data can be accessed by a URI



What a

How to get list of employees from a particular department ?

1. Resource : everything is a reso

2. URI : any resource/data can be accessed by

URI

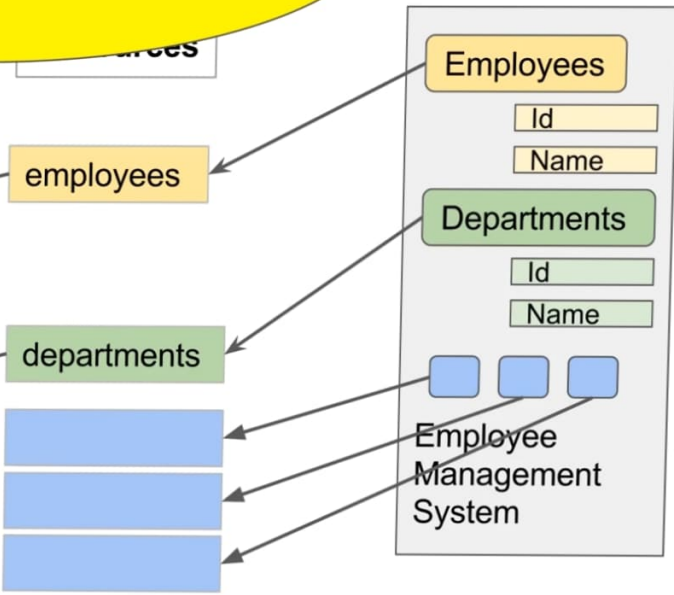
http://example.com/employees

http://example.com/employees/10

http://example.com/departments

http://example.com/departments/123

http://example.com/departments/123/employees



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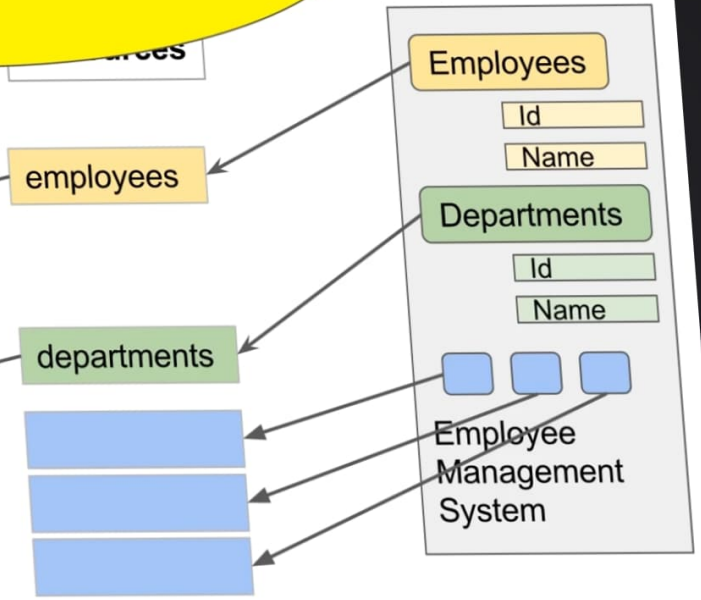
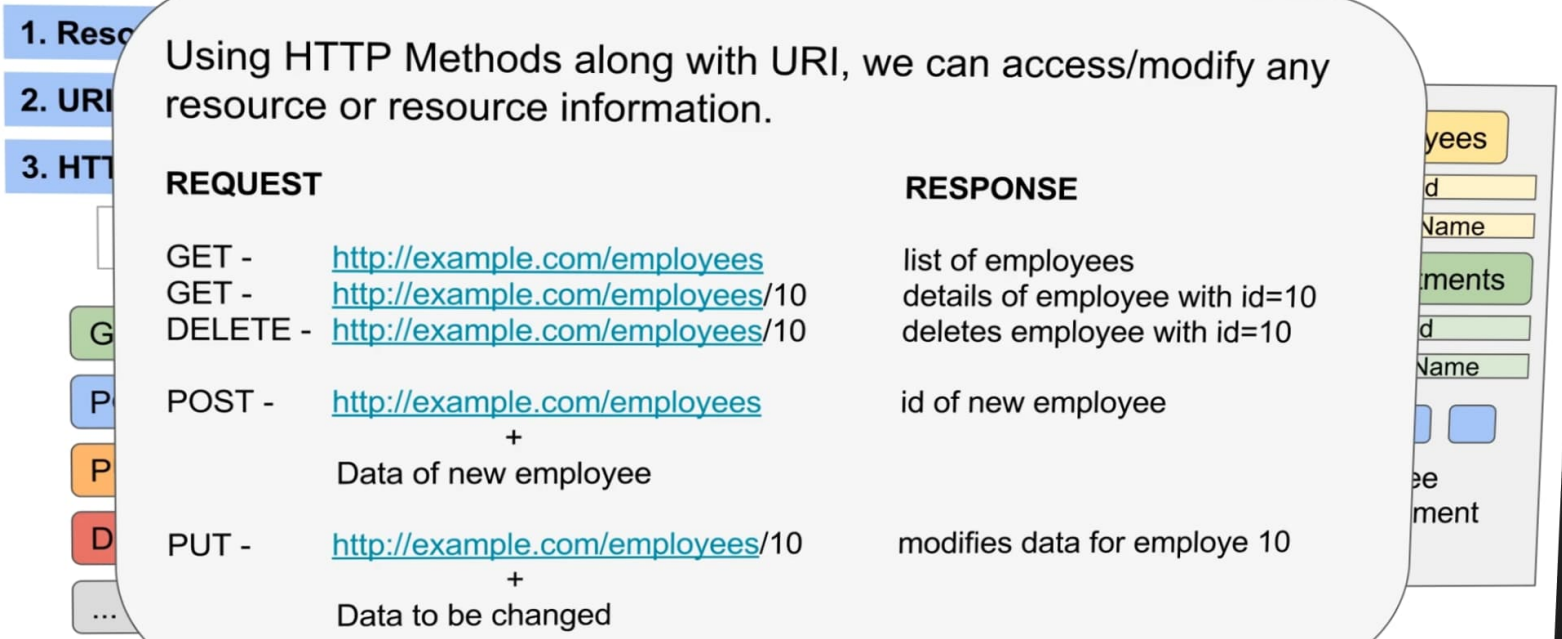


What are RESTful Web Services ?



Using HTTP Methods along with URI, we can access/modify any resource or resource information.

		REQUEST	RESPONSE
GET -	http://example.com/employees		list of employees
GET -	http://example.com/employees/10		details of employee with id=10
DELETE -	http://example.com/employees/10		deletes employee with id=10
POST -	http://example.com/employees	+ Data of new employee	id of new employee
PUT -	http://example.com/employees/10	+ Data to be changed	modifies data for employe 10

What are RESTful Web Services ?

1. Resou
2. URI :
3. HTTP

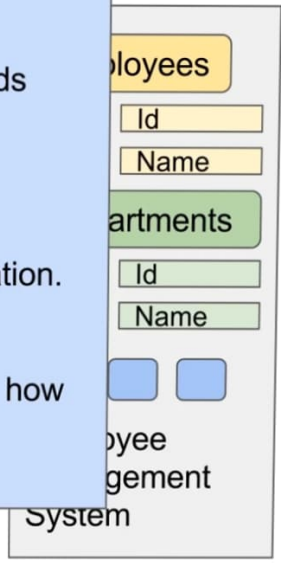
GET
POS
PUT
DEL
...

UNIFORM INTERFACE - 1st principle of REST

Identification of Resources - Resources + URI + HTTP
Each resource has a URI and is accessed through a defined set of HTTP methods (GET, PUT, POST, DELETE)

Manipulation of Resources using Representations
Each resource can have one or more representations. Such as application/xml, application/json, text/html, etc. Clients and servers negotiate to select representation.

Self descriptive messages
Requests and responses contain not only data but additional headers describing how the content should be handled. Such as if it should be cached, authentication requirements, etc.



http://example.org/departments/123

http://example.org/departments/123/employees

What are RESTful Web Services ?

SOAP

```
<?xml version="1.0"?>
<soap:Envelope
    xmlns:soap="http://www.w3.org/2001/12/soap-envelope"
soap:encodingStyle="http://www.w3.org/2001/12/soap-encoding">
    <soap:body pb="http://www.example.com/employees">
        <pb:GetEmployee>
            <pb:EmpId>123</pb:EmpId>
        </pb:GetEmployee>
    </soap:Body>
</soap:Envelope>
```

REST

http://example.com/employees/123 GET

What are RESTful Web Services ?

4. Stateless : all client-server communications are stateless

Each request from the client to the server must contain all of the data that is necessary to handle the request.
No need of storing any state on the server.

What are RESTful Web Services ?

STATELESSNESS

Server should not require to store the state of a session.

If the concept of a session is required all information should be stored at client side and sent with every subsequent request.

This makes every request (call) from client independent and a complete entity in itself.

For Example:

If a person is adding items to his cart on a shopping website, the state of the cart should be stored at the client side only.
And this state of the cart has to be sent from the client to the server whenever required.

What are RESTful Web Services ?

4. Stateless : all client-server communications are stateless

Each request from the client to the server must contain all of the data that is necessary to handle the request.
No need of storing any state on the server.

\+

Improves Web Service Performance

What are RESTful W

5. Caching : happens at client side

The data within a response to a request must be implicitly labeled as cacheable or non-cacheable

Server generates responses that indicate whether they are cacheable or not to improve the performance by reducing number of requests for duplicate resources.

Server does this by including a **Cache-Control** and **Last-Modified** (date value) In HTTP Response Headers

What are RESTful W

5. Caching : happens at client side

Server generates responses that indicate

irces.

URL	Status	Domain	Size
▼ GET 2	304 Not Modified	127.0.0.1:9292	1.4 KB

Headers | Response | Cache | HTML | Cookies

Response Headers view source

Age	100
Cache-Control	max-age=180, public
Connection	close
Date	Wed, 26 Sep 2012 09:41:16 GMT
Etag	"2fd5257a3dd12a2b0d130931f3bc1ab5"
Server	thin 1.4.1 codename Chromeo
X-Content-Digest	7ce9d1010d836cf77d921adc615ed387d5a59c91
X-Rack-Cache	fresh
X-Request-Id	ca28f6820243fe9fac8c7516a01c5edd
X-Runtime	0.122089
x-ua-compatible	IE=Edge

Tful W

5

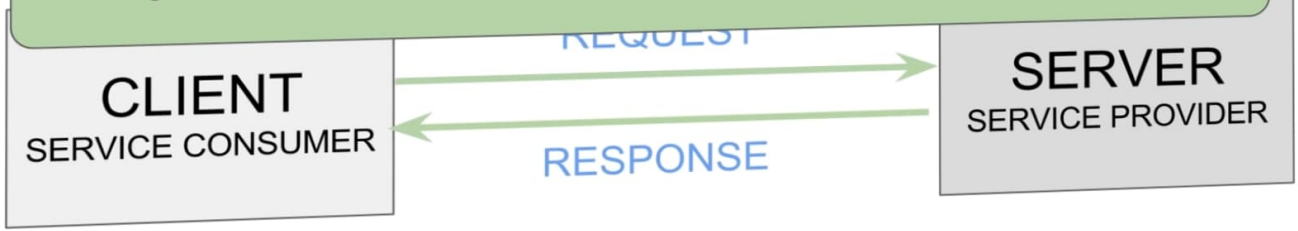
Client uses the **Cache-Control** header to determine wheter to cache the resource (make local copy) or not.

e implicitly

Server generates responses that indicate whether they are cacheable or not to improve the performance by reducing number of requests for duplicate resources.

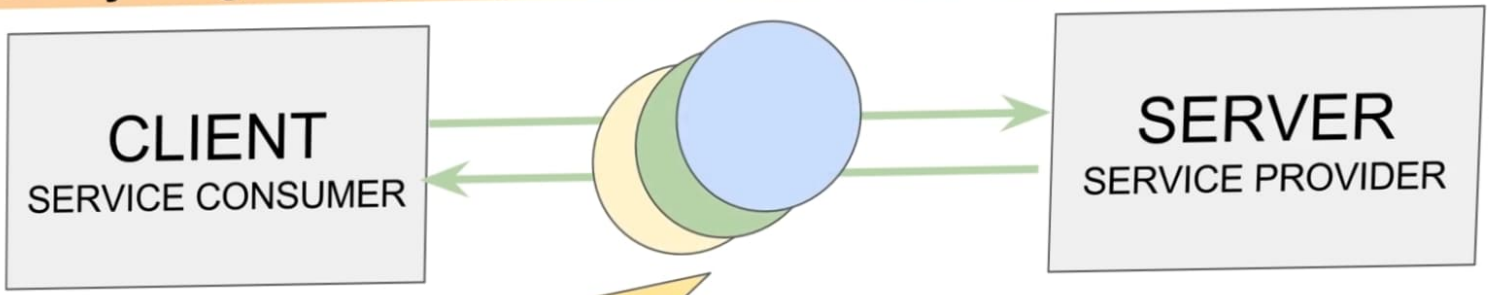
Server does this by including a **Cache-Control** and **Last-Modified** (date value) In HTTP Response Headers

In RESTful Web Services, This co-ordination between **Client** and **Server** is essential for being **Stateless.**



What are RESTful Web Services ?

6. Layering : multiple layers can exist between client and server

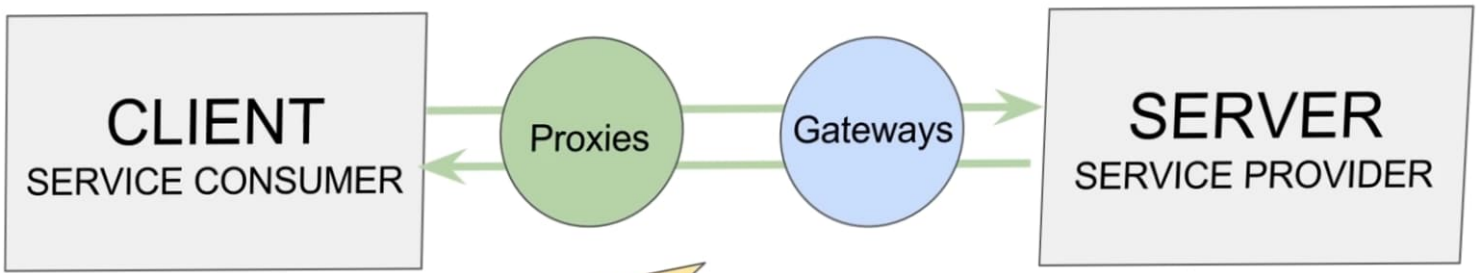


There can be many layers (intermediaries) between client and server.
These are HTTP Intermediaries.

Can be used for message translations / improving performance with caching etc.
Can include Proxies and Gateways

What are RESTful Web Services ?

6. Layering : multiple layers can exist between client and server



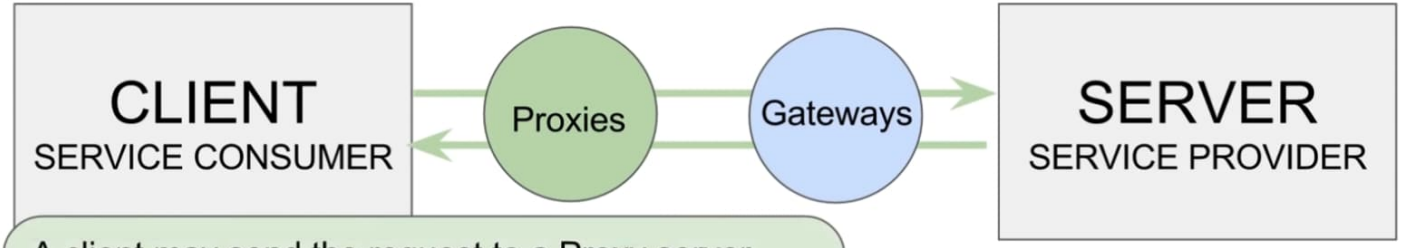
Client and Server communication channel may also include intermediaries like Proxies and Gateways.

Proxies - are chosen by client
Gateways - are chosen by server

There can be several proxies and gateways.

What are RESTful Web Services ?

6. Layering : multiple layers can exist between client and server



A client may send the request to a Proxy server (instead of main server).
Proxy server evaluates the request to simplify or control its complexity, etc.

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What are RESTful Web Services ?

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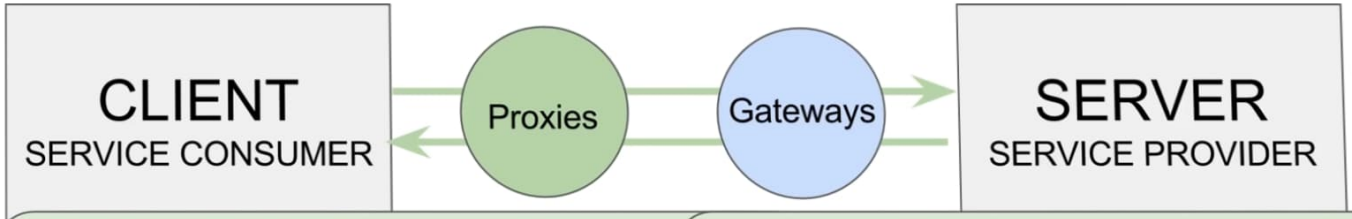


A client may send the request to a Proxy ser
(instead of main server).
Proxy server evaluates the request to simplif
control its complexity, etc.

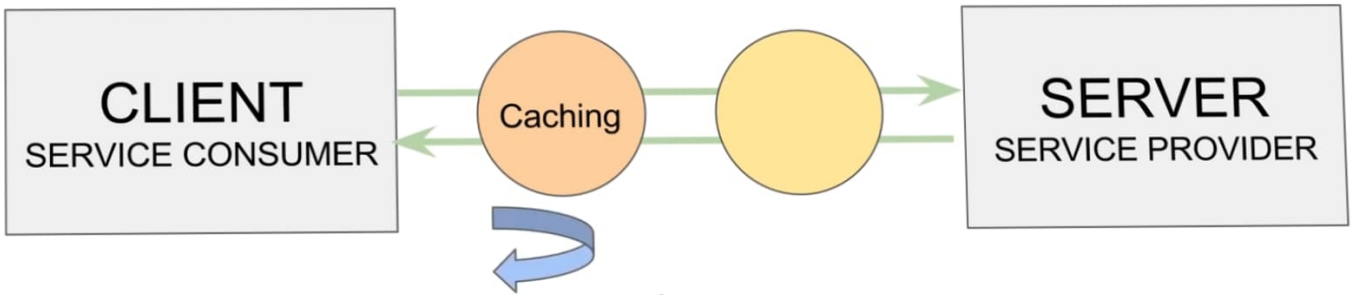
Gateways may be used for managing traffic on the network, protocol translations etc.

Proxies - are chosen by client
Gateways - are chosen by server

There can be several proxies and gateways.

What are RESTful Web Services ?

6. Layering : multiple layers can exist between client and server



Example : we use a layer (intermediary) that can cache a response and store it for an hour.
If a new request comes from the client within an hour, the cached response will be sent from the intermediary (without going untill the server)
Improves Performance and Scalability.

What are RESTful Web Services ?

6. Layering : multiple layers can exist between client and server

This is to improve scalability.

The layered constraint was added to address improving internet sized scalability requirements. Each layer cannot see beyond the immediate layer with which it is communicating with. This places boundaries on the overall complexity of the system.

Like most solutions for scalability there are usually trade-offs. Latency is increased with the introduction of layers but the cache-constraint above can certainly help reduce the amount of requests over the network.

What are RESTful Web Services ?

7. Code-on-Demand : ability to download and execute code at client side

The code-on-demand constraint allows clients to be extendable by downloading and executing code. Similarly to java script in a web browser this allows you to add functionality without re-deploying client software.

The code-on-demand constraint is ***optional***.

For example:

Client requests a resource
Server returns resource with some JavaScript