# Developing RESTful Services using Rational Software Architect

Manoj Paul Software Developer, Rational manojpaul@in.ibm.com



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# Agenda

## What is REST?

- REST Concepts
- Why Model REST Services?

## Modelling Support for REST in RSA

- REST Service Profile and tooling support
- Customized Sequence Diagram
- REST Service Model Report Generation

## JAX-RS Support

- JAXRS Modelling
- Code Generation & Reverse Engineering





# **REST : REpresentational State Transfer**

- REST defines a set of architectural principles for designing Web services
  - > Focus on resources, including how resource states are addressed and transferred over HTTP.
- A simpler alternative to SOAP- and Web Services Description Language (WSDL)-based Web services
- Has gained widespread acceptance across the Web
  - > Adoption of REST by mainstream Web 2.0 service providers—including Yahoo, Google, and Facebook



- REST Web service follows four basic design principles:
  - Use HTTP methods explicitly.
  - Be stateless.
  - Expose directory structure-like URIs.
  - Representation of resource state





# **REST Concepts**

- One-to-one mapping between create, read, update, and delete (CRUD) operations
  - To create a resource on the server, use POST.
  - > To retrieve a resource, use GET.
  - To change the state of a resource or to update it, use PUT.
  - ▶ To remove or delete a resource, use DELETE.
- Web services be stateless
- Expose directory structure-like URIs
  - hierarchical, rooted at a single path, and branching from it are subpaths
  - http://www.bookmarkservice.com/bookmarks/users/{john}
- Resource Representation
  - > A resource representation typically reflects the current state of a resource
  - Has to do with the format of the data that the application and service exchange in the request/response payload or in the HTTP body





# Why Model REST Services?

## Traditional Approach

- Describe the design on REST based Services in terms of URIs, Resource, HTTP methods and their representations
- Publish as documentation to enable its implementation and enable the clients of the service
- Lack of any formal notation

Resource	URI	HTTP Methods Supported		
Users	/users	GET	getListofUsers	
		POST	createUser	
User	/users/{username}	GET	getUser	
		DELETE	deleteUser	
Bookmarks	/users/{username}/book	GET	getListofBookmarks	
	marks	POST	createBookmark	
Bookmark	/users/{username}/book	GET	getBookmark	
	marks/{bookmarkId}		deleteBookmark	

- How do you design your RESTful Web Service?
- How do you implement this design?
- How do you publish your RESTful services to consumers?
- How do you evolve this design and implementation?





«Resource» BookmarksMD5

# Why Model REST Services?

# MDD-based Approach

- Rational Software Architect v8.0.3 supports modeling and implementation of RESTful Web Services.
- The modeling support enables you to create UML models for your web service to describe your web service.
- On the implementation side, you generate Java code to generate your web service using JAX-RS.



«Resource»



# Modelling REST Services

#### The key modeling elements:

- RESOURCE
- Resource Path
- Resource Methods
- Resource Input/Output types

«Application» BookmarkApplication

> «Path» /users

Param Types

Rest Stereotype	UML Element
Resource	Class, Interface
Application	Class
GET	Operation
PUT	Operation
POST	Operation
DELETE	Operation
HEAD	Operation
Param	Parameter
Path	Dependency





### **RESTful Service Modeling – Palette Support**







## **RESTful Service Modeling**

#### Capture parameter types



Capture input/output types for

Capture return codes for resource methods



### Modeling RESTful interactions in Sequence Diagrams

 You can model the typical interactions with the clients of your RESTful Web Service using the sequence diagrams.





#### Modeling RESTful interactions in Sequence Diagrams

 You can also detail each request or response in terms of the URI, headers and content using the HTTP properties tab for a message

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### Modeling RESTful interactions in Sequence Diagrams

- To detail implementation side, you can further details the sequence diagram with calls to actual Resource classes
- Simply drag your Resource classes on the sequence diagrams and draw messages to it





# **BIRT reports for REST services**

#### Generating documentation using BIRT Reports

#### **REST Resource Report**

Resource URL Description	User /users/{username} This Resource can be used to access individual users.					
<i>Method</i> DELETE	<i>Description</i> Delete a user.					
	Produces	Produces				
	Consumes	Consumes				
	Parameters Name Type Default Value					
	username	PathParam				
	Return Codes					
	Code	Content	Description			
	200 OK		Deletes a user.			
<b>Method</b> GET	Description Get details for a user.					
	Produces	application/xml				
	Consumes					
	Parameters Name	Туре	Default Value			
	username	PathParam				
	Return Codes					
	Code	Content	Description			
	200 OK	<user> <name>Tom</name> <age>35</age> </user>	This method returns the user details in xml.			





# **JAX-RS Support**





# JAX-RS: The Java API for RESTful Web Services

 JAX-RS: Java API for RESTful Web Services provides Java API for creating REST Services

- JAX-RS uses annotations to simplify the development and deployment of web services
  - @Path, specifies the relative path for a resource class.
  - @GET, @PUT, @POST, @DELETE, specifies the HTTP request type of a resource method.
  - @Produces, specifies the returned MIME media types etc
  - ....

@Path(`widgets')
@Produces("text/plain")
public class WidgetsResource {
 @GET
 @Path(`offers')
 public WidgetList getDiscounted() {
 }
 @Path(`fidf')
 public WidgetResource findWidget(@PathParam("id") String id) {
 return new WidgetResource(id):
 }
 public class WidgetResource {
 public WidgetResource {
 public WidgetResource(String id) {}
 @GET
 public Widget getDetails() { }
}





# JAX-RS: The Java API for RESTful Web Services



@Provider
@Produces(application/xml)
public class WorldProvider
implements MessageBodyWriter<World>{

Provider for Type Conversion





≥ JAX-RS

Image: Provide the second contract of the second contra

# **JAX-RS Modelling**

#### REST Profile is independent of any target platform

- > JAXRS Extension profile captures modeling concepts for the JAXRS domain
- Can be applied along with REST Services profiles





## **JAX-RS Code Generation**





public Users() {

// TODO Auto-generated constructor stub

QGET

}

}

@Produces("text/html")
public List getUsers(){
 return null;

@PUT

@Consumes("text/plain")
public void modifyUsers(String name){

}

3

@Path("{username}")
public UserName getUserName(){
 return new UserName();





# **Reverse Engineering**

- Allows reverse transforming JAXRS code into REST service model
- Complete RTE support for incremental development





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