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Maximizing the value of IT together

Take a Load Off with U2 RESTful Web Services

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Lead Technical Support for Rocket U2

Rocket | U2™

Webinar Opening Procedure

- Orange arrow = control GoTo Webinar control panel

- This webinar will be recorded and posted to our Rocket U2 web site for you to replay at a later date
  - You will be notified via email once .pdf and video are posted

- If using phone – don't select "Use Mic & Speakers"

- All attendees are muted during the presentation

- Brief Q&A session – after the presentation

Nik Kesic's Biography
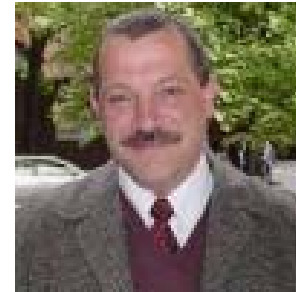
- Joined Unidata in 1995

- ATS (Advanced Technical Support), U2 Clients and DBTools

- Provides consultancy, Level 3 support and training

- Published articles on web enablement using U2 WebDE, Sockets, XML, SOAP, SSL and Encryption

- MCP (Microsoft Certified Professional) in networks

Webinar Origins

- A push towards newer web technology

- Modern programming language agnostic

- Decoupling database interface

Agenda 1 of 2

- URL or URN or maybe URI

- Web Services

- SOAP vs. REST

- REST and RESTful

- REST Architecture

- RESTful Methods
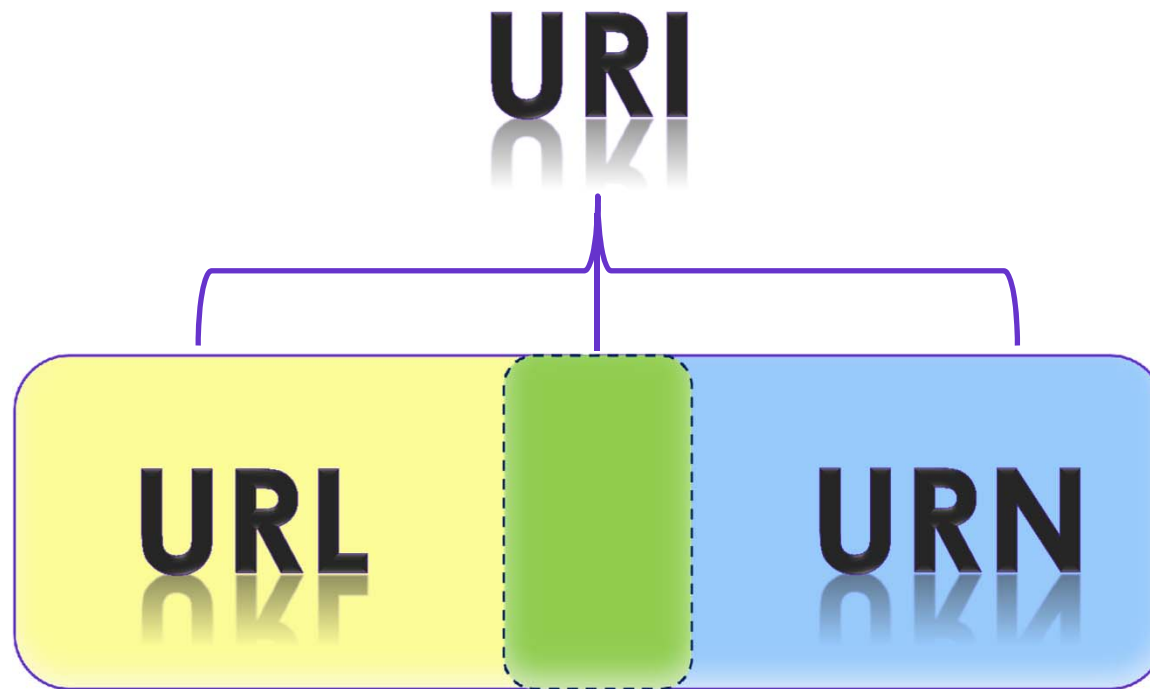
- HTTP Authentication

Dog REST-ing

Definitions

- Resource

- Service

- Representation

- State

- Reveal/Expose

- Consume

URL or URN or maybe URI Diagram

URL is often used as a synonym for URI

URL / URN / URI Defined

- **URN - Uniform Resource Name**
  - Functions like a person's name

- **URL - Uniform Resource Locator**
  - Resembles that person's street address

- **URI - Uniform Resource Identifier**
  - Strings of characters used to identify a name or a resource
  - Can be classified as locators (URLs), as names (URNs), or as both
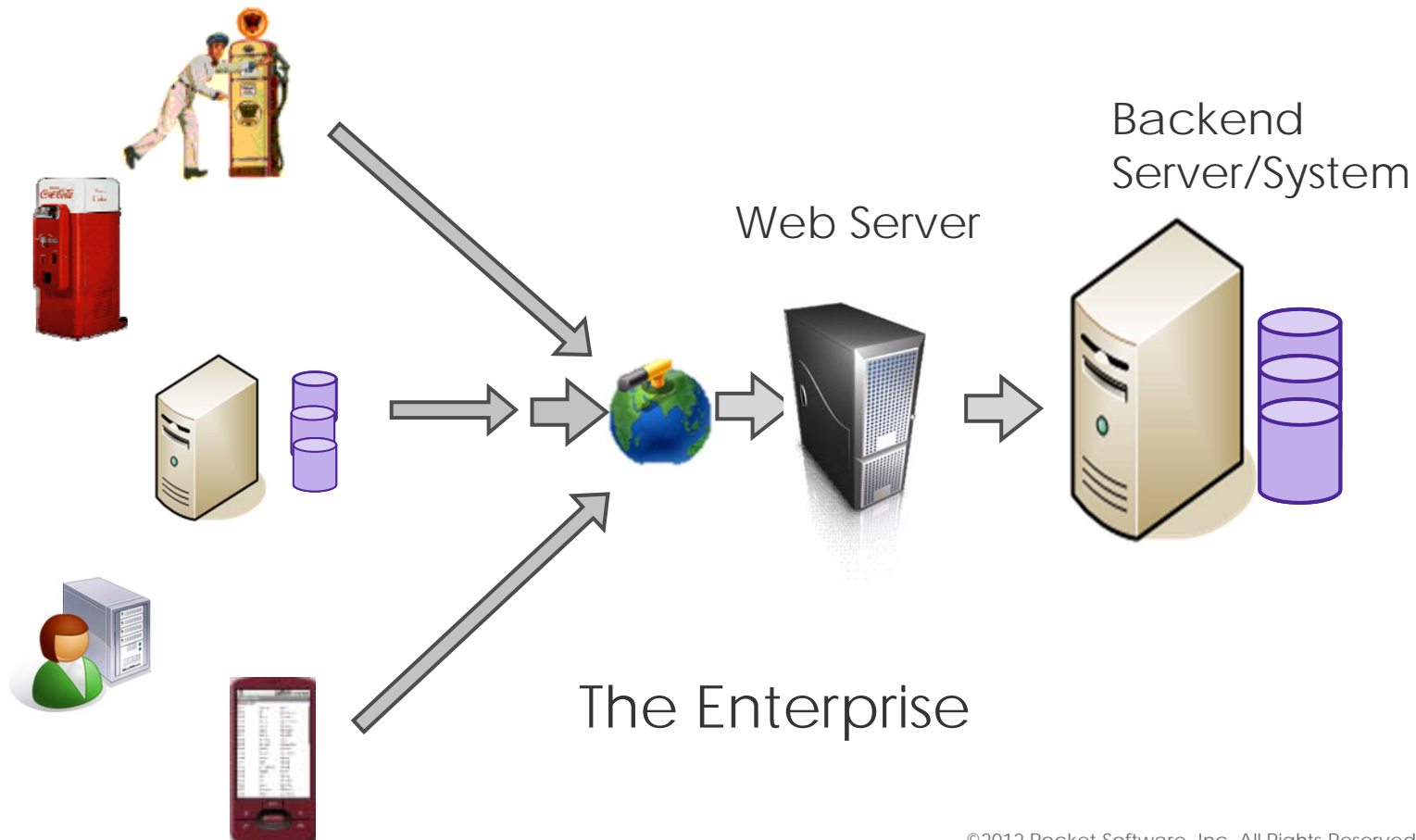
Protocol – http, ftp, file, etc.

Web Services

- Web services provide a *standard* means of interoperating between different software applications, running on a variety of platforms and/or frameworks.

- Unlike a browser, a web service is a web page that is consumed by an autonomous program.

Enterprise View of Web Services

Backend
Server/System

Web Server

Databases

The Enterprise
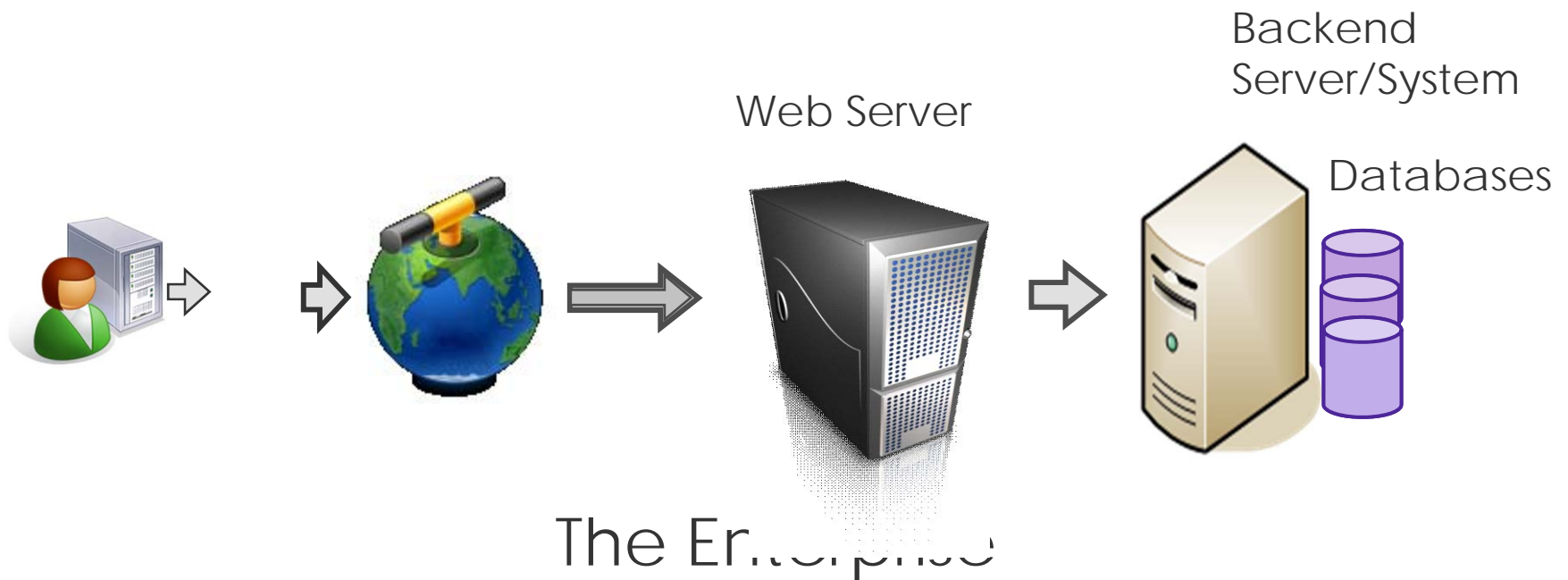
Today's View of Web Services

Web Server

Backend Server/System

The Enterprise

SOAP vs. REST

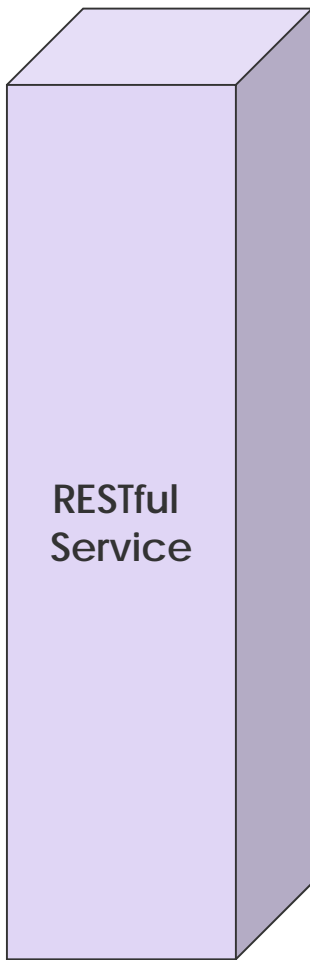Unless you have a reason to use SOAP .....
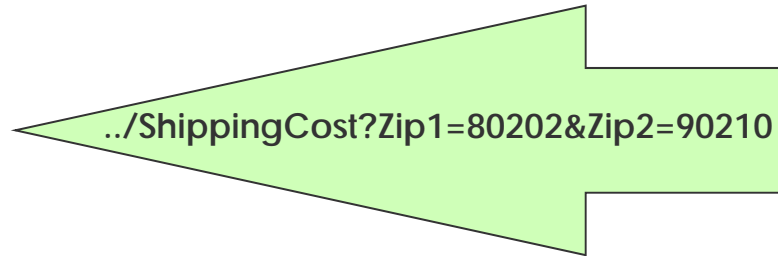use REST

REST and RESTful

- REST: (Representational State Transfer) software architecture style of networked systems such as the World Wide Web

- RESTful: Systems that follow REST principles.

- RESTful web services has become a popular way to build and consume Web services
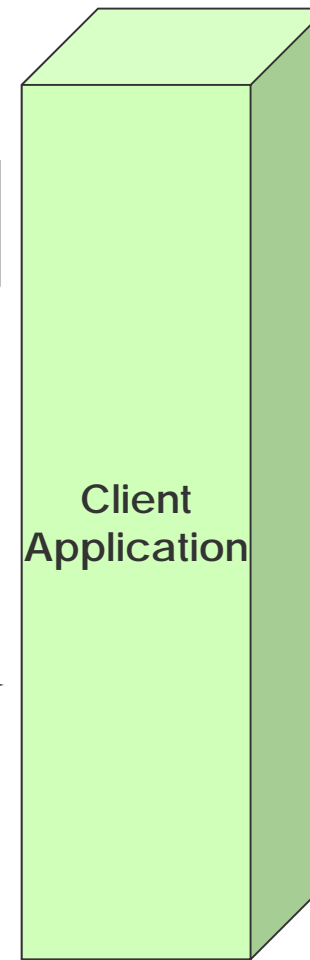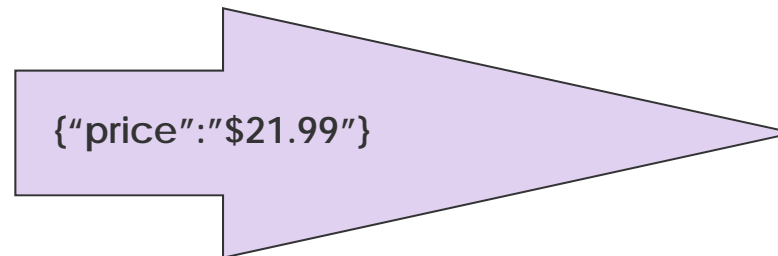
RESTful Example

What does it cost to ship from ZIP code 80202 to 90210?

RESTful Service

../ShippingCost?Zip1=80202&Zip2=90210

Web Services Are Just Information, Not Presentation

{"price":"$21.99"}

Client Application

Rocket

U2 REST Architecture

../ShippingCost?Zip1=80202&Zip2=90210

Client

HTTP →

HTTP {JSON} ←

U2 REST Server

(JETTY)

U2JPA

← UOJ →

U2 DB Server

{"price":"$21.99"} ←

Attribute PRICE, ZIP1, ZIP2 Returns 21.99

* U2JPA – U2 Java Persistence Architecture

Request Methods

REST – Uses HTTP Methods (CRUD) to Access
Business Logic

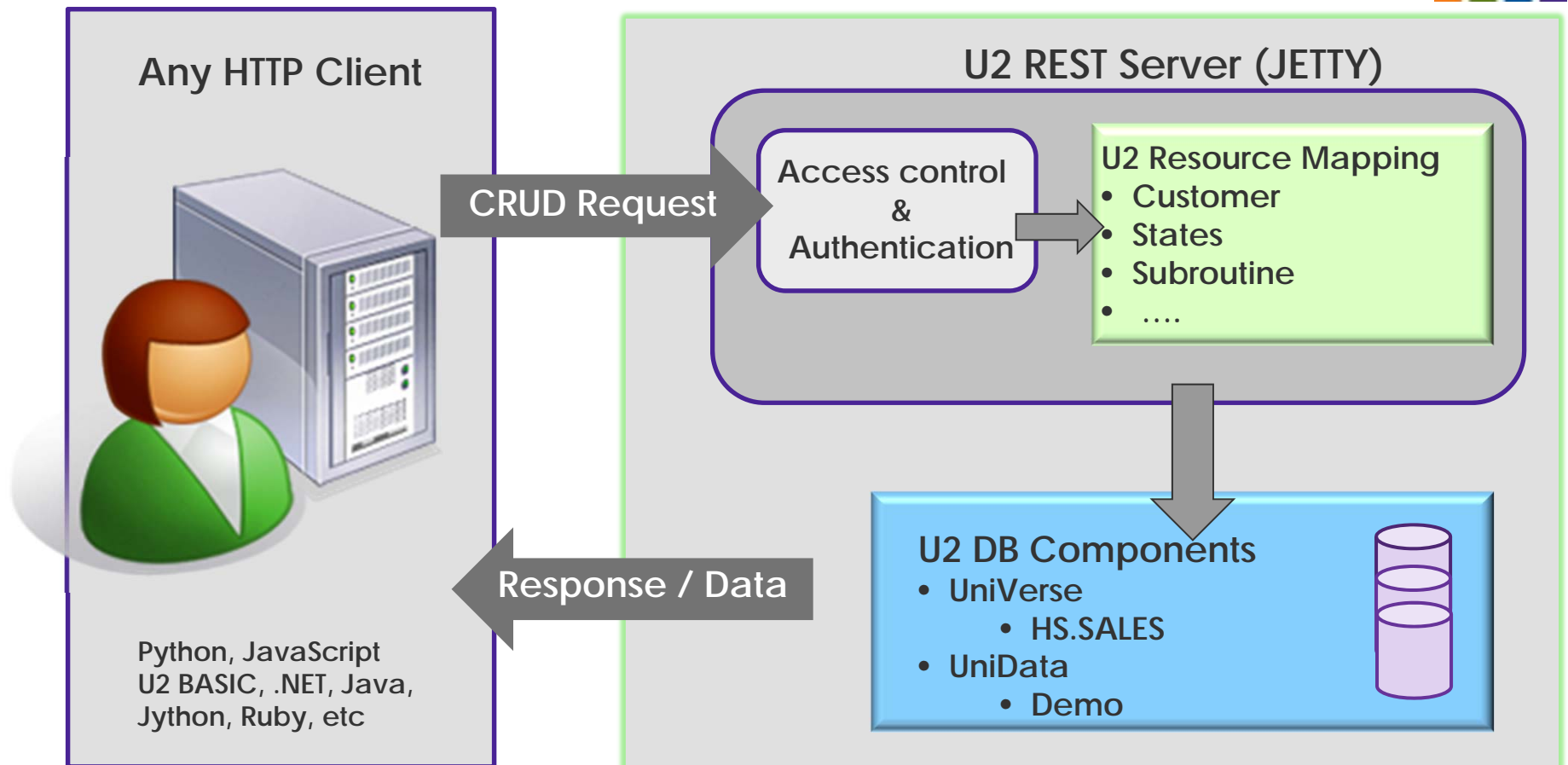| Operation	SQL	HTTP/REST
Create	INSERT	POST
Read (Retrieve)	SELECT	GET
Update	UPDATE	PUT
Delete (Destroy)	DELETE	DELETE

HTTP Authentication

HTTP Authentication is a method for a web browser or other client program to provide a user name and password when making a request

U2 RESTful Web Services support both Basic and Digest Access Authentication

U2 REST Architecture

Any HTTP Client

CRUD Request →

Python, JavaScript
U2 BASIC, .NET, Java,
Jython, Ruby, etc

← **Response / Data**

U2 REST Server (JETTY)

Access control
&
Authentication

→

U2 Resource Mapping
- Customer
- States
- Subroutine
- ….

↓

U2 DB Components
- UniVerse
  - HS.SALES
- UniData
  - Demo

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Agenda 2 of 2

- U2 DBTools

- JSON

- HTTP Authentication

- Data Access Control

- Security

- Deployment

- Monitoring

- Resources

The New U2 DBTools Release Includes U2 RESTful Web Services Developer –

And it is a FREE download!

U2 RESTful Web Services Developer

- New U2 DBTools just released

- Configures RESTful Web Services

- Similar to SOAP WSD
  - Native U2 integration
  - Wizard based
  - Test facilities for data and subroutine resources
  - Deployment
  - ADE (Automatic Data Encryption) not supported naturally
  - SB+ data support
  - Remote monitoring

U2 to REST Mapping

Edit Resources

Select Fields for Resources

Select U2 file fields that will be generated in resources.

	Foreign Key	@ID	TYPE	LOC	C...	NAME	FOR...	SM	ASSOC
☑		ISBN	D	1		ISBN	15L	S	
☑		TITLE	D	2		Title	35L	S	
☐		DISCS	D	3		# Discs	5R	S	
☑		DISKS	D	3		# Disks	5R	S	
☑		RATING	D	4		Rating	20L	S	
☑		TIME	D	5	MT	Time	5R	S	
☑		ASPECT	D	6		Aspect	15R	S	
☑		GENRE	D	7		Genre	25L	S	
☑		DIRECTOR	D	8		Director(s)	35L	MV	
☑		WRITER	D	9		Writer(s)	35L	MV	
☐		ACTOR	D	10		Lead Actors	35L	M	
☑		ACTORS	D	10		Lead Actors	35L	MV	
☑		COMPOSER	D	11		Composer(s)	35L	MV	
☑		PRODUCER	D	12		Producer(s)	35L	MV	
☑		NOEPISODES	D	13		# Of Episodes	2R	S	

Select All   Select All D-type   Deselect All   Invert Selection   Check Selected

< Back   Next >   Finish   Cancel

U2 RESTful Web Services Developer

What is JSON?

- **JSON** (JavaScript Object Notation) is a lightweight data-interchange format
  - Easy for humans to read and write
  - Easy for machines to parse and generate

http://json.org/

- Properties of an Object:
  - Defined as an unordered set of name/value pairs
  - Begins with { (left brace) and ends with } (right brace).
  - Each objects' name (property, field, attribute) is followed by : (colon)
  - Each object's name/value pairs are separated by , (comma).

object

{ string : value }

,

Rocket
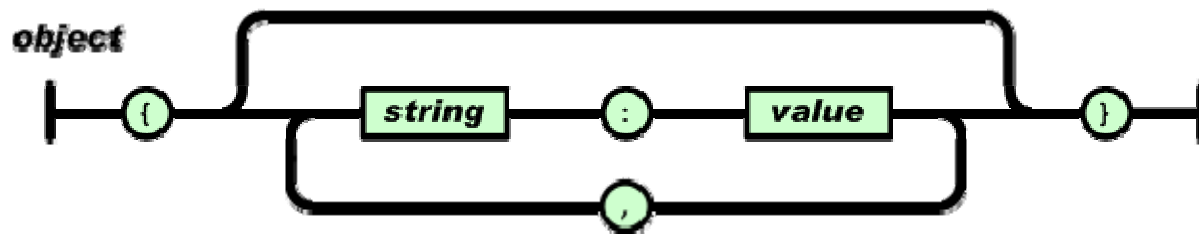
U2 RESTful Web Services Uses JSON

- JSON – JavaScript Object Notation
- JavaScript is native to all browsers
- Can handle from very simple to complex structures

```
2.txt - Notepad
File  Edit  Format  View  Help
{
        "custid":"2",
        "orders_list":
            {
            "orders":[
                {
                list_price":"$6,890",
                "svc_price":"$900",
                "paid_date":"02/05/91",
                "u2version":"82586543545924524 58",
                "svc_start":"01/13/91",
                "price":"$6,600",
                "prodid":"c2000",
                "buy_date":"01/08/91",
                "description":"Moderate duty, entry level, color copier",
                "svc_end":"01/15/92",
                "svc_paid_date":"02/05/91",
                "discount":"4.2"
                }
            ]
        },
}
                                                              Ln 11, Col 26
```

REST Web Service – Customer Rec

REST Web Service - Member

{"@uri":"http://den-l-nk01.rocketsoftware.com:9191/hs_sales/Customer/2?depth=1","custid":"2","fulladdr":"431 Third Ave.","phone":"(617)555-9823","sal":"Ms.","city":"Waltham","lname":"Morris","fname":"Diana","company":"Fast Copy Center","zip":"01133","addr2":"","addr1":"431 Third Ave.","orders_list":{"@uri":"http://den-l-nk01.rocketsoftware.com:9191/hs_sales/Customer/2/Orders","orders":[{"@uri":"http://den-l-nk01.rocketsoftware.com:9191/hs_sales/Customer/2/Orders/1","ser_num":"600782","list_price":"$6,890","svc_price":"$900","paid_date":"02/05/91","u2version":"8258654354592452458","svc_start":"01/13/91","price":"$6,600","prodid":"c2000","buy_date":"01/08/91","description":"Moderate duty, entry level, color copier","svc_end":"01/15/92","svc_paid_date":"02/05/91","discount":"4.2"},{"@uri":"http://den-l-nk01.rocketsoftware.com:9191/hs_sales/Customer/2/orders/2","ser_num":"700422","list_price":"$12,990","svc_price":"$500","paid_date":"02/05/91","u2version":"8258654354592452458","svc_start":"01/13/91","price":"$12,000","prodid":"M3000","buy_date":"01/08/91","description":"Heavy duty monochrome copier","svc_end":"06/12/91","svc_paid_date":"02/05/91","discount":"7.6"},{"@uri":"http://den-l-nk01.rocketsoftware.com:9191/hs_sales/Customer/2/Orders/3","ser_num":"101456","list_price":"$1,990","svc_price":"$150","paid_date":"02/12/91","u2version":"8258654354592452458","svc_start":"01/13/91","price":"$900","prodid":"s3000","buy_date":"01/22/91","description":"Sorting attachment for M3000/C3000","svc_end":"01/15/92","svc_paid_date":"02/12/91","discount":"54.8"}]},"fullname":"Ms. Diana Morris","statename":"Massachusetts","u2version":"8258654354592452458","state":"MA"}

JSON Response

HTTP Authentication

Basic Authentication:

- Based on HTTP/1.0 specification

- User passwords are sent in simple base64 ENCODING
  (not ENCRYPTED)

Digest Authentication:

- User passwords are sent in an ENCRYPTED which is much
  more secure

- U2 REST server enforces a **qop=auth**

Data Access Control

User+**Password**+**Role** defines which CRUD method(s) are allowed for that resource
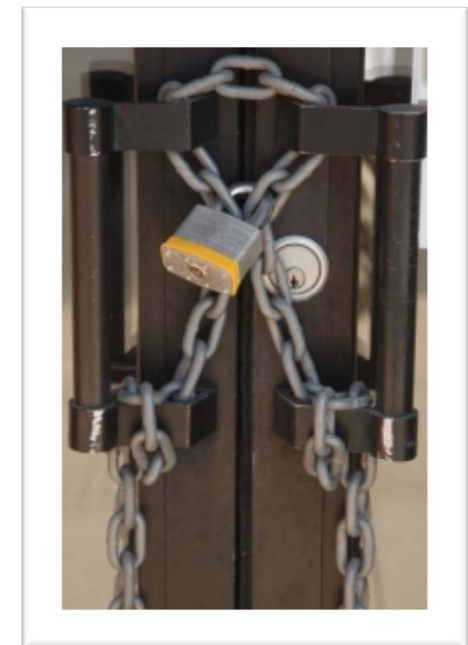
- Users can be assigned one of more roles

- User roles are defined by grouping a set of user privileges together

Security

- **SSL Security**
  - U2 REST supports SSL connections between the U2 REST server and its clients
  - U2 REST supports SSL connections between the U2 REST server and the U2 database server

- **Tools needed to implement**
  - XAdmin and Java keytool

U2 RESTful Web Services Deployment

- Platform independent

- Java JRE 1.6 required

- .bat and .sh files

- Start and Stop U2 RESTful Server

- Change Deployment setting after deployment
  - SSL implementation / changes
  - Access control
  - Database properties

Remote Monitoring

- Turn Debug ON/OFF

- View RESTful Server log files

- Stop U2 RESTful Server

Resource Tools

- Test Tools
  - Fiddler – www.fiddler2.com
  - REST Client – www.WizTools.org

- Client Tools
  - Python – www.python.org/
  - Jython – www.jython.org/
  - U2 Samples – In the U2 RESTFul pdf

RESTful Client Tools

Readily available JSON viewers can help organize info

U2 Client Sample Code

Source

- BASIC

- Python

- JQuery

- Jscript

- Ruby

- PHP

U2U 2012

- iPhone

- Android

- UDO BASIC
  (U2 Dynamic Objects)

U2 REST Pass-through & UDO

U2 REST Pass-through Enables:

- UDO object data structure strictly follows JSON specification

- UDO object structure that supports unlimited nesting levels, make it easier to consume web services

- UDO provides convenient data structures available in more modern languages

- UDO is a new data format to transfer data between server and client

- UDO defines a new subroutine parameter type, easier to publish a subroutine as web service
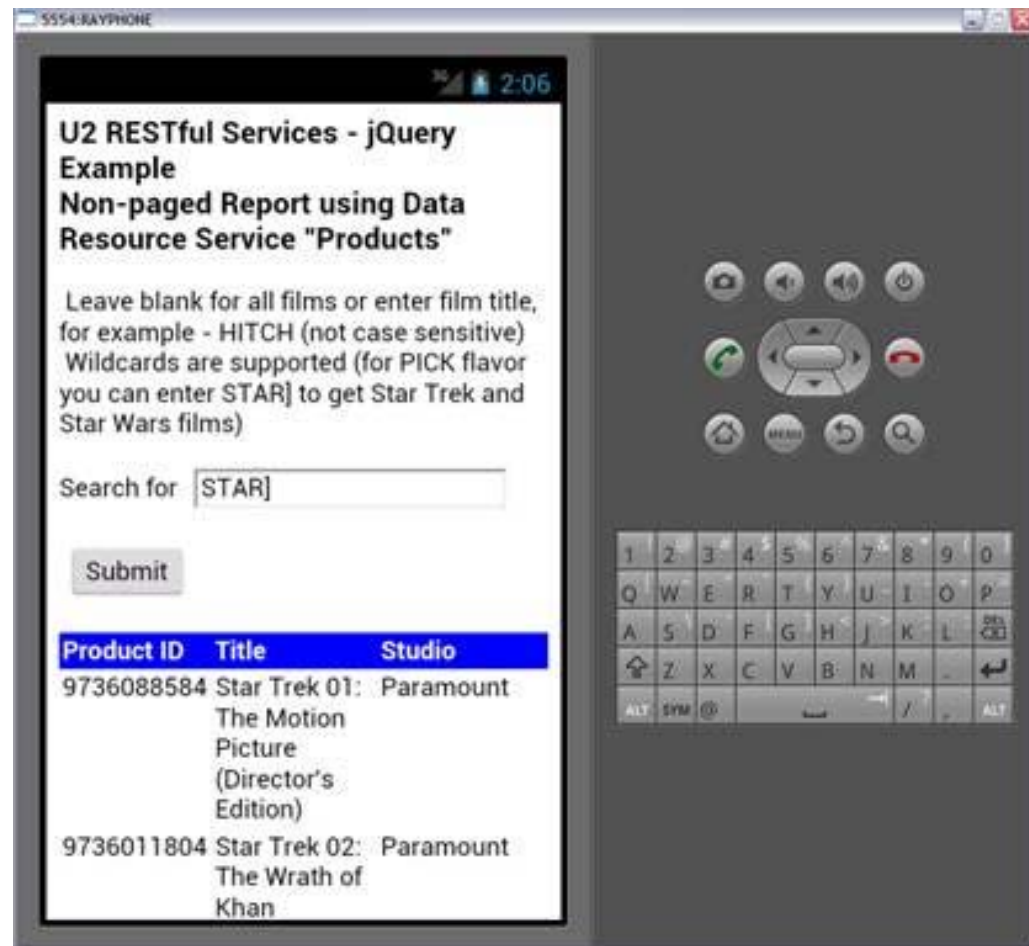
For a guided tour of U2 RESTful Web Services...

You are invited to join us at U2 University 2012

University 2012
Achieve Your Potential

Denver May 8-10 | UK Jun 26-28 | AUS Aug 14-16 | Rocket U2

U2U 2012 Preview

Question and Answer Session

To ask a question:
- Click on hand icon with green arrow and we will call your name

Or you may email us your question later at:

U2AskUs@rocketsoftware.com

For more information on Professional Services
email: **U2Services@rocketsoftware.com**

References and Resources

- Rocket Software http://www.rocketsoftware.com/u2
  - U2 Support – DeveloperZone
- Microsoft http://www.microsft.com and http://www.msdn.com
- Apple http://developer.apple.com
- Android – http://www.android.com and http://www.eclipse.org
- Java – http://www.oracle.com
- Help – http://www.google.com and http://wikepedia.com
- Books
- Articles
- U2 Education
- U2 Professional Services – Quick Start
- Email questions to U2AskUs@rocketsoftware.com

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Thank you!

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