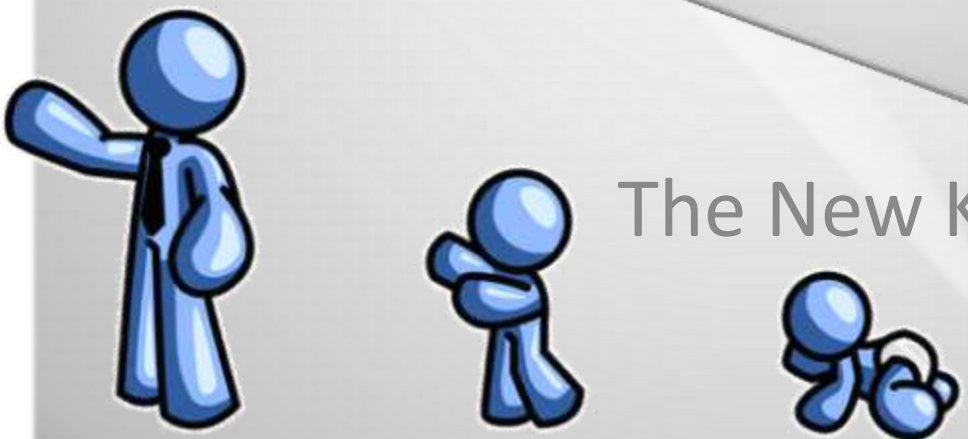
JSON and REST



The New Kids on the Data Block

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REST

What does it stand for?:

Representational **S**tat**e** **T**ransfer

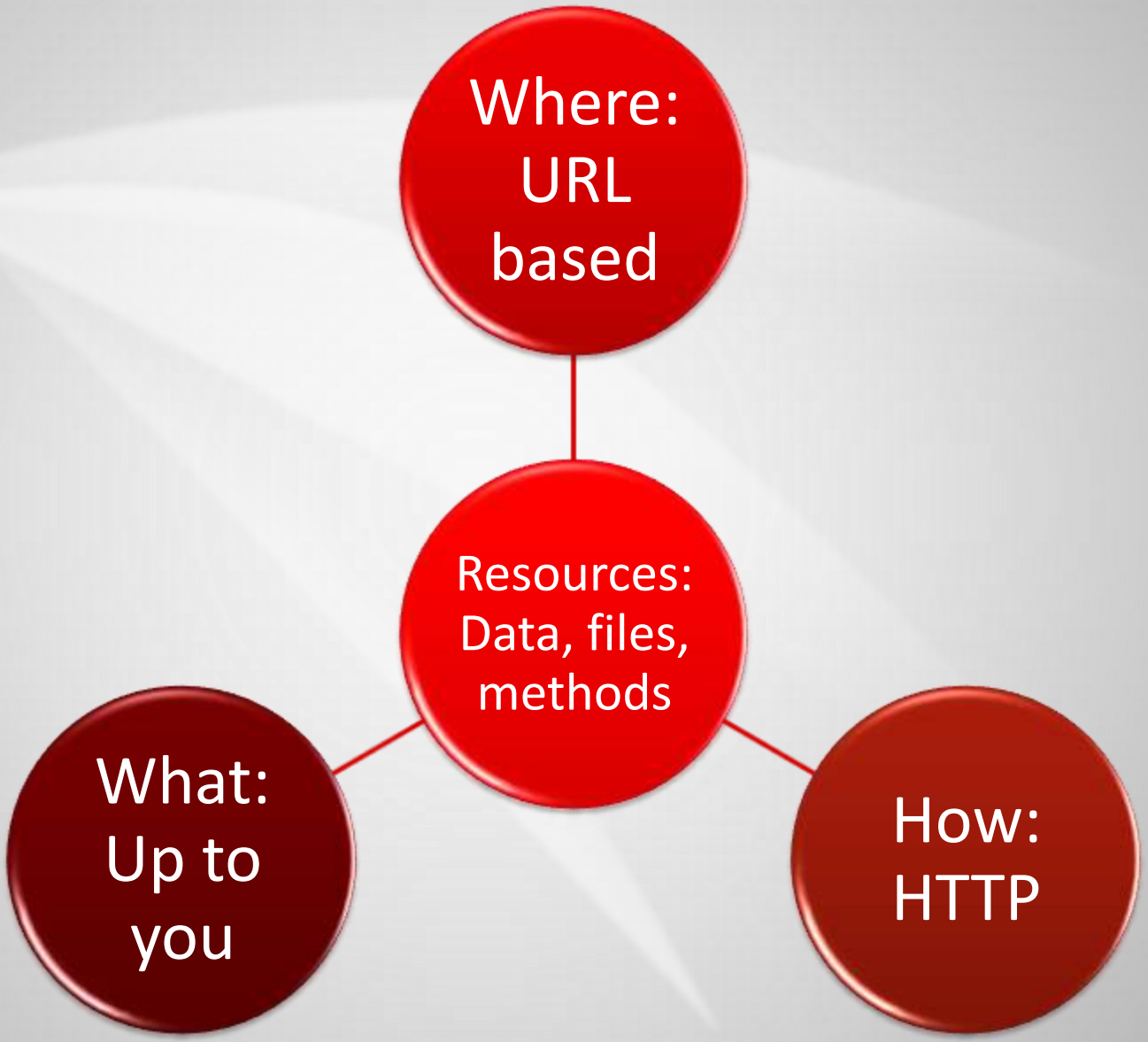
What Is it?

A **style** of software architecture for distributed systems

Who/Where/When?

Came about in 2000 doctoral dissertation of Roy Fielding – but it's been used for much longer

REST – Core Principal



REST – Where/How: Simple Example

Premise:

- Data in a table could be a resource we want to read
- Database server called *bbddb01*
- Database called *northwind*
- Table called *users*

http://bbddb01/northwind/users

What, What, What?

What type of content you return is up to you.

Compare to SOAP where you must return XML.

Most common are XML or JSON. You could return complex types like a picture.

REST – Is it used?

Web sites are RESTful

RSS is RESTful

Twitter, Flickr and Amazon expose data using REST

Some things are “accidentally RESTful” in that they offer limited support.

Real Life: Flickr API

Resource: Photos

Where:

- http://farm{farm-id}.static.flickr.com/{server-id}/{id}_{secret}.jpg
- http://farm{farm-id}.static.flickr.com/{server-id}/{id}_{secret}_[mstb].jpg
- http://farm{farm-id}.static.flickr.com/{server-id}/{id}_{o-secret}_o.(jpg|gif|png)

What: JPEG, GIF or PNG (defined in the URL)

http://farm1.static.flickr.com/2/1418878_1e92283336_m.jpg

REST – Methods

HTTP Methods are a key corner stone in REST.
They define the action to be taken with a URL.
Proper RESTful services expose all four – "accidental" expose less.
Nothing stopping you doing some Mix & Match
❖Some URL's offering all of them and others a limited set

What are the four methods and what should they do?

REST	CRUD (Create, Read, Update, Delete)
POST	Create
GET	Read
PUT	Update or Create
DELETE	Delete

REST – Methods Example

http://bbddb01/northwind/users[firstname="rob%"]

- **+ POST = Error**
- **+ GET = Returns everyone who begins with rob**
- **+ PUT = Error**
- **+ DELETE = Deletes everyone who begins with rob**

http://bbddb01/northwind/users

& we add some input data

- **+ POST = Creates a new user**
- **+ GET = Returns everyone who meets criteria**
- **+ PUT = Creates/Updates a user (based on data)**
- **+ DELETE = Deletes everyone who meets criteria**

REST – Methods Example

http://bbddb01/northwind/users[firstname="rob%"]

+ POST = Error

+ PUT = Error

What would the error be?

HTTP 400 or 500 errors are normally used to indicate problems – same as websites

REST – Commands

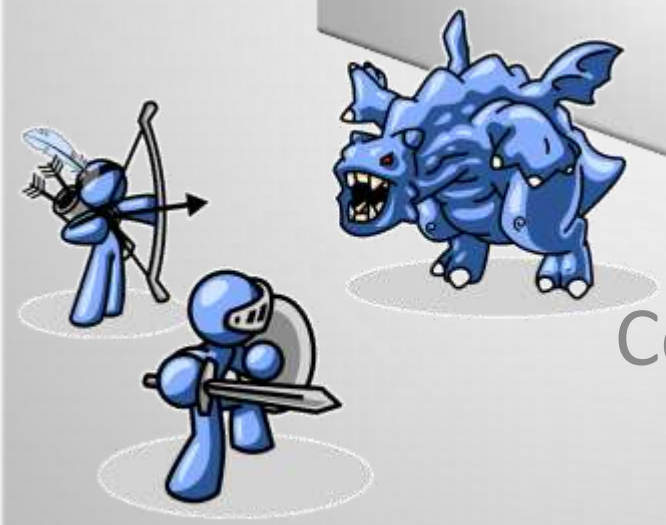
You can associate commands with a resource.

Commands can replace the need for using HTTP methods and can provide a more familiar way of dealing with data.

Example:

```
userResource = new Resource('http://example.com/users/001')
userResource.delete()
```

FIGHT: REST vs. SOAP



Comparing apples and oranges

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REST vs. SOAP – pt I: Technology

REST	SOAP
A STYLE	A Standard
Proper REST: Transport must be HTTP/HTTPS	Normally transport is HTTP/HTTPS but can be something else
Response data is normally transmitted as XML, can be something else. ❖On average the lighter of the two as does not have SOAP header overhead	Response data is transmitted as XML
Request is transmitted as URI ❖Exceptionally light compared to web services ❖Limit on how long it can be ❖Can use input fields	Request is transmitted as XML
Analysis of method and URI indicate intent	Must analyse message payload to understand intent
…	WS* initiatives to improve problems like compression or security

REST vs. SOAP – pt II: Languages

REST	SOAP
Easy to be called from JavaScript	JavaScript can call SOAP but it is hard, and not very elegant.
If JSON is returned it is very powerful (keep this in mind)	JavaScript parsing XML is slow and the methods differ from browser to browser.
C# (Visual Studio) parsing of REST means using HttpWebRequest and parsing the results (string/xml) or normal service consumption (.NET 3.5 SP 1 and later).	C# (Visual Studio) makes consuming SOAP very easy and provides nice object models to work with.
C# version 4 should make this easier thanks to new dynamic methods.	...
There are 3rd party add-on's for parsing JSON with C# so that may make it easier.	...

REST vs. SOAP – pt III: Tools

REST	SOAP
Basic support for REST in BizTalk	BizTalk and SOAP are made to be together.
WCF can consume REST.	WCF can consume SOAP.
WCF can serve REST with a bit of tweaking.	WCF can server SOAP.
The new routing feature in ASP.NET 3.5 SP1 makes building a RESTful service easy.	...

FAQ about Security?

Are RESTful services secure?

It's a style, not a technology so that depends on how you implement it.

Are you open to SQL injection attacks?

When you look at *http://bbddb01/northwind/users[firstname="rob%"]*, you may think so but you shouldn't be. Because:

1) The parameter shouldn't be SQL
2) If it is SQL, why are you not filtering it?
3) Remember the old rule: Do not trust user input

FAQ about Security?

How can I do authentication?

It's built on HTTP, so everything you have for authentication in HTTP is available

PLUS

You could encode your authentication requirements into the input fields

JSON – What is it?

*"JSON (JavaScript Object Notation) is a **lightweight data-interchange format**. It is easy for humans to read and write. It is easy for machines to parse and generate"* – JSON.org

Importantly: JSON is a subset of JavaScript

JSON – What does it look like?

```
{
    "firstName": "John",
    "lastName": "Smith",
    "address": {
        "streetAddress": "21 2nd Street",
        "city": "New York",
        "state": "NY",
        "postalCode": 10021
    },
    "phoneNumbers": [
        "212 555-1234",
        "646 555-4567"
    ]
}
```

Name/Value Pairs

Child properties

String Array

Number data type

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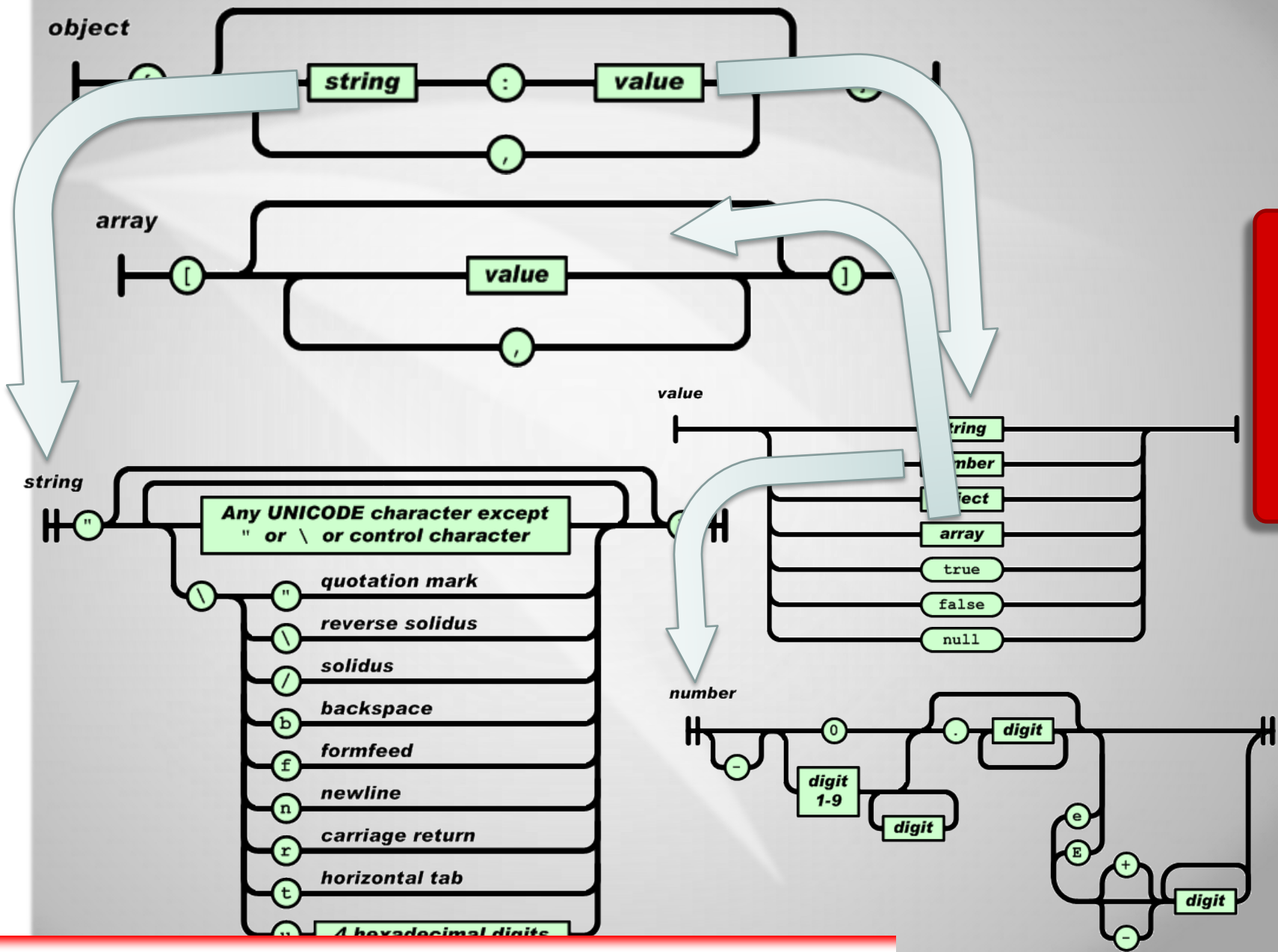
JSON Data Structures



JSON Basics

Demo

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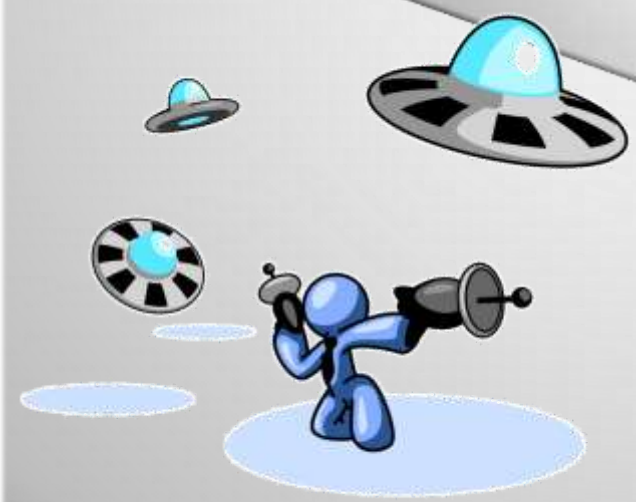
FIGHT:
JSON vs XML



Aren't they the same?

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JSON vs. XML

JSON	XML
Data Structure	Data Structure
No validation system	XSD
No namespaces	Has namespaces (can use multiples)
Parsing is just an eval •Fast •Security issues	Parsing requires XML document parsing using things like XPath
In JavaScript you can work with objects – runtime evaluation of types	In JavaScript you can work with strings – may require additional parsing
Security: Eval() means that if the source is not trusted anything could be put into it. Libraries exist to make parsing safe(r)	Security: XML is text/parsing – not code execution.

JSON vs. XML which to use?

Scenario 1: You have a website (say Twitter.com) and you want to expose a public API to build apps.

Issue	JSON	XML
The public will be parsing data in. You must make it secure.	Run checks against the data in the object to make sure it's secure. You are working on objects so you must also check for potential code access issues.	Run checks against the data to make sure it's secure.
Data must be in a specific format.	Build something that parses the objects.	XML Schema

JSON vs. XML which to use?

Scenario 2: You have a website (say gmail.com) and your front end needs to show entries from a mailbox, but needs to be dynamic and so you will use a lot of JavaScript.

Issue	JSON	XML
Your in house developers know objects and would like to use them.	JSON is JavaScript objects.	Write JavaScript to parse the XML to objects.
The site is secure but you worry about people checking the page source.	You page has JavaScript in it and (maybe) code which communicates with a private backend server. No major issues.	You page has JavaScript in it and (maybe) code which communicates with a private backend server. No major issues.

JSON vs. XML

Which of them should you use?

Use Both – They both have strengths and weaknesses and you need to identify when one is stronger than the other.

Question and Answers

? = !

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