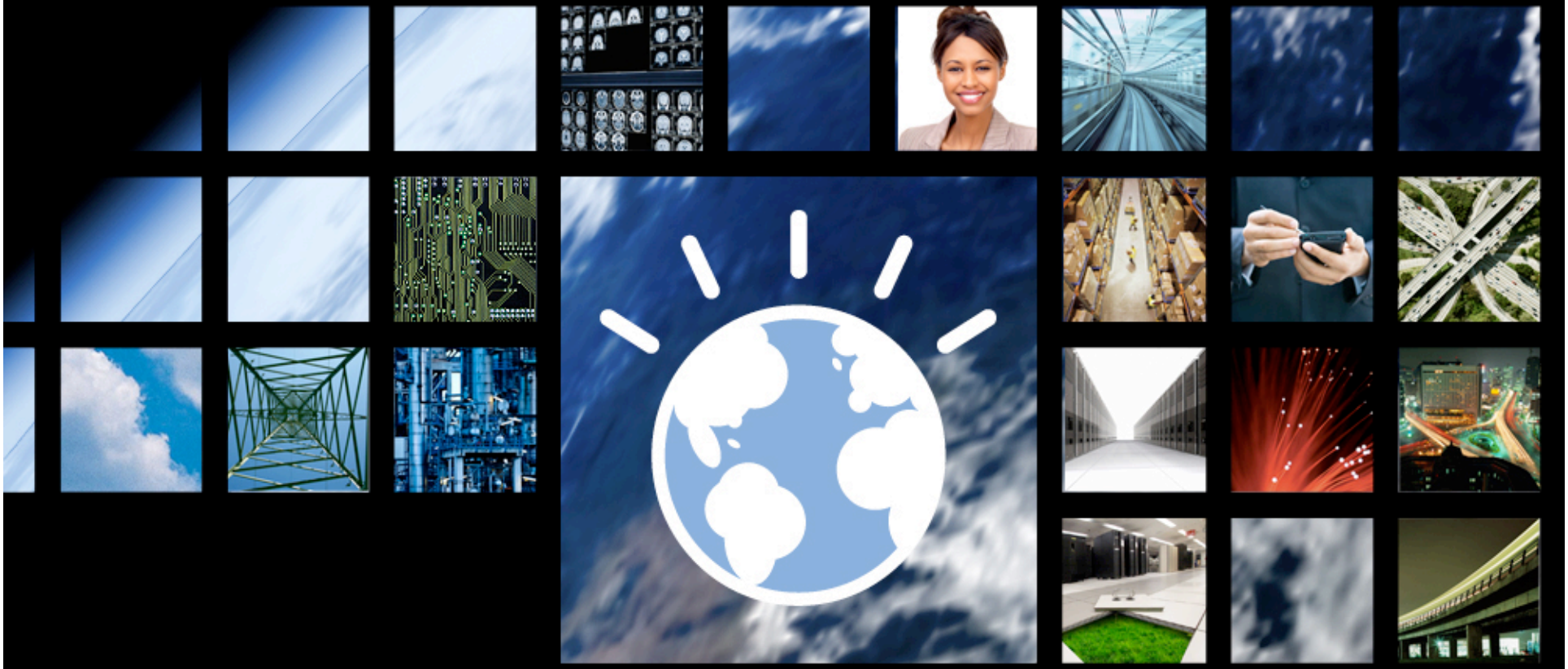
A smart conference for a smarter planet



Web 2.0 and RESTful Applications with WebSphere sMash and PHP

Roland Barcia - STSM,
WebSphere Lab Services, Lead Web 2.0 Architect

2009 IMPACT
SMART SOA CONFERENCE
MAY 3-8 LAS VEGAS

Agenda

- **WebSphere sMash**
- **WebSphere sMash Programming Model**
- **PHP in WebSphere sMash**
- **PHP Applications**
- **Demonstrations**

let's build a smarter planet

Agenda

- **WebSphere sMash**
- **WebSphere sMash Programming Model**
- **PHP in WebSphere sMash**
- **PHP Applications**
- **Demonstrations**

let's build a smarter planet

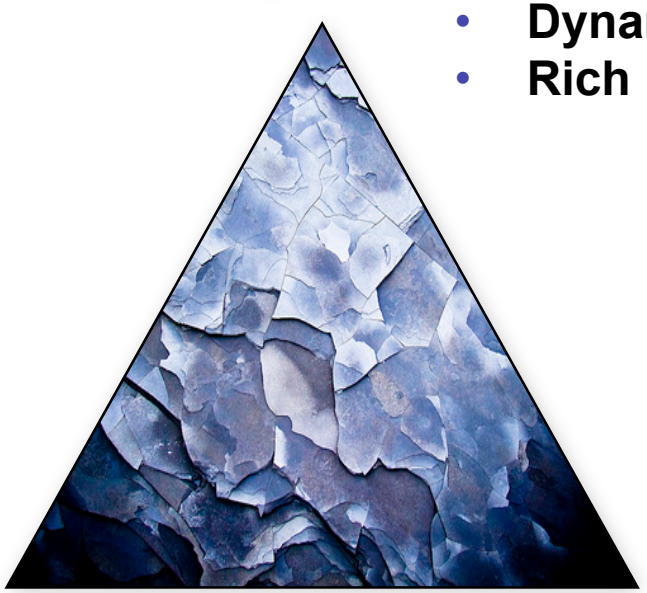
What is WebSphere sMash?

- WebSphere sMash is a new Agile Web Application Platform
  - Leveraging Dynamic Scripting Languages
  - Optimized for Producing....
    - REST-based Services
    - Integration Applications
    - Mash-ups
    - Rich Web interfaces

sMash Core Values

Speed

- **Dynamic Scripting Support**
- **Rich User Interfaces Support**



Agility

- **Integrated runtime**
- **Pre-built services**

Simplicity

- **End to end web-based tooling**
- **Visual & programmatic editors**

Dynamic Scripting

- WebSphere sMash is a dynamic scripting platform
- Application logic is created in a scripting language
  - Groovy (for people that prefer Java)
  - PHP (for the millions of existing PHP programmers)
- Java is positioned as the “system” language

Application Centric Runtime

- WebSphere sMash is an application-centric runtime
  - You create an application and run it
  - Each application runs in its own process (JVM)
  - Runtime is designed to be short lived
- WebSphere sMash is a full runtime stack
  - Everything needed to run the application is provided
    - including the HTTP stack
  - No external proxy or web server is required

Simple Deployment

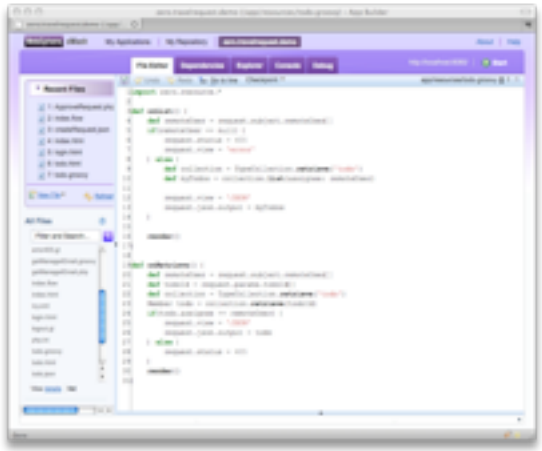
- The deployment is essentially ZIP and Copy
- No machine specific information bound into the application
- Default mode is shared dependencies
  - Application dependencies are stored locally and pulled from the network as needed
- Standalone mode is supported as well
  - All application dependencies are included in the ZIP except the JVM

Scalability

- Programming model is single threaded
- Application instance holds many independent threads
- Greater scalability achieved via multiple instances with a sprayer
- Tooling is provided for Apache mod_proxy
- WebSphere Virtual Enterprise can be used for larger deployments

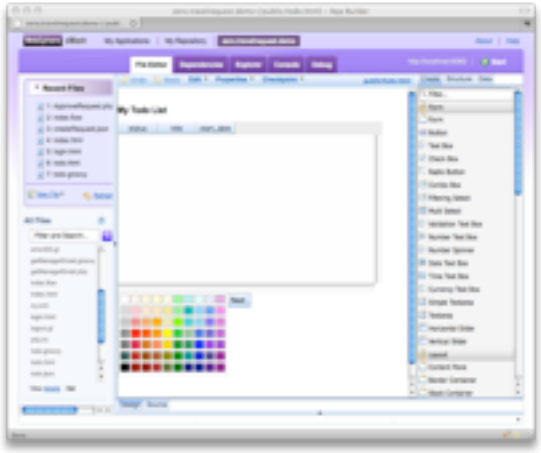
Browser-based Tooling

Dynamic Scripting Editor



Agility in Dynamic Scripting – Groovy / PHP

Visual UI Editor



Simplicity in constructing web pages (Javascript)

Visual Assembly Editor

Speed in scripting / assemble activities into a flow

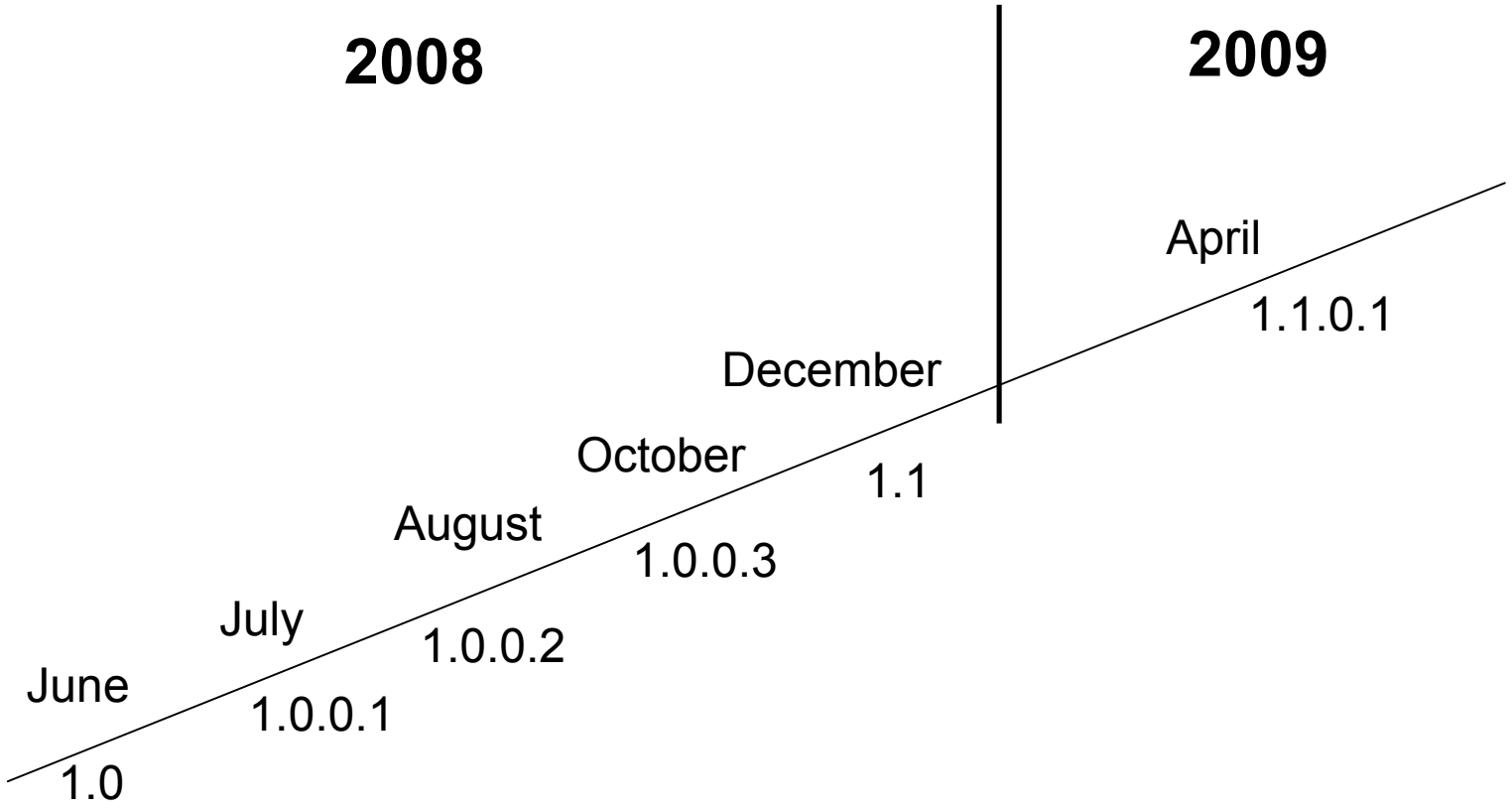
Versions of WebSphere sMash

WebSphere sMash DE (Developer Edition)	*Free download!* **WebSphere sMash + development tooling. Restricted production use.**
WebSphere sMash	**The runtime environment. Available under a standard IBM commercial license.**
WebSphere sMash RTE (Reliable Transport Extension)	**Allows sMash apps to communicate with one another using asynch-ronous messages.**
Project Zero	*Free download!* **Bleeding edge version.**

PROJECT ZERO The development community for WebSphere sMash

http://projectzero.org

Version History



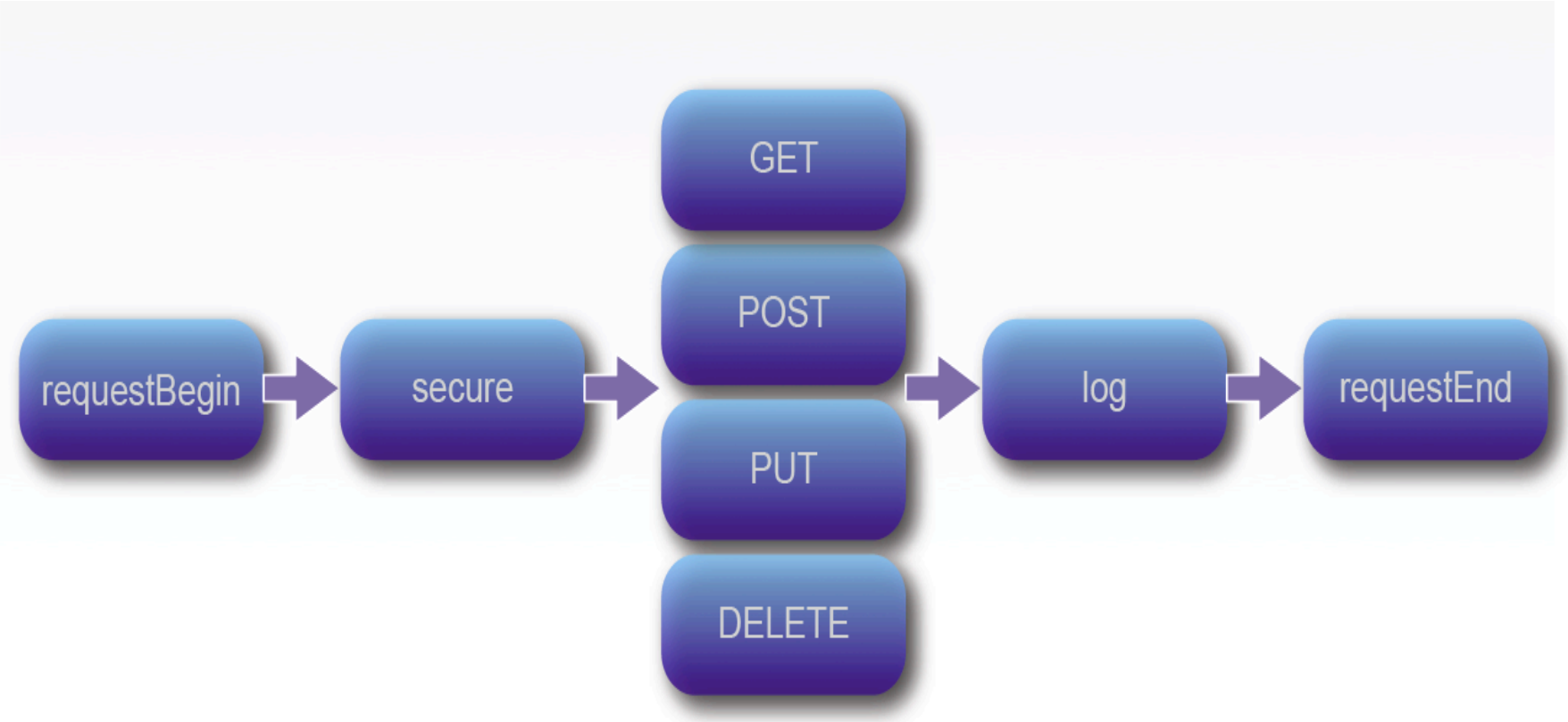
Agenda

- WebSphere sMash
- **WebSphere sMash Programming Model**
- PHP in WebSphere sMash
- PHP Applications
- Demonstrations

let's build a smarter planet

Events

- All behavior in the system is modeled as a set of event
  - Applications are built by handling these events and providing desired behavior
  - Similar to AJAX model or classic UI programming



Event Handlers

- All handlers are stateless
- Can be implemented in Groovy, PHP, and Java

PHP

```
<?php
class Employees {
        function onGET() {
                echo "Response from a GET request";
        }
        function onPUT() {
                echo "Response from a PUT request";
        }
        function onPOST() {
                echo "Response from a POST request";
        }
        function onDELETE() {
                echo "Response from a DELETE request";
        }
}?>
```

PHP

```
<?php echo "Response from a ".get('/request/method'). " request"; ?>
```

Groovy

```
println "Response from a $request.method[]"
```

Groovy

```
def onGET() {
        println "Response from a GET request"
}
def onPUT() {
        println "Response from a PUT request"
}
def onPOST() {
        println "Response from a POST request"
}
def onDELETE() {
        println "Response from a DELETE request"
}
```

Global Context – State Management

- The Global Context (GC) provides access to and management of all application state
  - Conceptually a map of data

- Externalizes all state from the application logic
  - Enables the restartability of the JVM without data loss
  - Enables clustering and scaling to be added transparently

- Simplifies and unifies access to application state and data structures and simplifies state passing within the application

- Contains information provided by both the runtime (such as request parameters) and by the application

Global Context Zones

Zone	Scope	Automatic Recycle	User Initiated Restart	User modified data
Request	Request / Thread	State discarded	State discarded	discarded
Event	Event / Thread	State discarded	State discarded	discarded
Tmp	Application	State discarded	State discarded	discarded
Config	Application	State reloaded from config files	State reloaded from config files	discarded
Connection	Event / Thread	State discarded	State discarded	discarded
User	Session denoted by zsessionid	State preserved	State discarded	preserved
App	Application	State preserved	State discarded	preserved
Storage	Application	State preserved	State preserved	preserved

Accessing the Global Context

- Data is organized by a URI structure
  - First part of URI is always the Zone name
    - /app, /user, /request, /config, /event, /tmp, etc…
- Access is modeled after REST
  - GET, PUT, POST, DELETE
  - zget(), zput(), zpost(), zdelete(), zlist(),zdump(),zcontains()
  - Groovy Short Cuts

Java

```
String path =
GlobalContext.zget("/request/path");
GlobalContext.zput("/tmp/cachedData"
,someVar);
ArrayList config =
GlobalContext.zlist("/config");
```

Groovy Shortcuts

```
def path = request.path[];
// same as zget()
user.count[] = i
// same as zput()
```

PHP

```
<?php
    // Get the URI from the request.
    $uri    = zget("/request/uri");

    echo "<br/>$uri";

    // Get the user agent
    $header = zget("/request/headers/in/User-Agent");
    echo "<br/>$header";

    // List all the parameters.
    $params = zlist("/request/params",false);
    echo "<br/>The parameters<br/>";
    var_dump($params);

     // Put the status.
    zput("/request/status",200);

    // Delete a key.
    zdelete("/request/some_unwanted_key");

    // Add a header value 'no-cache'
    zpost("/request/headers/out/Cache-Control","no-
cache");

    // secured pages only.
    $remoteU = zget("/request/subject#remoteUser");
    $group   = zget("/request/subject#groups");
    $roles   = zget("/request/subject#roles");
?>
```

Value Pathing

- The GC provides simplified access to certain data structures
  - Called ***Value Pathing***
- Understands
  - Maps, List, First Element List, Objects
  - JSON (Implicitly through Maps, Lists, Objects)
- Allows read and write access to internals of the structure through the GC address

Lists
(PHP Examples)

```
//Set or Replace list element
zput("/app/myList#0", "bar")
```

(Groovy Example)

```
app.myList[0] = "bar"
```

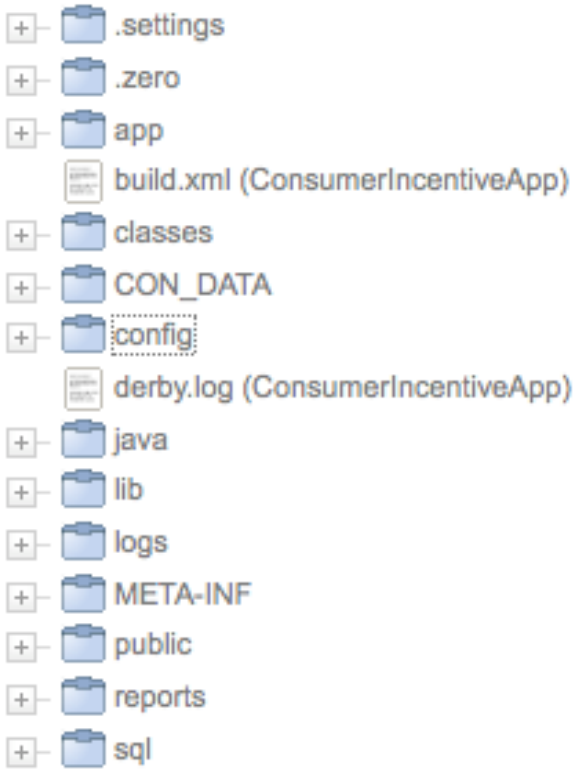
Maps
(PHP Examples)

```
// Create or Replace existing Map
zput("/app/myMap", $arr)

// Add or replace an existing item in a Map
zput("/app/myMap#foo", "bar")

//Create or Merge into existing Map.
zpost("/app/myMap", $arr)

//Returns the map
$arr = zget("/app/myMap")

// Returns entry
$key = zget("/app/myMap#foo")

//Deletes Map
zdelete("/app/myMap")

// Removes entry
zdelete("/app/myMap#foo")
```

(Groovy Example)

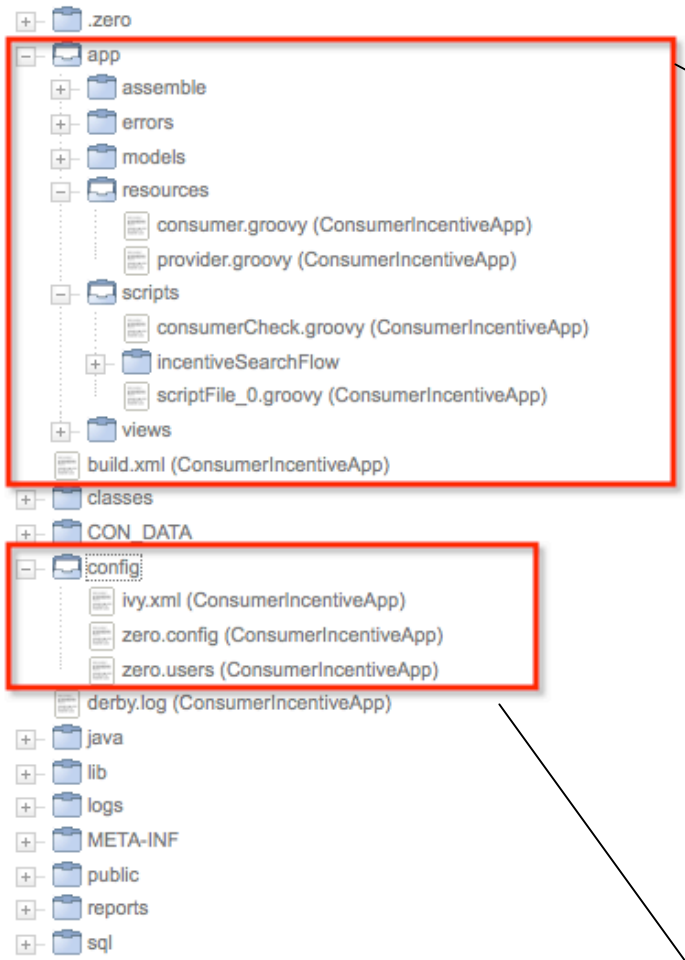
```
app.myMap['foo'] = 'bar'
```

Application Directory Layout



Directory	Description
app	The scripts and templates for key components
classes	The java class files that are part of an application.
config	The configuration files of your application
java	The Java source files.
lib	Additional jar files that are required by your application.
logs	The log and trace files produced by your running application.
public	The Web accessible root folder of the application. Can contain html files, images, dynamic server scripts like .php and .groovy files, JavaScript, etc…
reports	The IVY dependency report shows details of the dependencies that you have on extension modules.
.zero	This directory is created by the WebSphere sMash runtime on behalf of the application to hold any generated files. Developers do not need to maintain or edit files in this directory.

app and config

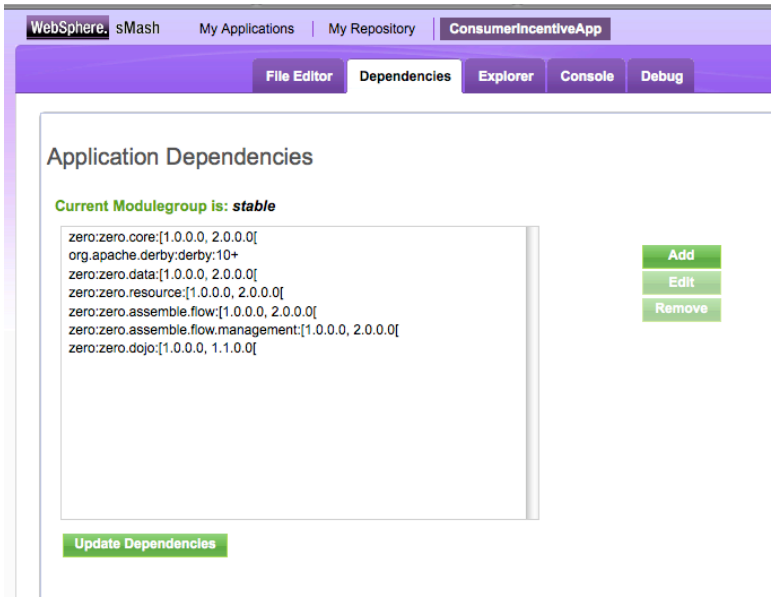


Directory	Description
app/errors	Custom error pages that handle specific errors
app/resources	Set of RESTful resources for an application.
app/scripts	Shared Scripts within an application, not directly accessible via URI.
app/views	Script implementation of views. Represents rendering logic.
app/models	JSON based Resources Models leveraging ZRM.

Directory	Description
config/ivy.xml	Configuration for dependency management of your application.
config/zero.config	Runtime configuration file for your application. Populates the config zone of GC.

Dependencies and Ivy

- Apache Ivy is a tool for managing project dependencies.
- WebSphere sMash Leverage ivy technology for Dependencies.
- sMash applications have:
  - Local Repository
  - Remote Repository
    - Default (projectzero.org)
  - Dependency commands use to load modules into your app from local and remote repositories.
  - Strong Version Support

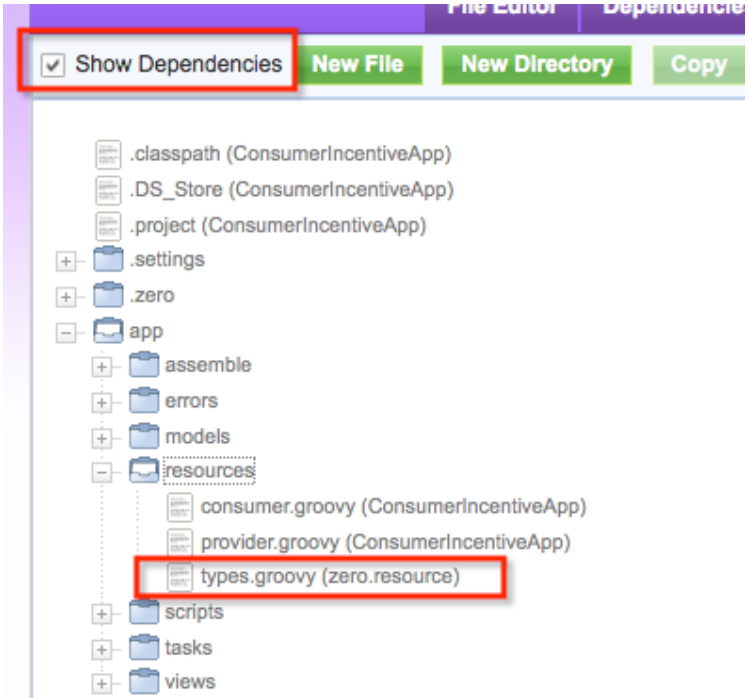



```
<ivy-module version="1.3">
  <info packagingType="unknown" module="ConsumerIncentiveApp" organisation="zero"
revision="1.0.0">
    <license name="type of license" url="http://license.page"/>
    <ivyauthor name="author name" url="http://authors.home.page"/>
    <description homepage="http://module.description.page"/>
  </info>
  <publications>
    <artifact name="ConsumerIncentiveApp" type="zip" org="zero"/>
  </publications>
  <dependencies>
    <dependency org="zero" name="zero.core" rev="[1.0.0.0, 2.0.0.0["/>
    <dependency org="org.apache.derby" name="derby" rev="10+"/>
    <dependency org="zero" name="zero.data" rev="[1.0.0.0, 2.0.0.0["/>
</dependencies>
</ivy-module>
```

Virtualized Directory

- WebSphere sMash provides seamless integration of directories across an application and its dependencies, while maintaining each as separate entities.

- All artifacts are searched within both the application and its declared dependencies



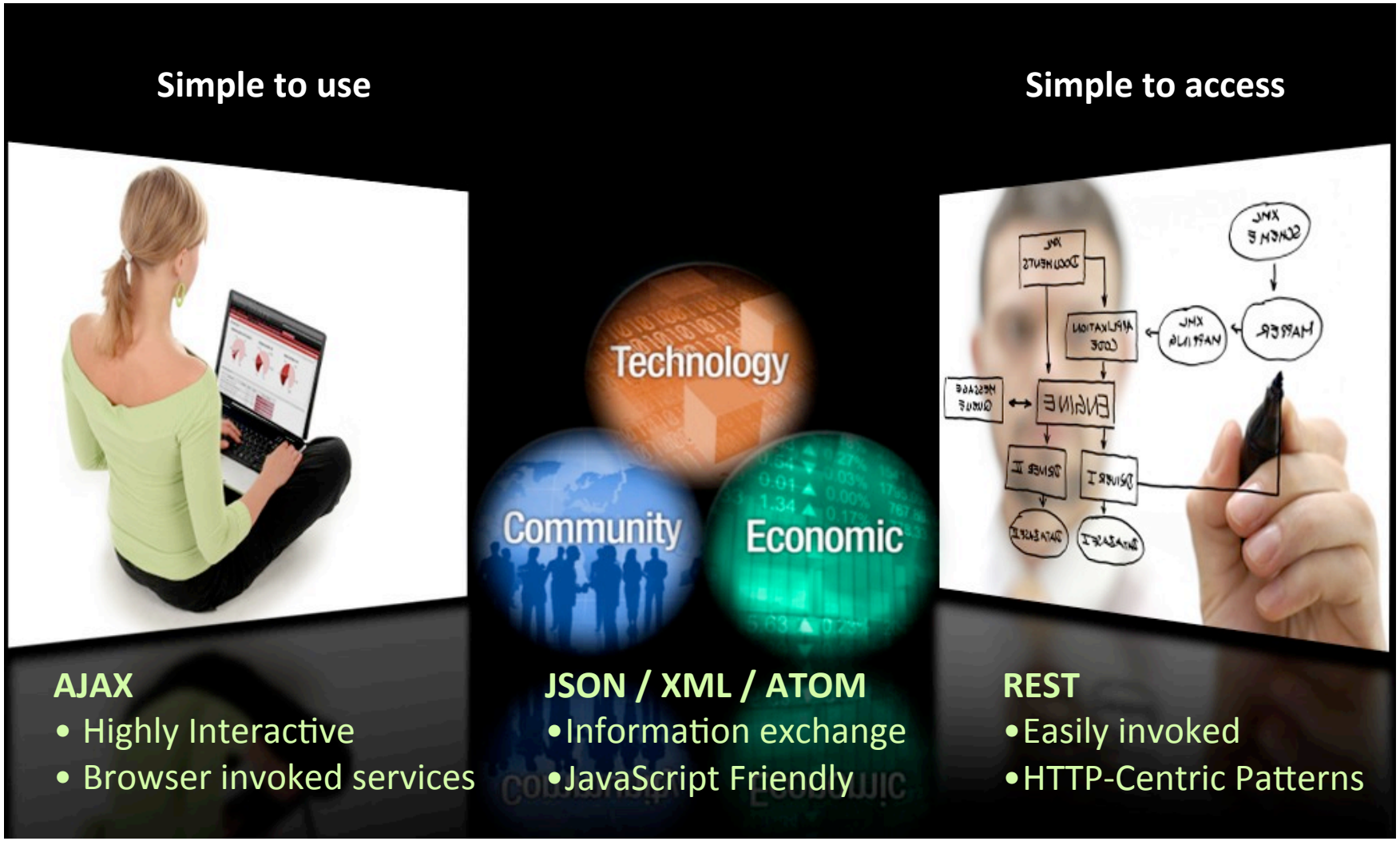
Configuration – zero.config

- **zero.config**
  - processed at the start of a Zero application
  - organized into "stanzas" of related key/value pairs.
  - Stanzas are associated with directives, such as
    - "store to the Global Context"
    - "include another configuration file."

```
# Value set
/config/http/port = 8080

# List set
/config/resources/defaultExtensions = [".groovy"]

# List append
/config/bindings/.groovy += ["zero.core.groovysupport.bindings.DefaultBindings"]

# Map set
/config/test/map = { "a" : "b", "c" : "d" }

# Map append
/config/test/mapappend += { "a" : "b", "c" : "d" }
/config/test/mapappend += { "x" : "y", "w" : "z" }

 # Event handler
/config/handlers += [{
            "events" : "GET",
            "handler" : "custom.Handler.class" }]

# Value reference (insert value read at config-load time)
/config/property/myPrefix = "/foo/bar“
/config/test/value = "${/config/property/myPrefix}/bat“

 # Variable set/value reference
myPrefix = "/foo/bar"
/config/test/value = "${myPrefix}/bat"

# Include
@include "${/config/dependencies/zero.core}/config/security/form.config" {
"formLoginPage" : "/login" }
```

Web 2.0 Applications?

* A term coined by Tim O'Reilly
(http://www.oreillynet.com/pub/a/oreilly/tim/news/2005/09/30/what-is-web-20.html)



What is REST?

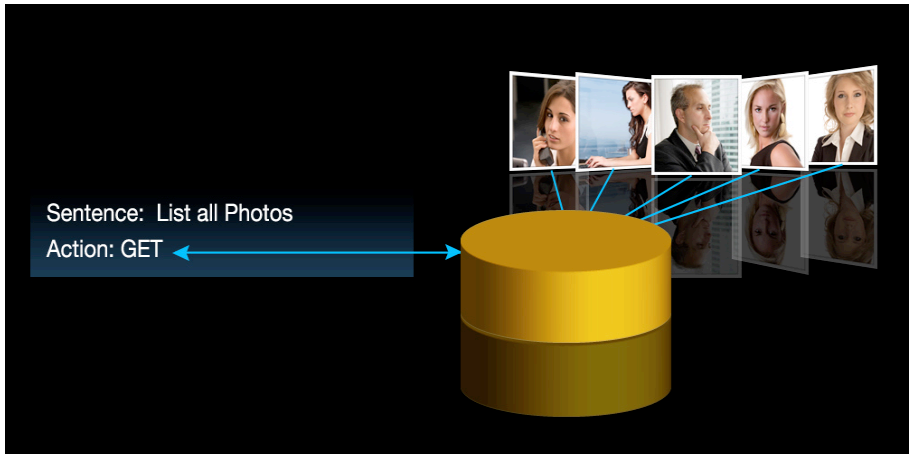
- Representational State Transfer
- Roy Fielding described this via his dissertation
  - http://www.ics.uci.edu/~fielding/pubs/dissertation/rest_arch_style.htm
- It's the design rationale behind the web
- Architectural style for describing distributed hypermedia systems
  - Client/Server
  - Stateless
  - Cacheable
  - Uniform Interface
  - Layered Interface
  - Code-On-demand
- Architectural elements include
  - Data Elements (resources, identifiers, data representations, representational data, control data)
  - Connectors (client, server, cache, resolvers)
- Architecturally - it doesn't really *have* to apply to HTTP

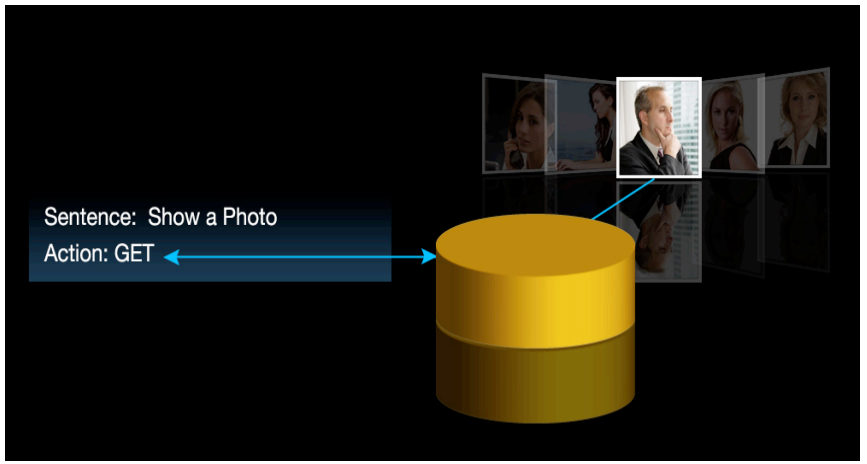
26

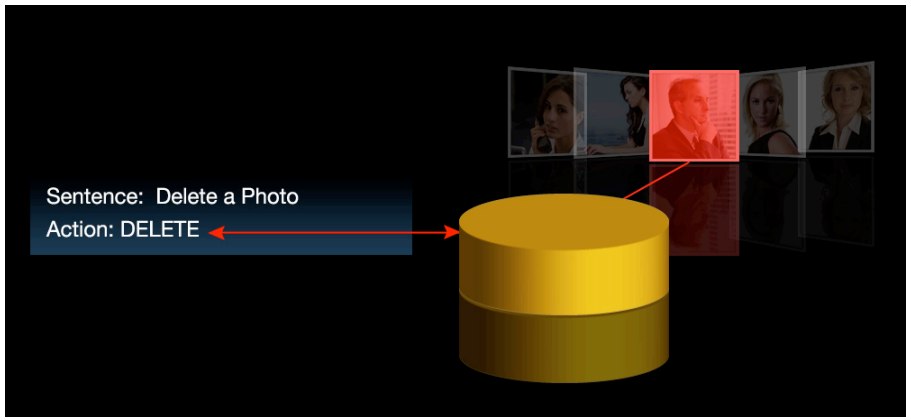
RESTful Web Services

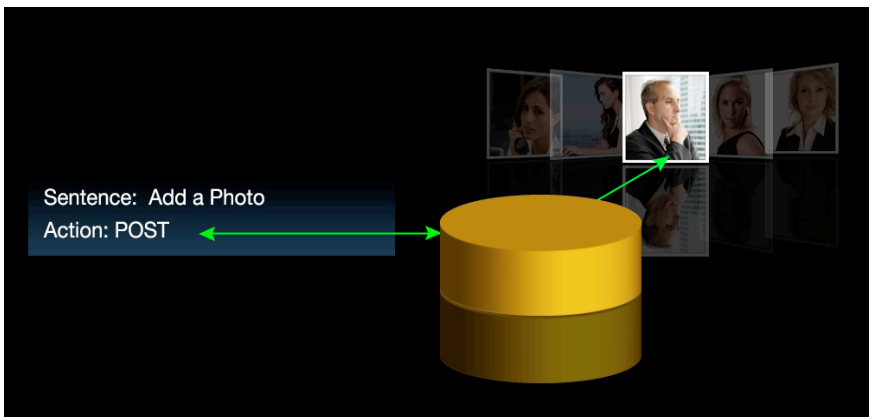
A RESTful Web service is formed like a sentence – it simplifies how developers access services

- Verb = HTTP Action (GET, POST, PUT, DELETE)
- Noun = the URI of the Service (the document)
- Adjective = MIME type of the resulting document









27

REST Misconceptions

- REST is just any XML over HTTP not using SOAP?
  - NO !!! REST is a Pattern of exchanging Resources.
  - RPC is Not REST
- REST is only useful for CRUD (Create, Read,Update, and Delete) semantics.
  - NO!!! Resources can be anything, from a Business Process to an Image.
  - No new Verbs, just new resources.
- REST replaces traditional Web Services
  - REST is about delivering resources through the HTTP Web channel.
  - Does not address Distributed transactions, other protocols like messaging.

REST Web Services

- Identifiable resources (URIs)
  - http://sports.espn.go.com/oly/summer08/swimming/news/story?id=3530615
- Uniform Interface
  - GET, PUT, POST, DELETE
- Stateless Communication
  - Scalable, loose coupling
- Resource Representations
  - Multiple ways to represent (PDF, HMTL, XML,) - via content types
  - HTTP has negotiation capabilities (e.g. ACCEPT)
- Hypermedia
  - Server provides links to resources
  - Allows for evolution

29

Verbs (Actions)

- HTTP offers a uniform interface
  - i.e. constrains the user interface

Operation	HTTP Method	API	Comments	Codes
Create Resource	POST or PUT	HTTP PUT with data to the new resource URI	Creates the new resource, does not return the resource	200 (success), 201 (created),400 (bad request), 401 (unauthorized), 403 (forbidden), 404 (not found), 410 (gone)
Retrieve Resource	GET	HTTP GET with the resource URI	Returns the resource if found	200 (success), 304 (unmodified), 403 (forbidden), 404 (not found), 410 (gone)
Update Resource	PUT	HTTP PUT with data to the existing resource URI	Replaces the current resource representation with the data	200 (success), 400 (bad request), 401 (unauthorized), 403 (forbidden), 404 (not found), 409 (conflict), 410 (gone)
Delete Resource	DELETE	HTTP DELETE with the resource URI	Deletes the resource, does not return the resource	200 (success), 204 (no content), 400 (bad request), 401 (unauthorized), 403 (forbidden), 404 (not found), 410 (gone)
Get information about a resource	OPTIONS	HTTP OPTIONS with the resource URI	Returns information about the options or requirements associated with the resource	200 (success), 404 (not found), 410 (gone)
Test a resource link	HEAD	HTTP HEAD with the resource URI	Returns same information as a GET without the body. Used for testing links	200 (success), 304 (unmodified), 403 (forbidden), 404 (not found), 410 (gone)

Algorithmic Resources

- Resources can be algorithms
  - Business Process, Façade, etc…
  - Should Follow HTTP Verb semantics like any other resource
  - Forces good auditing habits.
- Example: Consider Resource /Transfer
  - Transfers money from one account to another

Verb	Collection	Member
GET	Returns a list of all previous transfers	/Transfer/344 Returns record of specific Transfer
POST	Executes new Transfer.!!	Could retry failed transfer
PUT	Not Supported	Could Change parameters of transfer still in progress.
DELETE	Not Supported	Cancel/Purge Transfer

Default Handlers

- Script as a Resources
  - http://<host>:<port>/Employee.php

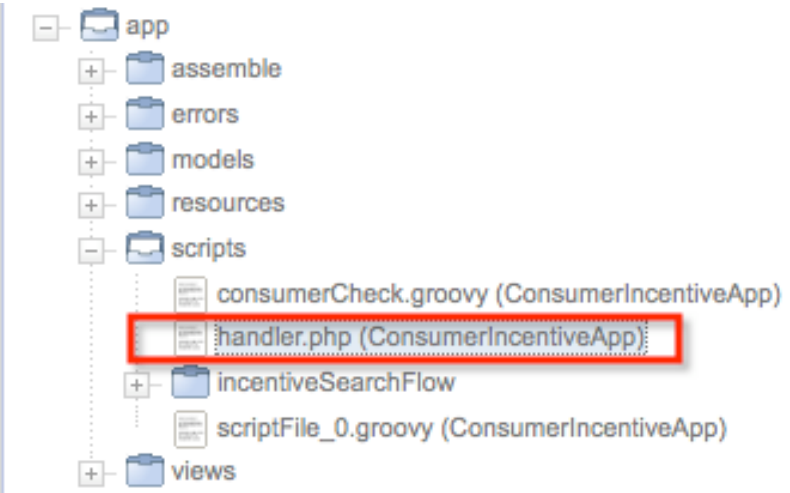
PHP

```
<?php
class Employee {
        function onGET() {
                echo "Response from a GET request";
        }
        function onPUT() {
                echo "Response from a PUT request";
        }
        function onPOST() {
                echo "Response from a POST request";
        }
        function onDELETE() {
                echo "Response from a DELETE request";
        }
}?>
```

```
<?php

switch (zget('/request/method')) {
        case 'GET':
        //GET handling
            break;
        case 'POST':
        //POST handling
            break;
        case 'DELETE':
        // DELETE handling
            break;
        case 'PUT':
        // PUT handling
            break;
}
?>
```

Custom Handlers

- Script as a Resources
  - http://<host>:<port>/emp
  - http://<host>:<port>/emp/333



PHP Resource Handler

```
<?php
class Handler {
        function onGET() {
                echo "Response from a GET request";
        }
        function onPUT() {
                echo "Response from a PUT request";
        }
        function onPOST() {
                echo "Response from a POST request";
        }
        function onDELETE() {
                echo "Response from a DELETE request";
        }
}?>
```

zero.config

```
# Add a custom handler
/config/handlers += [{
    "events" : ["GET","PUT","POST","DELETE"],
    "handler" : "handler.php",
    "conditions" : "/request/path =~ /emp(/.*)?"
}]
```

RESTful Resources

- RESTful Design
  - Collection Model
  - Action can be taken on the entire collection or a specified member of the collection
  - URI and HTTP method define the resource request

HTTP Method	URI	Description
GET	/people	List members
POST	/people	Create member
GET	/people/1	Retrieve member
PUT	/people/1	Update member
DELETE	/people/1	Delete member

REST and WebSphere sMash

WebSphere sMash supports URI and HTTP method define the collection resource model

Each script in the <apphome>/app/resources directory represents a resource handler

URL convention for interacting with resources based on

/resources/<collectionName>[/<memberID>[/<pathInfo>]]

where the actions are defined as follows:

Resource	GET	PUT	POST	DELETE
Collection	list	putCollection	create	deleteCollection
Member	retrieve	update	postMember	delete

Resources on the Web

- What are the URIs?
- Which methods are supported at each URI?
- What formats?

Resource	URI	Method	Representation	Description
Rebate list	/resources/rebate	GET	JSON (array)	List
		POST	JSON (object)	Create
Specific Rebate	/resources/rebate/{id}	GET	JSON (object)	Retrieve
		PUT	JSON (object)	Update
		DELETE		Delete

Resource Handlers in Zero

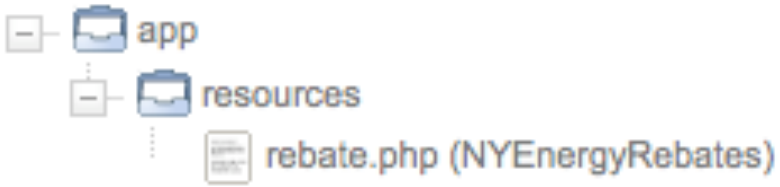
- Basic event handlers for /resources/*

- Zero supports the collection model natively within the <apphome>/app/resources virtualized directory. Each script within the resources directory represents a resource handler, which implements the collection and member operations. Resource handlers are accessed via a simple URL convention:

URI pattern	Method	Event	Description
/resources/collection	GET	list	List of all members
	POST	create	Create member
/resources/collection/{id}	GET	retrieve	Retrieve one member
	PUT	update	Replace member
	DELETE	delete	Delete member

Resource Handlers Example

http://<host>:<port>/resources/rebate
Creates list event
onList() handler in employee.groovy
handles event




```
<?php

// Initialization common to all operations
$dataManager = data_manager('REBATE_DB');

class rebate {

    function onList() {
        global $dataManager;

        $renderType = $location = zget("/request/params/format");
        $rebateRecords = dataExec ($dataManager,    "select * from rebate");
        zput('/request/headers/out/Content-Type', 'text/json');
        echo json_encode($rebateRecords);
     }
…
```

Resource Handlers Example

app/resources/rebate.php (continued)
Similarly POST to /resources/rebate triggers create event…

```
function onCreate() {
        global $dataManager;


            // Convert the raw JSON stream in to a PHP array
            $er = json_decode($HTTP_RAW_POST_DATA);

            $result = dataInsert($dataManager,
  "INSERT INTO Rebate (name,description,rebatetype,validfrom,validto,website) ".
            "VALUES (?, ?, ?, ?, ?, ?)",
            array('rebateid'),array($er['name'], $er['description'],
            $er['rebatetype'],
            $er['validfrom'], $er['validto'], $er['website']));
            $locationUri = zget('/request/path') . "/" . @result;
            zput('/request/headers/out/Location', $locationUri);
            zput('/request/status', 204);
    }
```

Resource Handlers Example

app/resources/rebate.php (continued)

Similarly GET, PUT, and DELETE to /resources/rebate/333

```
 function onRetrieve() {
   global $dataManager;
   $rebateid = zget("/request/params/rebateId");
   $rebateRecords = dataQueryFirst($dataManager, "select * from rebate where rebateId = ?", array($rebateid));
   if(isset($rebateRecords)) {
     zput('/request/headers/out/Content-Type', 'text/json');
     echo json_encode($rebateRecords);
   } else {
     zput("/request/status", 404);
     $message = "incentiveid ". $incentiveid . " not found.";
     zput('/request/error/message', $message);
     zput('/request/view', 'error');
     render_view();
  }
}
function onUpdate() {
   global $dataManager;
   $rebateid = zget("/request/params/rebateId");
   $er = json_decode($HTTP_RAW_POST_DATA);
   $user = zget('/request/subject#remoteUser');
   $result = dataExec($dataManager, "UPDATE rebate SET name=?, description=?, ".
                         "rebatetype=?, validfrom=?, validto=?, website=? WHERE rebateid=?",
                          array($er['name'], $er['description'], $er['rebatetype'], $er['validfrom'],
                          $er['validto'], $er['website'], $rebateid));
    if ($result != null) zput("/request/status", 204);
    else {zput('/request/status', 503); echo "Database query execution failure"; }
    }
function onDelete() {
        global $dataManager;
        $rebateid = zget("/request/params/rebateId");
        $user = zget('/request/subject#remoteUser');
        $result = dataExec($dataManager, "DELETE FROM rebate WHERE rebateId=?", array($rebateid));
        if ($result != null) zput("/request/status", 204);
        else { zput('/request/status', 503); echo "Database query execution failure"; }
       }
}
?>
```

Data formats – JavaScript Object Notation

- Encode

```
{
  “name”:”John Smith”,
  “id”:”/resources/employee/JohnSmith”,
  “mgr”:”/resources/employee/JaneDoe”
}
```

```php
<?php

$employee = array(  'name' => "John Smith",
                    'id' => '/resources/employee/JohnSmith',
                    'mgr' => '/resources/employee/JaneDoe');
// Use json_encode()
zput('/request/headers/out/Content-Type', 'application/json');
echo json_encode($employee);

// Alternatively use Zero JSON renderer
zput('/request/view', 'JSON');
zput('/request/json/output', $employee);
render_view();
?>
```

- Decode

```php
<?php

$employee = json_decode($HTTP_RAW_POST_DATA);

// Alternatively

$input = fopen("php://input", 'r');
$employee = json_decode(fread($input, 1024));

?>
```

Data Format - XML

```php
<?php

$address = array('line1' => 'This lane', 'line2' => 'Somewhere');
$employee = array('name' => "Smith", 'address' => $address);

echo xml_encode($employee, false, "employee");

// Alternatively use the XML renderer
zput('/request/view', 'XML');
zput('/request/xml/output', $employee);
zput('/request/xml/rootElement', 'employee');
zput('/request/xml/idRefs',false);
render_view();

?>
```

```xml
<?xml version="1.0" encoding="UTF-8"?>
<employee>
    <name>Smith</name>
    <address>
        <line1>This lane</line1>
        <line2>Somewhere</line2>
    </address>
</employee>
```

Decode

```php
<?php
$xmlstring = <<<XML
<?xml version="1.0" encoding="UTF-8"?>
<employees>
    <employee id="345435">
        <name>John Smith</name>
    </employee>
    <employee id="343334">
        <name>Jane Doe</name>
    </employee>
</employees>
XML;

$employees = xml_decode($xmlstring);

$employee = $employees->employee[0];
$name = $employee->name;
$id = $employee->getAttribute('id');
?>
```

Data Format - ATOM

Atom document

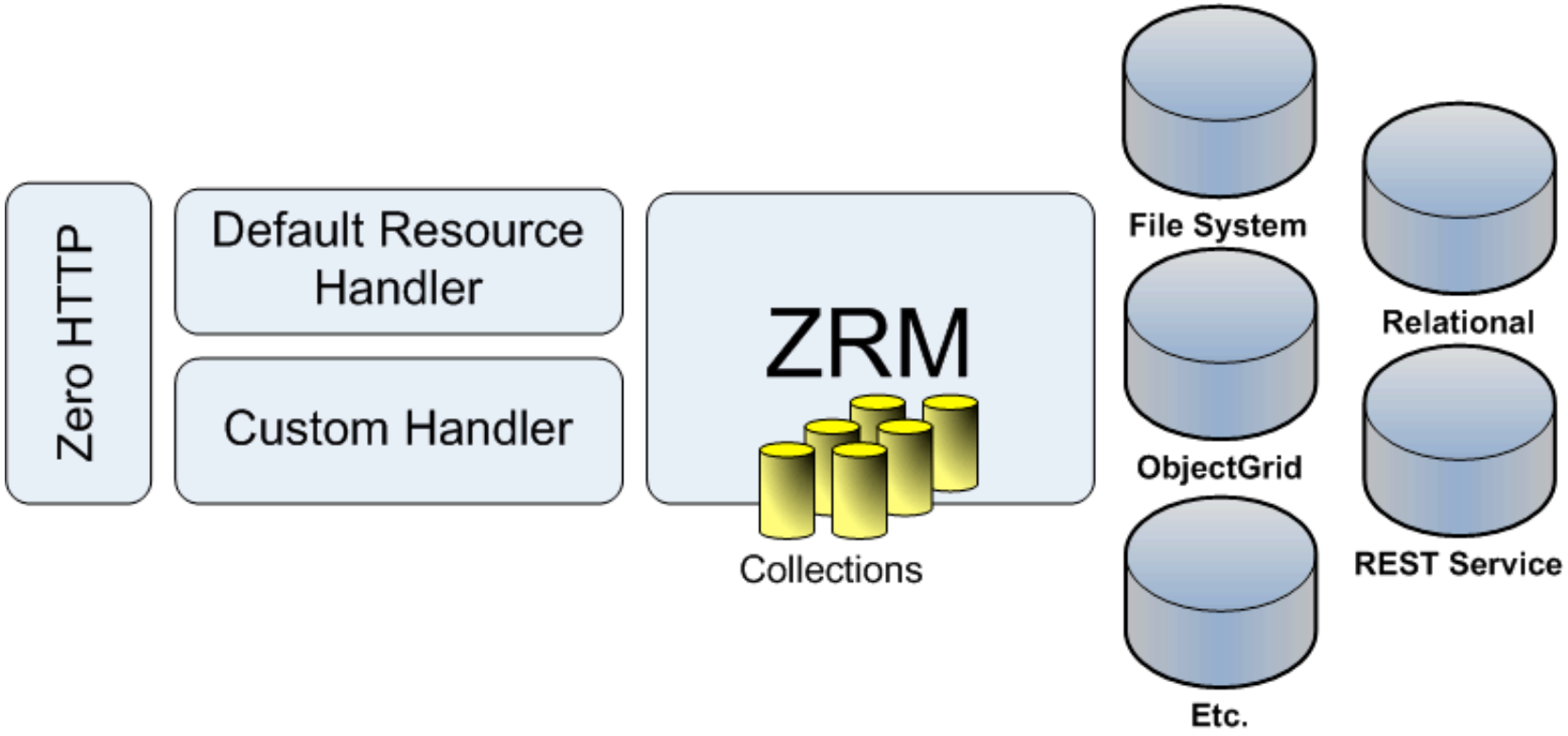
```
<?xml version="1.0" encoding="UTF-8"?>
<feed xmlns="http://www.w3.org/2005/Atom">
    <id>http://localhost:8080/feed.php</id>
    <title type="text">http://localhost:8080/feed.php</title>
    <link href="http://localhost:8080/feed.php" rel="self"></link>
    <updated>1980-12-25T12:00:00.000Z</updated>
    <entry>
        <id>http://localhost:8080/feed.php/1</id>
        <title type="text">A Good Title is Important</title>
        <updated>1970-01-01T00:00:00.000Z</updated>
        <author>
            <name>John Doe</name>
        </author>
        <content type="text">Content is also important.</content>
        <link href="http://localhost:8080/feed.php/1" rel="edit"></link>
    </entry>
    <entry>
         <id>http://localhost:8080/feed.php/2</id>
         <title type="text">Bad Titles are Misleading</title>
         <updated>1980-12-25T12:00:00.000Z</updated>
         <author>
             <name>Jane Q. Sample</name>
         </author>
         <content type="text">Content is also important.</content>
         <link href="http://localhost:8080/feed.php/2" rel="edit"></link>
     </entry>
</feed>
```

Atom Feed

```
<?php

// Rendering an Atom feed document.

$feed = array(
array(
"id" => 1,
"title" => "A Good Title is Important",
"authorname" => "John Doe",
"updated" => "1970-01-01", // date format
"contenttype" => "TEXT",
"content" => "Content is also important."
),
array(
"id" => 2,
"title" => "Bad Titles are Misleading",
"authorname" => "Jane Q. Sample",
"updated" => "1980-12-25 12:00:00", // date time format
"contenttype" => "TEXT",
"content" => "Content is also important."
)
);

zput("/request/view","atom");
zput("/request/atom/output",$feed);
render_view();

?>
```

An alternative: Zero Resource Model (ZRM)

- Model application data
  - Constrained set of APIs encourages a RESTful application architecture
  - Data model that maps well into Atom feeds and JSON formats
  - Robust framework for persistence, validation, and serialization
  - Application Databases focus



ZRM Development life cycle

app/models/employee.json

```
{
    "fields" : {
        "first_name": {"type":"string"},
        "last_name": {"type":"string"},
        "location": {"type":"string"}
    }
}
```

app/resources/employee.php

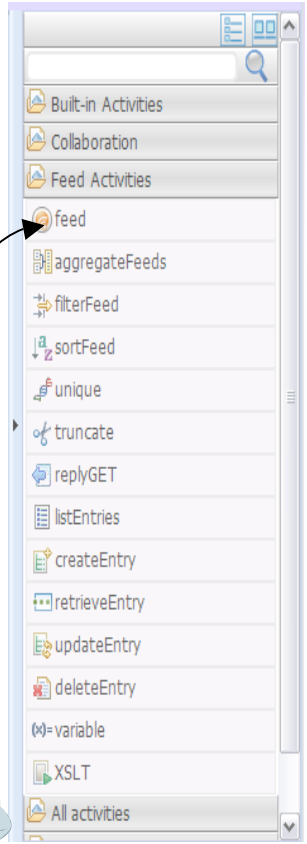
```
<?php
    zrm_delegate();
?>
```

```
roly-mac:zero barcia$ zero model sync
```

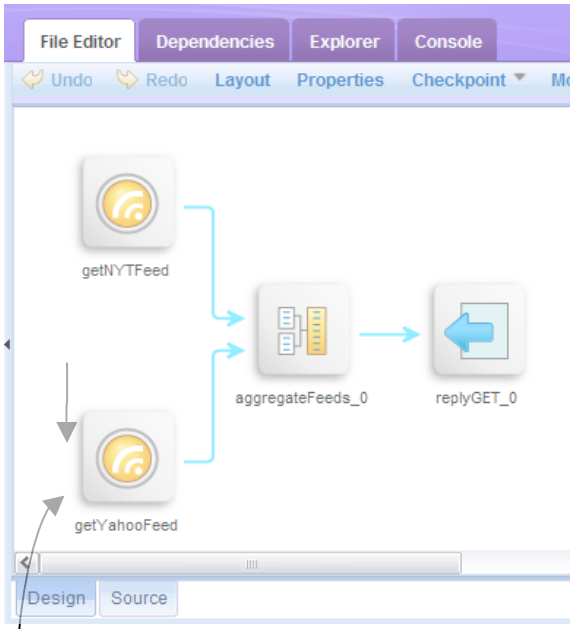
app/models/fixtures/initial_data.json

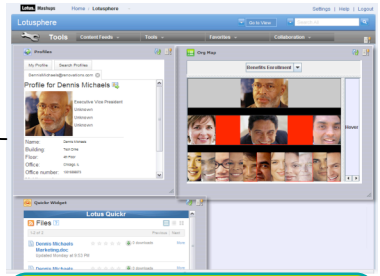
```
[
    {
        "type": "employee",
        "fields": {
                "first_name" :   "Alice",
                "last_name"  :   "Rogers",
                "location"   :   "Seattle"
        }
    },
    {
        "type": "employee",
        "fields": {
                "first_name" :   "Bill",
                "last_name"  :   "Stevens",
                "location"   :   "Seattle"
        }
    },
    {
        "type": "employee",
        "fields": {
                "first_name" :   "Cathy",
                "last_name"  :   "Tomlin",
                "location"   :   "Boston"
        }
    }
]
```

Activity flows in a Nutshell



Rick builds things for the palette





Linda designs the Web UI

Frank strings together flow activities into solutions

George builds flows, Web UIs and ad-hoc scripts

```
import zero.json.JsonType;

import stats.BlogStats;

def onGET()
{
    def wksHistory = 24 // number of

    def blogs = new BlogStats();
    def allWeeks = blogs.getStats( w

//  println allWeeks;

    displayBlogHits( allWeeks );

    displayBlogHitsStats( allWeeks );
}
```

Rick scripts ad-hoc activities

sMash Features and Services

- Dojo Toolkit
  - Drag and Drop Development in AppBuilder
  - sMash Dojo Dijits and sMash REST Store
- Data Access
  - Tools for generating and running DB Scripts
  - API based on pureQuery
- iWidget Creation
  - Integration with Lotus Mashup Center
- Security
  - LDAP Based Registries
  - Active Content Filtering
- Integration
  - Feed Support (RSS, ATOM)
  - Extended protocols (JMS, SFTP, Mail, REST to SOAP)
  - Timers
- Services
  - Excel Services
  - Open Services (Jazz Platform Integration)

Agenda

- WebSphere sMash
- WebSphere sMash Programming Model
- **PHP in WebSphere sMash**
- PHP Applications
- Demonstrations

let's build a smarter planet

Why PHP?

- **20M+ web domains <u>use</u> PHP**
- **3M+ Programmers <u>know</u> PHP**
- **Huge repository of reusable modules, snippets, extensions.**
- **Easy language to learn -> Mashups**
- **Language has <u>evolved</u> to be easy to use**

Gartner (Dec 2007)

- PHP Developers to grow from 3 to **5.5 million** by 2013
- PHP Developers in Commercial or Corporate IT to grow from 13% to **60%** by 2013
- "Pay special attention to opportunities to leverage PHP in combination with Java development efforts"

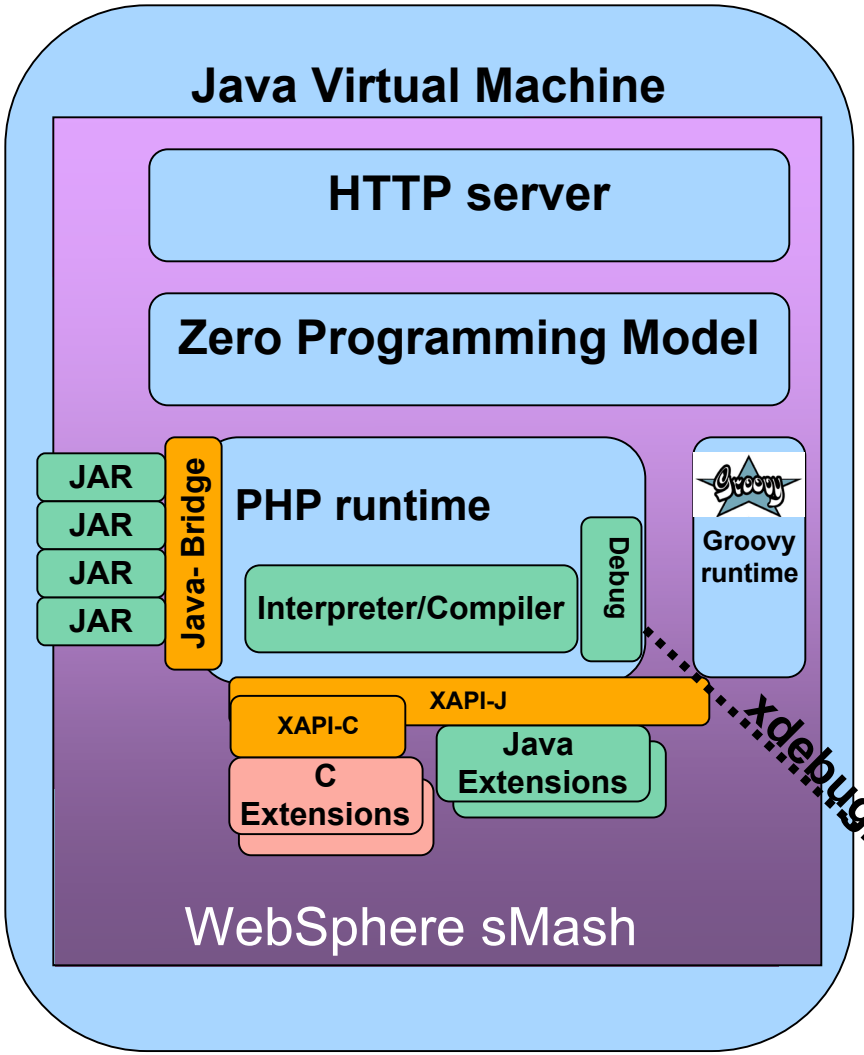
TIOBE Programming Community Index (Sep 2008)

Position Sep 2008	Position Sep 2007	Delta in Position	Programming Language	Ratings Sep 2008
1	1	=	Java	20.715%
2	2	=	C	15.379%
3	5	⇑	C++	10.716%
4	3	⇓	(Visual) Basic	10.490%
5	4	⇓	PHP	9.243%
6	8	⇑	Python	5.012%
7	6	⇓	Perl	4.841%
8	7	⇓	C#	4.334%

WebSphere sMash PHP Support

- PHP runtime built in Java.
  - To PHP.net as Jruby is to Ruby and Jython is to Python
- Compile PHP into Java bytecodes and run on a Java Virtual Machine.
- Powerful blending of PHP and Java code.
  - Java and PHP code run in the same process on the same Thread
    - No need for Inter-process communication.
  - Efficient calls between PHP, Java, Groovy on the same stack.
  - Pass data between Java, Groovy and PHP without copying.
    - Avoids serialising and passing data between processes.
  - Import Java classes as PHP Classes
    - Easy access to the many Java libraries from PHP code.
  - http://www.projectzero.org/sMash/1.1.x/docs/zero.devguide.doc/zero.php/Core.html

PHP in WebSphere sMash



- Runs PHP 5 scripts
- Requires Java 5 SE or later.
- Extensibility via XAPI
  - XAPI-C for C extensions from php.net
  - XAPI-J for Java extensions, native libraries invoked over JNI and Project Zero interface
  - Extension language choice opaque to PHP script
- Java Bridge
- Debug using via xdebug protocol using Eclipse with PDT

Benefits of PHP in sMash.

- Develop quickly by using the best tools and materials for the job.
  - PHP code such as smarty, SimpleXML, drupal, phpBB,
  - Java code such as Apache Lucene, POI and Eclipse BIRT
- Start simple using sMash tooling such as ZRM, Flow
  - Customise and extend using PHP scripts and snippets
- Unleash agile teams using Java and PHP skills.
  - Allow teams to use their full range of skills.
- Build on a solid base.
  - PHP built on the Java VM at the heart of IBM's enterprise software stack.
    - Familiar to many enterprises.
    - Vast investment in JIT, Garbage Collector, RAS and tools.

PHP – Java/Groovy Interaction

- PHP Java/Groovy Bridge allows PHP to:
  - Instantiate Java Classes
  - Call static and instance methods
  - Access static and instance fields
  - Extend Java Classes (not abstract)
  - Implement Java Interfaces.
  - Interact with Groovy Classes objects, Closures and Ranges

- Zero programming model allows PHP to:
  - Interact with other Modules built using Groovy, Java, PHP, Flow by:
    - Handle and fire Zero events
    - Fetch and store to the global context.

PHP – Java Bridge – Basic use

```php
<?php
$date = new Java("java.util.Date", 70, 9, 4);

$map = new Java("java.util.HashMap");
$map->put("title", "Java Bridge!");
$map->put("when", $date);
$array = array(1,2,3,4,5);
$map->put("stuff", $array);
$map->get("stuff");
```

Basic access to Java methods and fields - types are automatically converted at boundary of PHP runtime

```php
<?php
$system = new JavaClass("java.lang.System");
echo("Current time: ".$system->currentTimeMillis()."\n");

$integerClass = new JavaClass("java.lang.Integer");
$integerClass->parseInt("1234567890");
?>
```

Static methods and fields are accessible by using the built in JavaClass class

```php
<?php
try {
    $system = new JavaClass("java.lang.System");
    $system->getProperty(FALSE);
} catch (JavaException $exception) {
    echo "Cause: ".$exception->getCause()." \n";
    var_dump($exception->getCause());
}
?>
```

Java exceptions can be caught in PHP scripts

PHP- Java Bridge – Iterators and overloads

```php
<?php
$list = new Java("java.util.ArrayList");

$list->add("Hello World!");
$list->add(FALSE);
$list->add(1234567890);
var_dump($list);

foreach ($list as $key => $value) {
    echo $key." ".$value."\n";
}
?>
```

Bridging between PHP and Java iterators

Signatures provide explicit control for overloaded constructors and methods

```php
<?php
$signature = new JavaSignature(JAVA_STRING);
$string = new Java("java.lang.String", $signature, "Hello World!");

$class = new JavaClass("java.lang.String");
$signature = new JavaSignature(JAVA_INT);
var_dump($class->valueOf($signature, 1234567890));
?>
```

```php
<?php
$string = new Java("java.lang.String", FALSE);
$string->lastIndexOf(FALSE);
?>

Notice: No signature on ambiguous call to method 'lastIndexOf' in ...
```

Java Bridge – Importing Java Classes.

```php
<?php
java_import("java.lang.Integer", NULL, FALSE);
$value = new Integer(new JavaSignature(JAVA_STRING), "1234567890");
echo "Integer [".$value."]\n";

java_import("java.util.Date");
$date = new Date(70, 9, 4);
$date->toLocaleString();

java_import("java.lang.Comparable");
ReflectionClass::export("Comparable");
?>
```

Importing a Java class creates a PHP class that has the same shape

```php
<?php
java_import("java.lang.Integer", NULL, FALSE, "TestInteger");
$value = new TestInteger(new JavaSignature(JAVA_STRING), "1234567890");
echo "Integer [".$value."]\n";
?>
```

```php
<?php
java_import("java.util.ArrayList", array("Traversable"), FALSE);
$list = new ArrayList();
$list->add("Hello World!");
$list->add(FALSE);
$list->add(1234567890);
foreach ($list as $key => $value) {
    echo $key." ".$value."\n";
}
?>
```

Java Bridge – Extending Java in PHP

```php
<?php
java_import("java.io.File");

class SuperFile extends File {
    function SuperFile($signature, $path) {
        parent::__construct($signature, $path);
    }
    function isThisCool() {
        return TRUE; // Way cool
    }
}

$file = new SuperFile(new JavaSignature(JAVA_STRING), "/");
$file->isDirectory();
$file->isThisCool();
?>
```

Extending a Java class inside PHP is possible but has some limitations

Java bean access maps field access onto get/set method calls

```php
<?php
java_import("java.io.File");
$file = new File("/");
echo $file->Parent."\n";
echo $file->Name."\n";

java_import("java.lang.StringBuffer");
$buffer = new StringBuffer("Hello World!");
$buffer->Length = 5;
echo $buffer->toString()."\n";
?>
```

Groovy Bridge – Importing Scripts

```php
<?php
groovy_import("Import.groovy");
$import = new Import();
$result = $import->getDate();
?>
```

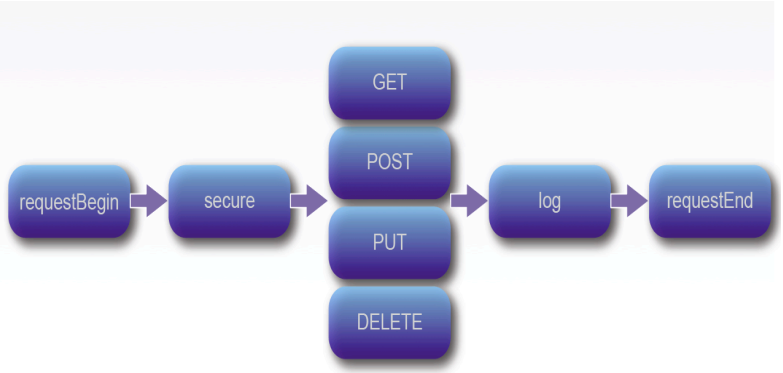
```
class Import {
    def getDate() {
        return new Date();
    }
}
```

```
Class [ <internal> class Import ] {

  - Constants [0] {
  }

  - Static properties [2] {
    Property [ public static $__timeStamp ]
    Property [ public static $__timeStamp__239_neverHappen1224852539937 ]
  }

  - Static methods [0] {
  }

  - Properties [0] {
  }

  - Methods [8] {
    Method [ <internal, ctor> public method Import ] {
    }

    Method [ <internal> public method getDate ] {
    }

    Method [ <internal> public method getMetaClass ] {
    }
    ...
  }
}
```

Other Groovy Bridge Features

- Method and Field Access
- Closures and Curry
  - PHP Functions can be passed to Groovy as a closure.

Invoking PHP - Events

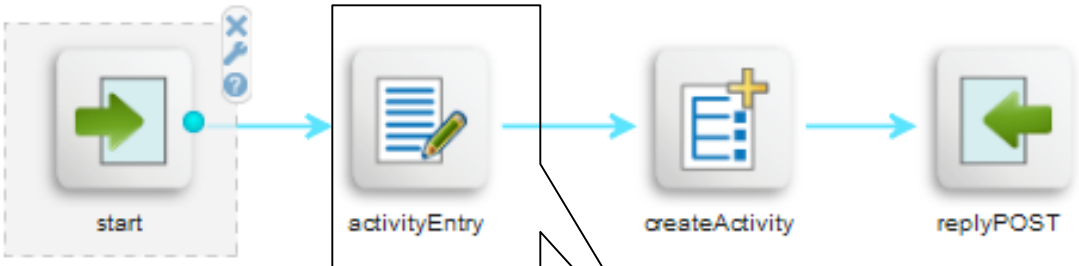


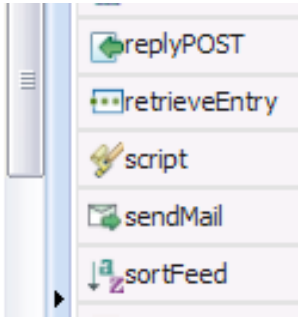
- PHP Event Handler examples:
  - Timer
  - Custom Event
  - Flow, Security or Connection event.
  - Standard Request Event

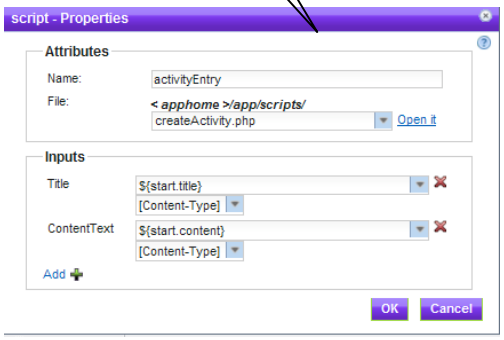
```
/config/handlers += [{
   "events" : "myevent",
   "handler" : "myeventhandler.php"
}]
```

```
<?php
// Event Handler for "myevent" stored in app/scripts/myeventhandler.php
$arr =
array('foo' => 'bar');
zput('/request/somekey', $arr);
?>
```

Invoking PHP - Script Activity in Flow








```php
<?php

$title = zget("/event/title");
$content = zget("/event/contentText");
```

Agenda

- WebSphere sMash
- PHP in WebSphere sMash
- WebSphere sMash Programming Model
- **PHP Applications**
- Demonstrations

let's build a smarter planet

PHP Applications that run on sMash

Forums

phpBB

wiki

MediaWiki
Because ideas want to be free.

Ajax Debugging

FirePHP

CRM

SUGARCRM
COMMERCIAL OPEN SOURCE

Content Management

POWERED BY Drupal

Desktop Virtualisation

eyeOS

Blogging

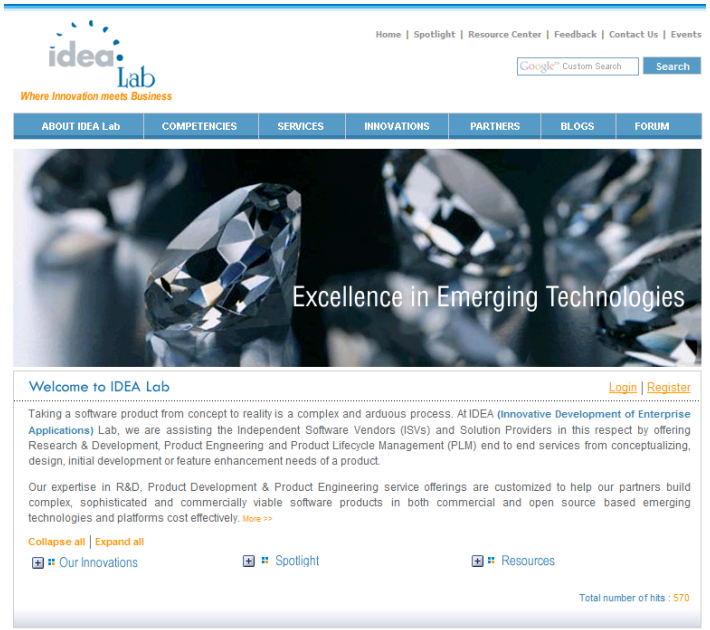
WordPress

PHP Applications

- phpBB
- SugarCRM
- WordPress
- MediaWiki
- FirePHP
- Drupal
- EyeOS

ZSL develops Web 2.0 Assets 3x faster with WebSphere sMash

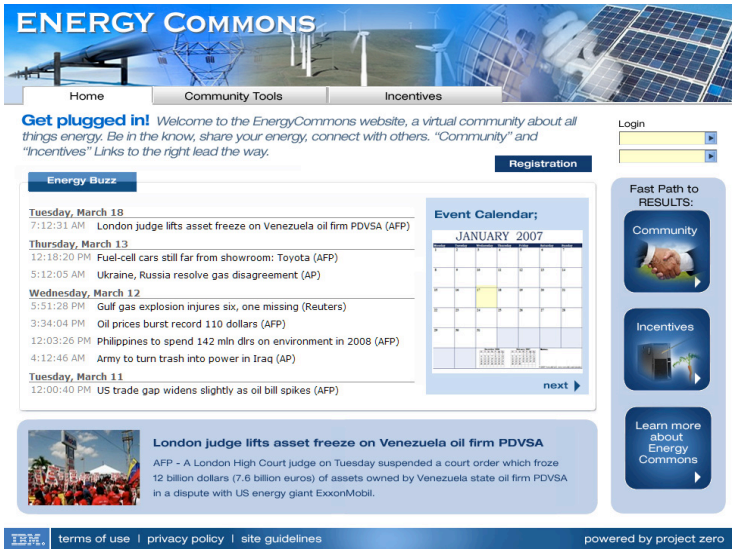
- Downloaded sMash DE from projectzero.org
- Assets built in 3½ weeks
- Junior web development team
  - Dynamic Scripting Skills
  - Web Development Focus
  - Know very little about .Net and JEE
  - Understand concepts and functioning of Web Services, but may not have built or deployed them.
- 67% reduction in time-to-market for developing Web 2.0 assets
- 90% less time to implement best-of-breed programs
- Ability to reuse 25% of code
- Out-of-the-box functionality vs. 2½ days to install comparable software



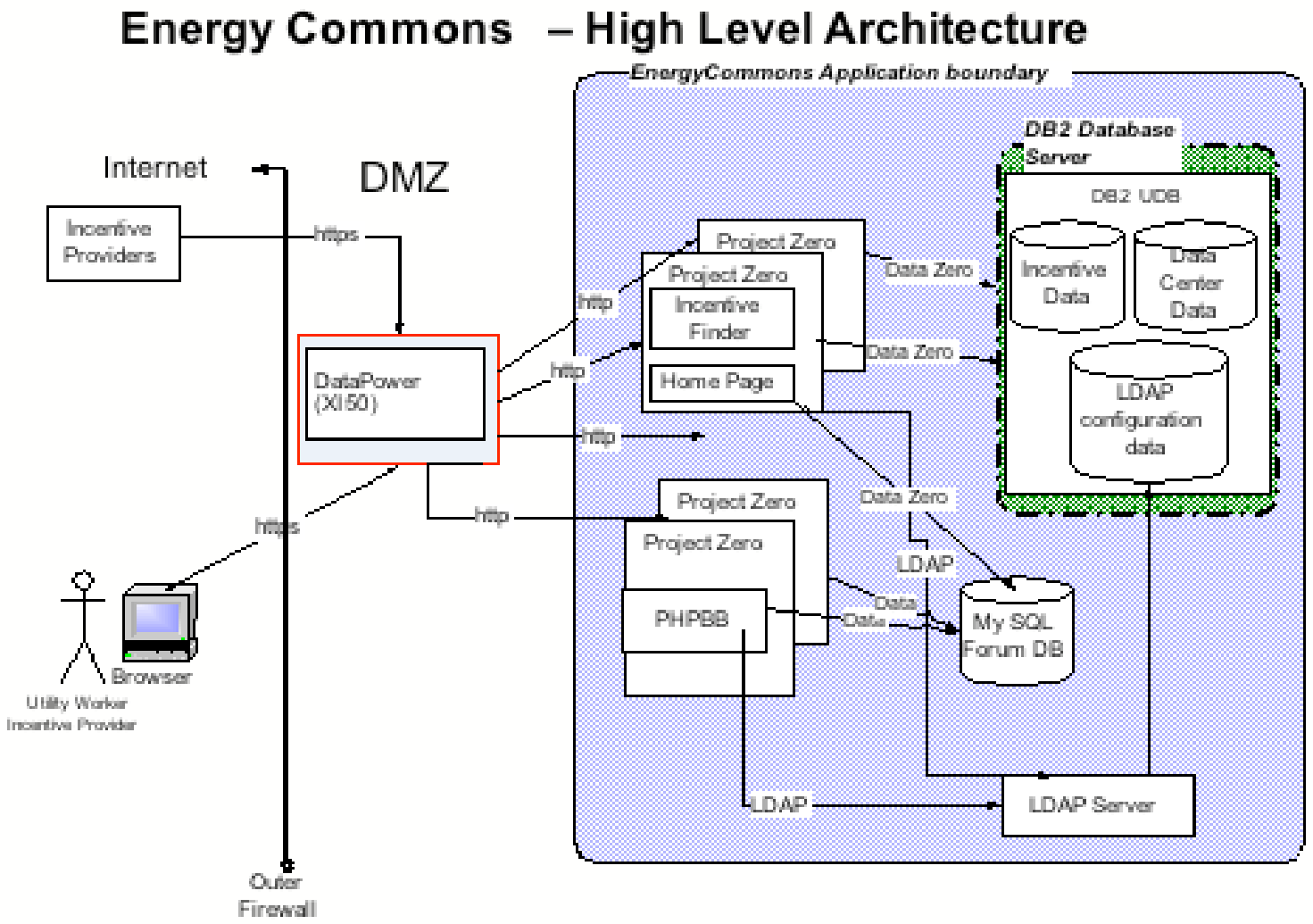
Energy Commons Overview

www.energycommons.com(Situational Application)

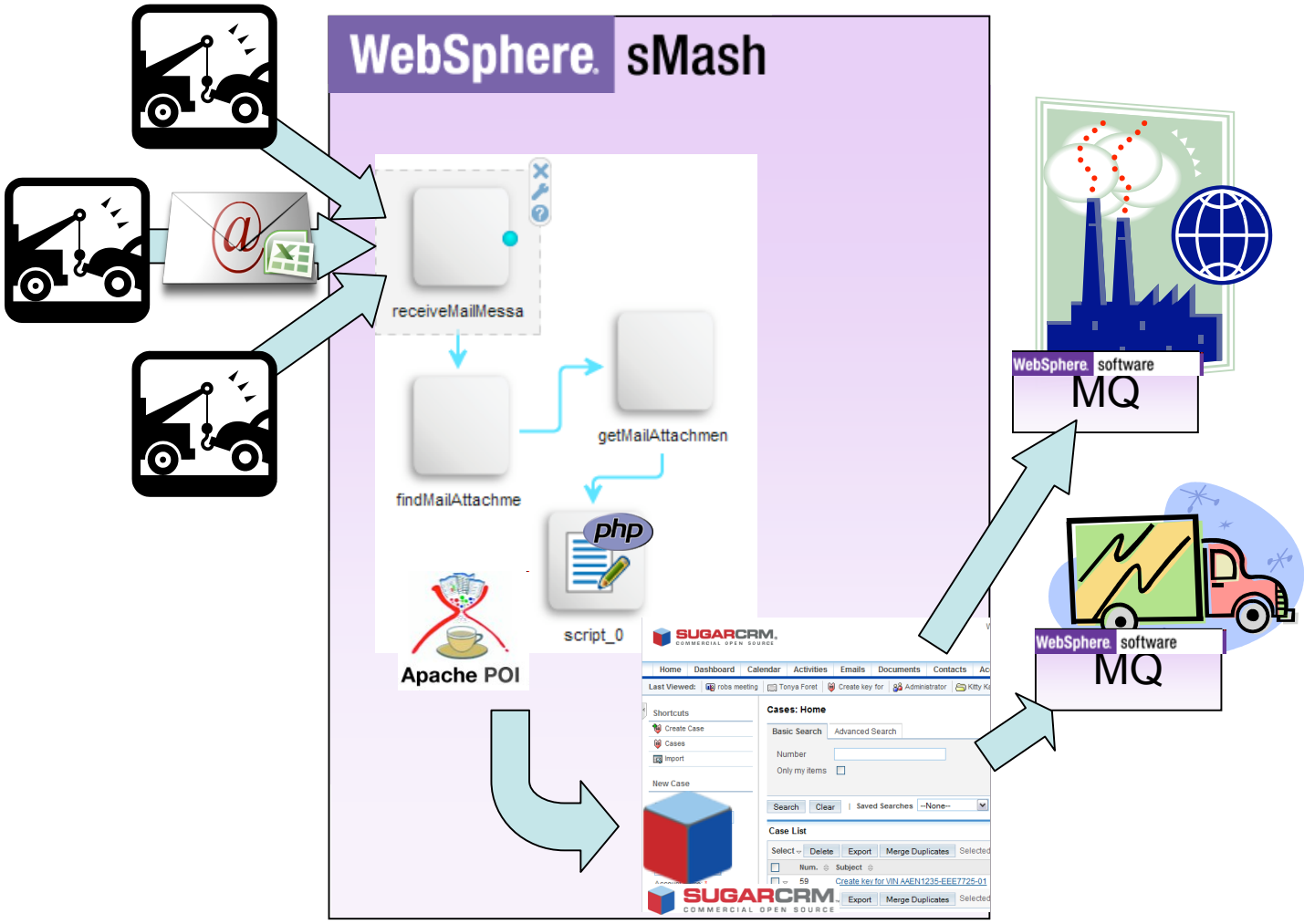
- **Concept**
  - Standardized, private labeled social networking application offering targeted at businesses, consumers, and inter company collaboration on the energy topic
- **Value Proposition**
  - Interconnection of parties for knowledge share and exchange on demand in a silo'd industry through shared cost model for development and operations
- **Innovative Aspects**
  - Interconnected portals through "hub and spoke" utilizing global reach, large ecosystem, and utility channel to create scale
  - Viral expansion into energy value chain
  - Incentive Finder for Data Center incentives
  - 24x7 advertisement for IBM as global innovator for energy and climate



Energy Commons Architecture Overview



SugarCRM Integration scenario



Demonstrations

Agenda

- WebSphere sMash
- PHP in WebSphere sMash
- PHP Applications
- **Demonstrations**

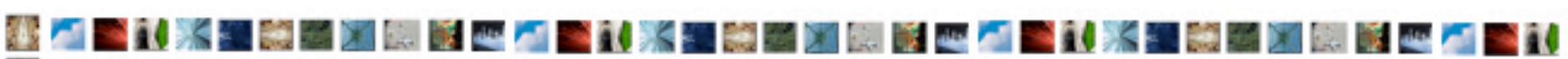

Questions

References

- WebSphere sMash site **http://www.projectzero.org/**
- WebSphere sMash forums **http://www.projectzero.org/forum/**
- Developers Guide Documentation. **http://www.projectzero.org/documentation/**
- PHP Applications that run on sMash: http://www.projectzero.org/blog/index.php/2008/10/29/documenting-php-applications-that-run-on-smash/

We love your Feedback!

- Don’t forget to submit your Impact session and speaker feedback! Your feedback is very important to us, we use it to improve our conference for you next year.
- Go to www.impact09guide.com on a smartphone device or a loaner device
- From the Impact 2009 Online Conference Guide;
  - Select Agenda
  - Navigate to the session you want to give feedback on
  - Select the session or speaker feedback links
  - Submit your feedback



The workshops, sessions and materials have been prepared by IBM or the session speakers and reflect their own views. They are provided for informational purposes only, and are neither intended to, nor shall have the effect of being, legal or other guidance or advice to any participant. While efforts were made to verify the completeness and accuracy of the information contained in this presentation, it is provided AS IS without warranty of any kind, express or implied. IBM shall not be responsible for any damages arising out of the use of, or otherwise related to, this presentation or any other materials. Nothing contained in this presentation is intended to, nor shall have the effect of, creating any warranties or representations from IBM or its suppliers or licensors, or altering the terms and conditions of the applicable license agreement governing the use of IBM software.

References in this presentation to IBM products, programs, or services do not imply that they will be available in all countries in which IBM operates. Product release dates and/or capabilities referenced in this presentation may change at any time at IBM's sole discretion based on market opportunities or other factors, and are not intended to be a commitment to future product or feature availability in any way. Nothing contained in these materials is intended to, nor shall have the effect of, stating or implying that any activities undertaken by you will result in any specific sales, revenue growth or other results.

Performance is based on measurements and projections using standard IBM benchmarks in a controlled environment. The actual throughput or performance that any user will experience will vary depending upon many factors, including considerations such as the amount of multiprogramming in the user's job stream, the I/O configuration, the storage configuration, and the workload processed. Therefore, no assurance can be given that an individual user will achieve results similar to those stated here.

All customer examples described are presented as illustrations of how those customers have used IBM products and the results they may have achieved. Actual environmental costs and performance characteristics may vary by customer.

The following are trademarks of the International Business Machines Corporation in the United States and/or other countries:
ibm.com/legal/copytrade.shtmlAIX, CICS, CICSPlex, DataPower, DB2, DB2 Universal Database, i5/OS, IBM, the IBM logo, IMS/ESA, Power Systems, Lotus, OMEGAMON, OS/390, Parallel Sysplex, pureXML, Rational, Redbooks, Sametime, SMART SOA, System z , Tivoli, WebSphere, and z/OS.

A current list of IBM trademarks is available on the Web at "Copyright and trademark information" at ibm.com/legal/copytrade.shtml.

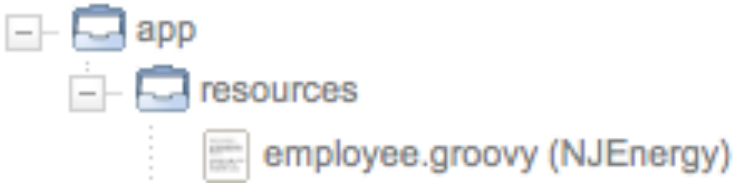
Adobe, the Adobe logo, PostScript, and the PostScript logo are either registered trademarks or trademarks of Adobe Systems Incorporated in the United States, and/or other countries.
IT Infrastructure Library is a registered trademark of the Central Computer and Telecommunications Agency which is now part of the Office of Government Commerce
Java and all Java-based trademarks are trademarks of Sun Microsystems, Inc. in the United States, other countries, or both.
Microsoft and Windows are trademarks of Microsoft Corporation in the United States, other countries, or both.
ITIL is a registered trademark, and a registered community trademark of the Office of Government Commerce, and is registered in the U.S. Patent and Trademark Office
Intel and Pentium are trademarks or registered trademarks of Intel Corporation or its subsidiaries in the United States and other countries.
UNIX is a registered trademark of The Open Group in the United States and other countries.
Linux is a registered trademark of Linus Torvalds in the United States, other countries, or both.

Backup

Nested URIs

For example: `/resources/employees/Roland/accounts/FooTech`

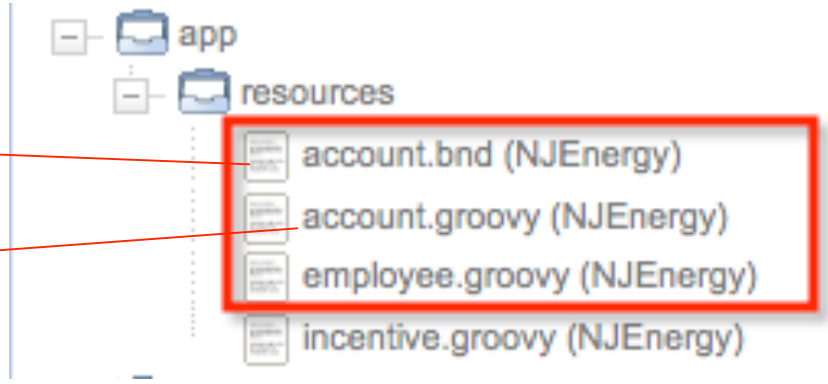
- Development option 1:
  `/resources/employees/{employeesId}/{pathInfo}`




```
def onList()
{
    def empId = request.employeeId[];
    def info = request.pathInfo[];
}
```

- Development option 2:
  `/resources/employees/{employeesId}/accounts/{acctountId}`

  and accounts.bnd:
  `employees/accounts`

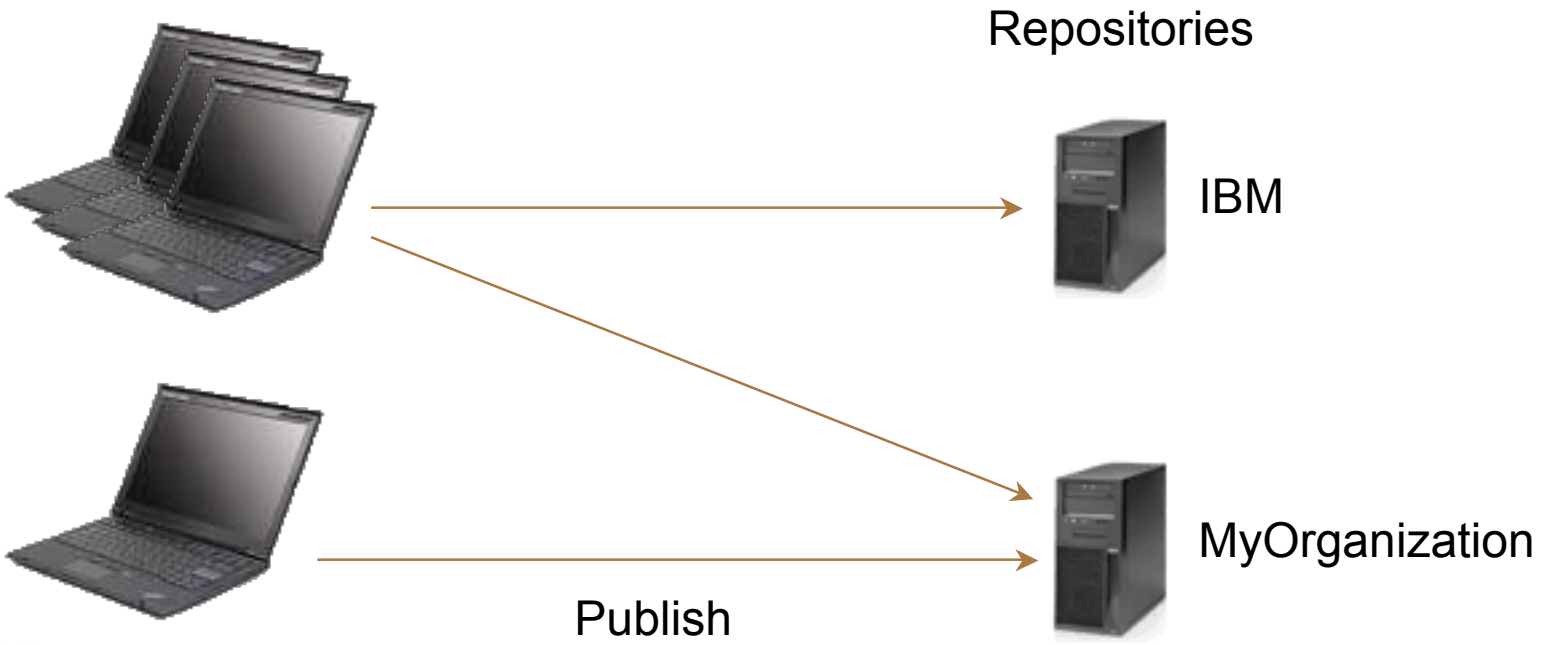



```
def onList()
{
    def empId = request.employeeId[];
    def acctId = request.accountId[];
}
```

New Features

In-House Repository

- In-house repository
  - Publish your own modules
  - Hosted by a sMash Application or Web Server



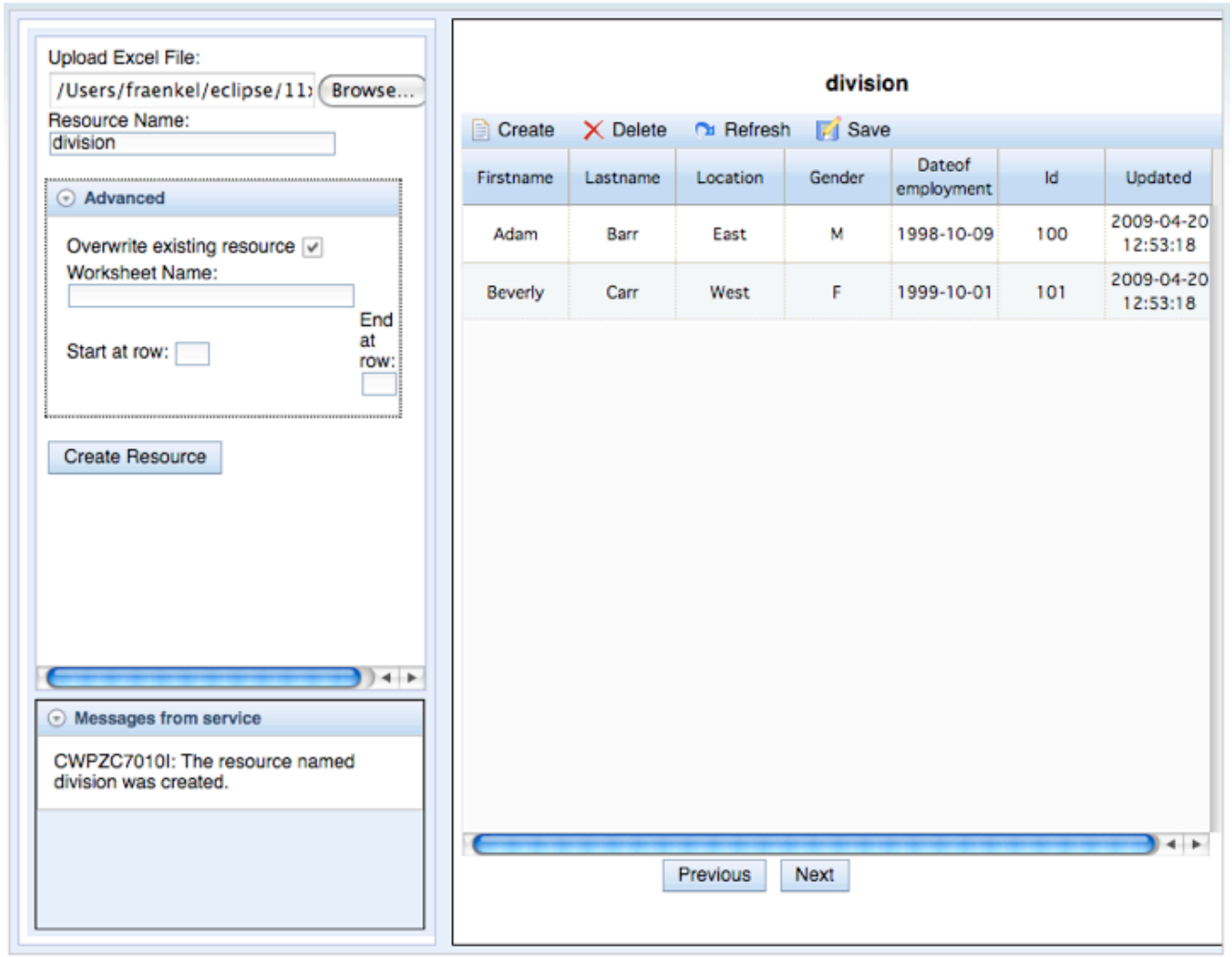
Data support

- Externalized SQL statements

```
/config/db/reviewDB/statements = {    "SELECT_ALL"      : "SELECT * FROM
table",    "SELECT_WHERE_IN" : "SELECT * FROM table WHERE id IN
(?,?,?)",    "INSERT" : "INSERT INTO table (col1, col2) VALUES (?,?)"}


def allrows = data.queryList('SELECT_ALL')
```

- Zero Resource Model for PHP
- SQL Server 2005

Excel Service



Excel Service

XLS

First name	Last name	Location	Gender	Date of Employme
Adam	Barr	East	M	10/10/02
Beverly	Carr	West	F	10/2/03
Charlie	Dent	North	M	2/2/04
Debbie	Evert	South	F	3/3/05

ZRM

```
{ "fields": {
"Firstname": { "type": "string" },
"Lastname": { "type": "string" },
"Location": { "type": "string" },
"Gender": { "type": "string" },
"DateofEmployment": { "type": "date" }
} }
```

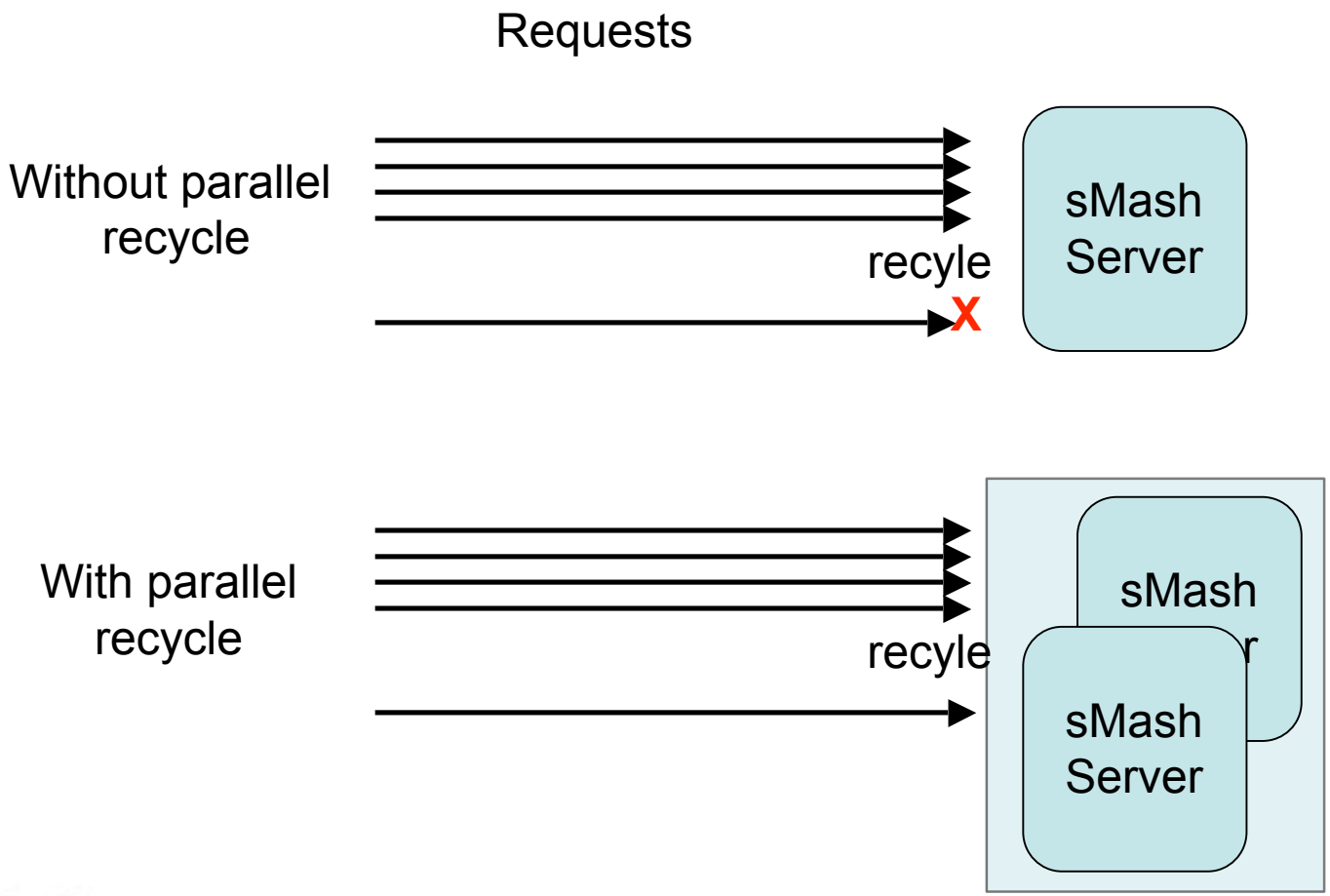
Data

```
[   {       "type": "employees",       "fields": {       "I
]
```

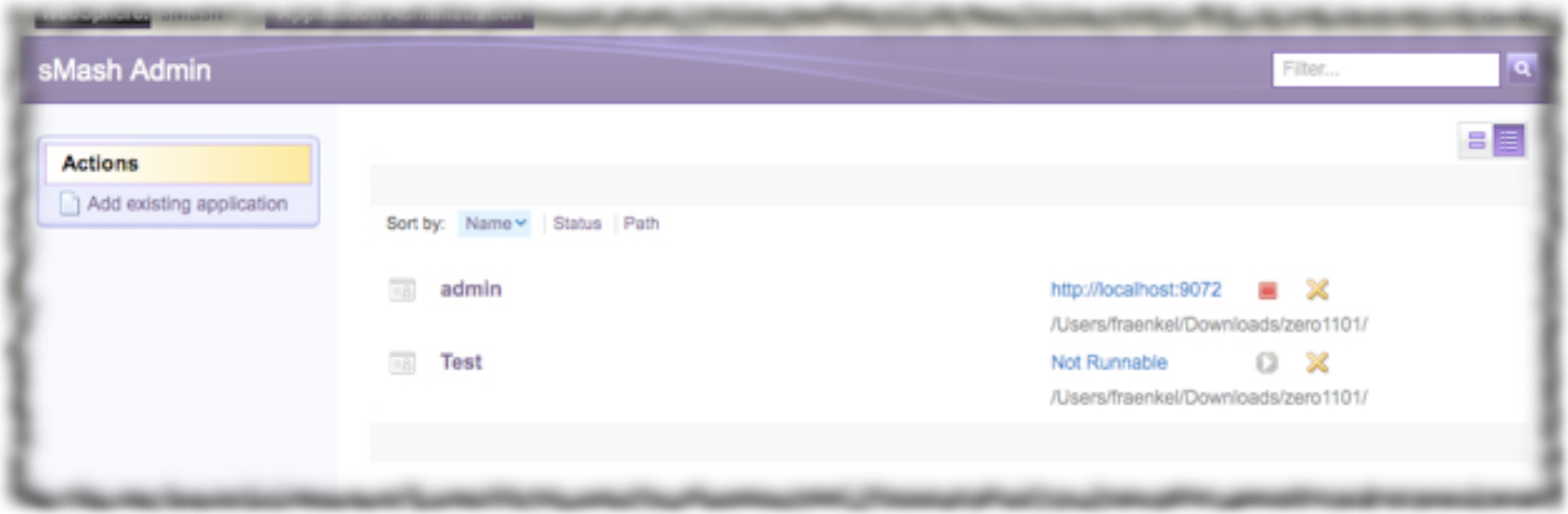
Unit Testing

- zero test
  - JUnit based
  - Tests can run
    - inside the application via a request
    - outside the application
  - Specialized task testing

Parallel Recycle



Admin Console

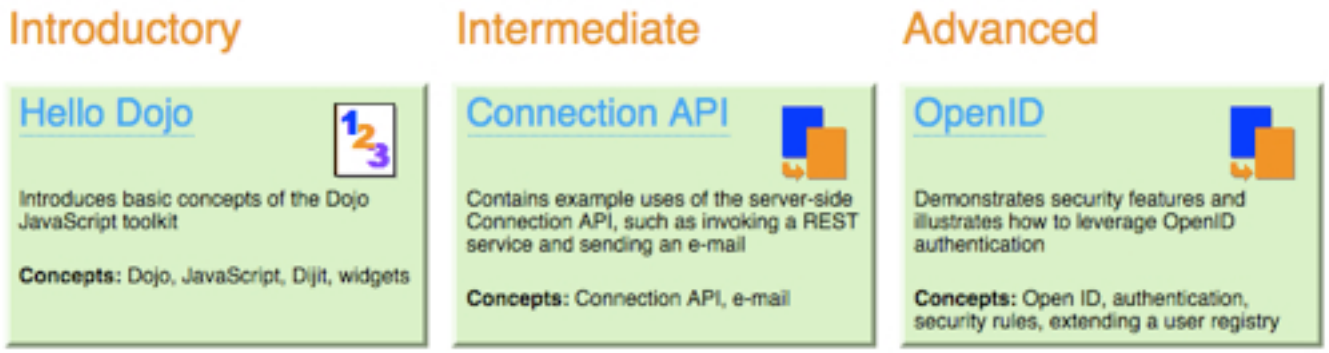


sMash in the Cloud

- Available on Amazon EC2
  - sMash DE 1.1.0.1
    - AppBuilder enabled with security
- See http://tinyurl.com/sMashEC2

Samples

- Broken down into levels

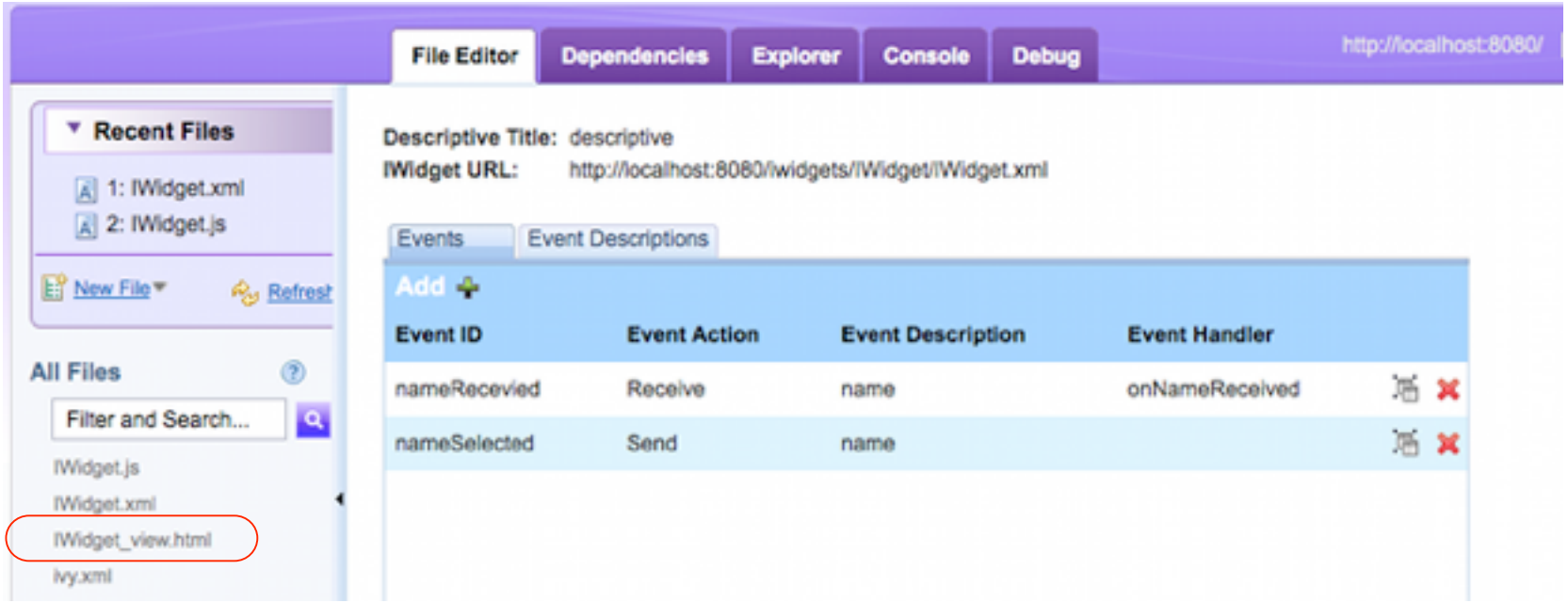


- Cookbook
- Recipes written by anyone

Tighter integration with IBM Mashup Center

- Generate iWidget templates
- Simple web page to test iWidget interactions
- Easy deployment into MashupHub:

iWidget Editor



- Define events and payload
- Logical html pages

PHP Applications

- phpBB
- SugarCRM
- WordPress
- MediaWiki
- FirePHP
- Drupal
- EyeOS

PHP to Java/Groovy Bridge

```php
<?php
$date = new Java("java.util.Date", 70, 9, 4);

$map = new Java("java.util.HashMap");
$map->put("title", "Java Bridge!");
$map->put("when", $date);
$array = array(1,2,3,4,5);
$map->put("stuff", $array);
$map->get("stuff");
```

Access to Java types and methods

Automatic conversions

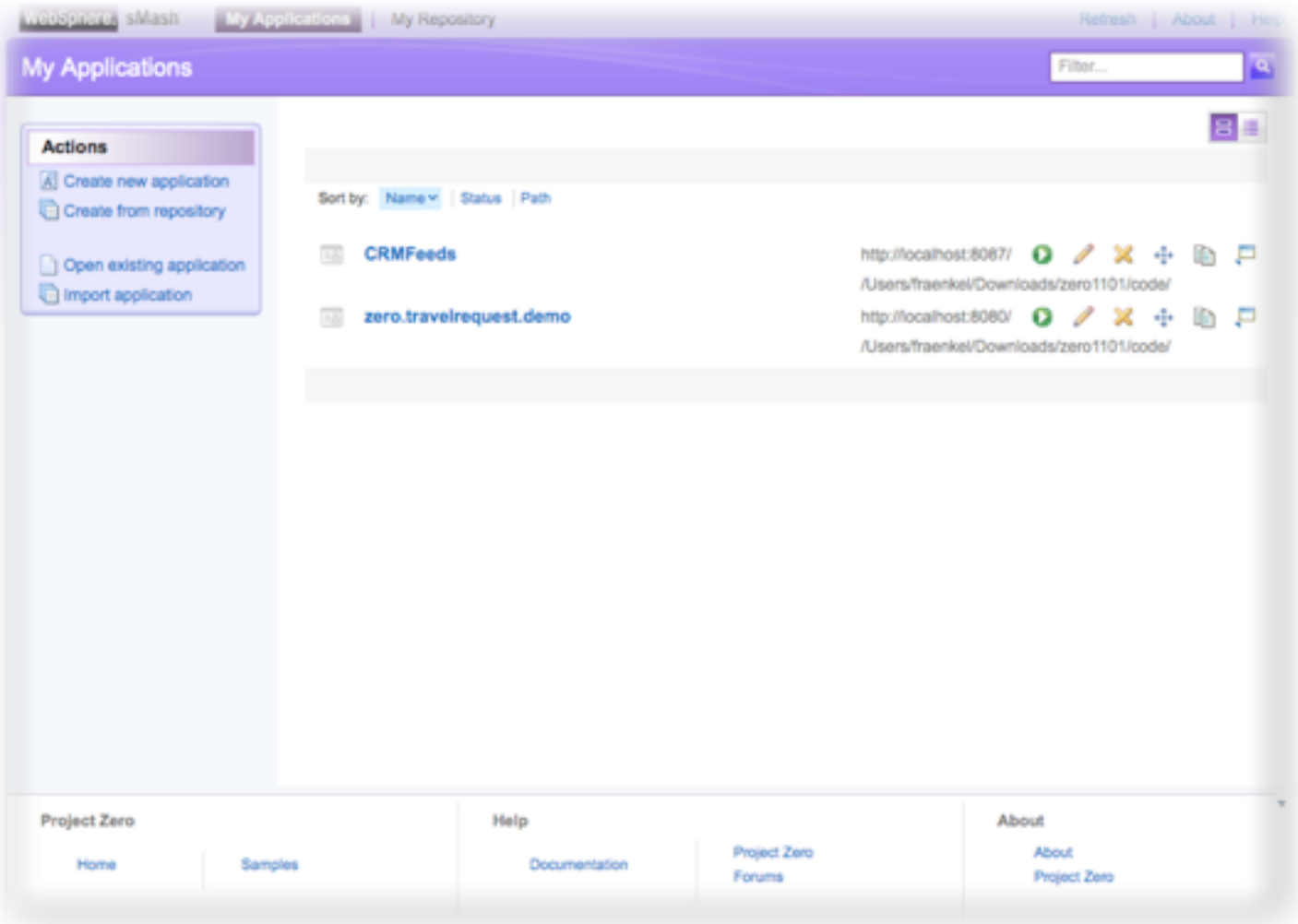
Exception handling

```php
<?php
try {
    $system = new JavaClass("java.lang.System");
    $system->getProperty(FALSE);
} catch (JavaException $exception) {
    echo "Cause: ".$exception->getCause()." \n";
    var_dump($exception->getCause());
}
?>
```

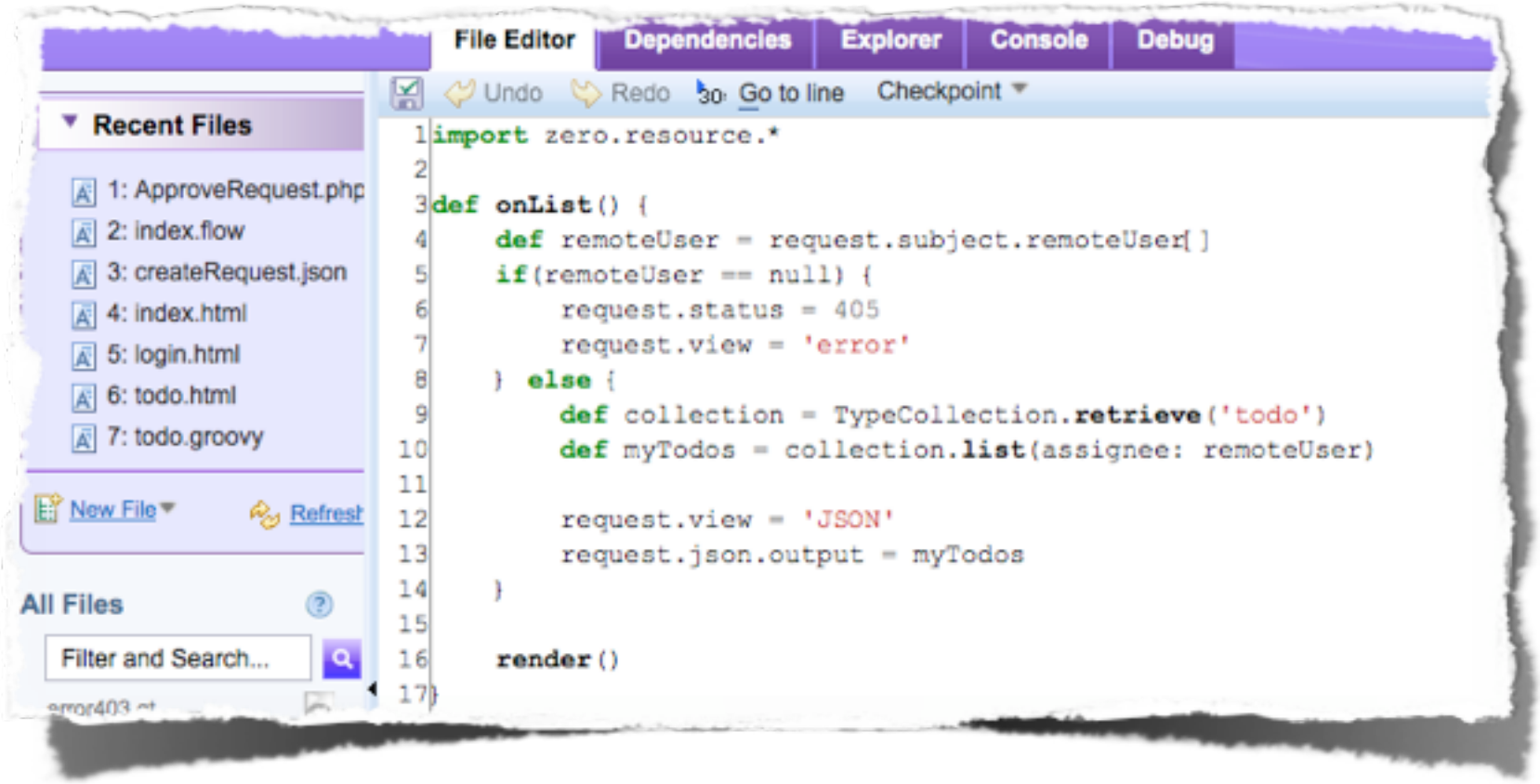
Assemble Flow

- New activities
  - Web UI for simple collaboration
  - Invoke script - Groovy or PHP
- Flow persistence - app zone or DB
- User defined activities

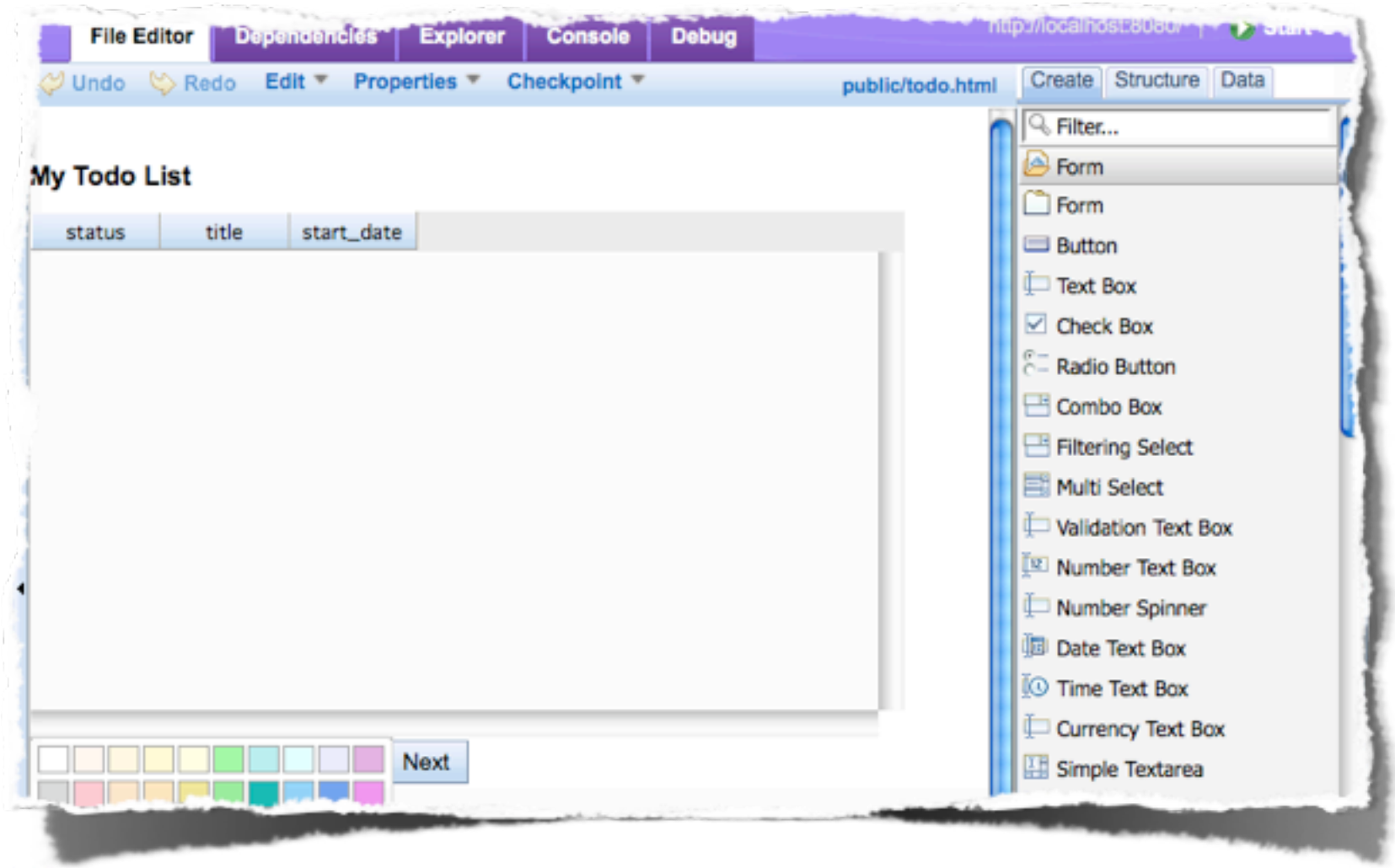
AppBuilder


WebSphere sMash
My Applications
My Repository
Refresh
About
My Applications
Filter...
Actions
Create new application
Create from repository
Open existing application
Import application
Sort by:
Name
Status
Path
CRMFeeds
http://localhost:8087/
/Users/fraenkel/Downloads/zero1101/code/
zero.travelrequest.demo
http://localhost:8080/
/Users/fraenkel/Downloads/zero1101/code/
Project Zero
Home
Samples
Help
Documentation
Project Zero Forums
About
About Project Zero

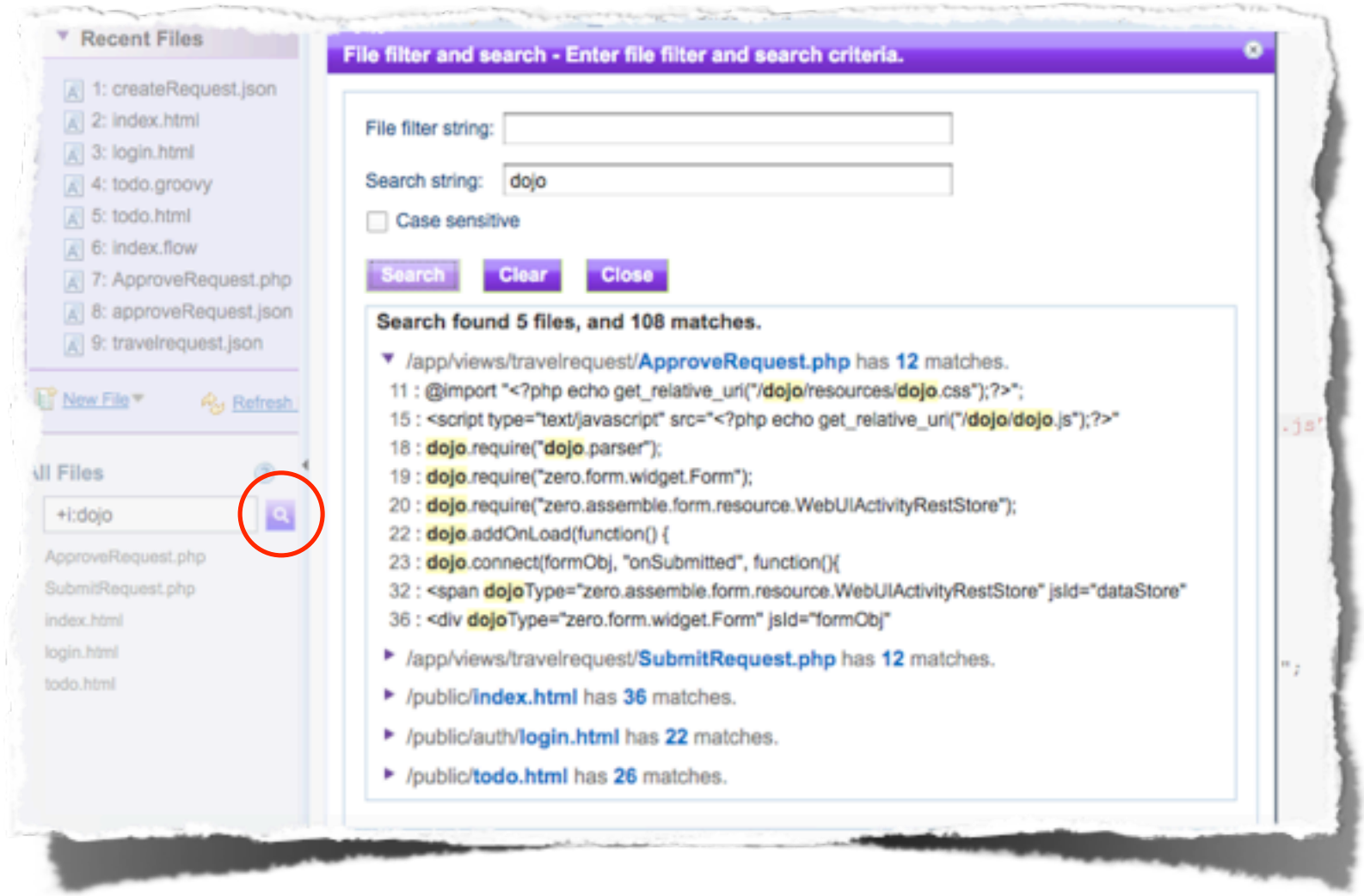
Source Editor



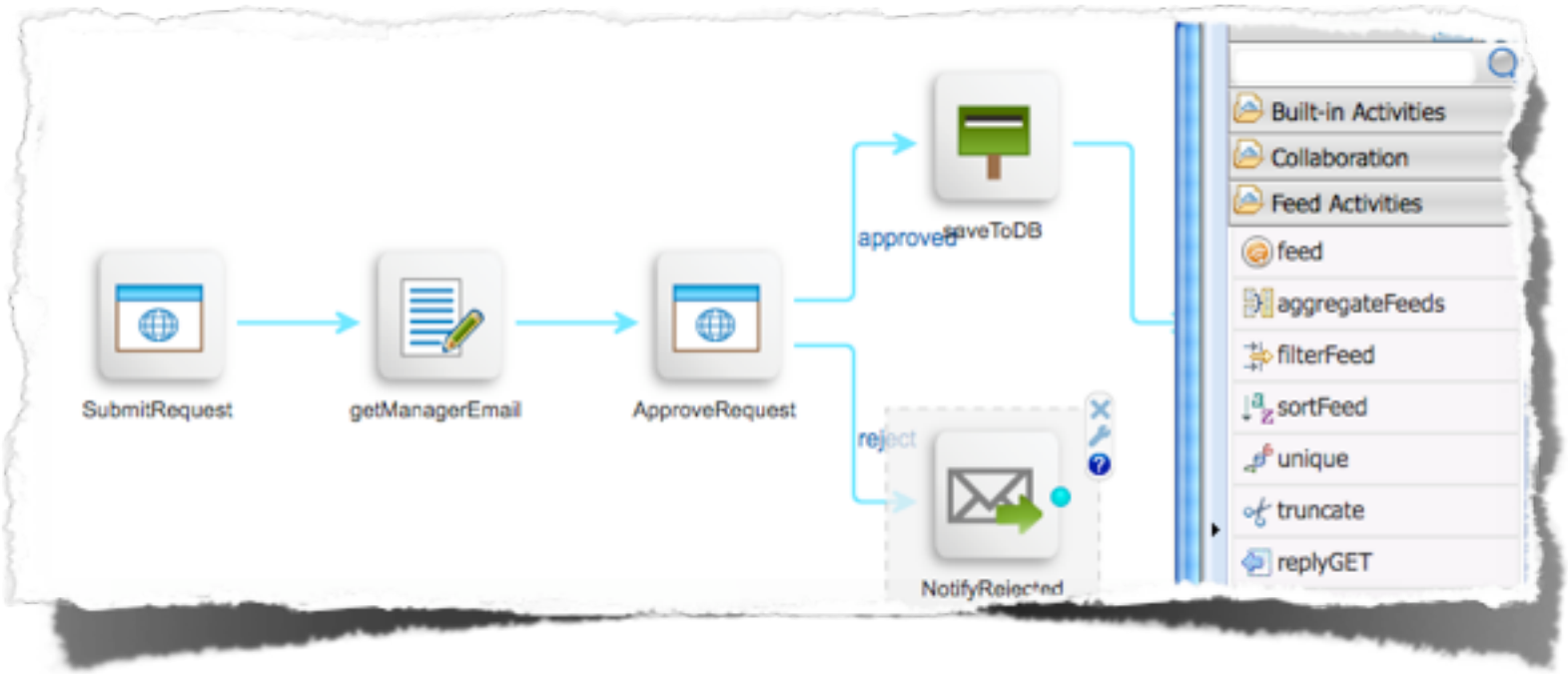
Page Editor


File Editor
Dependencies
Explorer
Console
Debug
Undo
Redo
Edit
Properties
Checkpoint
public/todo.html
Create
Structure
Data
My Todo List
status
title
start_date
Next
Filter...
Form
Form
Button
Text Box
Check Box
Radio Button
Combo Box
Filtering Select
Multi Select
Validation Text Box
Number Text Box
Number Spinner
Date Text Box
Time Text Box
Currency Text Box
Simple Textarea

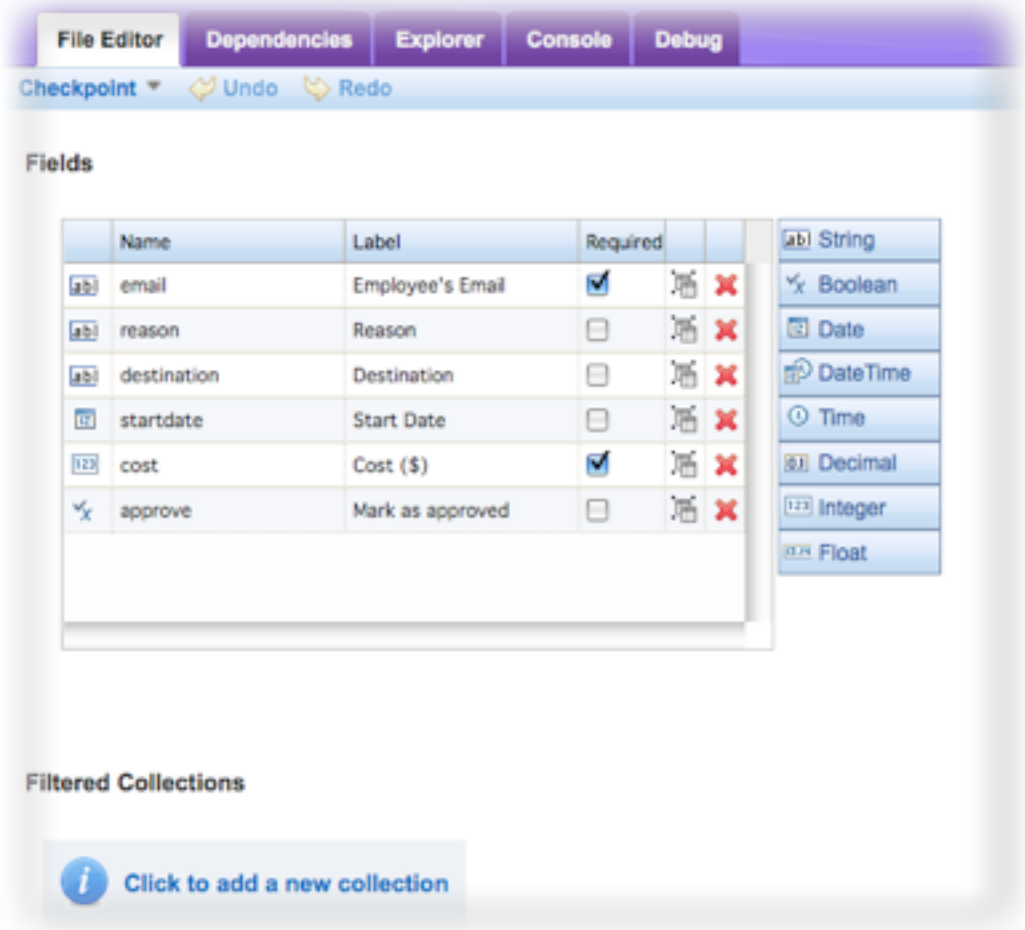
Search Dialog



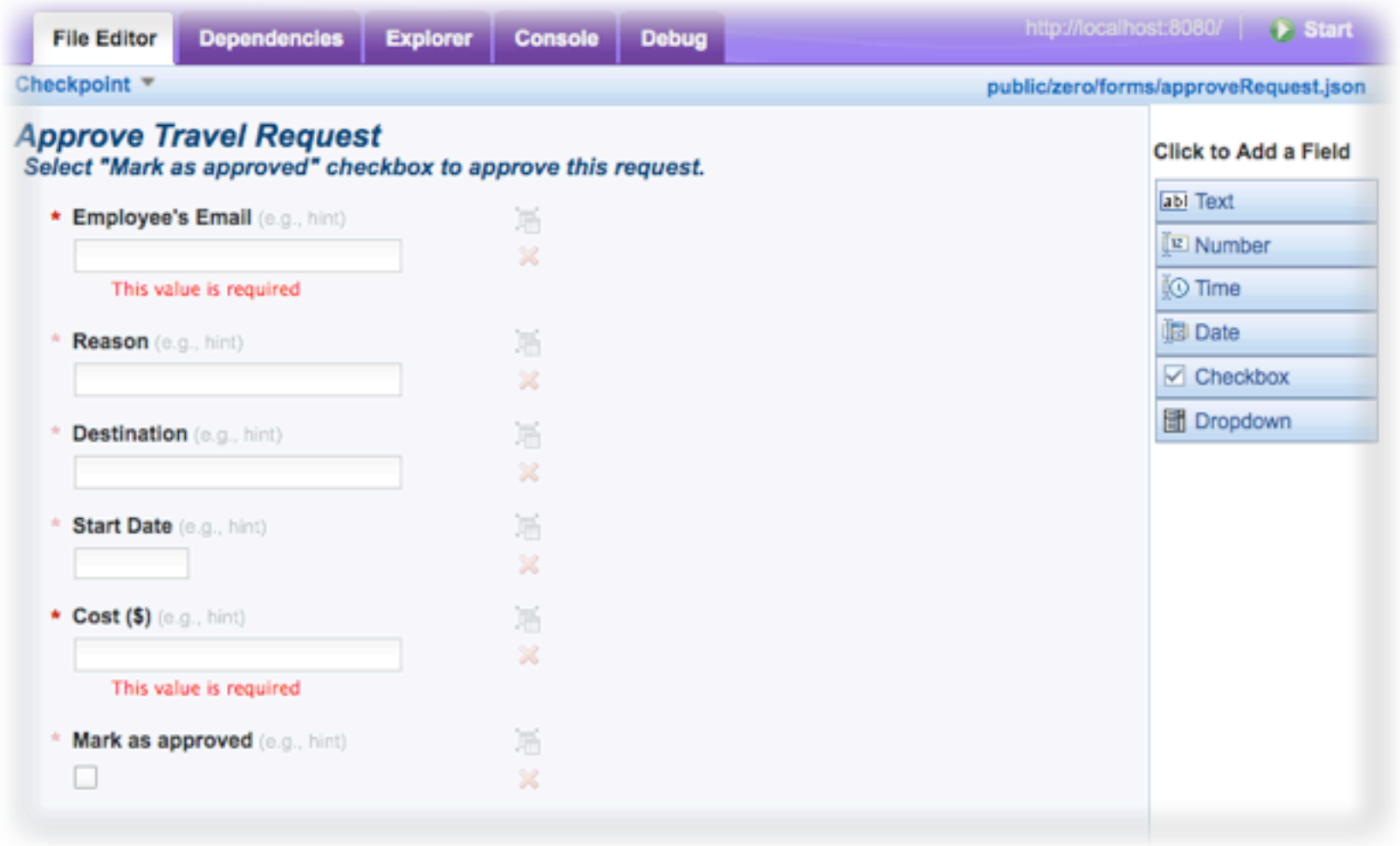
Assemble Flow Editor



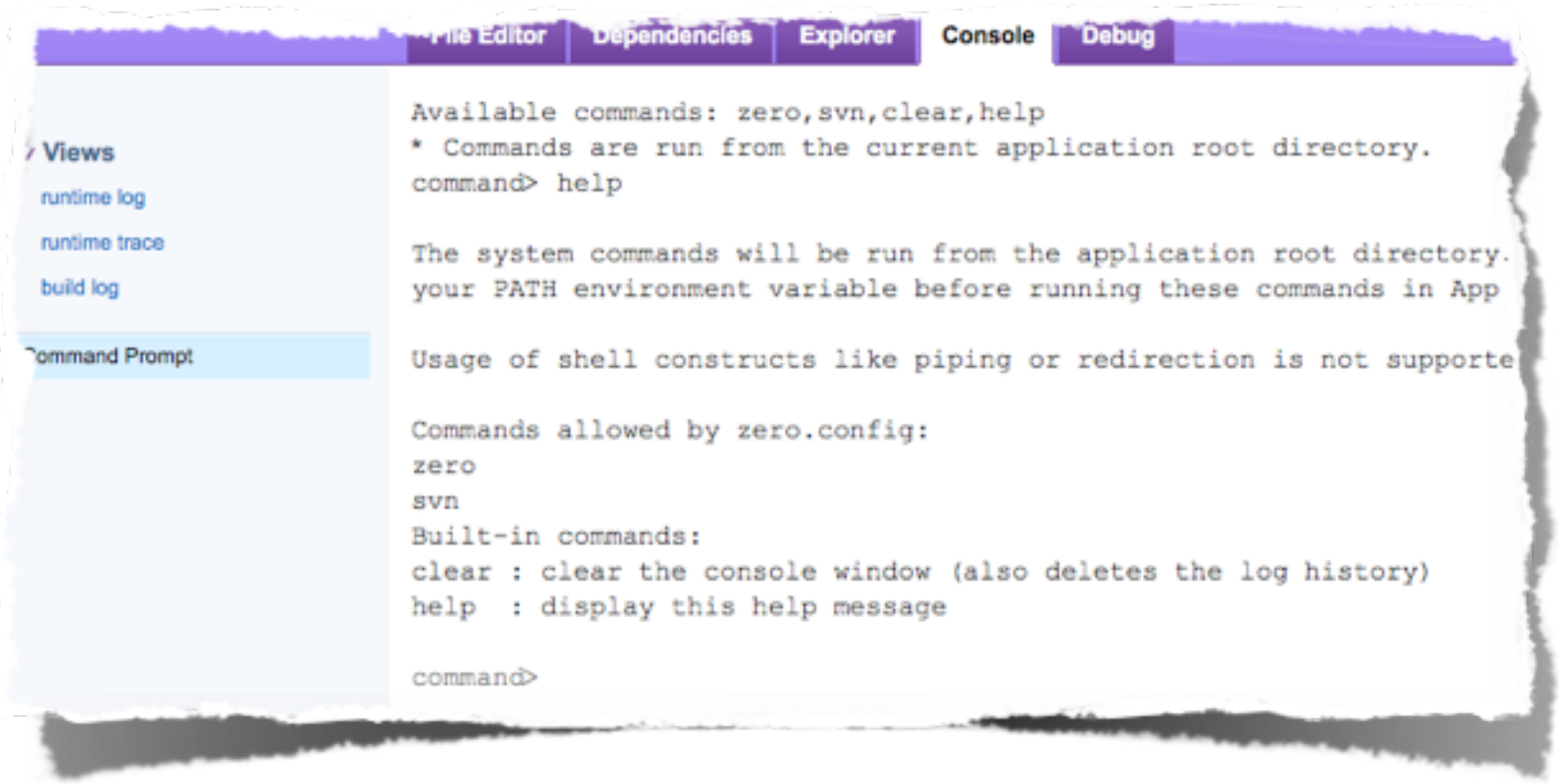
Zero Resource Model Editor



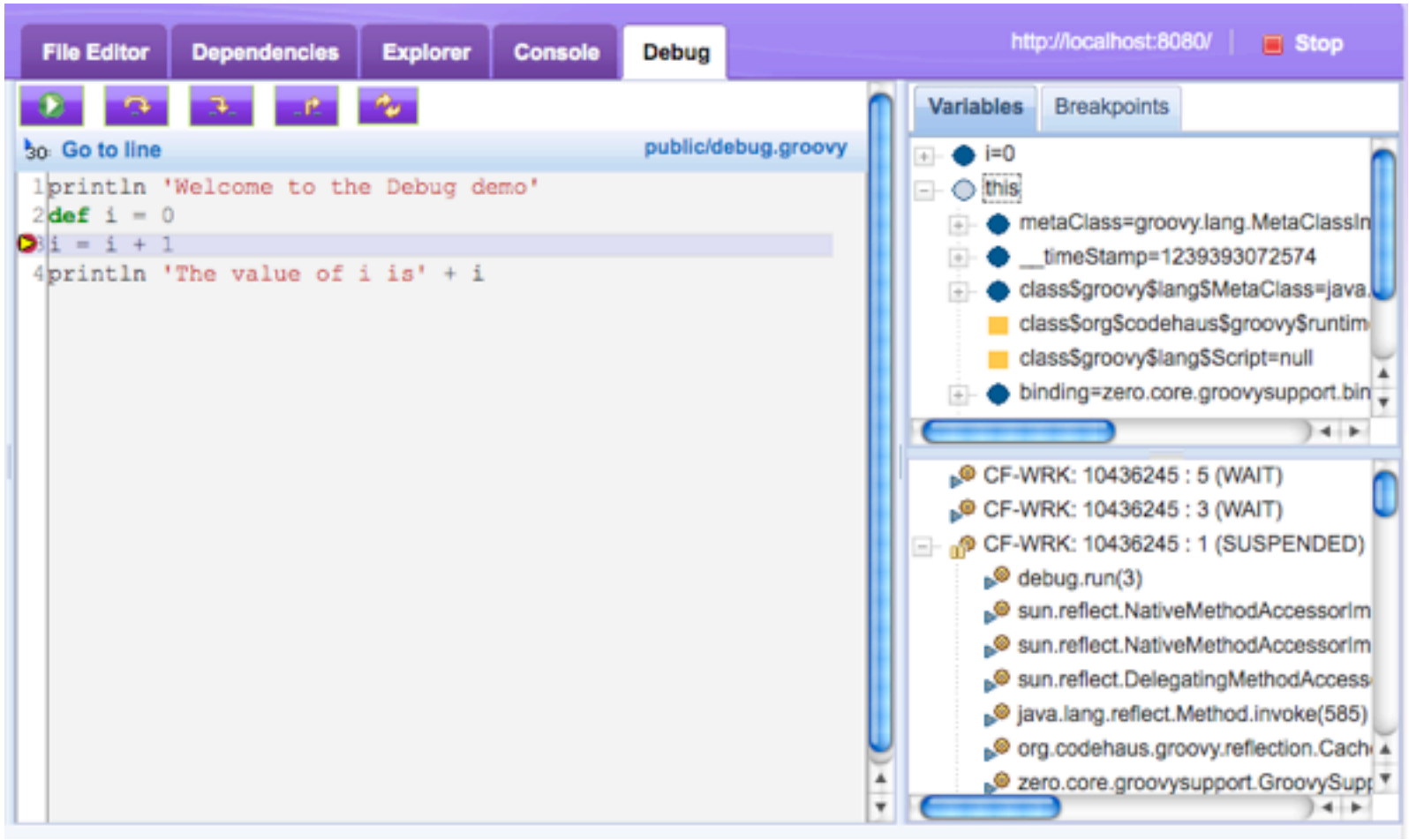
Zero Form Editor



Console


File Editor
Dependencies
Explorer
Console
Debug
Views
runtime log
runtime trace
build log
Command Prompt
Available commands: zero,svn,clear,help
* Commands are run from the current application root directory.
command> help
The system commands will be run from the application root directory.
your PATH environment variable before running these commands in App
Usage of shell constructs like piping or redirection is not supporte
Commands allowed by zero.config:
zero
svn
Built-in commands:
clear : clear the console window (also deletes the log history)
help : display this help message
command>

Debugger


File Editor
Dependencies
Explorer
Console
Debug
http://localhost:8080/
Stop
Go to line
public/debug.groovy
println 'Welcome to the Debug demo'
def i = 0
i = i + 1
println 'The value of i is' + i
Variables
Breakpoints
i=0
this
metaClass=groovy.lang.MetaClassIn
__timeStamp=1239393072574
class$groovy$lang$MetaClass=java.
classorgcodehaus$groovy$runtim
class$groovy$lang$Script=null
binding=zero.core.groovysupport.bin
CF-WRK: 10436245 : 5 (WAIT)
CF-WRK: 10436245 : 3 (WAIT)
CF-WRK: 10436245 : 1 (SUSPENDED)
debug.run(3)
sun.reflect.NativeMethodAccessorIm
sun.reflect.NativeMethodAccessorIm
sun.reflect.DelegatingMethodAccess
java.lang.reflect.Method.invoke(585)
org.codehaus.groovy.reflection.Cach
zero.core.groovysupport.GroovySupp

Import ZIP file