OSGi and Spring Data for simple (Web) Application Development

Christian Baranowski

Content of my talk in a sentence
„*Java development with Bndtools and bnd is so much fun!*"

My Talk in three Words - „*Bndtools is cool!*"

SEITENBAU

OSGi™ Community Event 2014

Welcome

- Christian Baranowski (Twitter: @tux2323)
- Software Developer @ SEITENBAU
    - Software Engineering
    - Custom Software Solutions
    - E-Government Solutions
    - Identity Management and SSO Solutions
    - www.seitenbau.de

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Bndtools

Easy, powerful and productive way to develop OSGi applications. Based on bnd and Eclipse.

http://bndtools.org/

„Development should be fun, so you need the right tools!“

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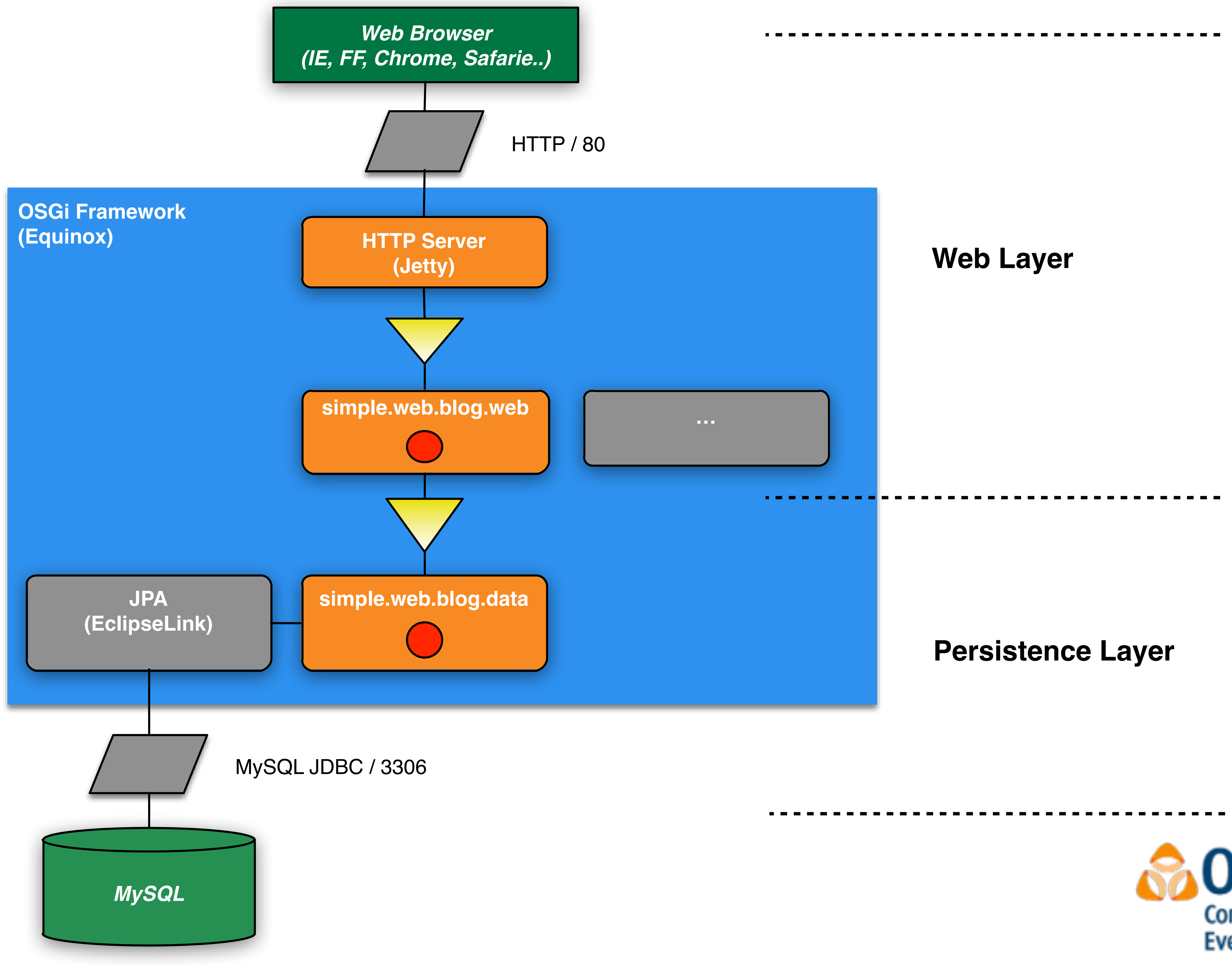
enRoute

- Getting started with OSGi → enRoute project
  http://enroute.osgi.org/
- The talk is based on the ideas from the enRoute blog demo project
- enRoute OSGi blog sample project by Peter Kriens
  https://github.com/osgi/osgi.enroute.blog/
- Step by step tutorial from Peter Kriens
  http://goo.gl/Y569g5
- Last OSGi Code Camp (Ludwigsburg 2013) was based on this step by step tutorial

Running Blog Example



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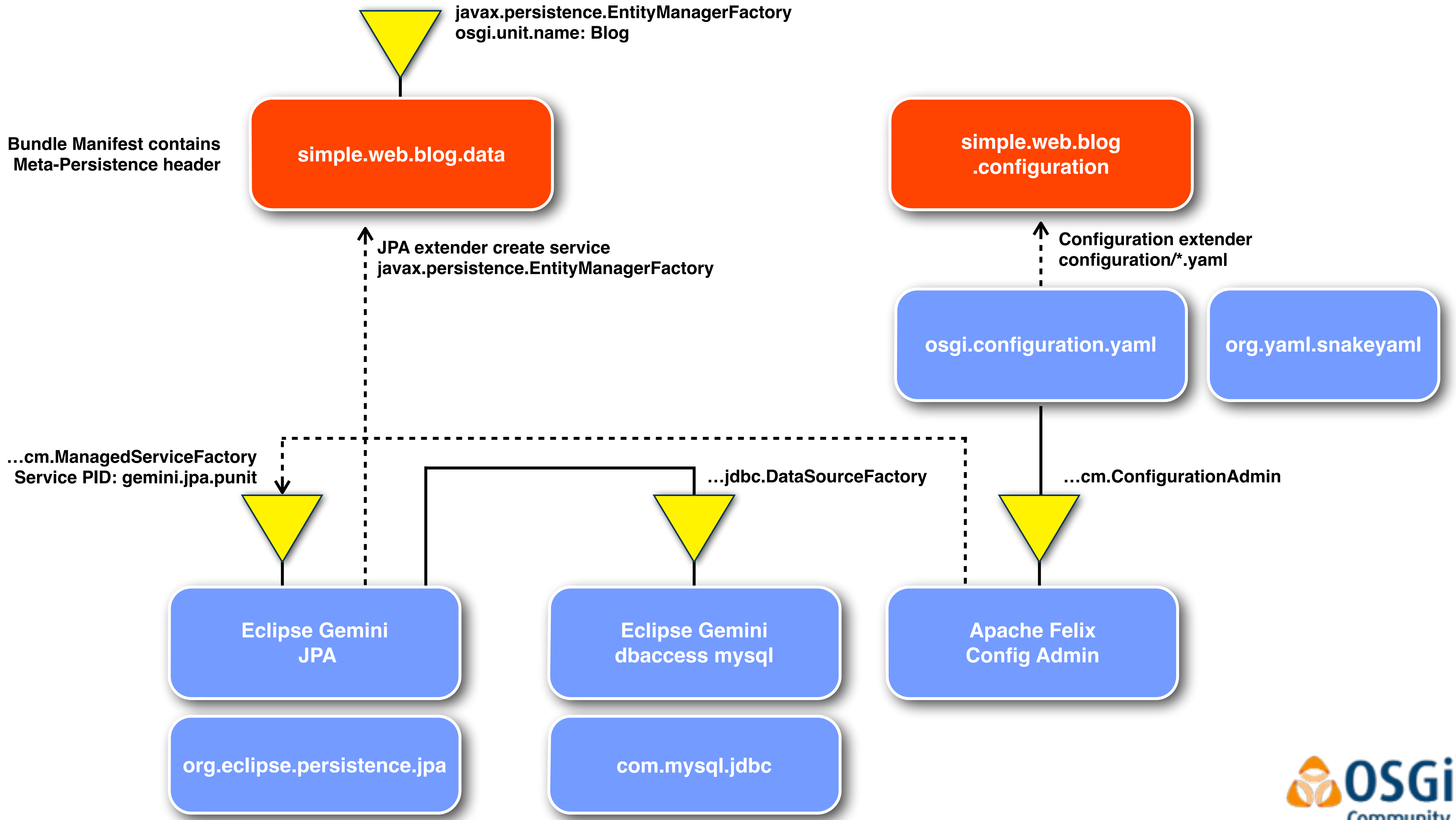
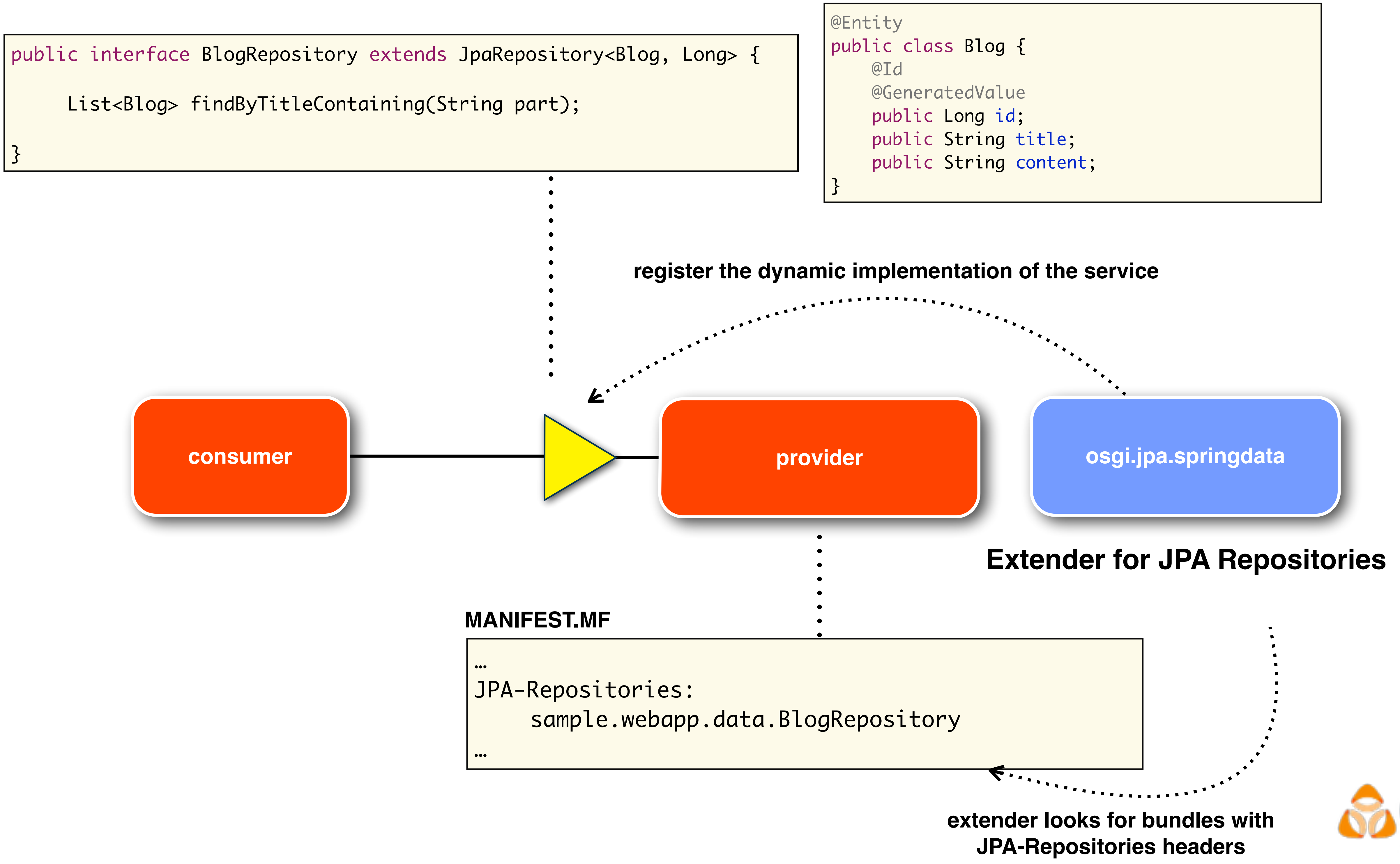
Persistence Layer (JPA)



Spring Data Extender



```java
public interface BlogRepository extends JpaRepository<Blog, Long> {

     List<Blog> findByTitleContaining(String part);

}
```

```java
@Entity
public class Blog {
    @Id
    @GeneratedValue
    public Long id;
    public String title;
    public String content;
}
```

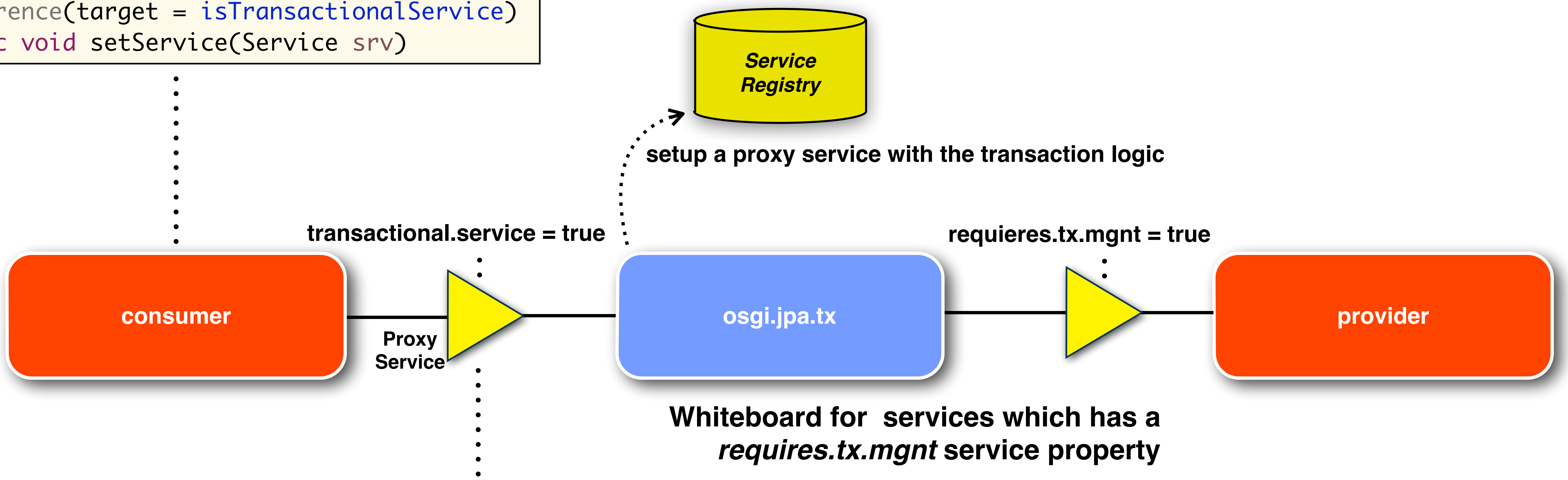
MANIFEST.MF

```
…
JPA-Repositories:
     sample.webapp.data.BlogRepository
…
```

register the dynamic implementation of the service
consumer
provider
osgi.jpa.springdata
Extender for JPA Repositories
extender looks for bundles with JPA-Repositories headers

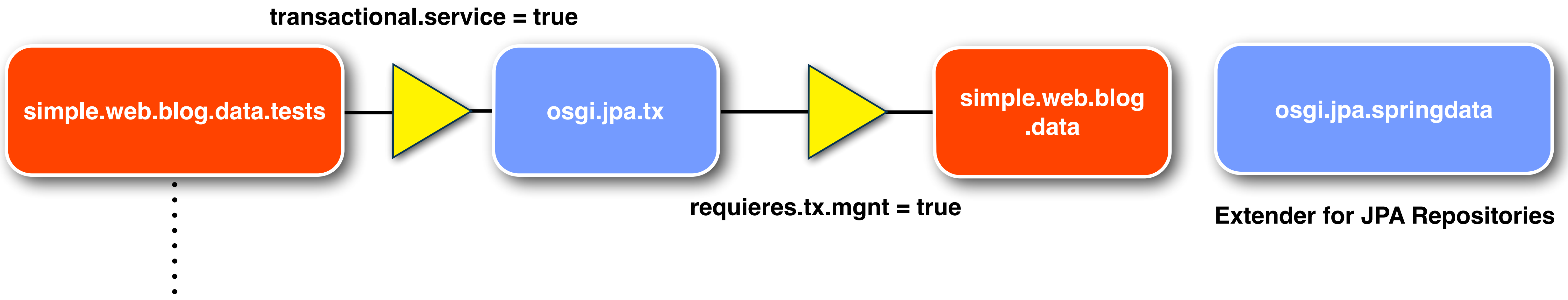
Simple Transaction Management

```
@Reference(target = isTransactionalService)
public void setService(Service srv)
```


Service Registry
setup a proxy service with the transaction logic
transactional.service = true
requieres.tx.mgnt = true
consumer
Proxy Service
osgi.jpa.tx
provider
Whiteboard for services which has a *requires.tx.mgnt* service property

```
if (tx.isTransactionOpen()) {
  return method.invoke(bundleContext.getService(serviceReference), args);
}
try {
  tx.begin();
  Object result = method.invoke(bundleContext.getService(serviceReference), args);
  tx.commit();
  return result;
} catch (Exception exp) {
  tx.rollback();
  throw exp;
} finally {
  bundleContext.ungetService(txMgrServiceReference);
}
```

Spock based OSGi Integration Tests


transactional.service = true
simple.web.blog.data.tests
osgi.jpa.tx
simple.web.blog .data
osgi.jpa.springdata
requieres.tx.mgnt = true
Extender for JPA Repositories

```
class BlogRepositorySpec extends Specification {

    @OSGiService
    BlogRepository blogRepository

    def setup() {
        blogRepository.deleteAll()
        blogRepository.save(new Blog(title: 'OSGi Web Dev'))
        blogRepository.save(new Blog(title: 'OSGi V.S Java EE'))
    }

    def findBlogPostByTitleContainingOSGi() {
        when:
        def list = blogRepository.findByTitleContaining("OSGi")
        then:
        list.size() == 2
    }
}
```

Web Layer

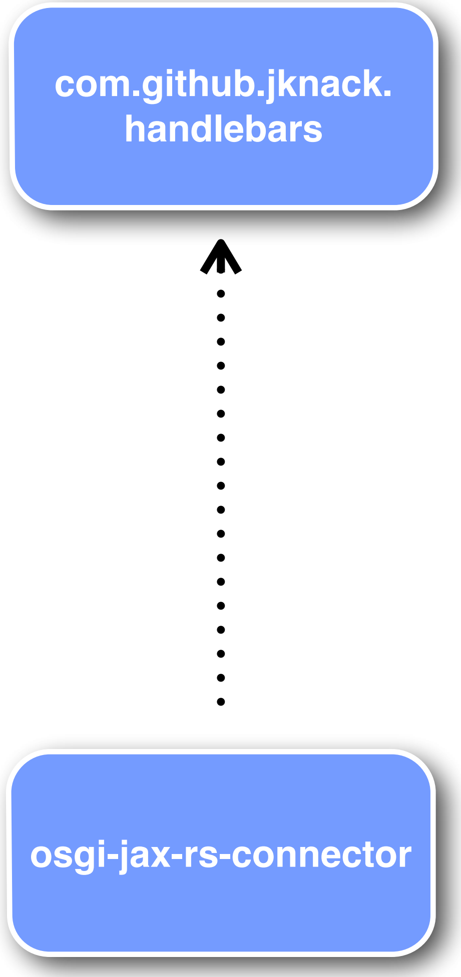
https://github.com/alrra/browser-logos

Jersey MVC (Server Side Web-App)

Handlebars View (list.hbs):

```
<html>
<head>
{{#resource type="css"}} /css/app.css {{/resource}}
</head>
<body>
<table class="table table-striped">
  <thead>
    <th>#id</th><th>Title</th><th>Content</th><th></th>
  </thead>
  {{#html-table-content columns="id, title, content" resource="blog"}}
  {{/html-table-content}}
</table>
{{#html-pagination}} {{/html-pagination}}
</body>
</html>
```

Handlebars Helpers



Controller (BlogController):

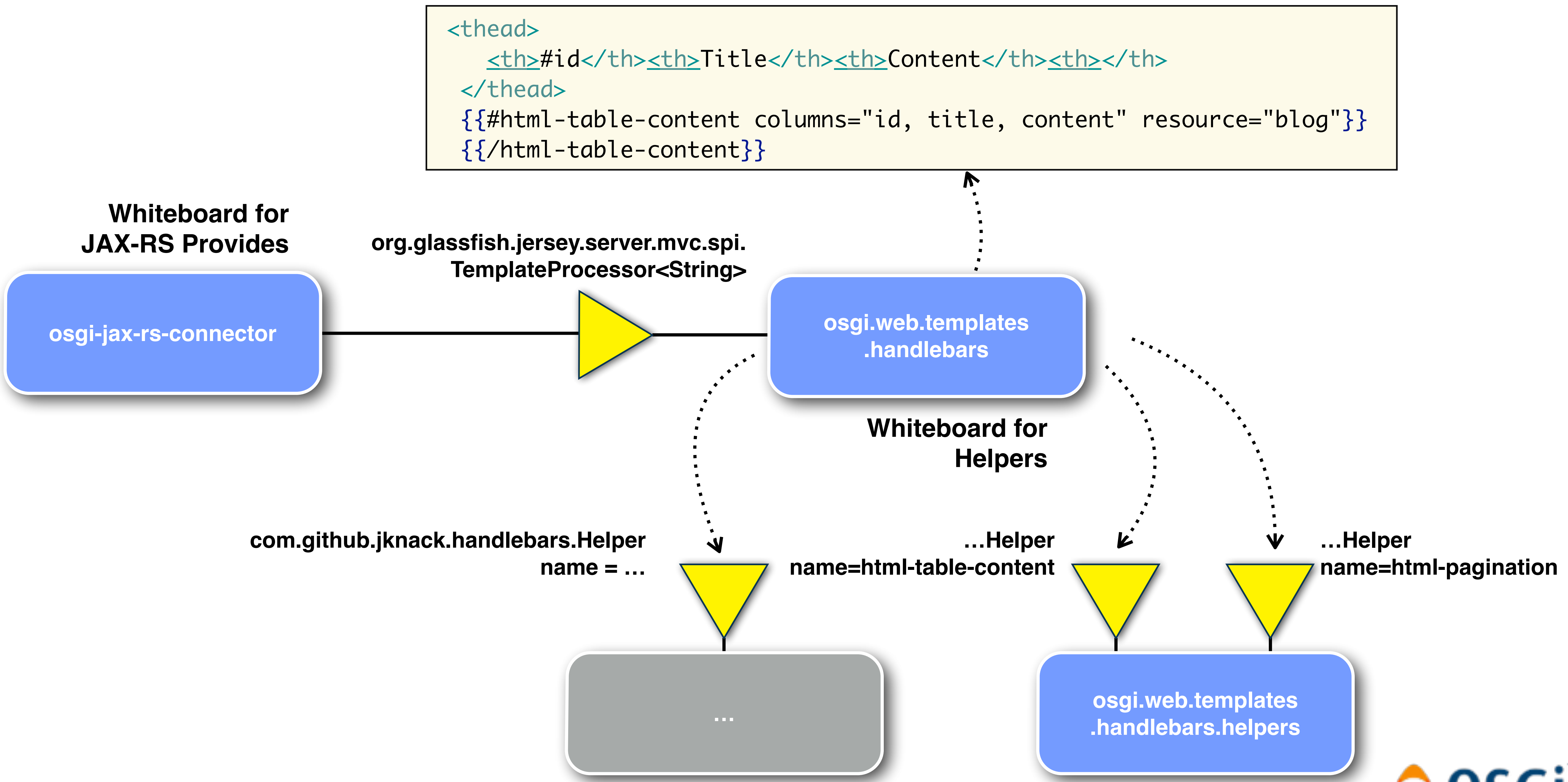
```
    @GET
    @Produces( MediaType.TEXT_HTML )
    @Template(name="list.hbs")
    public  Page<Blog> list(
            @QueryParam("page")      @DefaultValue("0")     Integer page,
            @QueryParam("size")      @DefaultValue("10")    Integer size) {
        return blogRepository.findAll(new PageRequest(page, size));
    }
```

Controller Method

return the model

Handlebars Helpers

Extend templates and provide components for the HTML UI

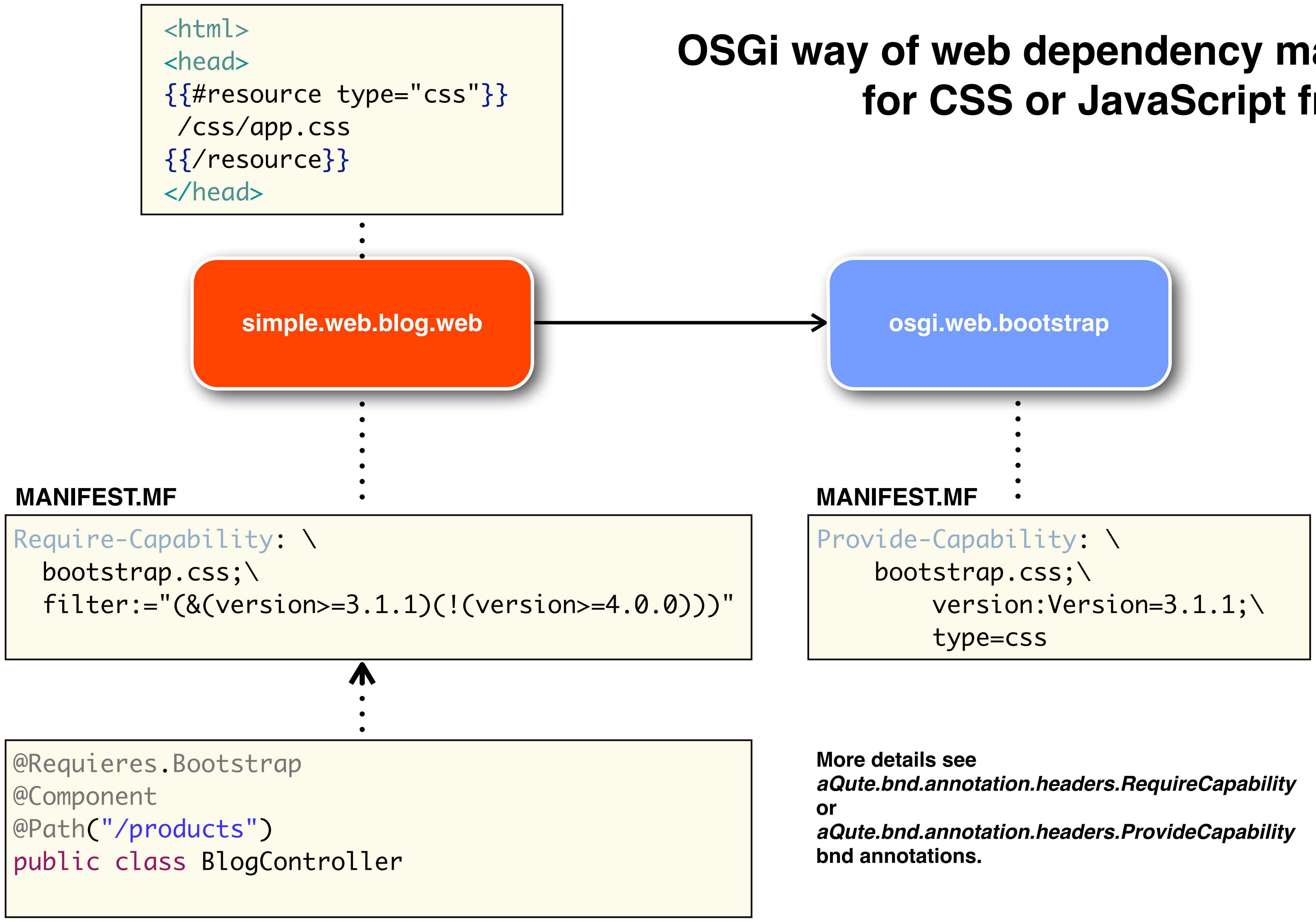


```
<thead>
   <th>#id</th><th>Title</th><th>Content</th><th></th>
 </thead>
 {{#html-table-content columns="id, title, content" resource="blog"}}
 {{/html-table-content}}
```

Whiteboard for JAX-RS Provides
org.glassfish.jersey.server.mvc.spi. TemplateProcessor<String>
osgi-jax-rs-connector
osgi.web.templates .handlebars
Whiteboard for Helpers
com.github.jknack.handlebars.Helper name = ...
...Helper name=html-table-content
...Helper name=html-pagination
...
osgi.web.templates .handlebars.helpers

Static Web Bundles

OSGi way of web dependency management for CSS or JavaScript frameworks



```
<html>
<head>
{{#resource type="css"}}
 /css/app.css
{{/resource}}
</head>
```

MANIFEST.MF

```
Require-Capability: \
  bootstrap.css;\
  filter:="(&(version>=3.1.1)(!(version>=4.0.0)))"
```

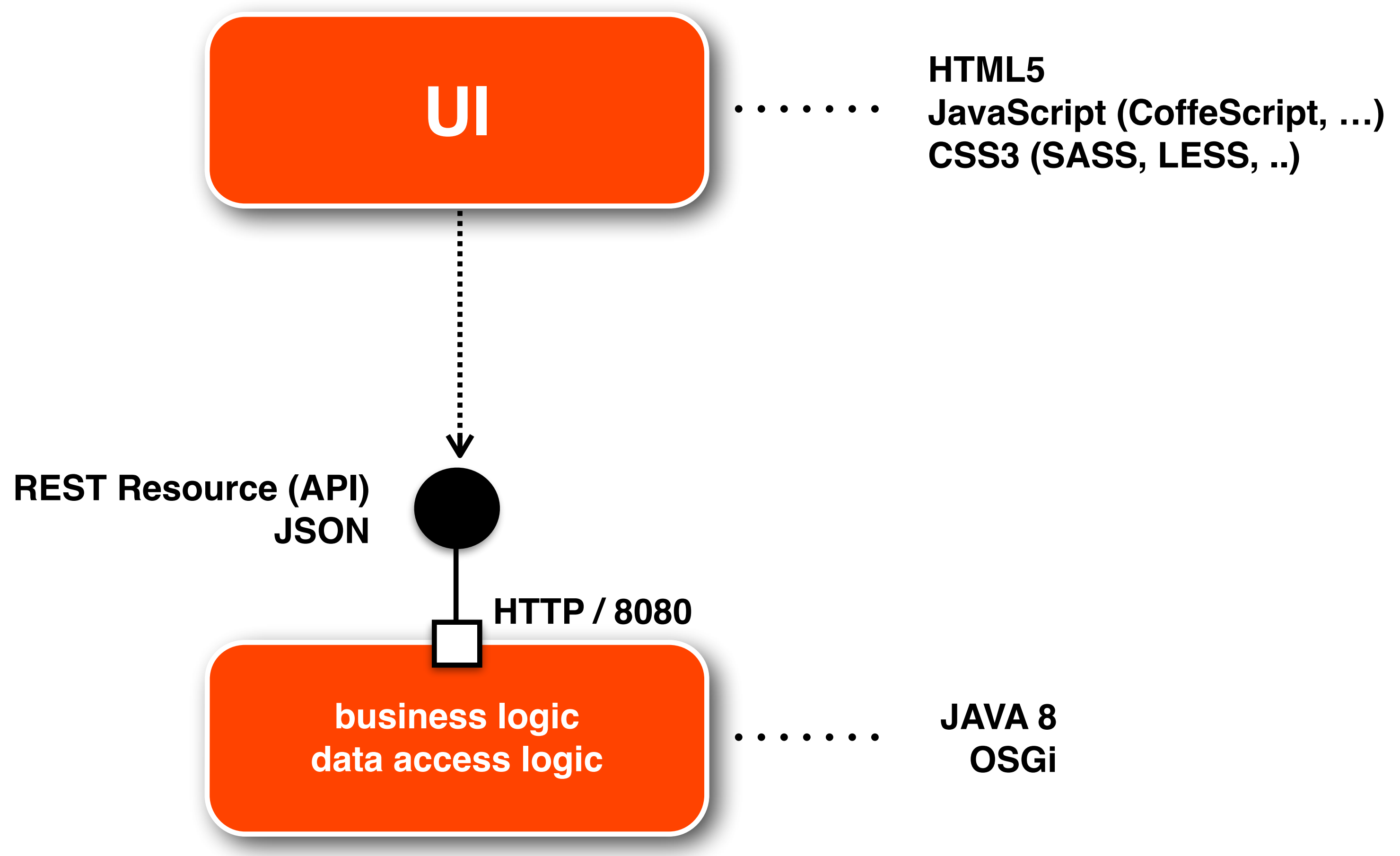
MANIFEST.MF

```
Provide-Capability: \
    bootstrap.css;\
        version:Version=3.1.1;\
        type=css
```

```
@Requieres.Bootstrap
@Component
@Path("/products")
public class BlogController
```

More details see
aQute.bnd.annotation.headers.RequireCapability
or
aQute.bnd.annotation.headers.ProvideCapability
bnd annotations.

Modern Web Applications



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Web Bundle build with Yeoman Grunt Bower

Thats the tool chain web developers love…

yeoman

- Scaffolding tool for webapps
- Yeoman helps kickstart new projects
- provide a generator ecosystem

http://yeoman.io/

Grunt

- JavaScript Task Runner
- Grunt ecosystem is huge
- minification, compilation, unit testing, linting, …

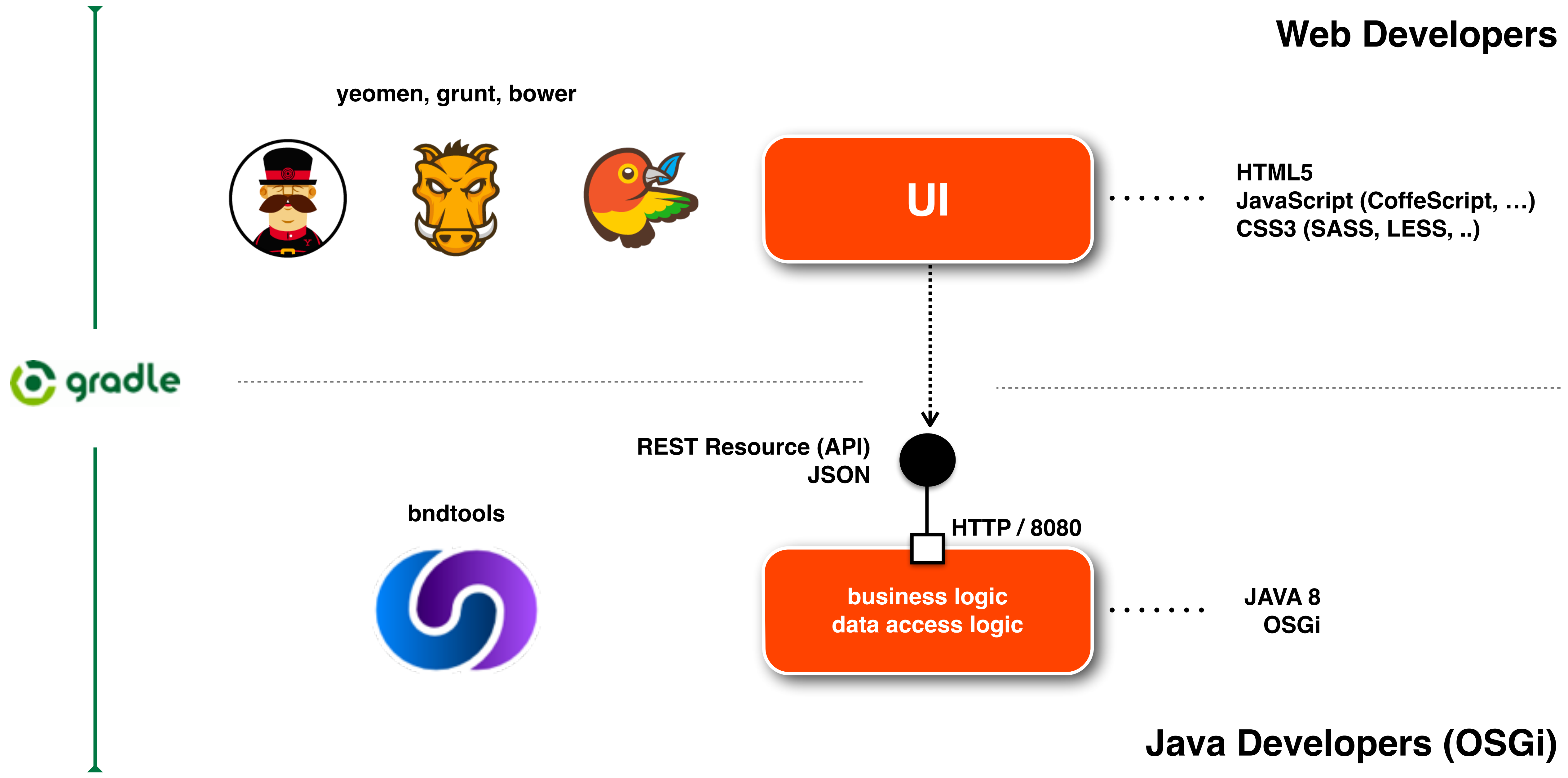
http://gruntjs.com/

bower

- package manager for the web
- solution to the problem of front-end package management
- ecosystem is huge

http://bower.io/

Building Web Applications



Gradle, tests and builds the OSGi and the Web application

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AngularJS REST Consumer (Client)

$blogResource (REST Consumer)

```
angular.module('blogApp')
  .factory('$blogResource', ['$resource', function($resource) {
    return $resource( '/rest/blog/:postId', { postId: '@postId' }, { });
  }]);
```

MainCtrl (the controller is using the REST resource to delete a blog entry)

```
angular.module('blogApp')
  .controller('MainCtrl', ['$scope','$blogResource', function($scope, $blogResource) {

    $scope.posts = $blogResource.query();

    $scope.deletePost = function(post) {
        $blogResource.delete({postId: post.id}).$promise.then(function() {
            $scope.posts = $blogResource.query();
        });
    };

 }]);
```

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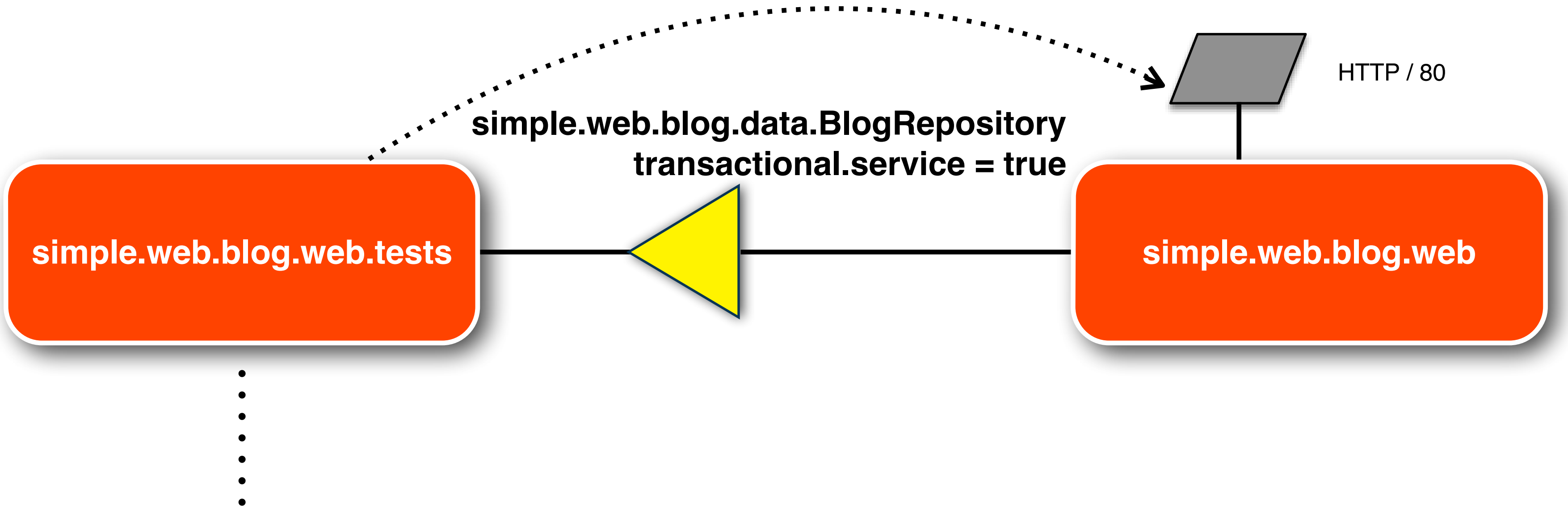
REST Resource (JAX-RS) Provider

A REST Resource build in standard and flexible way based on JAX-RS

```
@Component
@Path("/rest/blog")
public class BlogResource implements Resource {

    BlogRepository blogRepository;

    @Reference(target = isTransactionalService)
    public void setBlogRepository(BlogRepository blogRepository) { … }

    @GET
    public List<Blog> query() { return blogRepository.findAll(); }

    @GET
    @Path("/{id}")
    public Blog get(@PathParam("id") Long id) { return blogRepository.getOne(id); }

    @POST
    public void post(Blog blog) { blogRepository.save(blog); }

    @DELETE
    @Path("/{id}")
    public void delete(@PathParam("id") Long id) { blogRepository.delete(id); }
}
```

Integration Testing REST Resources


HTTP / 80
simple.web.blog.data.BlogRepository
transactional.service = true
simple.web.blog.web.tests
simple.web.blog.web

```
class BlogResourceSpec extends Specification {

    @OSGiServiceRegistration(properties=["transactional.service = true"])
    BlogRepository mockBlogRepository = Mock(BlogRepository)

    def getProductsByExistingId() {
        given:
        mockBlogRepository.findOne(42) >> new Blog(title: 'OSGi in Action', content: '-')
        when:
        Client client = ClientBuilder.newClient();
        Response response = client
            .target("http://localhost:8080")
                .path("halres").path("blog").path("42").request().get();
        then:
        response.status == Status.OK.statusCode
    }
```

Testing AngularJS Controllers

```
// Initialize the controller and a mock scope
beforeEach(inject(function ($controller, $rootScope, $injector) {
  scope = $rootScope.$new();
  $httpBackend = $injector.get('$httpBackend');
  $httpBackend.expect('GET', '/rest/blog').respond([{id: 1}, {id: 42}]);
  MainCtrl = $controller('MainCtrl', {
    $scope: scope
  });
}));

it('should send a request to delete a blog post', function () {
 $httpBackend.expect('DELETE', '/rest/blog/42').respond(200, 'success');
 $httpBackend.expect('GET',    '/rest/blog').respond([{id: 1}]);
  scope.deletePost({id: 42});
  $httpBackend.flush();
 expect(scope.posts.toString()).toBe([{id: 1}].toString());
});
```

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Technologie Stack

- **Modern Web-Application OSGi Stack**
  - AngularJS (Superheroic JavaScript Framework)
    https://angularjs.org/
  - Jetty (Web Server)
    https://www.eclipse.org/jetty/
  - osgi-jax-rs-connector (Jersey)
    https://github.com/hstaudacher/osgi-jax-rs-connector
  - Spring Data JPA (for simple JPA Services)
    http://projects.spring.io/spring-data-jpa/
  - Spock (testing and specification framework)
    https://code.google.com/p/spock/
  - Eclipse Equinox or Apache Felix as powerful OSGi Framework

Feedback

„***Erik Meijer:***
*Are you saying you cannot write large programs in **Java**?*

Anders Hejlsberg:
*No, you can write large programs in **Java**.*
You just can't maintain them. „

Quelle - http://t.co/Uw2iglqf

Compose small "applications" (modules)
in to large systems.

Quelle - http://t.co/Uw2iglqf

Resources

- OSGi Simple Blog App (Source, Slides)
  https://github.com/tux2323/simple.web.blog