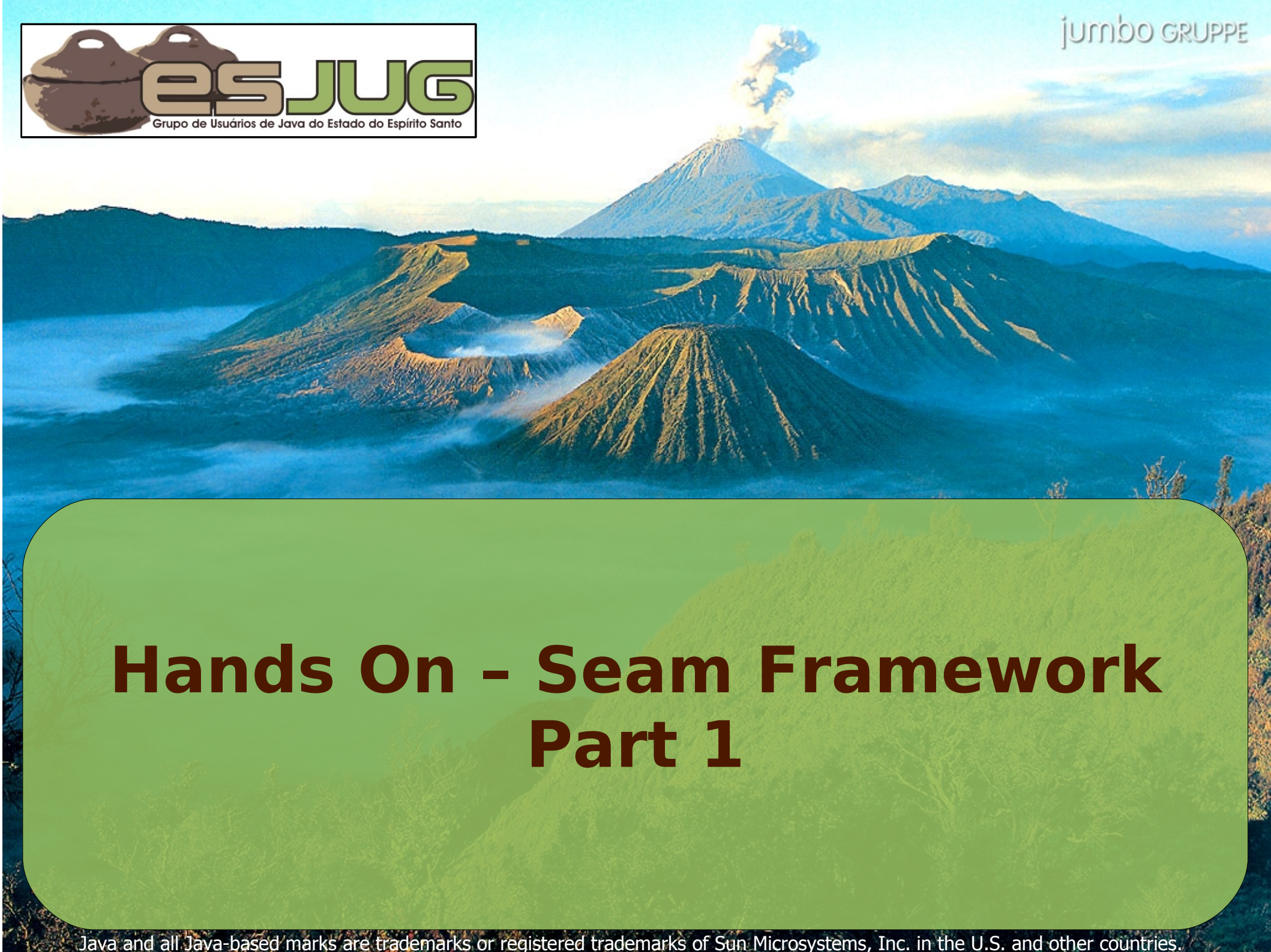

Hands On – Seam Framework Part 1

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About the author – Vítor Souza

- Education:
  - Computer Science graduate, masters in Software Engineering – (UFES, Brazil), currently PhD at U. Trento.
- Java:
  - Developer since 1999;
  - Focus on Web Development;
  - Co-founder and coordinator of ESJUG (Brazil).
- Professional:
  - Substitute teacher at Federal University of ES;
  - Engenho de Software Consulting & Development.
- Contact: vitorsouza@gmail.com

Hands On Setup

- Assuming Java 6 installed beforehand;
- Procedures have been tested in an Kubuntu Linux 9.10 on Intel 32 bits. The examples are for this architecture, but can be adapted;
- `$base` = folder where we will install everything (e.g.: `~/HandsOnSeam`);
- `$base/Software` = folder containing the software to be installed (for Windows, Linux and Mac) – copy from USB drive.

Examples and demonstration

- Examples in the slides and the “hands on” demonstration are redundant...
  - ... so you can repeat it at home;
  - ... so you see it twice and learn better;
  - ... so I don't forget a step!

Ok, it's mostly because of the last one...

Part 1 – The Basics

- Install software;
- Create and deploy a blank project;
- Customize the layout with Facelets;
- Implement the domain with EJB 3;
- Generate the schema for the database;
- Implement data access via DAOs;
- Develop a simple CRUD.

Install Eclipse Galileo

- Download:
  - http://www.eclipse.org/downloads/
  - Eclipse IDE for Java EE Developers
  - Current stable version: Galileo SR1
- Install:
  - Extract the files into `$base`, creating the `$base/eclipse` folder.
- Example:

```
$ tar -zxf Software/eclipse-jee-galileo-SR1-linux-gtk.tar.gz
```

Install JBoss Tools

- Download:
  - http://www.jboss.org/tools/
  - Current development version: 3.1.0.M4
- Install:
  - Run Eclipse Galileo (create a workspace in $base);
  - Help > Install New Software... > Add... > Archive...;
  - Point to JbossTools-Update-3.1.0.v200910281724M-H247-M4.zip, click OK;
  - Select features to install, proceed, accept agreement and finish.

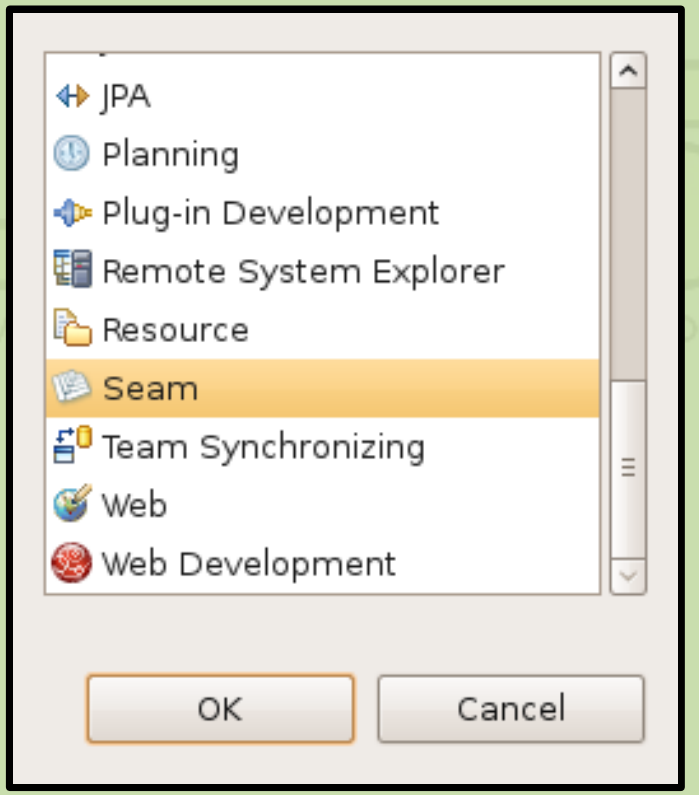
Install JBoss Application Server

- Download:
  - http://www.jboss.org/jbossas/downloads/
  - Current stable version: 5.1.0.GA
  - The 5.1 series is not yet integrated – let's use 5.0.1
- Install:
  - Extract files into `$base`. The folder `$base/jboss-5.0.1.GA` will be created.
- Example:

```
$ unzip Software/jboss-5.0.1.GA-jdk6.zip
```

Start Eclipse with JBoss Tools

- Restart eclipse;
- Check if JBoss Tools has been installed:
  - *Window > Open Perspective > Other* should show Seam perspective).



Configure JBoss AS in Eclipse

- Open the *Seam* perspective;
- Click on the *JBoss Server View*;
- Right-click in the blank area, *New > Server*;
  - Open JBoss Community (**not JBoss!**)
  - Select JBoss AS 5.0, Next >;
  - Fill in the correct Home Directory, Finish.
- Run the server and try opening `http://localhost:8080` in your browser.

Install JBoss Seam

- Download:
  - http://www.seamframework.org/Download
  - Current version: 2.2.0.GA
- Install:
  - Extract files into `$base`. The folder `$base/jboss-seam-2.2.0.GA` will be created.
- Example:

```
$ unzip Software/jboss-seam-2.2.0.GA.zip
```

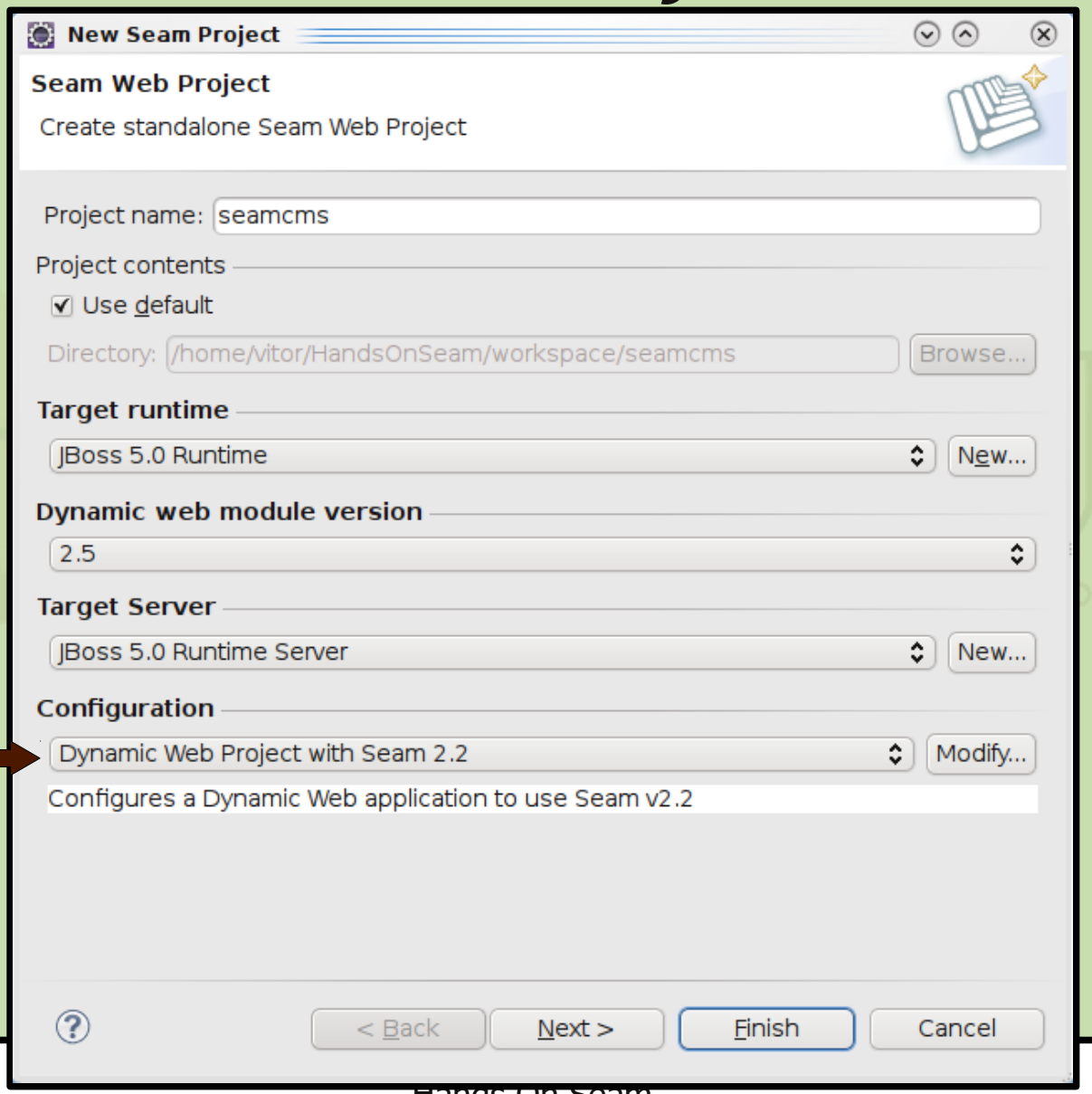
Install HSQLDB

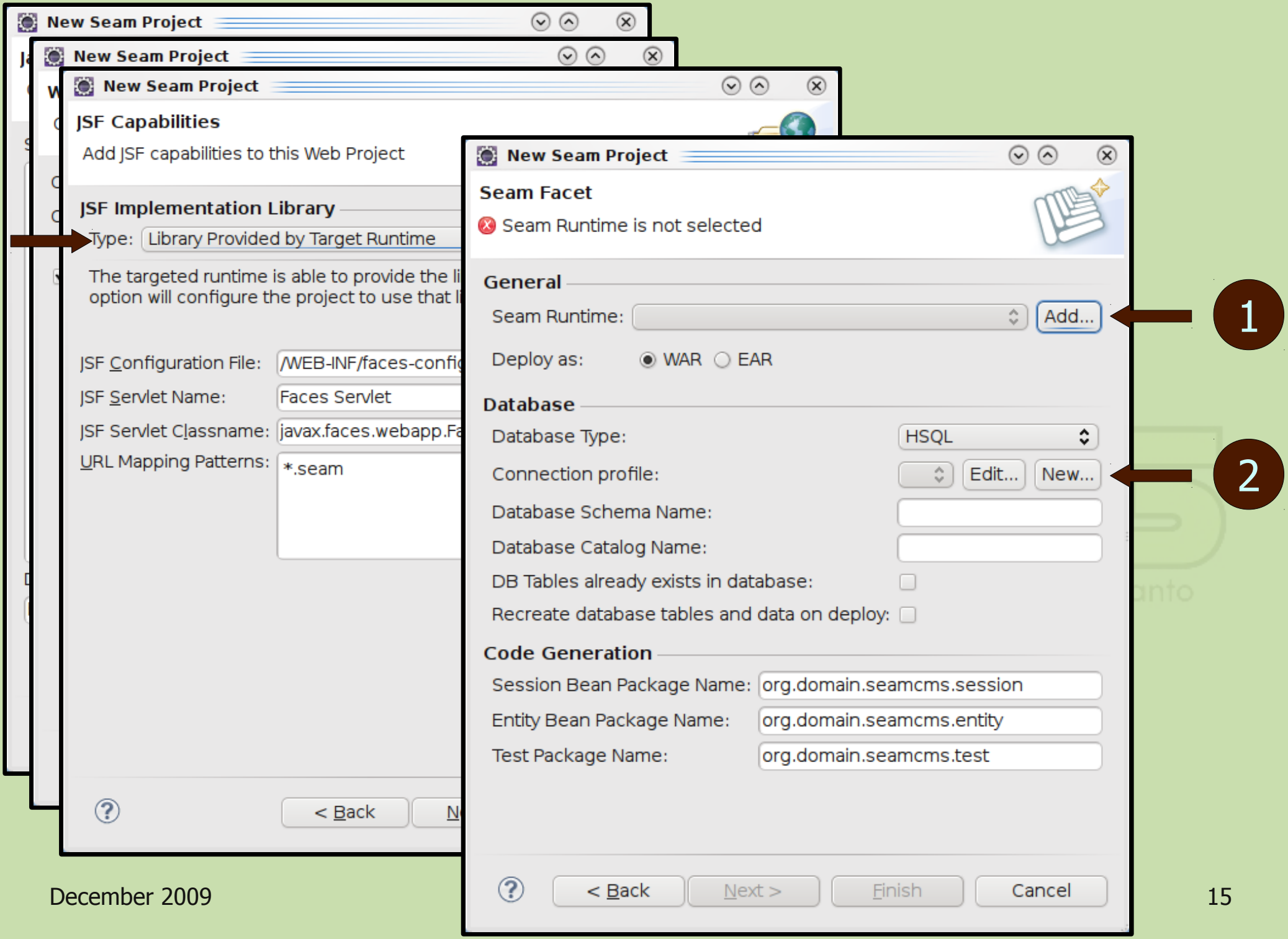
- Download:
  - http://hsqldb.org/
  - Current version: 1.8.1.1
- Install:
  - Extract files into `$base`. The folder `$base/hsqldb` will be created.
- Example:

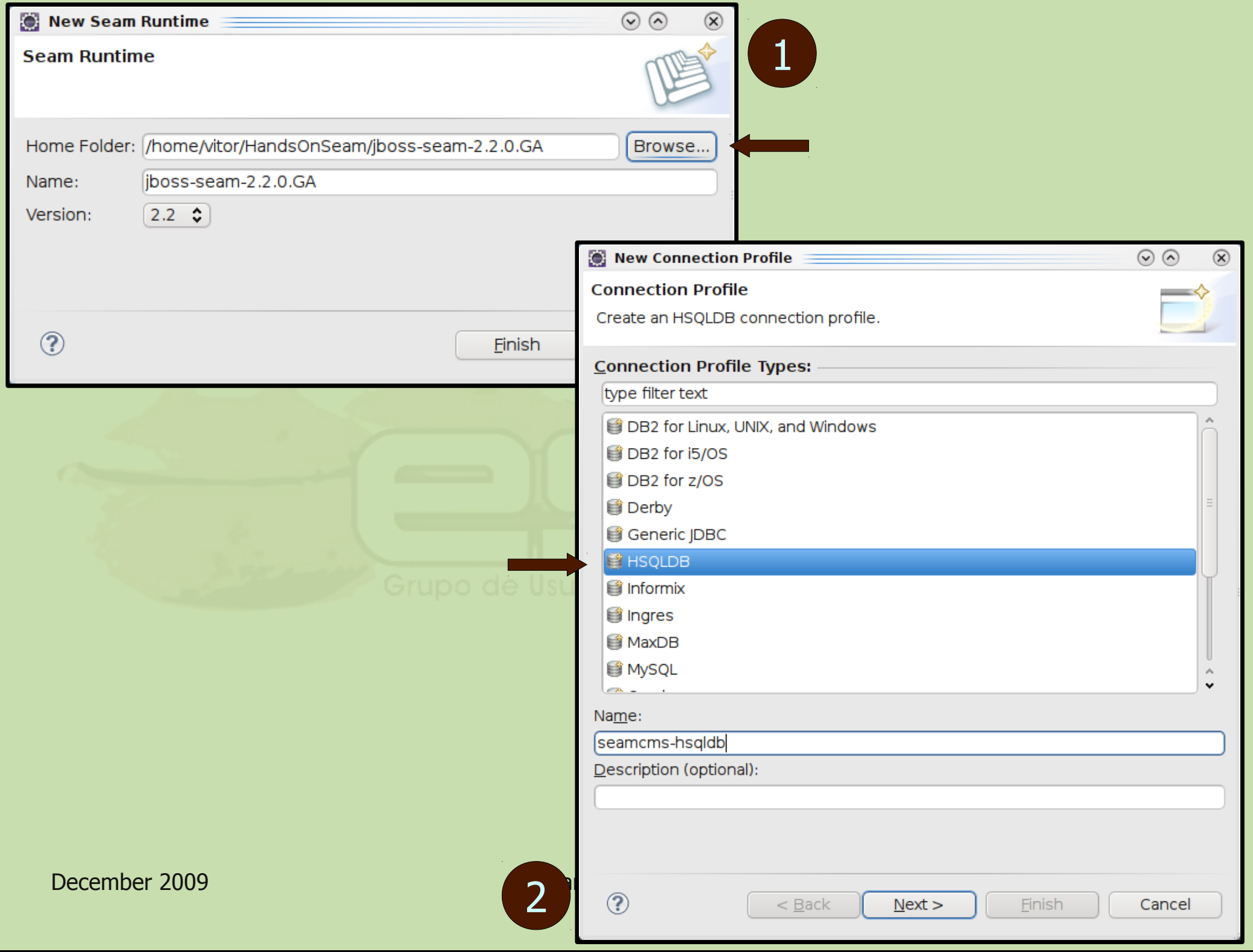
```
$ unzip Software/hsqldb_1_8_1_1.zip
```

Create a new Seam project

- *File > New > Seam Web Project...*

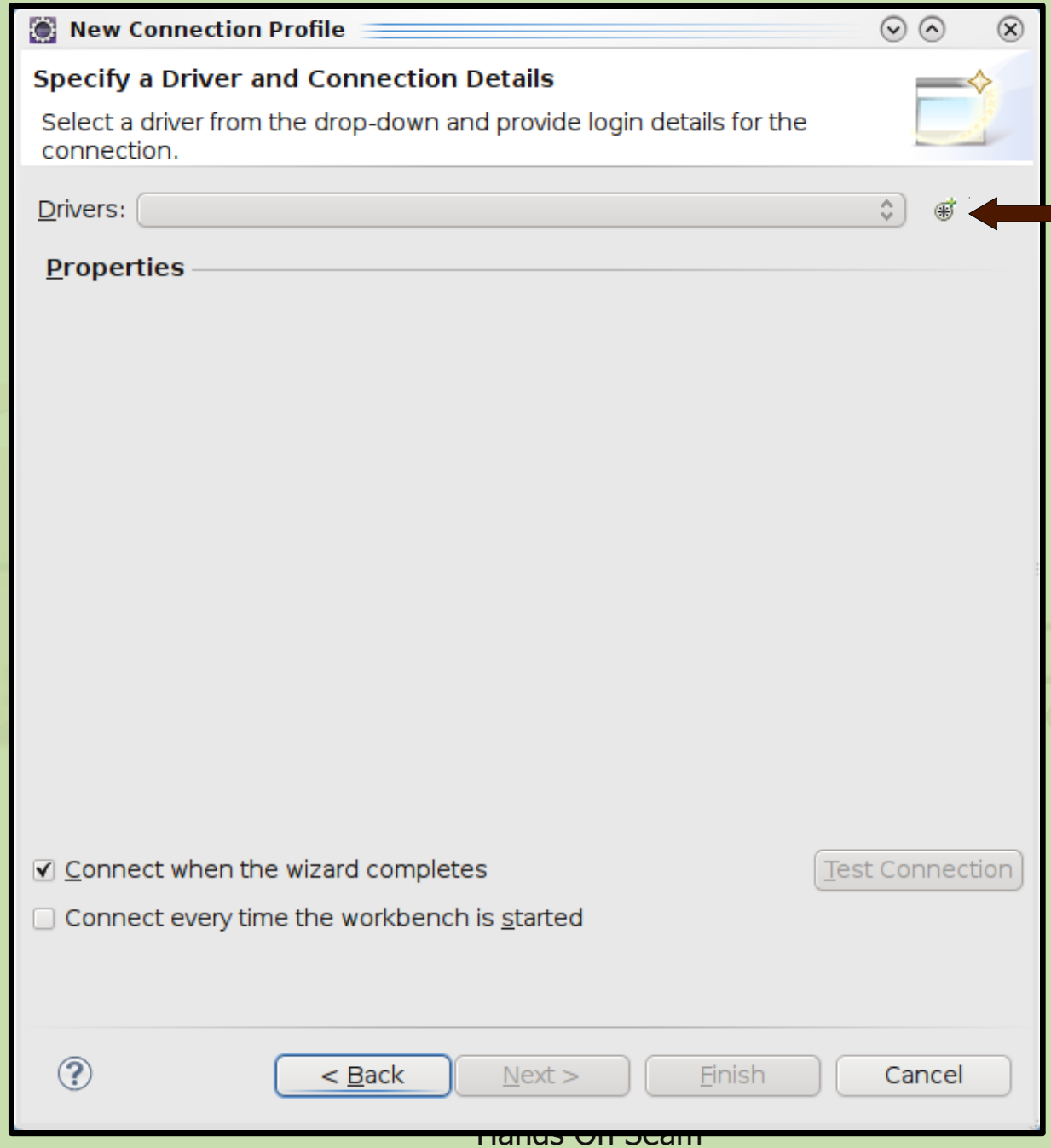


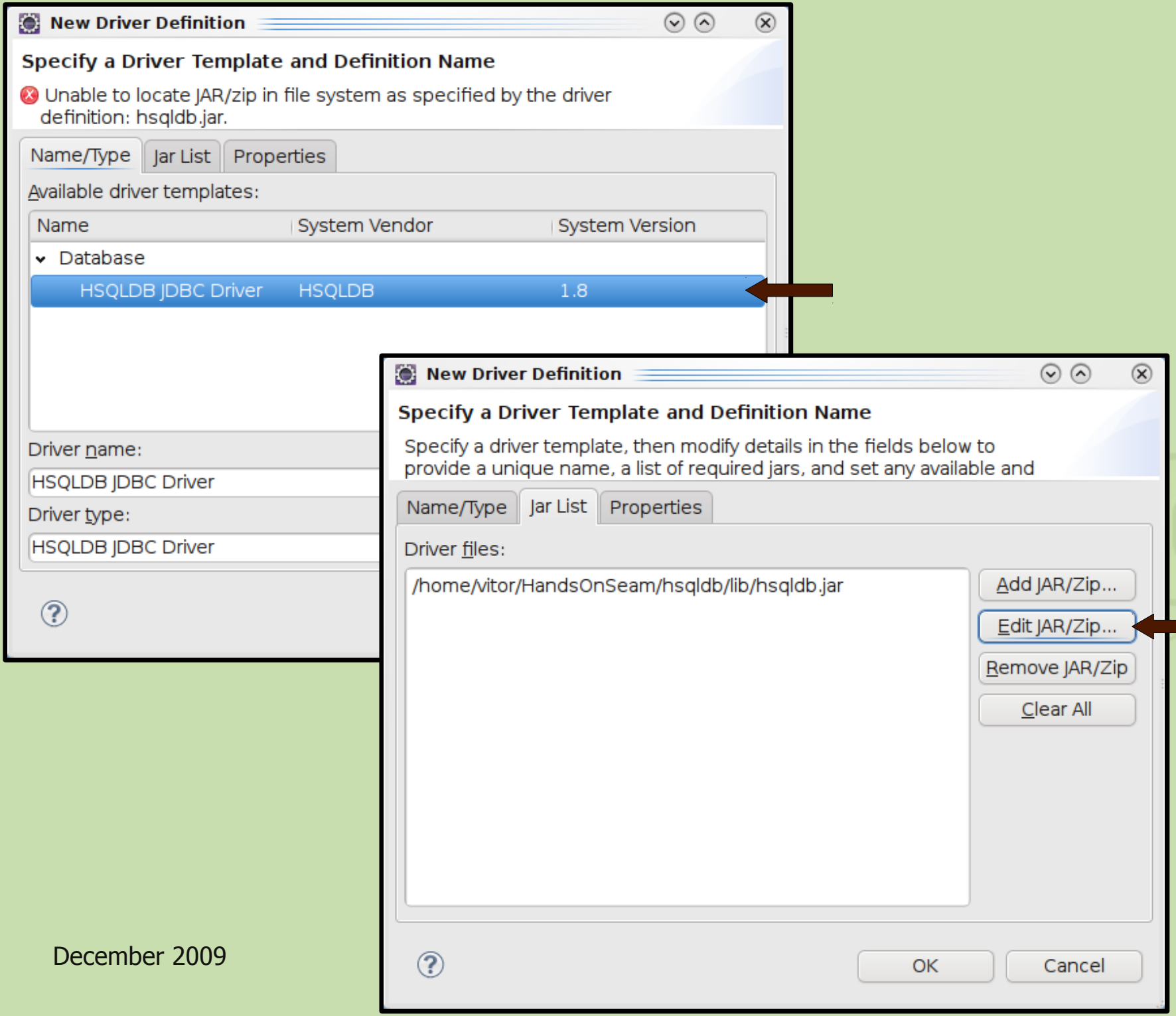

New Seam Project
New Seam Project
New Seam Project
JSF Capabilities
Add JSF capabilities to this Web Project
JSF Implementation Library
Type: Library Provided by Target Runtime
The targeted runtime is able to provide the li
option will configure the project to use that li
JSF Configuration File: /WEB-INF/faces-confi
JSF Servlet Name: Faces Servlet
JSF Servlet Classname: javax.faces.webapp.Fa
URL Mapping Patterns: *.seam
< Back
New Seam Project
Seam Facet
Seam Runtime is not selected
General
Seam Runtime:
Add...
Deploy as: WAR EAR
Database
Database Type: HSQL
Connection profile:
Edit...
New...
Database Schema Name:
Database Catalog Name:
DB Tables already exists in database:
Recreate database tables and data on deploy:
Code Generation
Session Bean Package Name: org.domain.seamcms.session
Entity Bean Package Name: org.domain.seamcms.entity
Test Package Name: org.domain.seamcms.test
< Back
Next >
Finish
Cancel
1
2

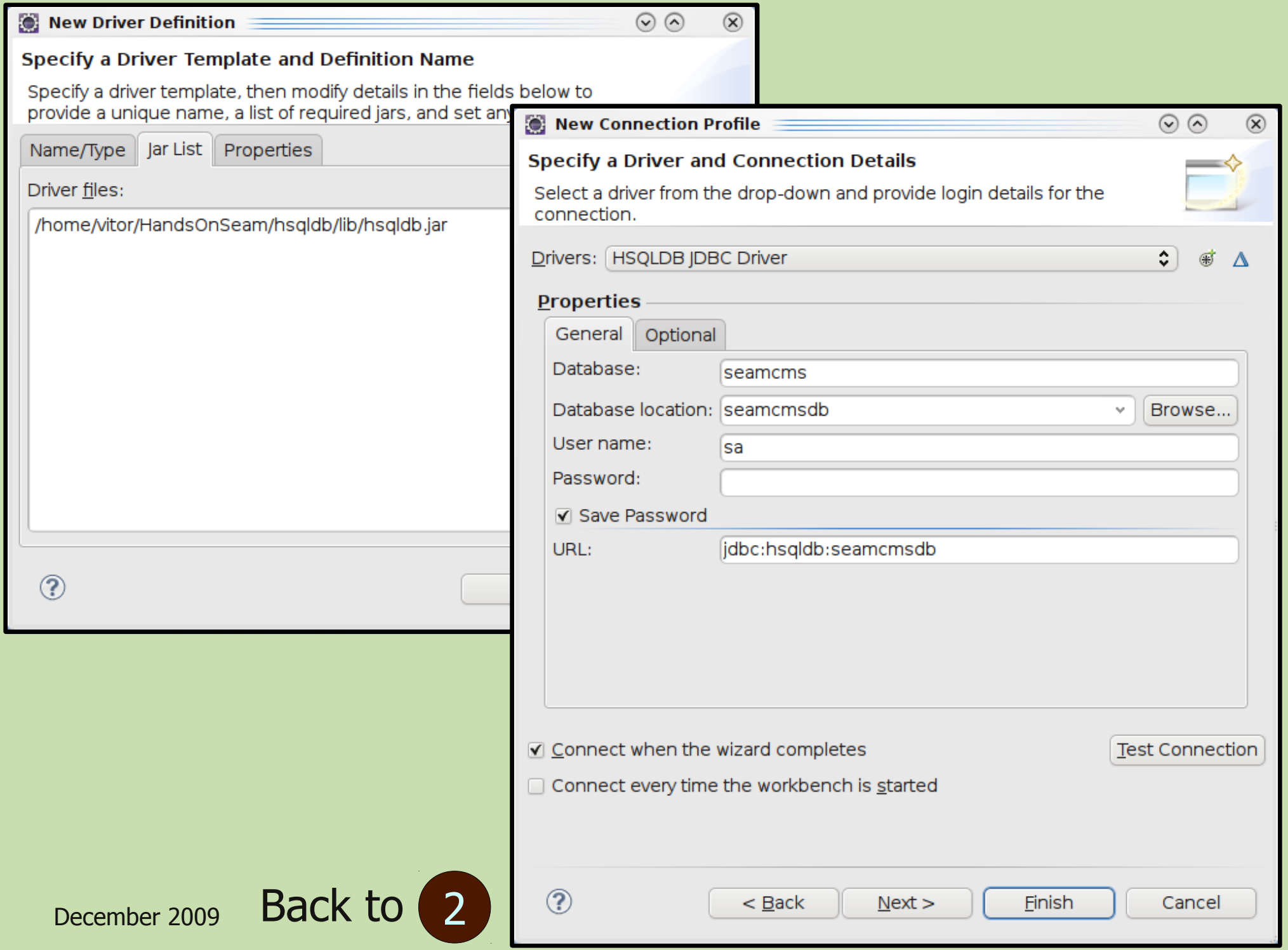


December 2009

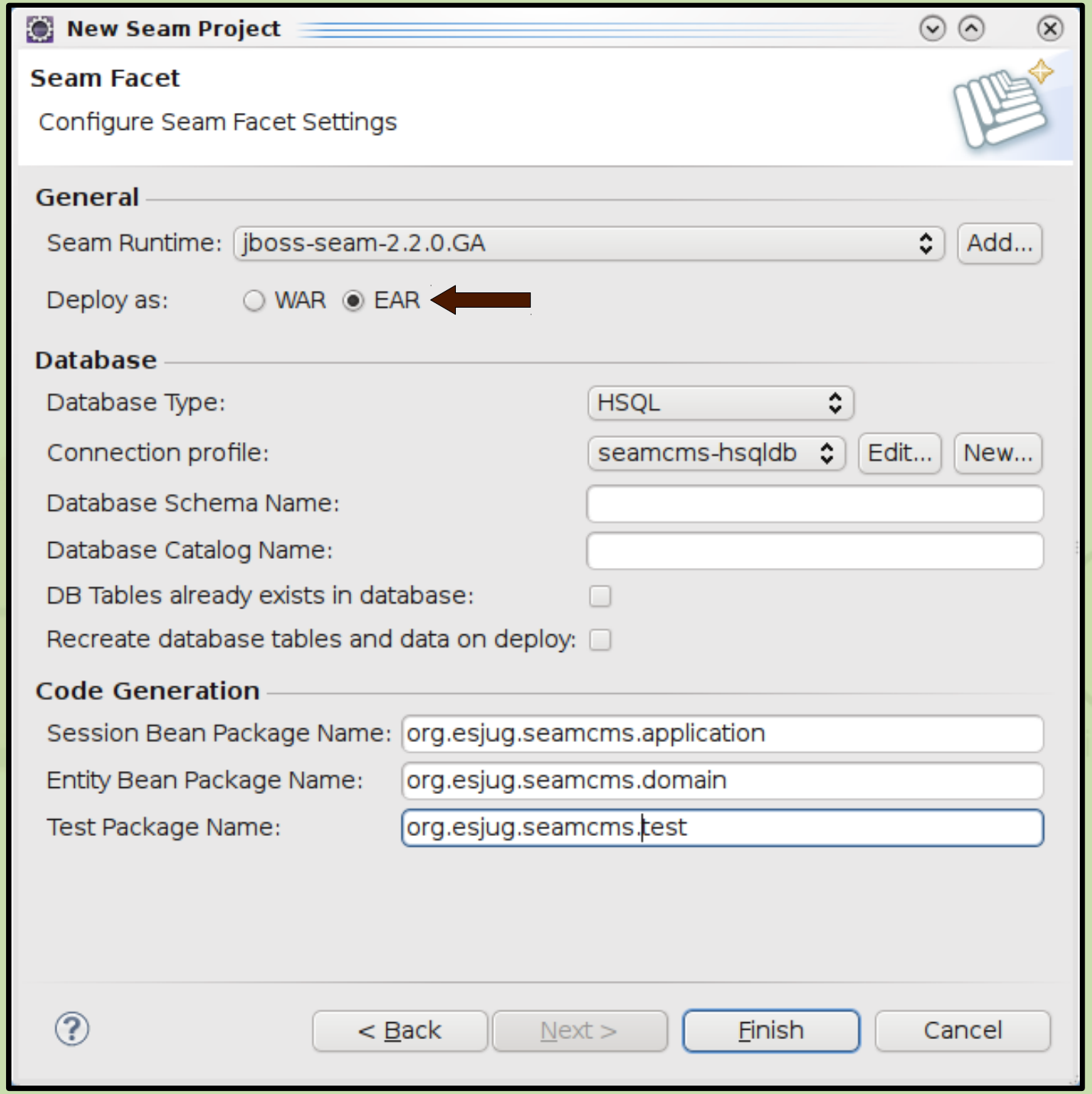
2 Continues...


New Connection Profile
Specify a Driver and Connection Details
Select a driver from the drop-down and provide login details for the connection.
Drivers:
Properties
Connect when the wizard completes
Test Connection
Connect every time the workbench is started
< Back
Next >
Finish
Cancel

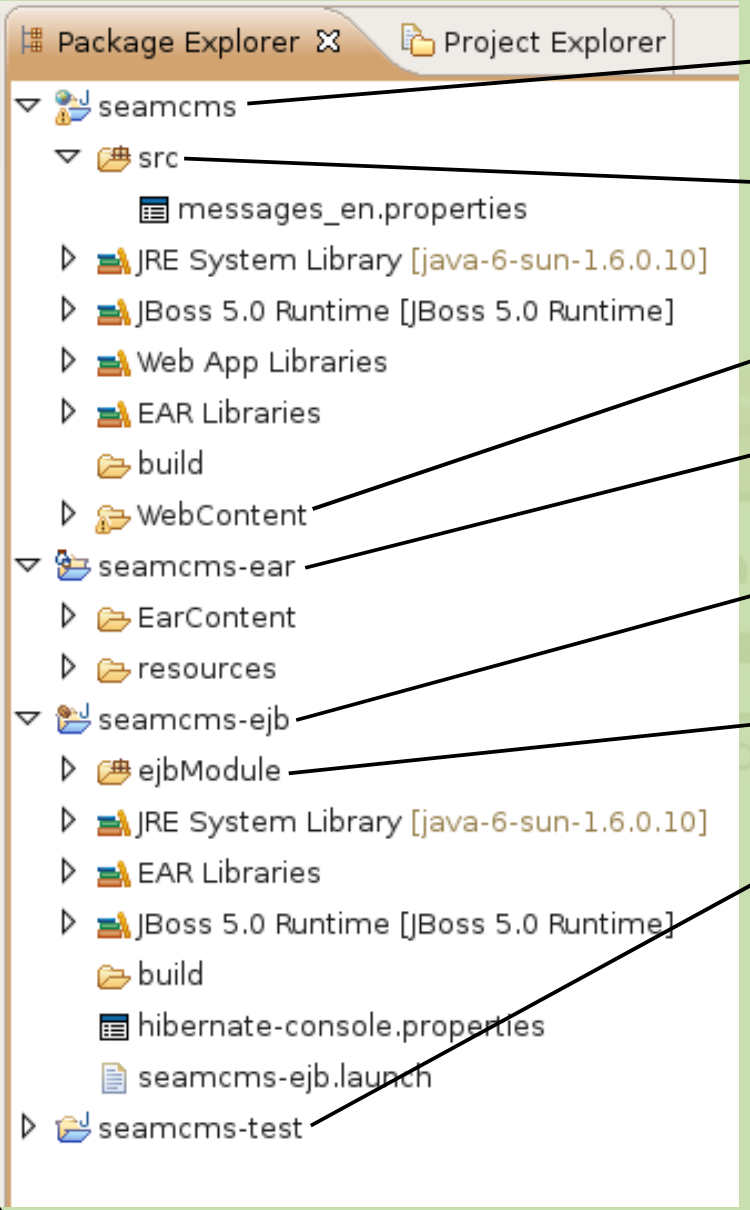

New Driver Definition
Specify a Driver Template and Definition Name
Unable to locate JAR/zip in file system as specified by the driver definition: hsqldb.jar.
Name/Type
Jar List
Properties
Available driver templates:
Name
System Vendor
System Version
Database
HSQLDB JDBC Driver
HSQLDB
1.8
Driver name:
HSQLDB JDBC Driver
Driver type:
HSQLDB JDBC Driver
New Driver Definition
Specify a Driver Template and Definition Name
Specify a driver template, then modify details in the fields below to provide a unique name, a list of required jars, and set any available and
Name/Type
Jar List
Properties
Driver files:
/home/vitor/HandsOnSeam/hsqldb/lib/hsqldb.jar
Add JAR/Zip...
Edit JAR/Zip...
Remove JAR/Zip
Clear All
OK
Cancel


New Driver Definition
Specify a Driver Template and Definition Name
Specify a driver template, then modify details in the fields below to
provide a unique name, a list of required jars, and set any
Name/Type
Jar List
Properties
Driver files:
/home/vitor/HandsOnSeam/hsqldb/lib/hsqldb.jar
New Connection Profile
Specify a Driver and Connection Details
Select a driver from the drop-down and provide login details for the
connection.
Drivers:
HSQLDB JDBC Driver
Properties
General
Optional
Database:
seamcms
Database location:
seamcmsdb
Browse...
User name:
sa
Password:
Save Password
URL:
jdbc:hsqldb:seamcmsdb
Connect when the wizard completes
Test Connection
Connect every time the workbench is started
< Back
Next >
Finish
Cancel

Back to 2


New Seam Project
Seam Facet
Configure Seam Facet Settings
General
Seam Runtime:
jboss-seam-2.2.0.GA
Add...
Deploy as:
WAR
EAR
Database
Database Type:
HSQL
Connection profile:
seamcms-hsqldb
Edit...
New...
Database Schema Name:
Database Catalog Name:
DB Tables already exists in database:
Recreate database tables and data on deploy:
Code Generation
Session Bean Package Name:
org.esjug.seamcms.application
Entity Bean Package Name:
org.esjug.seamcms.domain
Test Package Name:
org.esjug.seamcms.test
< Back
Next >
Finish
Cancel

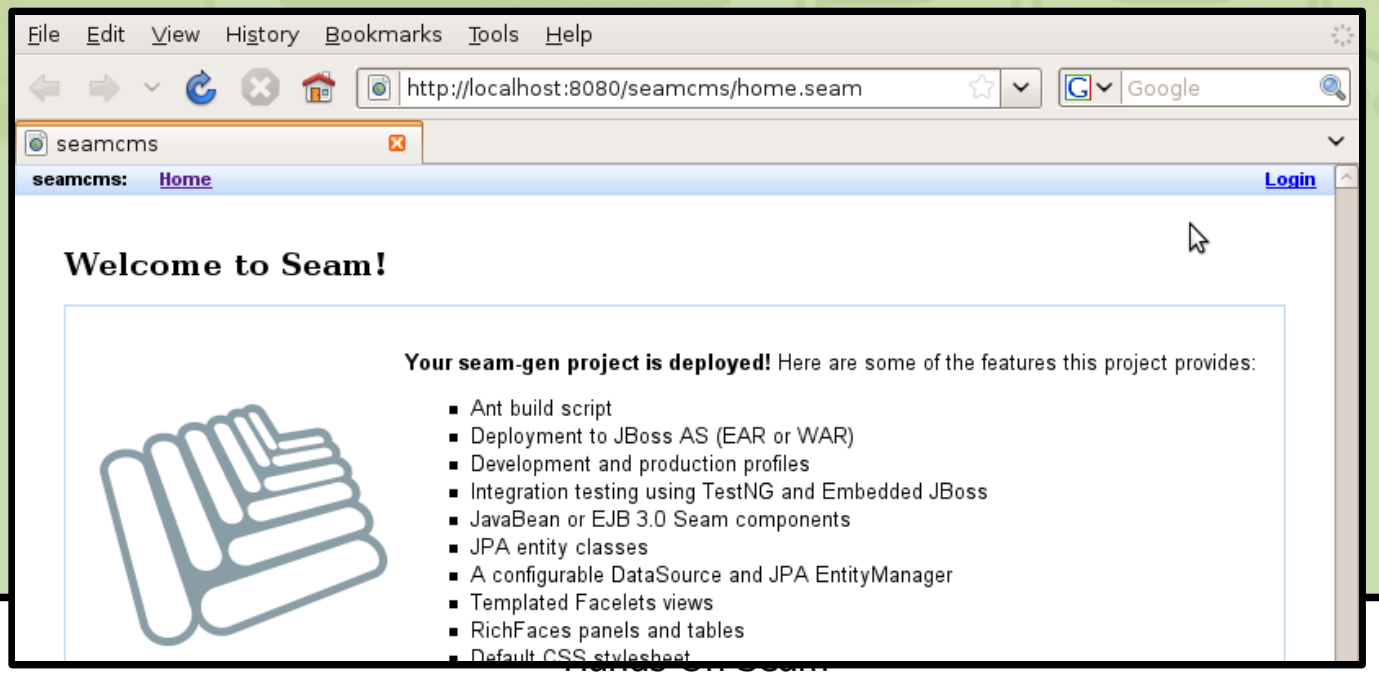
Seam Web project overview



- seamcms (Web):
  - src: resource bundles;
  - WebContent: web pages.
- seamcms-ear (EAR);
- seamcms-ejb (EJBs):
  - ejbModule: Java code;
- seamcms-test (tests).

Try your empty Seam project

- Deploy the project (if not done automatically):
  - Expand *JBoss 5.0 Server*;
  - Right-click *seamcms-ear > Publish*.
- Start the server;
- If you run into problems, try restarting the server.



Customize the layout with Facelets

```
<!-- WebContent/layout/template.xhtml -->
<f:view ...>
<html>
<head>
    ...
    <ui:insert name="head" />
</head>
<body>
  ...
    <ui:insert name="body" />
  ...
</body>
</html>
</f:view>
```

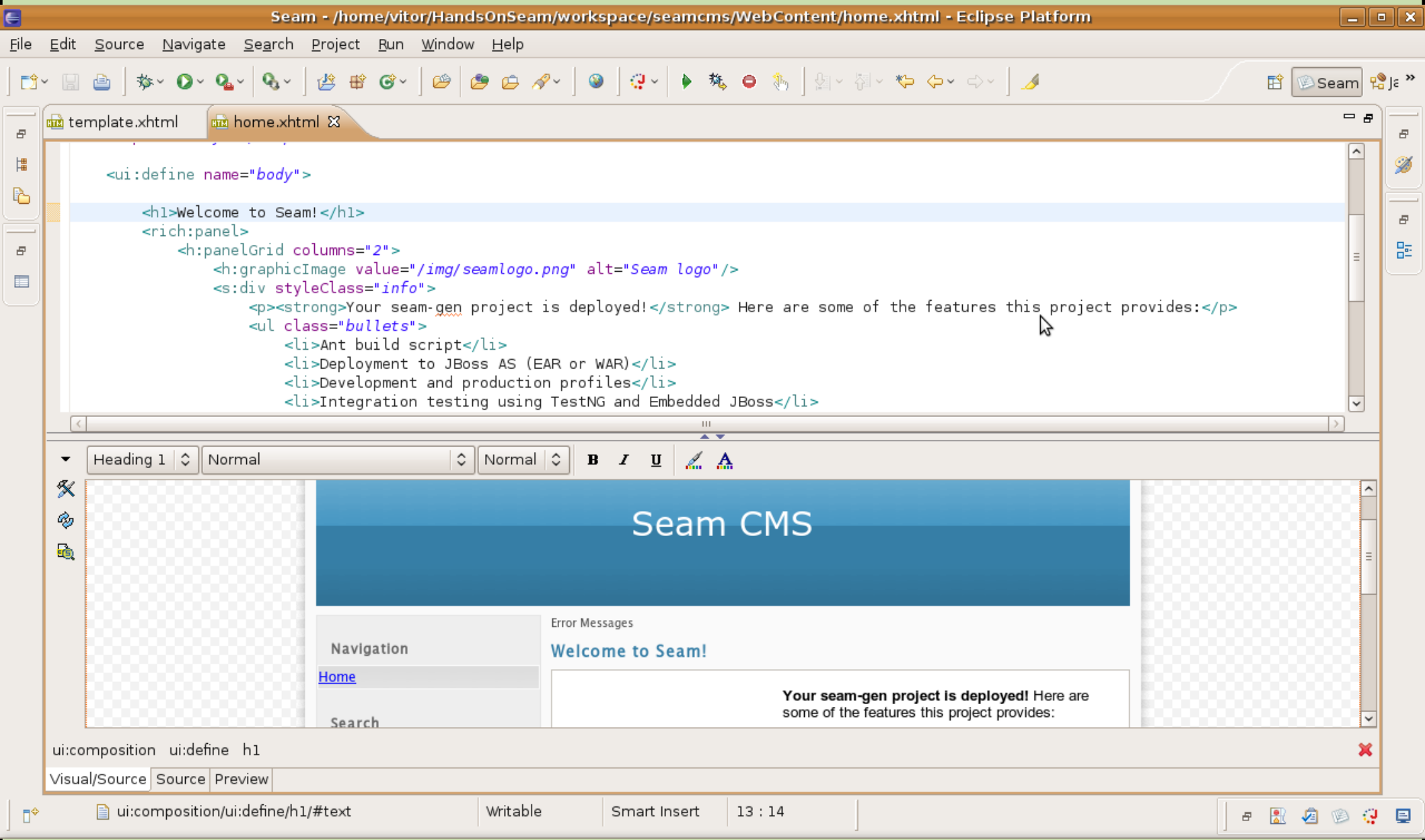
Customize the layout with Facelets

```
<!-- WebContent/home.xhtml-->
<ui:composition ...
   template="layout/template.xhtml">

   <ui:define name="body">
      <h1>Welcome to Seam!</h1>

      ...
      </ui:define>
</ui:composition>
```

Customize the layout with Facelets

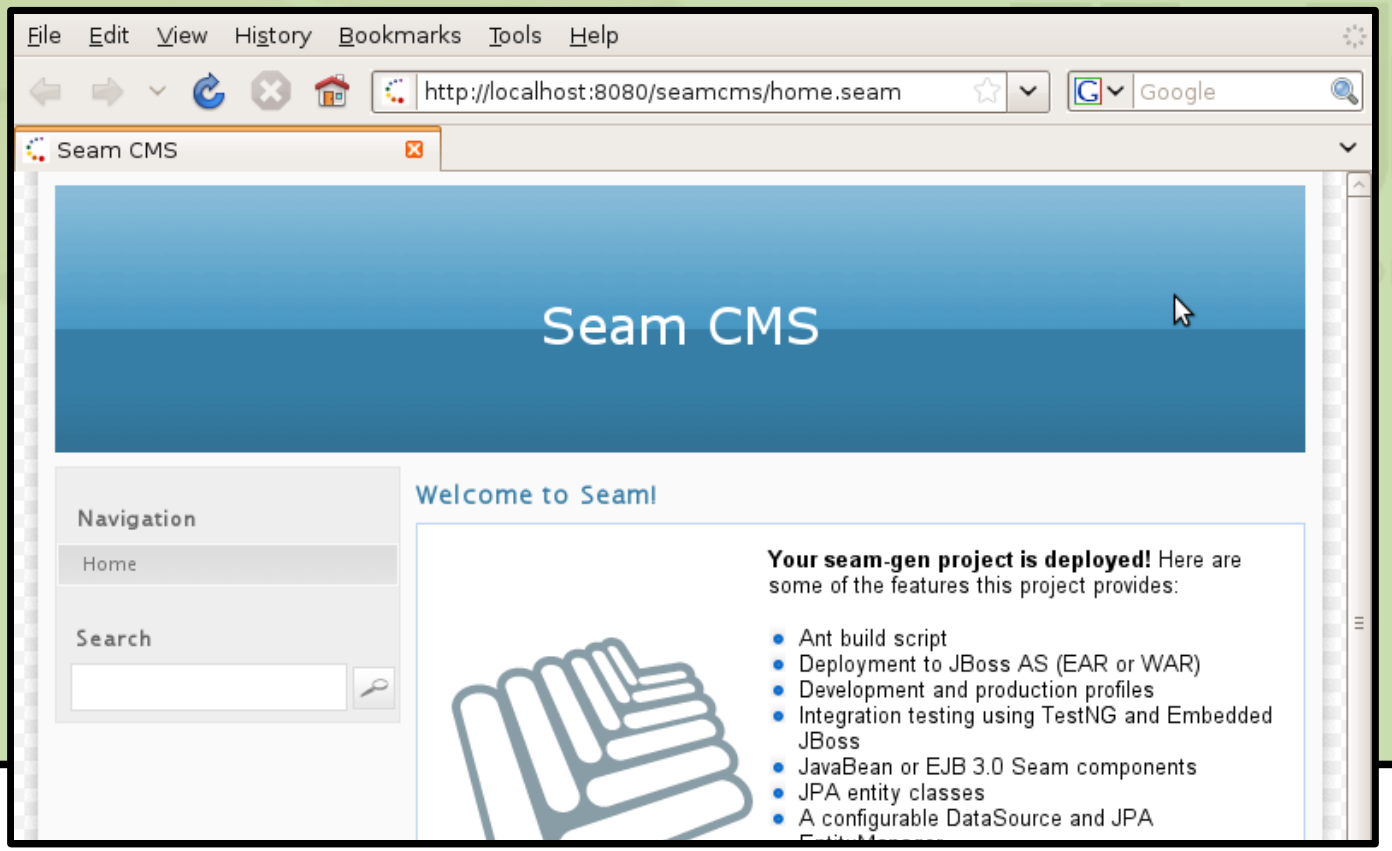
- Expand the `transparentia.zip` file under `$base/Layout;`
- Copy `default.css` and `img` to `seamcms/WebContent;`
- Adapt the template using `index.html`: `seamcms/WebContent/layout/template.xhtml`.
  - An already adapted is provided if you want to skip this step: `$base/Layout/template.xhtml`.
- Full publish of the application and test.

Try the XHTML editor



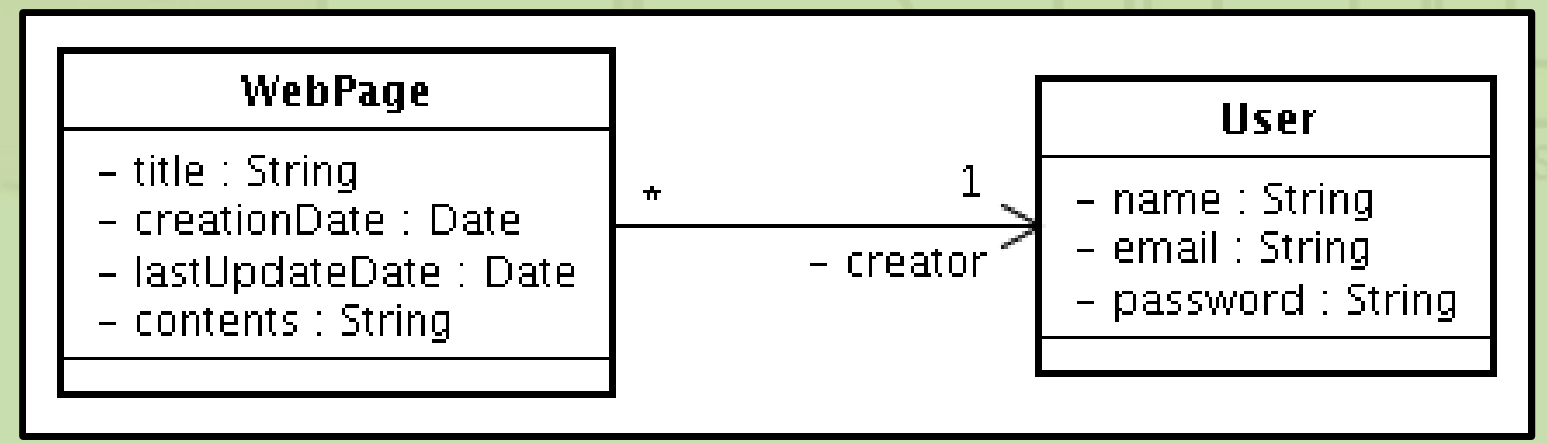
Publish Incrementally

- *JBoss Server View*, server already started:
  - Expand *JBoss 5.0 Server*;
  - Right-click *seamcms-ear* > *Full Publish*.
- Refresh the browser...



Implement the domain

- Very simple CMS;
- Users' names, e-mails and passwords are registered so they can create/edit content;
- WebPage is the only available content.



Implement the domain

- Create `domain` package;
- A superclass for domain objects might be useful:
  - All of them have IDs for persistence;
  - Optimistic locking (versioning) is a good idea;
  - Using UUIDs to implement `hashCode()` and `equals()` can save us a lot of time...
- Create the abstract class `DomainObject` as a mapped superclass with persistence annotation.

Implement DomainObject

```
@MappedSuperclass
public abstract class DomainObject
                                    implements Serializable {
   @Basic
   @Column(nullable = false, length = 40)
   protected String uuid;

   @Id
   @GeneratedValue(strategy = GenerationType.AUTO)
   private Long id;

   @Version
   @Column(nullable = false)
   private Long version;
```

Implement DomainObject

```
public DomainObject() {
   uuid = UUID.randomUUID().toString();
}

/* Getters and setters. */

@Override
public boolean equals(Object obj) {
   // Checks if the class is the same.
   if ((obj == null) ||
                (!getClass().equals(obj.getClass())))
      return false;

   // Checks if the UUID is the same.
   DomainObject o = (DomainObject) obj;
   return uuid.equals(o.uuid);
}
```

Implement DomainObject

```
   @Override
   public int hashCode() {
      return uuid.hashCode();
   }

   @Override
   public String toString() {
      return "Instance of " + getClass().getName() +
         " (id: " + id + "; uuid: " + uuid + ")";
   }
}
```

Implement the domain

- In `DomainObject` we used standard persistence annotation:

```
@Basic
@Column(nullable = false, length = 40)
protected String uuid;
```

- Create the classes `User` and `WebPage`, but this time use Hibernate Validator:
  - Integrates with Seam to provide validation;
  - `@NotNull`
  - `@Length(min=9, max=99)`

Implement User

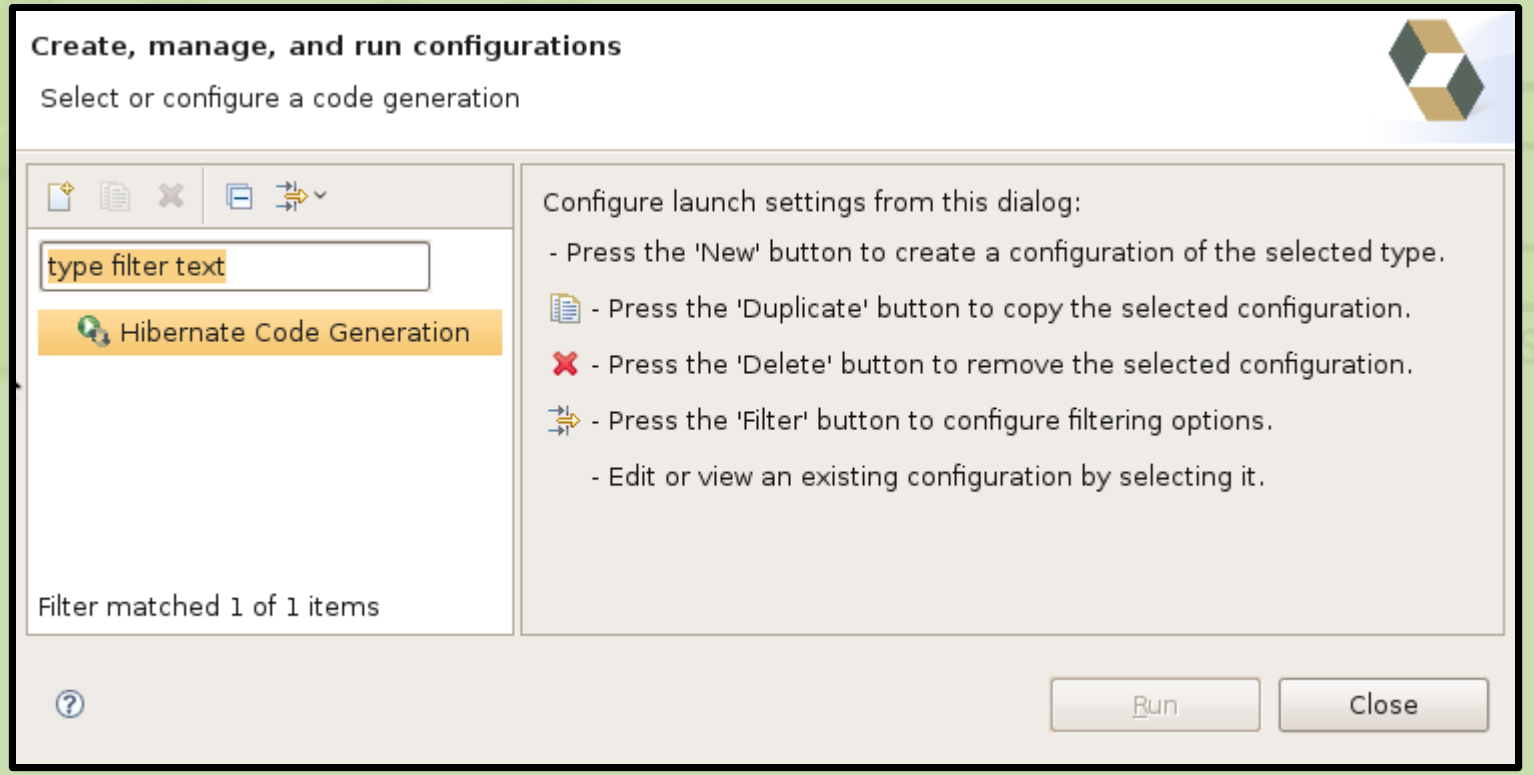
```
@Entity
public class User extends DomainObject {
   @Basic
   @NotNull
   @Length(max = 50)
   private String name;

   @Basic
   @NotNull
   @Length(max = 100)
   private String email;

   @Basic
   @NotNull
   @Length(max = 32)
   private String password;

   /* Getters and setters. */
}
```

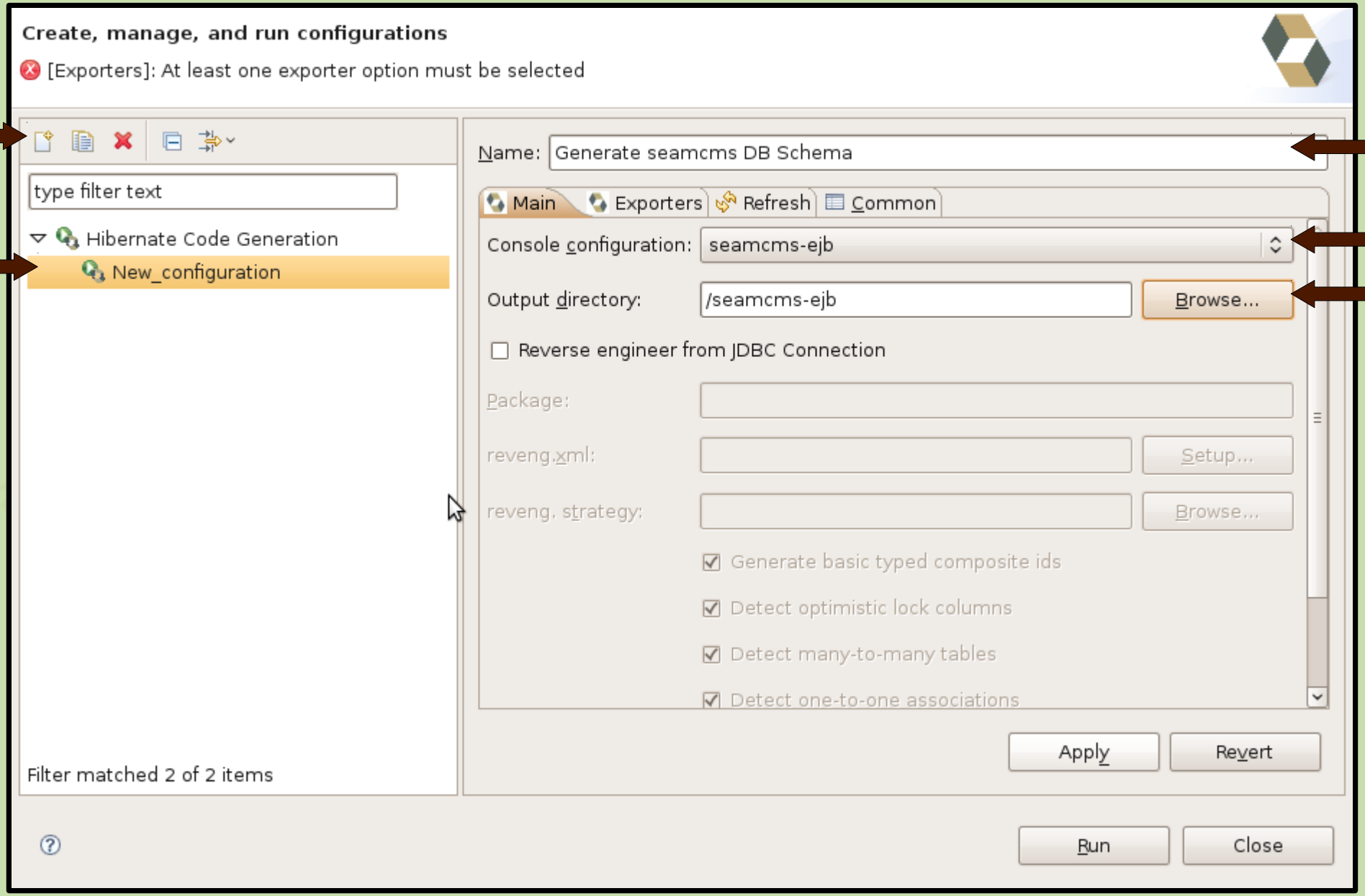
Implement WebPage

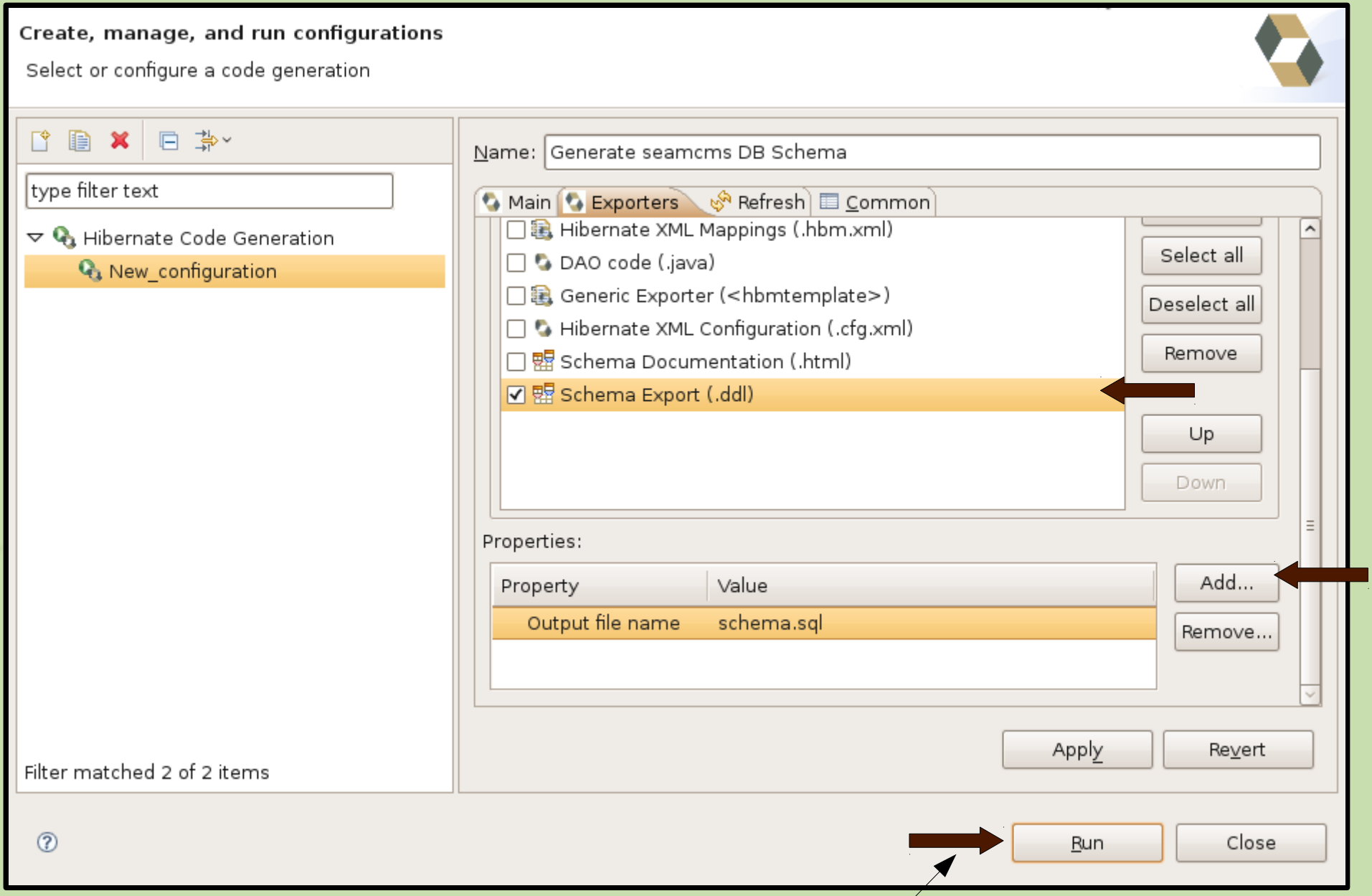
```
@Entity
public class WebPage extends DomainObject {
    @Basic
    @NotNull
    @Length(max = 200)
    private String title;

    @Temporal(TemporalType.TIMESTAMP)
    @NotNull
    private Date creationDate;

    @Temporal(TemporalType.TIMESTAMP)
    @NotNull
    private Date lastUpdateDate;

    @Lob
    @NotNull
    private String contents;

    /* Getters and setters. */
}
```

Generate DB schema from classes

- Switch to *Hibernate* perspective;
- *Run > Hibernate Code Generation... > Hibernate Code Generation Configurations...*




Create, manage, and run configurations
[Exporters]: At least one exporter option must be selected
type filter text
Hibernate Code Generation
New_configuration
Filter matched 2 of 2 items
Name: Generate seamcms DB Schema
Main
Exporters
Refresh
Common
Console configuration: seamcms-ejb
Output directory: /seamcms-ejb
Browse...
Reverse engineer from JDBC Connection
Package:
reveng.xml:
Setup...
reveng. strategy:
Browse...
Generate basic typed composite ids
Detect optimistic lock columns
Detect many-to-many tables
Detect one-to-one associations
Apply
Revert
Run
Close

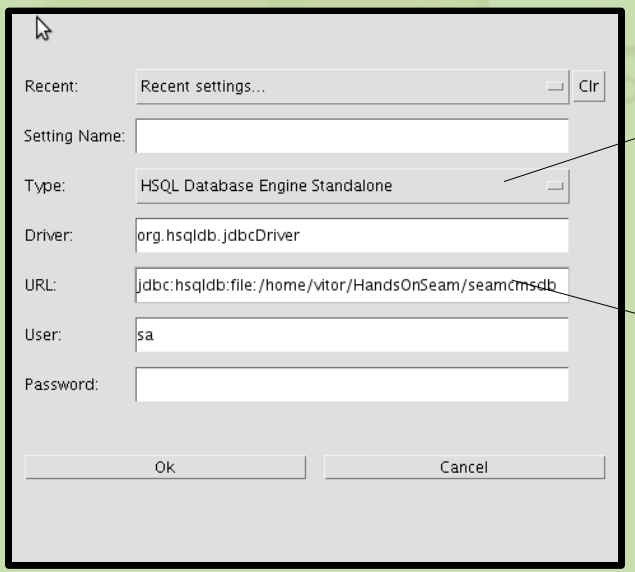


Must shutdown JBoss Server first!

Generate DB schema from classes

- The schema is written in `seamcms-ejb/schema.sql`;
- It's already executed in the database. Check it out with HSQLDB Manager.

```
$ cd hsqldb/lib
$ java -cp hsqldb.jar org.hsqldb.util.DatabaseManager
```



HSQL Database Engine Standalone

jdbc:hsqldb:file:*$path*/seamcmsdb

Check lock file first!

Use the DAO pattern for data access

- Create `persistence` package;
- A superclass for DAOs might be useful:
  - Basic operations are implemented the same way, no matter the class of the object being persisted.

```
public interface BaseDAO<T extends DomainObject> {
    long retrieveCount();

    List<T> retrieveAll();

    T retrieveById(Long id);

    void save(T object);

    void delete(T object);
}
```

Implement SeamBaseDAO

```
public abstract class SeamBaseDAO<T extends
                    DomainObject> implements BaseDAO<T> {
   @Logger
   private Log log;

   // Concrete subclasses must provide entity manager.
   protected abstract EntityManager getEntityManager();

   // Base operations need to know the class.
   protected abstract Class<T> getDomainClass();

   // Optionally, subclasses can define order.
   protected String getOrderByClause() {
      return "";
   }
```

Implement SeamBaseDAO

```
@SuppressWarnings("unchecked")
@Transactional
public List<T> retrieveAll() {
   log.info("Retrieving all #0",
                              getDomainClass().getName());
   Query query = getEntityManager().createQuery("from "
                  + getDomainClass().getName() + " obj "
                  + getOrderByClause());
   return query.getResultList();
}

@Transactional
public T retrieveById(Long id) {
   log.info("Retrieving #0 with id #1",
                            getDomainClass().getName(), id);
   return (T) getEntityManager().find(getDomainClass(),
                                                    id);
}
```

Implement SeamBaseDAO

```
@SuppressWarnings("unchecked")
@Transactional
public long retrieveCount() {
   Query query = getEntityManager().createQuery(
               "select new map (count(obj) as num) from "
               + getDomainClass().getName() + " obj");
   Map<String, Object> data = (Map<String, Object>)
                                    query.getSingleResult();
   Long count = (Long) data.get("num");
   log.info("Retrieving count for #0: #1",
                        getDomainClass().getName(), count);
   return (count == null) ? 0 : count;
}
```

Implement SeamBaseDAO

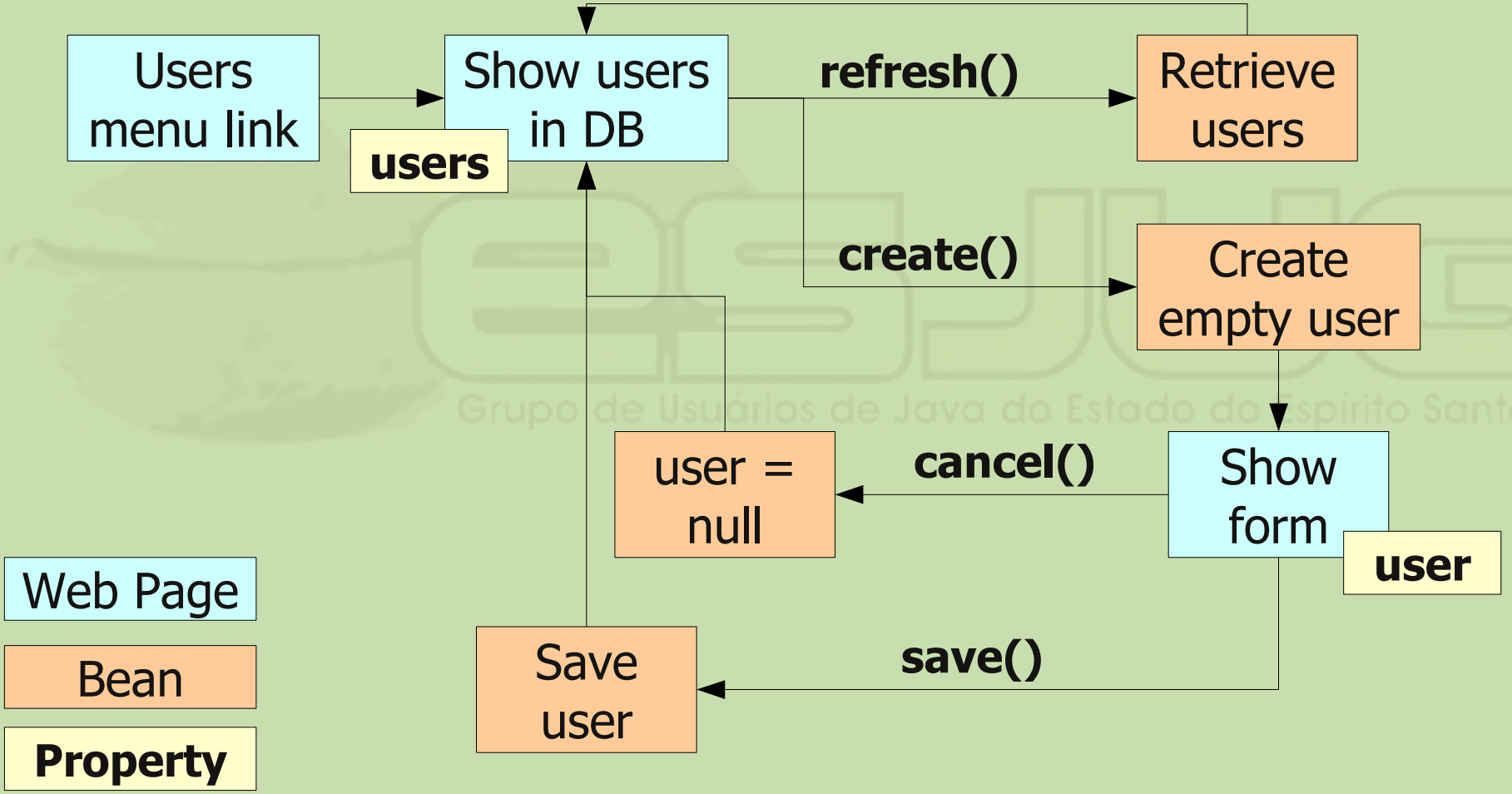
```
    @Transactional
    public void save(T object) {
        log.info("Saving #0: #1", getDomainClass().getName(),
                                                    object);
        getEntityManager().persist(object);
    }

    @Transactional
    public void delete(T object) {
        log.info("Deleting #0: #1",
                          getDomainClass().getName(), object);
        getEntityManager().remove(object);
    }
}
```

Implement UserDAO and SeamUserDAO

```
public interface UserDAO extends BaseDAO<User> { }

@AutoCreate
@Name("userDAO")
@Scope(ScopeType.APPLICATION)
@Stateless
public class SeamUserDAO extends SeamBaseDAO<User>
                                        implements UserDAO {
   @PersistenceContext
   private EntityManager entityManager;

   @Override
   protected Class<User> getDomainClass() {
      return User.class;
   }

   @Override
   protected EntityManager getEntityManager() {
      return entityManager;
   }
}
```

Implement CRUD of users

- Implement user creation first:



Implement CRUD of users

- 1st, define a local interface for a session bean:

```
@Local
public interface UserCrud {
   List<User> getUsers();

   void create();

   void save();

   void cancel();

   void refresh();
}
```

Implement CRUD of users

- Then, create the bean as a component:
  - One for each user (Session scope);
  - Keeps state.

```
@AutoCreate
@Name("userCrud")
@Scope(ScopeType.SESSION)
@Stateful
public class UserCrudService implements UserCrud {
```

- Note:
  - How stateful beans are painless in EJB3;
  - A stateless bean in Seam would have also worked.

Implement UserCrudService

```
@Logger
private Log log;

private List<User> users;

@In
private UserDAO userDAO;

@Out(required = false)
private User user;

public List<User> getUsers() {
   if (users == null) {
      log.info("Retrieving all users from the DB...");
      users = userDAO.retrieveAll();
      log.info("#0 users retrieved.", users.size());
   }
   return users;
}
```

Two kinds of *outjection*:
#{userCrud.users}
#{user}

Implement UserCrudService

```
public void setUsers(List<User> users) {
   this.users = users;
}

public void create() {
   log.info("Creating a new user...");
   user = new User();
}

public void cancel() {
   log.info("Canceling user creation...");
   user = null;
}
```

Implement UserCrudService

```
    public void save() {
        log.info("Saving user: #0 (#1)",
                                 user.getName(), user.getEmail());
        userDAO.save(user);
        users = null;
        user = null;
    }

    public void refresh() {
        log.info("Refreshing user list...");
        users = null;
    }

    @Remove @Destroy
    public void remove() { }
}
```

Mandatory for stateful beans.

Implement CRUD of users

- Now, to the web page `userCrud.xhtml`:

```
<ui:composition ... template="layout/template.xhtml">

  <ui:define name="body">
    <h:panelGroup rendered="#{userCrud.users.size == 0}">
      <p>No users were registered yet.</p>
    </h:panelGroup>

    <h:panelGroup rendered="#{(user == null) and
                              (userCrud.users.size != 0)}">
      <h:dataTable value="#{userCrud.users}" var="user"
                                             border="1">
        <h:column>
          <f:facet name="header">
            <h:outputText value="Name" />
          </f:facet>
          <h:outputText value="#{user.name}" />
        </h:column>
```

Implement userCrud.xhtml

```
      <h:column>
        <f:facet name="header">
          <h:outputText value="E-mail" />
        </f:facet>
        <h:outputText value="#{user.email}" />
      </h:column>
    </h:dataTable>
    <h:form>
      <h:commandButton action="#{userCrud.refresh}"
                                        value="Refresh" />
    </h:form>
  </h:panelGroup>

  <h:panelGroup rendered="#{user == null}">
    <h:form>
      <h:commandButton action="#{userCrud.create}"
                                      value="New User" />
    </h:form>
  </h:panelGroup>
```

Implement userCrud.xhtml

```
    <h:panelGroup rendered="#{user != null}">
      <h:form>
        <h:panelGrid columns="2">
          <h:outputText value="Name:" />
          <h:inputText value="#{user.name}" size="30" />
          <h:outputText value="Email:" />
          <h:inputText value="#{user.email}" size="30" />
          <h:outputText value="Password:" />
          <h:inputSecret value="#{user.password}" size="15"
                                                      />
        </h:panelGrid>
        <h:commandButton action="#{userCrud.cancel}"
                                          value="Cancel" />
        <h:commandButton action="#{userCrud.save}"
                                          value="Save" />
      </h:form>
    </h:panelGroup>
  </ui:define>
</ui:composition>
```

End of Part 1

- We've experimented with the basics of Seam;
- There is a lot more to see:
  - Security (authentication & authorization);
  - Internationalization;
  - Conversations / workspace management;
  - AJAX with Richfaces;
  - Sending email;
  - Testing;
  - And much more...

Hands On – Seam Framework