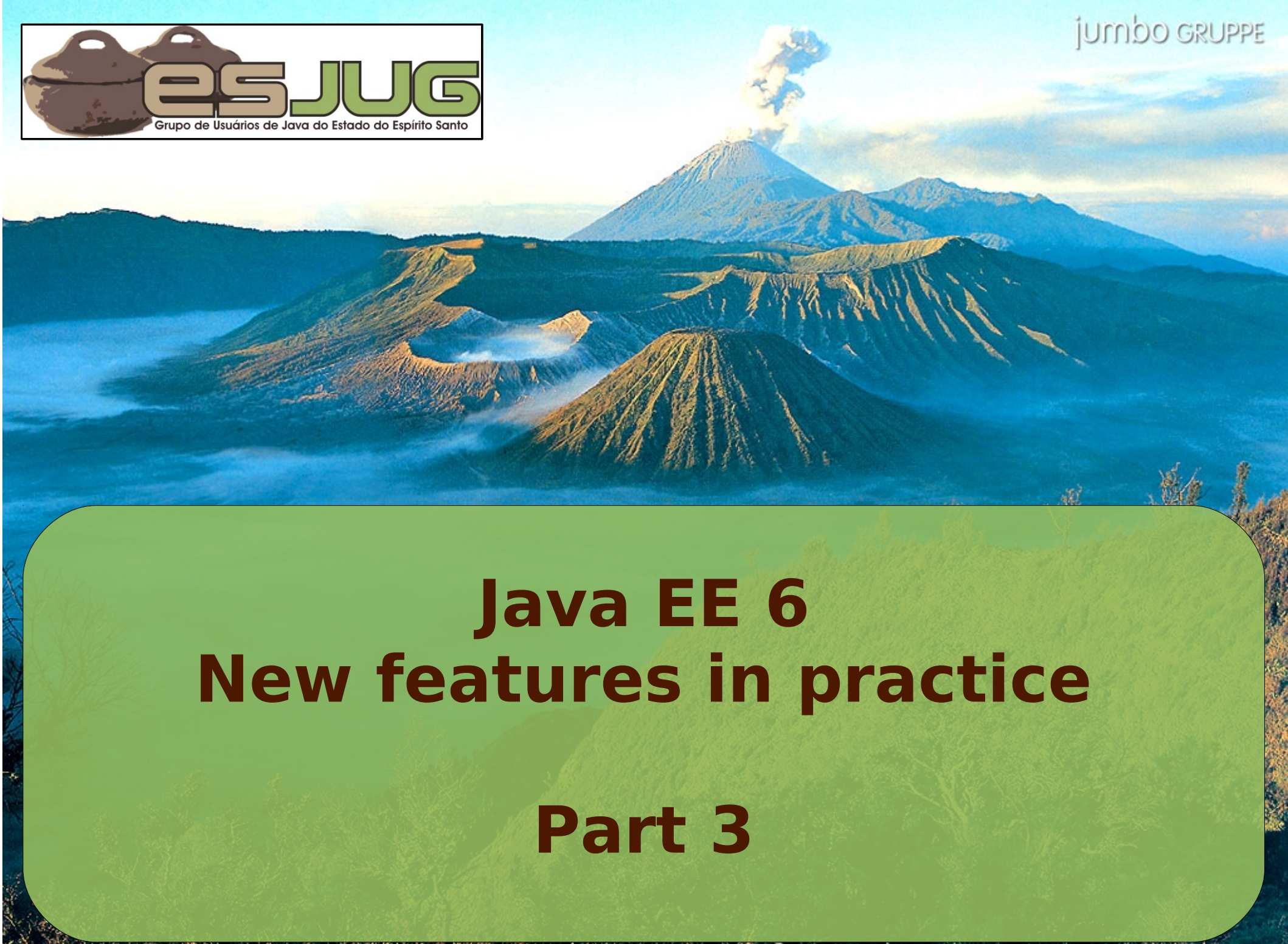

Java EE 6
New features in practice

Part 3

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About the author – Vítor Souza

- Education:
  - Computer Science graduate, masters in Software Engineering – (UFES, Brazil), taking PhD at U. Trento.
- Java:
  - Developer since 1999;
  - Focus on Web Development;
  - Co-founder and coordinator of ESJUG (Brazil).
- Professional:
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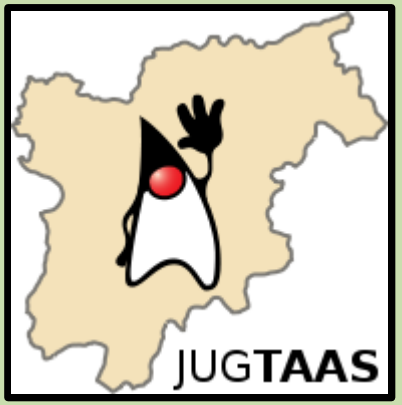
JUG TAAS = JUG Trento + JUG Bolzano

- Website:
  - http://www.jugtrento.org/
  - http://www.jugbz.org/
- Mailing list (in Italian, mostly): http://groups.google.com/group/jugtaa
- If you're interested in Java, join and participate!



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Agenda

- Auth^2 with JAAS;
- Servlets 3.0;
- More on JPA 2.0:
  - New commands in JPQL;
  - Support for pessimistic locking;
- Enhancements for EJBs.

Auth² with JAAS

Image source: http://www.freedigitalphotos.net/images/Security_g189-Keys_p17918.html

Auth² in Java = JAAS

- Authentication = guaranteeing the user is who she says she is;
- Authorization = guaranteeing the user can access resources she is authorized to;
- For Java applications, we can use JAAS: Java Authentication and Authorization Services;
  - Data integrity;
  - Confidentiality;
  - Non-repudiation;
  - Auditing.

Basic concepts of Auth²

- **Security realm**: set of security configurations registered under a name;
- **User**: an individual or software identified by an username and a password (credentials);
- **Group**: group of user;
- **Role**: a name associated with a set of access rights. Can be associated to users or groups.

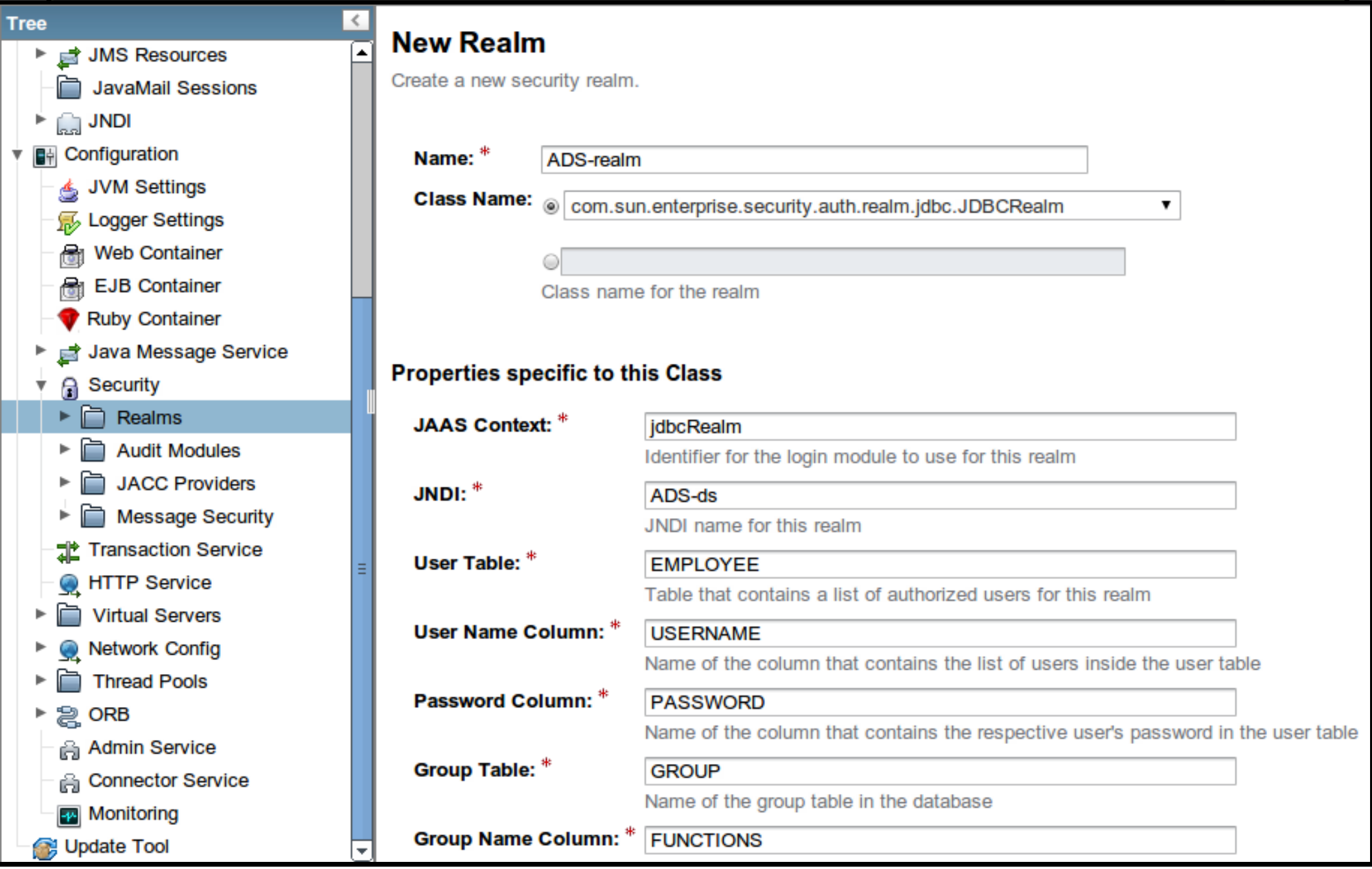
Authentication = what users exist and what are their passwords?

Authorization = which roles can access what?

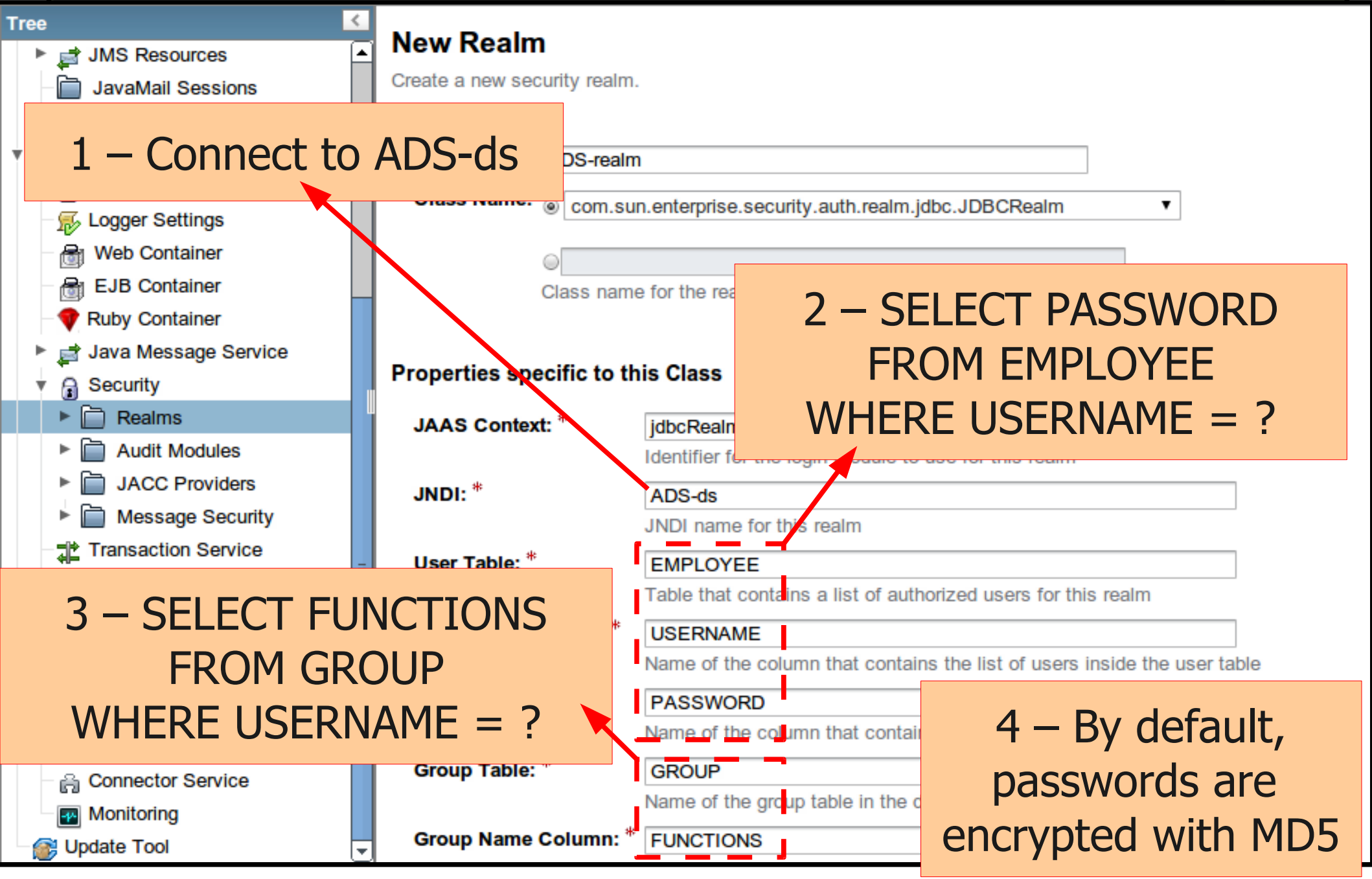
Realms in GlassFish

- Realm types:
  - Flat files;
  - JDBC;
  - Certificate;
  - Solaris;
  - LDAP / Microsoft Active Directory;
  - Any class implementing the Realm interface (proprietary).

Setting up a realm in Web Console



How JDBC Realm works

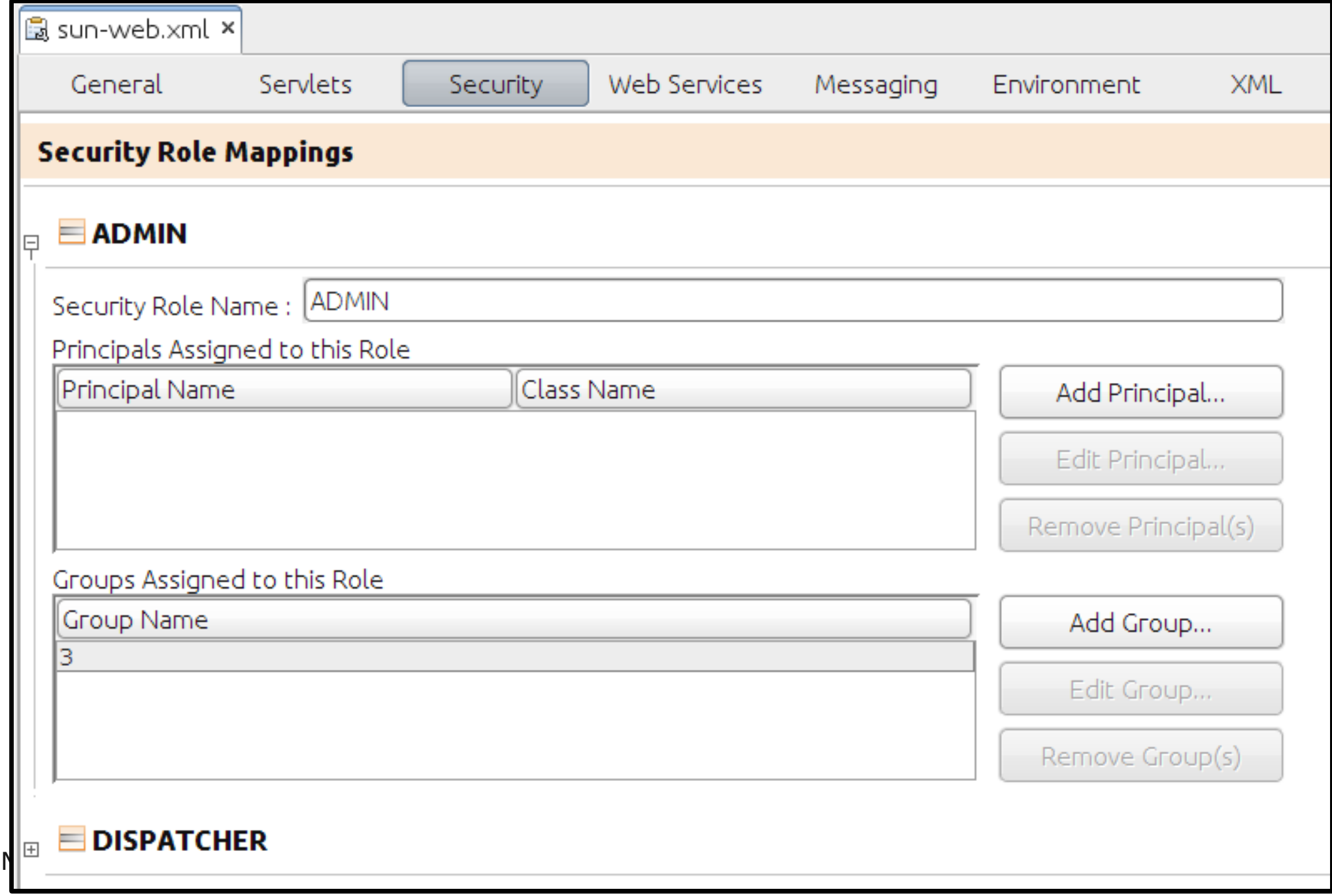


Configure GlassFish's sun-web.xml

```
<sun-web-app error-url="">
  <context-root>/ADS-war</context-root>
  <security-role-mapping>
    <role-name>OPERATOR</role-name>
    <group-name>0</group-name>
  </security-role-mapping>
  <security-role-mapping>
    <role-name>DISPATCHER</role-name>
    <group-name>1</group-name>
  </security-role-mapping>

  ...

  <class-loader delegate="true"/>
  <jsp-config>
    <property name="keepgenerated" value="true" />
  </jsp-config>
</sun-web-app>
```

Numerical values because FUNCTIONS is an enumeration!

Configure GlassFish's sun-web.xml

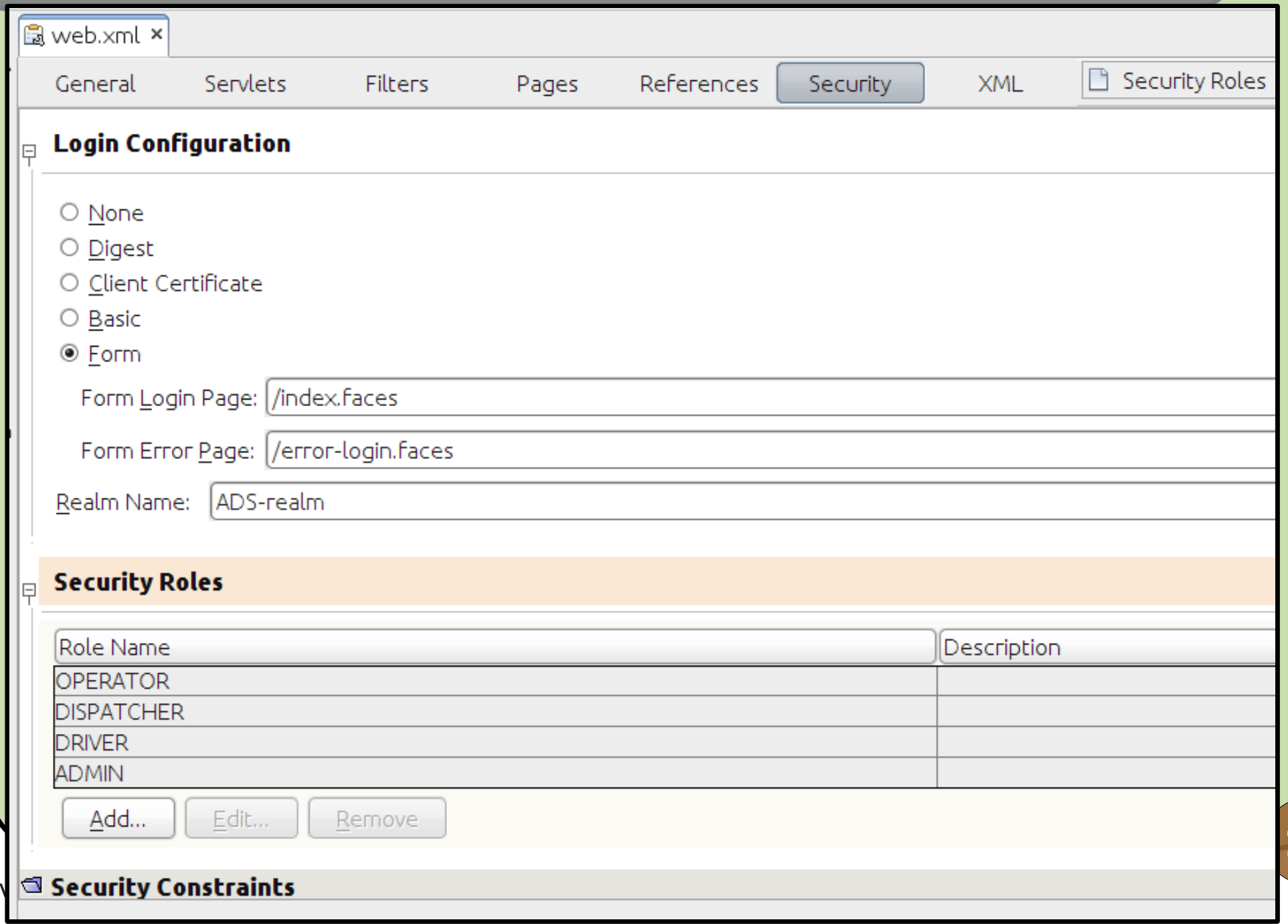


web.xml for FORM authentication

```
<web-app ...>
  <login-config>
    <auth-method>FORM</auth-method>
    <realm-name>ADS-realm</realm-name>
    <form-login-config>
      <form-login-page>/index.faces</form-login-page>
      <form-error-page>/error-login.faces</form-error-page>
    </form-login-config>
  </login-config>
  <security-role>
    <description />
    <role-name>OPERATOR</role-name>
  </security-role>
  <security-role>
    <description />
    <role-name>DISPATCHER</role-name>
  </security-role>

   ...

</web-app>
```

Should match the roles in sun-web.xml

web.xml for FORM authentication



The login form

```
<ui:decorate template="/templates/form.xhtml">
  <form id="form" method="POST" action="j_security_check">
    <ui:decorate template="/templates/field.xhtml">
      <ui:param name="id" value="form:username" />
      <ui:define name="nome">Username</ui:define>
      <input type="text" id="username" name="j_username" />
    </ui:decorate>
    <ui:decorate template="/templates/field.xhtml">
      <ui:param name="id" value="form:pwd" />
      <ui:define name="nome">Password</ui:define>
      <input type="password" id="pwd" name="j_password" />
    </ui:decorate>
    <ui:decorate template="/templates/buttons.xhtml">
      <input type="submit" value="Log in" />
    </ui:decorate>
  </form>
</ui:decorate>
```

Checking if user is authenticated

```
public class LoginManagerBean implements LoginManager,
Serializable {
  @Resource
  private SessionContext sessionCtx;

  @EJB
  private EmployeeDAO employeeDAO;

  public Employee checkJaasLogin() {
    Employee emp = null;
    Principal principal = sessionCtx.getCallerPrincipal();
    if (principal != null) {
      String username = principal.getName();
      if (! "ANONYMOUS".equals(username)) {
        emp = employeeDAO.retrieveByUsername(username);
      }
    }
    return emp;
  }
}
```

Form x programmatic authentication

- Form login:
  - Container is called directly;
  - Our application constantly checks for the principal.
- Programmatic login:
  - Our application is called;
  - The container is programmatically called from our application's code.

```
<form id="form" method="POST" action="j_security_check">
<input type="text" id="username" name="j_username" />
```

```
<h:form id="form">
<h:inputText id="username" value="#{loginBean.username}" />
```

Login method

```
public class LoginManagerBean ... {
  public void login(String username, String password) {
    Employee emp = employeeDAO.retrieveByUsername(username);
    String md5pwd = TextUtils.produceMd5Hash(password);
    String pwd = emp.getPassword();

    if ((pwd != null) && (pwd.equals(md5pwd))) {
      HttpServletRequest request =
(HttpServletRequest)FacesContext.getCurrentInstance().getExt
ernalContext().getRequest();
      request.login(username, password);

      currentUser = emp;
      pwd = password = null;
    }
    else {
      throw new LoginFailedException();
    }
  }
}
```

logout() also exists!

GlassFish also provides a proprietary solution:
com.sun.appserv.security.ProgrammaticLogin

Authorization for classes/methods

- Use of annotation `@RolesAllowed`:

```
@RolesAllowed("ADMIN")
public class AmbulanceCrudServiceBean implements
                          AmbulanceCrudService, Serializable {
   ...
}
```

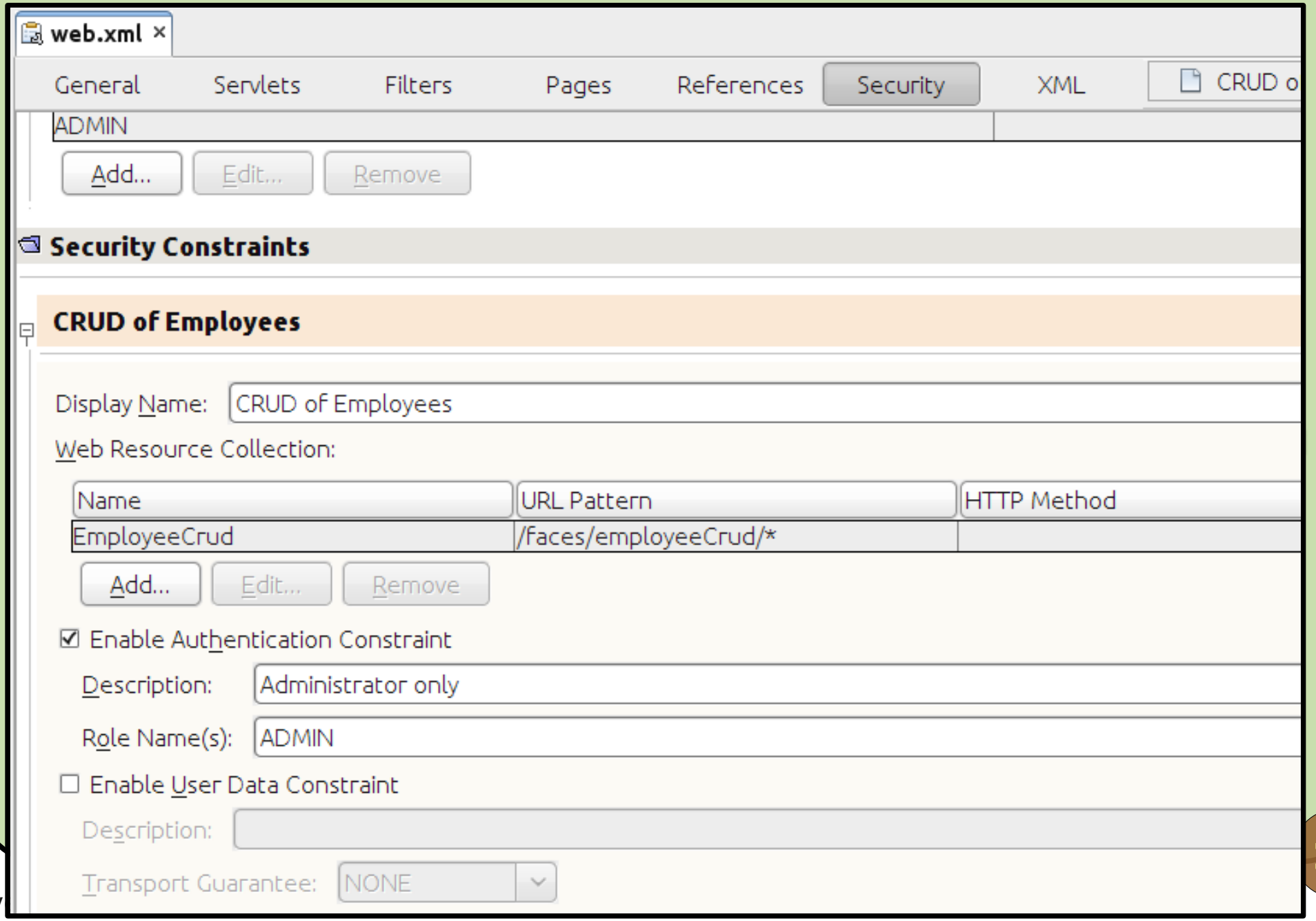
- Applies to the whole class or single methods;
- Limitation: does not extend to inherited methods;
- If a method is called and the user doesn't have the role, `javax.ejb.EJBAccessException` is thrown;
- Less useful: `@PermitAll` and `@DenyAll`.

Authorization for pages

```
<web-app ...>
  <security-constraint>
    <display-name>CRUD of Employees</display-name>
    <web-resource-collection>
      <web-resource-name>EmployeeCrud</web-resource-name>
      <description />
      <url-pattern>/faces/employeeCrud/*</url-pattern>
    </web-resource-collection>
    <auth-constraint>
      <description>Administrator only</description>
      <role-name>ADMIN</role-name>
    </auth-constraint>
  </security-constraint>

    ...

</web-app>
```

- Error 403 in case of violation.

Authorization for pages



Servlets 3.0

Image source: http://www.freedigitalphotos.net/images/Internet_g170-Global_Network_p21925.html

Servlet mapping with annotations

```
@WebServlet(name = "LogoutSrvlt", urlPatterns = {"/logout"})
public class LogoutServlet extends HttpServlet {
  protected void service(HttpServletRequest request,
HttpServletResponse response) throws ServletException,
IOException {
    // Destroys the session for this user.
    request.getSession(false).invalidate();

    // Redirects back to the initial page.
    response.sendRedirect(request.getContextPath());
  }
}
```

Filter mapping with annotations

```
@WebFilter(filterName = "CounterFltr", urlPatterns = {"/*"})
public class CounterFilter implements Filter {
  public void doFilter(ServletRequest request,
ServletResponse response, FilterChain chain) throws
IOException, ServletException {
    if (request instanceof HttpServletRequest) {
      HttpSession session =
                 ((HttpServletRequest)request).getSession();
      Object count = session.getAttribute("count");
      int c = (count == null) ? 0 :
                      Integer.parseInt(count.toString()) + 1;
      session.setAttribute("count", c);
    }
    chain.doFilter(request, response);
   }

  public void init(FilterConfig filterConfig) throws
ServletException { }
  public void destroy() { }
}
```

Extensibility of the Web layer

- With annotations, servlets, filters and listeners can be provided in JARs, no need for configuration;
- `ServletContext` provides methods for dynamic loading: `addServlet()`, `addFilter()`, ...;
- Also, a `web-fragment.xml` provided in the `META-INF` of the JAR is automatically loaded.

More on JPA 2.0

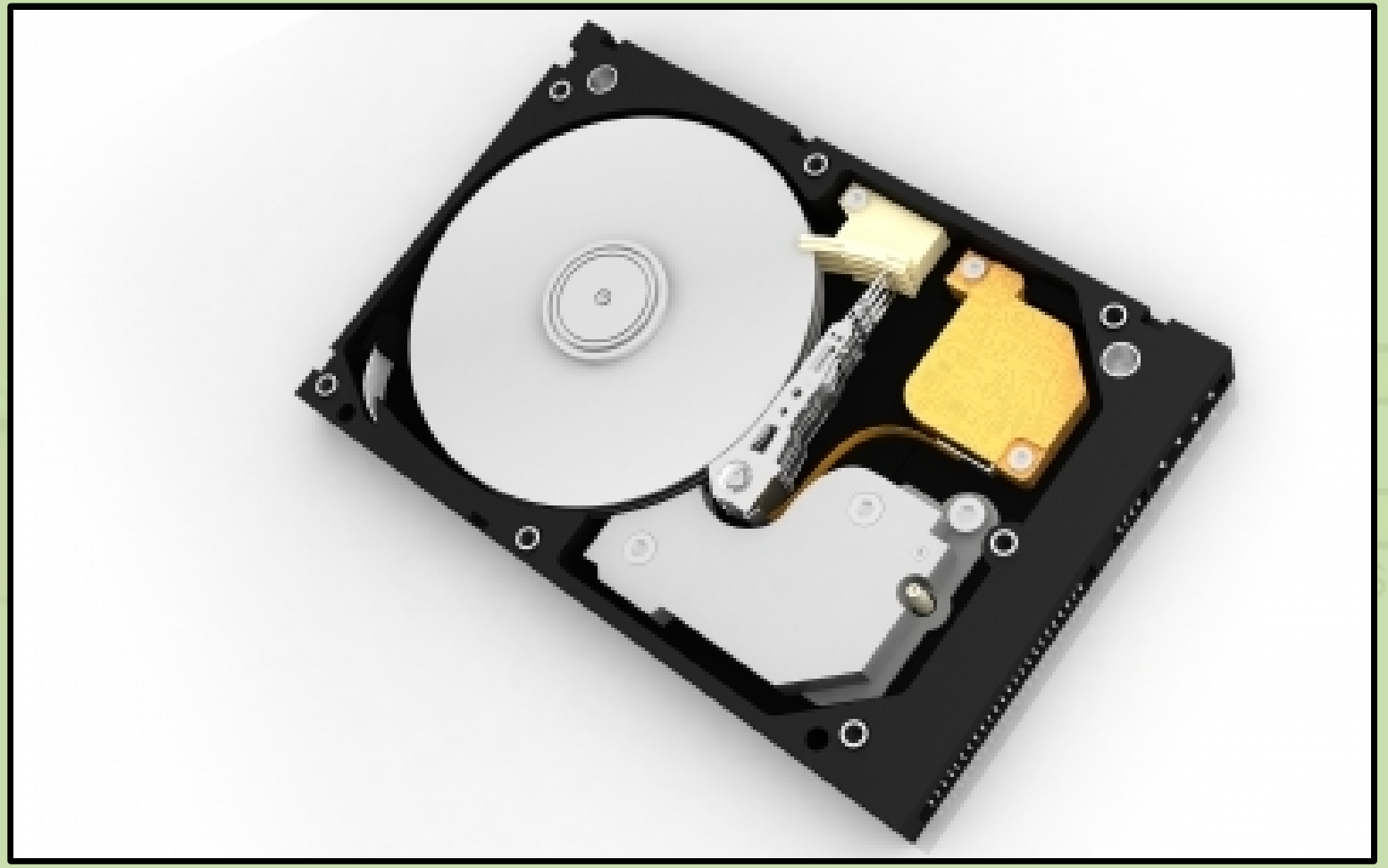


Image source: http://www.freedigitalphotos.net/images/Computers_g62-Hard_Disk_p13255.html

New operators

- Case expressions:

```
update Employee e set e.salary = case e.position
    when 'Director' then e.salary * 1.15
    when 'Manager' then e.salary * 1.10
    else e.salary * 1.05
end
```

- NULLIF:

```
select nullif(e.salary, -1) from Employee e
```

- COALESCE:

```
select coalesce(e.name, e.username) from Employee e
```

New operators

- INDEX:

```
-- Assuming a.drivers is a list instead of a set.
select d from Ambulance a join a.drivers d
where a.id = :id and index(d) between 0 and 4
```

- TYPE:

```
-- Assuming hierarchy of Employee instead of enum.
select e from Employee e
where type(e) in (Operator, Dispatcher)
```

- KEY, VALUE, ENTRY:

```
-- Assuming a.drivers is a map instead of a set.
select key(d), value(d) from Ambulance a join a.drivers d
where a.id = :id
```

Pessimistic Locking

- Optimistic = version column (few conflics);
- Pessimistic = locks (many conflics);
- Method lock() in EntityManager:

```
// cq is some CriteriaQuery that returns a single employee...
Employee emp = em.createQuery(cq).getSingleResult();
em.lock(emp, LockModeType.PESSIMISTIC_READ);
```

Lock modes

- **None**: no locking;
- **Optimistic**: new name for “read”, which already existed, = optimistic lock;
- **Optimistic, with force increment**: new name for “write”, which also existed;
- **Pessimistic read**: locks for writing (repeatable read);
- **Pessimistic write**: locks for everything (serialization);
- **Pessimistic, with force increment**: same as before, but forcing the increment of the version column.

Enhancements for EJBs

Image source: http://www.freedigitalphotos.net/images/Other_Business_g200-Desired_Outcome_p8711.html

No-interface EJB

- Before, EJBs had to be `@Local` or `@Remote`;
- Now, they can have no interface (`@LocalBean`). Public methods are made available:

```
@Stateless @LocalBean @Named
public class SomeStatelessBean {
    public void aMethod() { /* ... */ }
    public String anotherMethod() { /* ... */ }

    @PostConstruct
    public void init() {
        /* Initialization code... */
    }
}
```

Singleton

- We can also have Singleton EJBs:

```
@Stateless
@Singleton
@Named
public class HighlanderBean {
    /* There can be only one... */
}
```

- Note: singleton EJBs are thread-safe, serializing method calls...

Asynchronous calls

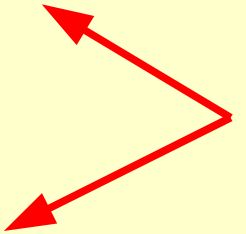
- Execute long methods in background:

```
public class RegisterCallServiceBean ... {
  @Asynchronous
  public Future<List<Call>> searchForSimilar(Call call) {
    List<Call> xList = callDAO.searchByX(call.getX());
    List<Call> yList = callDAO.searchByY(call.getY());
    // ...

    List<Call> similars = new ArrayList<Call>();
    similars.addAll(xList); // ...
    similars.remove(call);

    return new AsyncResult<List<Call>>(similars);
  }
}
```

Asynchronous calls

- Check if done:

```
public class RegisterCallAction ... {
  private Future<List<Call>> result;
  public List<Call> getSimilars() {
    if ((result != null) && (result.isDone())) return result.get();
     return null;
  }
  public boolean isDone() {
    return ((result != null) && (result.isDone()));
  }
  public void searchForSimilar() {
    result = registerCallService.searchForSimilar(call);
  }
}
```



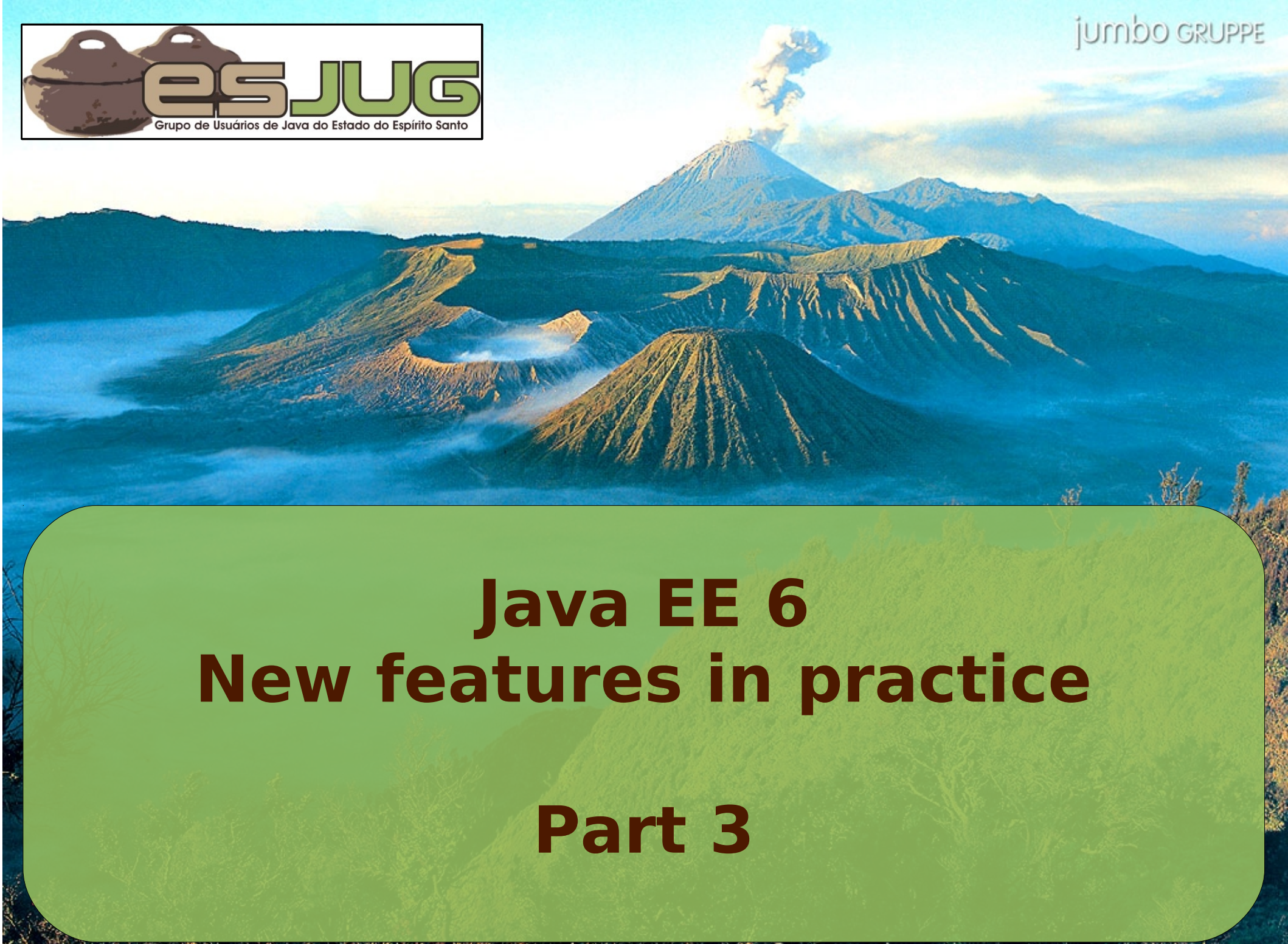
Call these using AJAX!

That's all folks...

Image source: http://www.freedigitalphotos.net/images/Coastal_And_Oceans_g117-In_Late_Summer_p20367.html

Conclusions

- Java EE 6 brings many new things;
- These things bring flexibility, extensibility and ease of development to the platform;
- In three presentations, we only introduced them:
  - Each topic can be explored in depth;
  - We leave this to you...
- Happy coding with Java EE 6!



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