JBoss Data Grid lab guides

Lab 4

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This guide explains the steps for running lab 4, either follow the steps in the step-by-step section or if you feel adventurous try to accomplish goals without the step-by-step guide.

1. Background

The sales account manager for Acme Inc from the RDBMS vendor (Cleora) had a meeting with the CIO of Acme this week. Because Acme Inc used JDG to improve performance instead of purchasing more DB licenses the sales account manager of Cleora decided to try to make up for the lost sales, by raising the price on the licenses that Acme are currently using. The discussion has been harsh and the CIO is really angry at the sales account manager from Cleora. At a similar meeting with the Red Hat Sales team with the CIO the Red Hat Solutions Architect (who's advice the CIO really trusts) suggested that Acme removes the database from the application an instead starts using JDG as the primary data store.

2. Use-case

Rewrite the application to only use JDG library mode, configure a file store and configure cluster.

3. These are the main tasks of lab 4

1. Remove JPA code from Task and TaskService
2. Configure a file store (using SingleFileStore)
3. Configure the cache for clustering

4. Setup the lab environment

To assist with setting up the lab environment we have provided a shell script that does this.

1. Run the shell script by standing in the jdg lab root directory (~/jdg-labs) execute a command like this

   ```
   $ sh init-lab.sh --lab=4
   ```

   Stop and running servers from previous labs. Then start the servers in separate consoles using the following commands

   Node 1:

   ```
   $ ./target/node1/jboss-eap-6.3/bin/standalone.sh
   ```

Node 2:

```
$ ./target/node2/jboss-eap-6.3/bin/standalone.sh -Djboss.socket.binding.port
-offset=100
```

5. Step-by-Step

1. Open `src/main/java/org/jboss/infinispan/demo/TaskService.java` and remove all references to EntityManager. TaskService should look something like this:

```
package org.jboss.infinispan.demo;

import java.util.ArrayList;
import java.util.Collection;
import java.util.Date;
import java.util.List;
import java.util.logging.Logger;

import javax.annotation.PostConstruct;
import javax.ejb.Stateless;
import javax.inject.Inject;
import javax.persistence.EntityManager;
import javax.persistence.PersistenceContext;
import javax.persistence.criteria.CriteriaBuilder;
import javax.persistence.criteria.CriteriaQuery;
import javax.persistence.criteria.Root;

import org.apache.lucene.search.Query;
import org.hibernate.search.query.dsl.QueryBuilder;
import org.infinispan.Cache;
import org.infinispan.query.CacheQuery;
import org.infinispan.query.Search;
import org.infinispan.query.SearchManager;
import org.jboss.infinispan.demo.model.Task;

@Stateless
public class TaskService {

@Inject
Cache<Long,Task> cache;

Logger log = Logger.getLogger(this.getClass().getName());

/**
* This methods should return all cache entries, currently contains mockup code.
* @return
*/
public Collection<Task> findAll() {
return cache.values();
}

/**
* This method filters task based on the input
* @param input - string to filter on
* @return
*
*/
```

```
public Collection<Task> filter(String input) {
SearchManager sm = Search.getSearchManager(cache);
QueryBuilder qb = sm.buildQueryBuilderForClass(Task.class).get();
Query q = qb.keyword().onField("title").matching(input).createQuery();
CacheQuery cq = sm.getQuery(q, Task.class);
List<Task> tasks = new ArrayList<Task>();
for (Object object : cq) {
tasks.add((Task) object);
}
return tasks;
}

/**
* This method persists a new Task instance
* @param task
*
*/
public void insert(Task task) {
if(task.getCreatedOn()==null)
task.setCreatedOn(new Date());
cache.put(task.getId(),task);
}

/**
* This method persists an existing Task instance
* @param task
*
*/
public void update(Task task) {
cache.replace(task.getId(),task);
}

/**
* This method deletes an Task from the persistence store
* @param task
*
*/
public void delete(Task task) {
//Note object may be detached so we need to tell it to remove based on reference
cache.remove(task.getId());
}

/**
* This method is called after construction of this SLSB.
*
*/
@PostConstruct
public void startup() {
```

```
}

}
```

2. Implement a new way to generate unique id when inserting new tasks. Replace:

```
public void insert(Task task) {
if(task.getCreatedOn()==null)
task.setCreatedOn(new Date());
cache.put(task.getId(),task);
}
```

with:

```
public void insert(Task task) {
if (task.getCreatedOn() == null)
task.setCreatedOn(new Date());
if(task.getId()==null) {
task.setId(System.nanoTime());
}
cache.put(task.getId(), task);
}
```

NOTE	Since our domain model relied on JPA to generate unique id's we will `System.nanoTime()` as id for simplicity reasons, please note that in a clustred environment there are no guarantee that System.nanoTime() will be unique which is a problem. Therefor we do not recommend using this method. Discuss with your collegues how we could solve this in a better way.

3. Remove JPA references in `src/main/java/org/jboss/infinispan/demo/model/Task.java`. The new Task class should look something like this:

```java
package org.jboss.infinispan.demo.model;

import java.io.Serializable;
import java.util.Date;

import org.hibernate.search.annotations.Field;
import org.hibernate.search.annotations.Indexed;
import org.hibernate.search.annotations.Store;

/**
 * This class is the JPA entity of a Task
 * @author tqvarnst
 *
 */
@Indexed
public class Task implements Serializable {

private static final long serialVersionUID = 2315323429163437300L;

private Long id;

private int version;

@Field(store = Store.YES)
private String title;

private boolean done;

private Date createdOn;

private Date completedOn;

public Long getId() {
return this.id;
}

public void setId(final Long id) {
this.id = id;
}

public int getVersion() {
return this.version;
}

public void setVersion(final int version) {
this.version = version;
}
```

```
@Override
public boolean equals(Object obj) {
if (this == obj) {
return true;
}
if (!(obj instanceof Task)) {
return false;
}
Task other = (Task) obj;
if (id != null) {
if (!id.equals(other.id)) {
return false;
}
}
return true;
}

@Override
public int hashCode() {
final int prime = 31;
int result = 1;
result = prime * result + ((id == null) ? 0 : id.hashCode());
return result;
}

public String getTitle() {
return title;
}

public void setTitle(String title) {
this.title = title;
}

public boolean isDone() {
return done;
}

public void setDone(boolean done) {
this.done = done;
}

public Date getCreatedOn() {
return createdOn;
}

public void setCreatedOn(Date createdOn) {
this.createdOn = createdOn;
```

```
}

public Date getCompletedOn() {
return completedOn;
}

public void setCompletedOn(Date completedOn) {
this.completedOn = completedOn;
}

@Override
public String toString() {
String result = getClass().getSimpleName() + " ";
if (title != null && !title.trim().isEmpty())
result += "title: " + title;
result += ", done: " + done;
return result;
}


}
```

4. Since we are not using the database anymore we don't have the pre-populated data from `import.sql` which our test relies on. Update the `TaskServiceTest.java` to provide new test data.

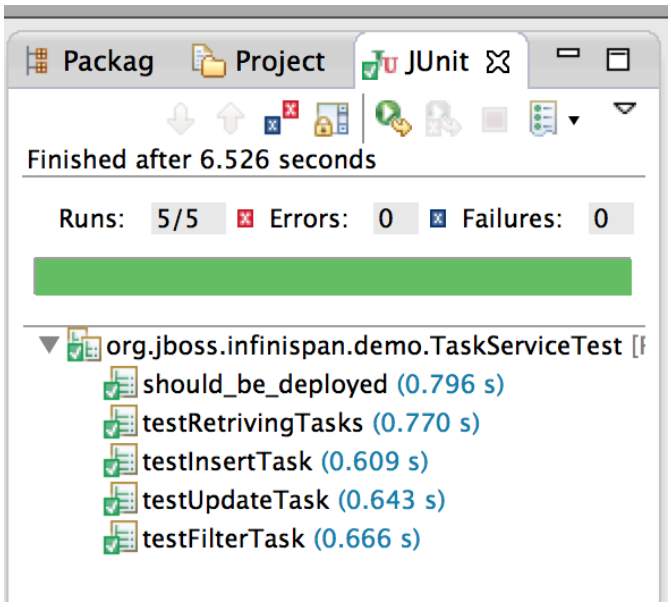
```
@Test
@InSequence(5)
public void testFilterTask() {

Task t1 = generateTestTasks("Sell EAP to customer A", false);
Task t2 = generateTestTasks("Get FeedBack from EAP customers", false);
Task t3 = generateTestTasks("Get FeedBack from JDG custoers", true);
Task t4 = generateTestTasks("Sell JDG to customer B", false);
Task t5 = generateTestTasks("Pickup kids from daycare", false);

Collection<Task> tasks = taskservice.filter("EAP");
Assert.assertEquals(2, tasks.size());
tasks = taskservice.filter("SELL");
Assert.assertEquals(2, tasks.size());
tasks = taskservice.filter("FeedBack");
Assert.assertEquals(2, tasks.size());

taskservice.delete(t1);
taskservice.delete(t2);
taskservice.delete(t3);
taskservice.delete(t4);
taskservice.delete(t5);
}
```

5. Run the JUnit test to verify your changes so far.



6. Open `src/main/java/org/jboss/infinispan/demo/Config.java` and add the following to Configuration builder before the build():

```
.persistence()
.addSingleFileStore()
.location(System.getProperty("jboss.home.dir") + "/cache-store")
.fetchPersistentState(true)
.ignoreModifications(true)
.shared(false)
.preload(false)
.async()
.enable()
.threadPoolSize(500)
.flushLockTimeout(1)
.modificationQueueSize(1024)
.shutdownTimeout(25000)
```

7. Run the JUnit test to verify that your changes works.
8. Add clustering using CacheMode REPL_SYNC to Configuration builder (after the enable()):

```
...
Configuration loc = new ConfigurationBuilder().jmxStatistics()
.enable() // Enable JMX statistics
.clustering().cacheMode(CacheMode.REPL_SYNC)
...
```

9. Configure the transport for the cluster by adding `jgroups-cluster-config.xml` to the `GlobalConfigurationBuilder`

```
GlobalConfiguration glob = new GlobalConfigurationBuilder()
.clusteredDefault()
.transport().addProperty("configurationFile", "jgroups-cluster-config.xml")
.globalJmxStatistics().allowDuplicateDomains(true).enable()
.build();
```

10. Update the createDeployment() method in the TaskServiceTest to look like this:

```
@Deployment
public static WebArchive createDeployment() {
return ShrinkWrap.create(WebArchive.class, "todo-test.war")
.addClass(Config.class).addClass(Task.class)
.addClass(TaskService.class).addAsResource("jgroups-cluster-config.xml")
.addAsWebInfResource(new File("src/main/webapp/WEB-INF/jboss-deployment-structure.xml
"))
.addAsWebInfResource(EmptyAsset.INSTANCE, "beans.xml");
}
```

11. Run the JUnit test again to verify your changes
12. Deploy the application and test that everything works as before.

```
$ cd projects/lab4
$ mvn clean package
$ mvn jboss-as:deploy
$ mvn jboss-as:deploy -Djboss-as.port=10099
```

13. Open two browser windows, one to http://localhost:8080/mytodo and another to http://localhost:8180/mytodo. Verify that you can add content in one window and that they appear when you reload the other window.
14. Congratulation you are finished with lab 4