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02: Understanding Hibernate proxy objects and avoiding potential pitfalls

Posted on December 24, 2014 by Arulkumaran Kumaraswamipillai — No Comments ↓

Q. How does hibernate support lazy loading?
A. Hibernate uses a proxy object to support lazy loading. Basically as soon as you reference a child or lookup object via the accessor/getter methods, if the linked entity is not in the session cache (i.e. the first-level cache), then the proxy code will go off to the database and load the linked object. It uses javassist (or CGLIB) to effectively and dynamically generate sub-classed implementations of your objects.

Let's look at an example. An employee hierarchy table can be represented in a database table as shown below

```
public class Employee {

   private Long id;
```

```
    private String name;
    private String title;
    private Employee superior;
    private Set<Employee> subordinates;

    //getters and setters are omitted

}


```

In the above example, if you use lazy loading then the "superior" and "subordinates" will be proxied (i.e. not the actual object, but the stub object that knows how to load the actual object) when the main "Employee" object is loaded. So, if you need to get the "subordinates" or "superior" object, you invoke the getter method on the employee like *employee.getSuperior( )* and the actual object will be loaded.

Q. What are some of the pitfalls of using a proxy object?
A. The typical pitfall is in how you implement your ***equals( )*** method that gets invoked when comparing objects.

Pitfall 1: As explained before, **the proxy objects are dynamically created by sub-classing your object** at runtime. The subclass will have all the methods of the parent, but the fields (e.g. name, etc) in the proxy object will remain null, and when any of the methods are accessed via getter/setter method, the proxy loads up the real object from the database.

A typical *equals( )* method implementation will look like

```
   @Override
   public boolean equals(Object obj) {
     if (obj == null) {
       return false;
     }
     if (obj == this) {
       return true;
     }
     if (!(obj instanceof Employee)) {           //
       return false;
     }
     return name.equals((Employee)obj).name);   //
   }


```

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As discussed before, the supplied object is a proxy object and the supplied name will be null. This can be fixed by using the getter method in **Line Y** instead of using the field directly. Using the getter method will tell the proxy object to load the actual object as shown below.

```
@Override
public boolean equals(Object obj) {
  if (obj == null) {
    return false;
  }
  if (obj == this) {
    return true;
  }
  if (!(obj instanceof Employee)) {
    return false;
  }
  return name.equals((Employee)obj).getName())
}


```

Pitfall 2: We saw earlier that the **the proxy objects are dynamically created by sub-classing your object.** In a simple scenario where you only have the "*Employee*" object the **typecasting** in Line Y and "**instanceof**" operator in Line X will work. But, what will happen if you have a type hierarchy for The class *Employee* as shown below

```
public class PermanentEmployee extends Employe
    .......
}

public class CasualEmployee extends Employee {
    .......
}


```

When you have a type hierarchy as shown above, the **type casts** and **instanceof** operators will not work with the proxy objects.

A proxy class is a subclass of a field type that is required. Hibernate creates a dynamic subclass by looking at the type of field. This means that if the field type is not the actual implementation (e.g. CasualEmployee) type, but an interface

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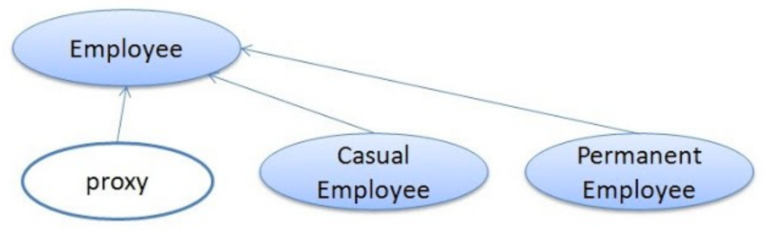
or superclass (e.g. Employee), the type of the proxy will be different than the type of the actual object. So, as shown in the diagram below, If the field type is the superclass (e.g. Employee) of the actual implementation (i.e. CasualEmployee), the proxy type (i.e. proxy) and the implementation-type (e.g. CasualEmployee) will be siblings in the type hierarchy, both extending the superclass. This means the proxy object will not be an instance of the implementing type (i.e. CasualEmployee), and the application code depending on this check will fail.



Hibernate proxy

To prevent this issue, you have two approaches.

Approach 1: Switch off proxying on the top level class by setting lazy=”false”, which will turn proxying off for the hierarchy.

Approach 2: Use the “Gang of Four” (i.e. GoF) **visitor design pattern** that allows you to adapt a single object or manipulate a collection of polymorphic objects without all the messy typecasts and instanceof operations.

Pitfall 3: As per the above example, if you have an “Employee” class, that contains a “name” property, when you invoke do “employee.getName()”, the proxies will get the “name” from Hibernate caches (either 1st or 2nd levels) or the database when requested. But if this call happens in the presentation layer like in the Struts action class, you will get the org.hibernate.LazyInitializationException because the **Hibernate Session is closed and this lazy attribute does not have the session attached**, hence can't load their lazy references.

The solution is to de-proxy the employee class as shown below:

Step 1: Write a generic utility class to **de-proxy** a given object

```
public class HibernateUtil {

    public static <T> T unproxy(T entity) {
        if (entity == null) {
            return null;
        }

        if (entity instanceof HibernateProxy) {
            Hibernate.initialize(entity);
            entity = (T) ((HibernateProxy) entit
        }

        return entity;
    }
}

```

Step 2: Use the above utility class

```
public Employee getSuperior() {
    superior = HibernateUtils.unproxy(employee);
    return superior;
}

```

These types of issues are hard to debug, and being aware of these pitfalls can save you lots of time in debugging and fixing the issues.

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