

Introduction to Entity Beans

Finder Methods



Esempio 1

1. CabinHomeRemote

```
package com.titan.cabin;

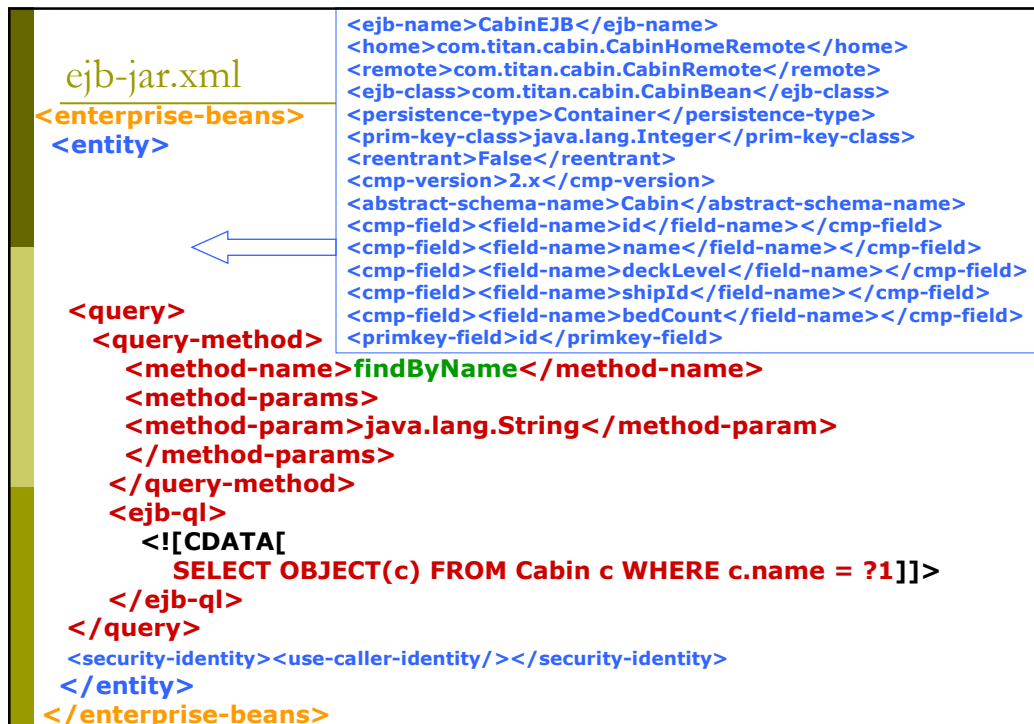
import java.rmi.RemoteException;
import javax.ejb.CreateException;
import javax.ejb.FinderException;

public interface CabinHomeRemote extends javax.ejb.EJBHome
{
    public CabinRemote create(Integer id)
        throws CreateException, RemoteException;

    public CabinRemote findByPrimaryKey(Integer pk)
        throws FinderException, RemoteException;

    public CabinRemote findByName(String s)
        throws FinderException, RemoteException;
}
```

Collection if more
than one entity
as result



Esempio 1

Client

```

...
public class Client_1
...
{
    public static void main(String [] args)
    {
        String command[]={
            "create", "read", "update", "delete", "readbyName"
        };
        if (args.length==0) {
            System.out.println("Usage:");
            System.out.println(command[0]);
            System.out.println(command[1]);
            System.out.println(command[2] + " name");
            System.out.println(command[3]);
            System.out.println(command[4] + " name");
            System.exit(0);
        }
        // continua...
    }
}

```

Esempio 1

Client

```
try
{
    ...
    if (args[0].equals(command[0])) { //create
    ...
    } else if (args[0].equals(command[4])) { //readByName
        Integer pk = new Integer(1);
        CabinRemote cabin_2 = home.findByName(args[1]);
        System.out.println(cabin_2.getName());
        System.out.println(cabin_2.getDeckLevel());
        System.out.println(cabin_2.getShipId());
        System.out.println(cabin_2.getBedCount());
    }
    ...
}
```

Esempio 1

Client

Esecuzione:

```
OK ant run.client -Darg1=create
OK ant run.client -Darg1=read
EXCEPTION! ant run.client -Darg1=readByName -Darg2=pippo
EXCEPTION! ant run.client -Darg1=create
OK ant run.client -Darg1=update -Darg2=pippo
OK ant run.client -Darg1=readByName -Darg2=pippo
OK ant run.client -Darg1=delete
EXCEPTION! ant run.client -Darg1=read
```

```
SELECT [DISTINCT]  
OBJECT(var) or var.x.y  
FROM abstractSchemaType [AS] var  
WHERE ...
```

Entity Beans

CMP versus BMP

CMP Entity Example

CMP Entity Example: Currency Converter

CMP Entity example – The Component (Remote) Interface

```
import java.rmi.*;
import javax.ejb.*;

public interface CurrencyConverter extends EJBObject {

    public void setRate(double rate) throws RemoteException;

    public double getRate() throws RemoteException;

}
```

CMP Entity example – The Home Interface

```
import java.rmi.*;
import javax.ejb.*;

public interface CurrencyConverterHome extends EJBHome {
    public CurrencyConverter create(String currency, double rate)
        throws RemoteException, CreateException;

    public CurrencyConverter findByPrimaryKey(String primaryKey)
        throws RemoteException, FinderException;
}
```

CMP Entity example – The bean

```
import java.rmi.*;
import javax.ejb.*;

public class CurrencyConverterBean implements EntityBean {
    public String valuta;
    public double rate;
    private EntityContext entityContext;
    public String ejbCreate(String valuta, double rate)
        throws CreateException {
        if (valuta == null) {
            throw new CreateException("You must specify the
currency.");
        }
        this.valuta=valuta;
        this.rate=rate;
        return null;
    }
    public void setRate(double rate) throws RemoteException ;
    public double getRate() throws RemoteException;
```

CMP Entity example – The bean

```
public void ejbPostCreate(String valuta,double rate)
    throws CreateException {}

public void ejbLoad() { //cut trailing blanks
    if (valuta !=null) valuta.trim();
}

public void ejbStore() {}
public void ejbRemove() throws RemoveException {}
public void ejbActivate() {}
public void ejbPassivate() {}
public void setEntityContext(EntityContext entityContext) {
    this.entityContext = entityContext;
}
public void unsetEntityContext() {
    entityContext = null;
}
}
```

CMP Entity example – The descriptor

```
<?xml version="1.0" encoding="UTF-8"?>
<!DOCTYPE ejb-jar PUBLIC "-//Sun Microsystems, Inc.//DTD Enterprise
JavaBeans 1.1//EN" "http://java.sun.com/j2ee/dtds/ejb-jar_1_1.dtd">
<ejb-jar>
  <display-name>currencyConverterCMP</display-name>
  <enterprise-beans>
    <entity>
      <ejb-name>CurrencyConverter</ejb-name>
      <home>CurrencyConverterHome</home>
      <remote>CurrencyConverter</remote>
      <ejb-class>CurrencyConverterBean</ejb-class>
      <persistence-type>Container</persistence-type>
      <prim-key-class>java.lang.String</prim-key-class>
      <reentrant>False</reentrant>
      <cmp-field>
        <description>nome della valuta</description>
        <field-name>valuta</field-name>
      </cmp-field>
    </entity>
  </enterprise-beans>
</ejb-jar>
```

CMP Entity example – The descriptor

```
<cmp-field>
  <description>rapporto di conversione con
    1'Euro</description>
  <field-name>rate</field-name>
</cmp-field>
<primkey-field>valuta</primkey-field>
</entity>
</enterprise-beans>
<assembly-descriptor>
  <container-transaction>
    <method>
      <ejb-name>CurrencyConverter</ejb-name>
      <method-name>*</method-name>
    </method>
    <trans-attribute>NotSupported</trans-attribute>
  </container-transaction>
</assembly-descriptor>
</ejb-jar>
```

CMP Entity example – The client

```
import javax.ejb.*;
import javax.naming.Context;
import javax.naming.InitialContext;
import javax.rmi.PortableRemoteObject;

public class ConverterClient {
  public static void main(String[] args) {
    CurrencyConverter bean=null;
    Object objref=null;
    CurrencyConverterHome home=null;
    try {
      Context ctx=new InitialContext();
      objref=ctx.lookup("CCcmp");
      home = (CurrencyConverterHome) PortableRemoteObject.narrow(
        objref,CurrencyConverterHome.class);
    }
  }
}
```

Get naming context and object reference

JNDI name

Cast to correct type

CMP Entity example – The client

```
try {
    bean=home.findByPrimaryKey("Pound");
    bean.setRate(bean.getRate() * (1+(Math.random()-0.5)/100));
} catch (ObjectNotFoundException e) {
    bean=home.create("Pound", 0.666);
}

try {
    bean=home.findByPrimaryKey("Dollar");
    bean.setRate(bean.getRate() * (1+(Math.random()-0.5)/100));
} catch (ObjectNotFoundException e) {
    bean=home.create("Dollar", 0.978);
}
```

Update or create record

Update or create record

CMP Entity example – The client

```
bean=home.findByPrimaryKey("Dollar");
double euro=1000;
System.out.println(euro+" Euro = "+euro*bean.getRate()+
    " Dollar");
double dollar=1000;
System.out.println(dollar+" Dollar = "+euro/bean.getRate()+
    " Euro");
bean.remove();
bean=home.findByPrimaryKey("Pound");
System.out.println(euro+" Euro = "+euro*bean.getRate()+
    " Pound");
double pound=1000;
System.out.println(pound+" Pound = "+euro/bean.getRate()+
    " Euro");
} catch (Exception e) {
    e.printStackTrace();
}
}
```

Read record

Read record

CMP Entity example – execution

RUN 1

```
1000.0 Euro = 978.0 Dollar  
1000.0 Dollar = 1022.4948875255624 Euro  
1000.0 Euro = 666.0 Pound  
1000.0 Pound = 1501.5015015015015 Euro
```

RUN 2

```
1000.0 Euro = 978.0 Dollar  
1000.0 Dollar = 1022.4948875255624 Euro  
1000.0 Euro = 664.1871408999466 Pound  
1000.0 Pound = 1505.5997600993007 Euro
```

BMP Entity Example

**BMP Entity Example:
Currency Converter**

BMP Entity example – The Component (Remote) Interface

```
import java.rmi.*;
import javax.ejb.*;

public interface CurrencyConverter extends EJBObject {

    public void setRate(double rate) throws RemoteException;

    public double getRate() throws RemoteException;

}
```

BMP Entity example – The Home Interface

```
import java.rmi.*;
import javax.ejb.*;

public interface CurrencyConverterHome extends EJBHome {

    public CurrencyConverter create(String currency, double rate)
        throws RemoteException, CreateException;

    public CurrencyConverter findByPrimaryKey(String primaryKey)
        throws RemoteException, FinderException;

    /*public Collection findInRange(...)
        throws RemoteException, FinderException;*/

}
```

BMP Entity example – The bean

```
import java.sql.*;
import javax.sql.*;
import javax.naming.*;
import java.rmi.*;
import javax.ejb.*;

public class CurrencyConverterBean implements EntityBean {
    private String valuta;
    private double rate;
    private EntityContext entityContext;
    private DataSource ds;
    private String dbName="java:comp/env/jdbc/Cloudscape";
    private Connection con;
```

BMP Entity example – The bean

```
    public void setRate(double rate) throws RemoteException {
        this.rate=rate;
    }

    public double getRate() throws RemoteException{
        return rate;
    }

    public void ejbPostCreate(String valuta,double rate)
        throws CreateException {
    }
```

UNCHANGED

BMP Entity example – The bean

```
public String ejbCreate(String valuta,double rate)
    throws CreateException {
    if (valuta == null) {
        throw new CreateException("E' obbligatorio specificare la valuta.");
    }
    try {
        String sqlStmt="INSERT INTO ValuteTable VALUES (?,?)";
        con=ds.getConnection();
        PreparedStatement stmt=con.prepareStatement(sqlStmt);
        stmt.setString(1,valuta);    stmt.setDouble(2,rate);
        stmt.executeUpdate();        stmt.close();
    } catch (SQLException e) {throw new EJBException(e);
    } finally {
        try {if (con!=null) con.close();} catch (SQLException e) {}
    }
    this.valuta=valuta;
    this.rate=rate;
    return valuta;
}
```

BMP Entity example – The bean

```
public void setEntityContext(EntityContext entityContext) {
    this.entityContext = entityContext;
    try {
        InitialContext initial= new InitialContext();
        ds=(DataSource)initial.lookup(dbName);
    } catch(NamingException e) {throw new EJBException(e);}
}

public void unsetEntityContext() {
    entityContext = null;
}

public void ejbActivate() {
    valuta=(String)entityContext.getPrimaryKey();
}
public void ejbPassivate() {
    valuta=null;
}
```

BMP Entity example – The bean

```
public void ejbLoad() {
    try {
        String sqlStmt="SELECT valuta, rate FROM ValuteTable WHERE valuta = ? ";
        con=ds.getConnection();
        PreparedStatement stmt=con.prepareStatement(sqlStmt);
        stmt.setString(1,valuta);
        ResultSet rs= stmt.executeQuery();
        if (rs.next()) {
            this.rate=rs.getDouble("rate");
            stmt.close();
        } else {
            stmt.close();
            throw new NoSuchEntityException("Valuta: "+valuta);
        }
    } catch (SQLException e) {throw new EJBException(e);
    } finally {
        try {if (con!=null) con.close();} catch (SQLException e) {}
    }
}
```

BMP Entity example – The bean

```
public void ejbStore() {
    try {
        String sqlStmt="UPDATE ValuteTable SET rate =? WHERE valuta = ? ";
        con=ds.getConnection();
        PreparedStatement stmt=con.prepareStatement(sqlStmt);
        stmt.setDouble(1,rate);
        stmt.setString(2,valuta);
        if (stmt.executeUpdate() != 1) {
            throw new EJBException("Object state could not be saved");
        }
        stmt.close();
    } catch (SQLException e) {throw new EJBException(e);
    } finally {
        try {if (con!=null) con.close();} catch (SQLException e) {}
    }
}
```

BMP Entity example – The bean

```
public void ejbRemove() throws RemoveException {
    try {
        String sqlStmt="DELETE FROM ValuteTable WHERE valuta = ? ";
        con=ds.getConnection();
        PreparedStatement stmt=con.prepareStatement(sqlStmt);
        stmt.setString(1,valuta);
        if (stmt.executeUpdate() != 1) {
            throw new EJBException("Object state could not be saved");
        }
        stmt.close();
    } catch (SQLException e) {throw new EJBException(e);
    } finally {
        try {if (con!=null) con.close();} catch (SQLException e) {}
    }
}
```

BMP Entity example – The bean

```
public String ejbFindByPrimaryKey(String primaryKey)
    throws FinderException {
    try {
        String sqlStmt="SELECT valuta FROM ValuteTable WHERE valuta = ? ";
        con=ds.getConnection();
        PreparedStatement stmt=con.prepareStatement(sqlStmt);
        stmt.setString(1,primaryKey);
        ResultSet rs= stmt.executeQuery();
        if (!rs.next()) throw new ObjectNotFoundException();
        rs.close();
        stmt.close();
        return primaryKey;
    } catch (SQLException e) {throw new EJBException(e);
    } finally {
        try {if (con!=null) con.close();} catch (SQLException e) {}
    }
}
```

BMP Entity example – The descriptor

```
<?xml version="1.0" encoding="UTF-8"?>
<!DOCTYPE ejb-jar PUBLIC "-//Sun Microsystems, Inc.//DTD Enterprise
JavaBeans 1.1//EN" "http://java.sun.com/j2ee/dtds/ejb-jar_1_1.dtd">
<ejb-jar>
  <display-name>currencyConverterBMP</display-name>
  <enterprise-beans>
    <entity>
      <ejb-name>CurrencyConverter</ejb-name>
      <home>CurrencyConverterHome</home>
      <remote>CurrencyConverter</remote>
      <ejb-class>CurrencyConverterBean</ejb-class>
      <persistence-type>Bean</persistence-type>
      <prim-key-class>java.lang.String</prim-key-class>
      <reentrant>False</reentrant>
    
```

BMP Entity example – The descriptor

```
      <resource-ref>
        <res-ref-name>jdbc</res-ref-name>
        <res-type>javax.sql.DataSource</res-type>
        <res-auth>Container</res-auth>
      </resource-ref>
    </entity>
  </enterprise-beans>
  <assembly-descriptor>
    <container-transaction>
      <method>
        <ejb-name>CurrencyConverter</ejb-name>
        <method-name>*</method-name>
      </method>
      <trans-attribute>NotSupported</trans-attribute>
    </container-transaction>
  </assembly-descriptor>
</ejb-jar>
```

BMP Entity example – execution

RUN 1

```
1000.0 Euro = 978.0 Dollar  
1000.0 Dollar = 1022.4948875255624 Euro  
1000.0 Euro = 667.4393156603387 Pound  
1000.0 Pound = 1498.2635522611347 Euro
```

RUN 2

```
1000.0 Euro = 978.0 Dollar  
1000.0 Dollar = 1022.4948875255624 Euro  
1000.0 Euro = 670.3469442143563 Pound  
1000.0 Pound = 1491.7648370456816 Euro
```