6. Demonstrate lazy collection in Hibernate

Source Code:

```
DROP TABLE IF EXISTS `colors`;
        /*!40101 SET @saved_cs_client     = @@character_set_client */;
        /*!40101 SET character_set_client = utf8 */;
        CREATE TABLE `colors` (
          `ID` bigint(20) NOT NULL AUTO_INCREMENT,
          `color_name` varchar(40) DEFAULT NULL,
          `idx` int(11) DEFAULT NULL,
          `product_id` bigint(20) DEFAULT NULL,
          PRIMARY KEY (`ID`)
        ) ENGINE=InnoDB AUTO_INCREMENT=6 DEFAULT CHARSET=latin1;
        /*!40101 SET character_set_client = @saved_cs_client */;



        LOCK TABLES `colors` WRITE;
        /*!40000 ALTER TABLE `colors` DISABLE KEYS */;
        INSERT INTO `colors` VALUES
(1,'Red',0,1),(2,'Silver',1,1),(3,'Gray',0,2),(4,'White',1,2),(5,'Maroon',0,3);•  /*!40000 ALTER
TABLE `colors` ENABLE KEYS */;
        UNLOCK TABLES;


        --
        -- Table structure for table `eproduct`
        --
```

```
DROP TABLE IF EXISTS `eproduct`;
/*!40101 SET @saved_cs_client     = @@character_set_client */;
/*!40101 SET character_set_client = utf8 */;
CREATE TABLE `eproduct` (
  `ID` bigint(20) NOT NULL AUTO_INCREMENT,
  `name` varchar(100) DEFAULT NULL,
  `price` decimal(10,2) DEFAULT NULL,
  `date_added` timestamp NOT NULL DEFAULT CURRENT_TIMESTAMP,
  PRIMARY KEY (`ID`)
) ENGINE=InnoDB AUTO_INCREMENT=4 DEFAULT CHARSET=latin1;
/*!40101 SET character_set_client = @saved_cs_client */;



LOCK TABLES `eproduct` WRITE;
/*!40000 ALTER TABLE `eproduct` DISABLE KEYS */;
INSERT INTO `eproduct` VALUES (1,'HP Laptop ABC',21900.00,'2019-06-04 07:18:57'),(2,'Acer Laptop ABC',23300.00,'2019-06-04 07:19:07'),(3,'Lenovo Laptop ABC',33322.00,'2019-06-04 07:19:19');
/*!40000 ALTER TABLE `eproduct` ENABLE KEYS */;
UNLOCK TABLES;



DROP TABLE IF EXISTS `finance`;
/*!40101 SET @saved_cs_client     = @@character_set_client */;
/*!40101 SET character_set_client = utf8 */;
CREATE TABLE `finance` (
  `ID` bigint(20) NOT NULL AUTO_INCREMENT,
  `ftype` varchar(10) DEFAULT NULL,
  `name` varchar(30) DEFAULT NULL,
  `product_id` bigint(20) DEFAULT NULL,
  PRIMARY KEY (`ID`)
) ENGINE=InnoDB AUTO_INCREMENT=6 DEFAULT CHARSET=latin1;
/*!40101 SET character_set_client = @saved_cs_client */;



LOCK TABLES `finance` WRITE;
/*!40000 ALTER TABLE `finance` DISABLE KEYS */;
INSERT INTO `finance` VALUES (1,'CREDITCARD','EMI on Citibank Card',1),(3,'BANK','40% finance from SBI',2),(4,'BANK','60% finance from ICICI',3),(5,'BANK','20% finance from ICICI',1);
/*!40000 ALTER TABLE `finance` ENABLE KEYS */;
UNLOCK TABLES;



DROP TABLE IF EXISTS `os`;
/*!40101 SET @saved_cs_client     = @@character_set_client */;
/*!40101 SET character_set_client = utf8 */;
CREATE TABLE `os` (
  `ID` bigint(20) NOT NULL AUTO_INCREMENT,
  `name` varchar(30) DEFAULT NULL,
  `product_id` bigint(20) DEFAULT NULL,
  PRIMARY KEY (`ID`)
) ENGINE=InnoDB AUTO_INCREMENT=6 DEFAULT CHARSET=latin1;
/*!40101 SET character_set_client = @saved_cs_client */;
```

```
LOCK TABLES `os` WRITE;

/*!40000 ALTER TABLE `os` DISABLE KEYS */;

INSERT INTO `os` VALUES (1,'Windows 10',1),(2,'Windows 10',2),(3,'FreeDOS',2),(4,'RedHat Linux',2),(5,'Windows 10',3);

/*!40000 ALTER TABLE `os` ENABLE KEYS */;

UNLOCK TABLES;




DROP TABLE IF EXISTS `screensizes`;

/*!40101 SET @saved_cs_client     = @@character_set_client */;

/*!40101 SET character_set_client = utf8 */;

CREATE TABLE `screensizes` (

  `ID` bigint(20) NOT NULL AUTO_INCREMENT,

  `size` varchar(10) DEFAULT NULL,

  `product_id` bigint(20) DEFAULT NULL,

  PRIMARY KEY (`ID`)

) ENGINE=InnoDB AUTO_INCREMENT=5 DEFAULT CHARSET=latin1;

/*!40101 SET character_set_client = @saved_cs_client */;




LOCK TABLES `screensizes` WRITE;

/*!40000 ALTER TABLE `screensizes` DISABLE KEYS */;

INSERT INTO `screensizes` VALUES (1,'12 in',1),(2,'14.5 in',2),(3,'14.9 in',2),(4,'15.5 in',3);

/*!40000 ALTER TABLE `screensizes` ENABLE KEYS */;

UNLOCK TABLES;
```

```
package com.ecommerce;


public class Color {
        private long COLORID;
        private String name;

        public Color() {

        }
        public Color(String name) {
                this.COLORID = 0;
                this.name = name;
        }

        public long getCOLORID() {return this.COLORID; }
        public String getName() { return this.name;}
        public void setCOLORID(long id) { this.COLORID = id;}
        public void setName(String name) { this.name = name;}


}
```

```java
package com.ecommerce;

import java.math.BigDecimal;
import java.util.Collection;
import java.util.Date;
import java.util.List;
import java.util.Set;
import java.util.Map;


public class EProduct {
    private long ID;
    private String name;
    private BigDecimal price;
    private Date dateAdded;
    private List<Color> colors;
    private Set<Finance> finance;
    private PDescription pdescrip;

    public EProduct() {

    }

    public long getID() {return this.ID; }
    public String getName() { return this.name;}
    public BigDecimal getPrice() { return this.price;}
    public Date getDateAdded() { return this.dateAdded;}
```

```
        public List<Color> getColors() { return this.colors;}
        public Set<Finance> getFinance() { return this.finance;}
        public PDescription getPdescrip() { return this.pdescrip;}

        public void setID(long id) { this.ID = id;}
        public void setName(String name) { this.name = name;}
        public void setPrice(BigDecimal price) { this.price = price;}
        public void setDateAdded(Date date) { this.dateAdded = date;}
        public void setColors(List<Color> colors) { this.colors = colors;}
        public void setFinance(Set<Finance> finance) { this.finance = finance;}
        public void setPdescrip(PDescription pdescrip) { this.pdescrip = pdescrip;}
}


package com.ecommerce;


public class Finance {
        private long FINANCEID;
        private String name;
        private String ftype;

        public Finance() {

        }
        public Finance(String name, String ftype) {
            this.FINANCEID = 0;
            this.name = name;
            this.ftype = ftype;
        }

        public long getFINANCEID() {return this.FINANCEID; }
        public String getName() { return this.name;}
        public String getFtype() { return this.ftype;}
        public void setFINANCEID(long id) { this.FINANCEID = id;}
        public void setName(String name) { this.name = name;}
        public void setFtype(String ftype) { this.ftype= ftype;}


}




package com.ecommerce;



public class OS {


        private long OSID;
        private String name;

        public OS() {
        }
        public OS(String name) {
            this.OSID = 0;
            this.name = name;
        }

        public long getOSID() {return this.OSID; }
        public String getName() { return this.name;}
        public void setOSID(long id) { this.OSID = id;}
        public void setName(String name) { this.name= name;}


}



package com.ecommerce;


public class ScreenSizes {
        private long SCREENID;
        private String size;

        public ScreenSizes() {

        }
        public ScreenSizes(String size) {
            this.SCREENID = 0;
            this.size = size;
        }

        public long getSCREENID() {return this.SCREENID; }
        public String getSize() { return this.size;}
        public void setSCREENID(long id) { this.SCREENID = id;}
        public void setSize(String size) { this.size = size;}



}




package com.ecommerce;

import org.hibernate.SessionFactory;
import org.hibernate.boot.Metadata;
import org.hibernate.boot.MetadataSources;
import org.hibernate.boot.registry.StandardServiceRegistry;
import org.hibernate.boot.registry.StandardServiceRegistryBuilder;

public class HibernateUtil {

        private static final SessionFactory sessionFactory;

        static {
            try {
               StandardServiceRegistry standardRegistry = new StandardServiceRegistryBuilder()
                        .configure("hibernate.cfg.xml").build();
                Metadata metaData = new
MetadataSources(standardRegistry).getMetadataBuilder().build();
                sessionFactory = metaData.getSessionFactoryBuilder().build();
            } catch (Throwable th) {
                throw new ExceptionInInitializerError(th);
            }
        }

        public static SessionFactory getSessionFactory() {
            return sessionFactory;
        }
}
```

```
<?xml version="1.0"?>
<!DOCTYPE hibernate-mapping PUBLIC
"-//Hibernate/Hibernate Mapping DTD 3.0//EN"
"http://www.hibernate.org/dtd/hibernate-mapping-3.0.dtd">
<hibernate-mapping package="com.ecommerce">
  <class name="Color" table="colors">
    <id name="COLORID" type="long" column="ID">
      <generator class="identity"/>
    </id>
    <property name="name" type="string" column="COLOR_NAME"/>
  </class>
```

```
</hibernate-mapping>


<?xml version="1.0"?>
<!DOCTYPE hibernate-mapping PUBLIC
"-//Hibernate/Hibernate Mapping DTD 3.0//EN"
"http://www.hibernate.org/dtd/hibernate-mapping-3.0.dtd">
<hibernate-mapping package="com.ecommerce">
    <class name="EProduct" table="eproduct">
        <id name="ID" type="long" column="ID">
            <generator class="identity"/>
        </id>
        <property name="name" type="string" column="NAME"/>
        <property name="price" type="big_decimal" column="PRICE"/>
        <property name="dateAdded" type="timestamp" column="DATE_ADDED"/>

                <list name="colors" cascade="all" lazy="true">
                        <key column="product_id" />
                        <list-index column="idx" />
                        <one-to-many class="com.ecommerce.Color" />
                </list>

                <bag name="screensizes" cascade="all" lazy="true">
                <key column="product_id"></key>
                 <one-to-many class="com.ecommerce.ScreenSizes"/>
                </bag>
        <set name = "os" cascade="all" lazy=”true”>
     <key column = "product_id"/>
     <one-to-many class="OS"/>
   </set>

   <map name = "finance" cascade="all">
     <key column = "product_id"/>
     <index column = "ftype" type = "string"/>
     <one-to-many class="com.ecommerce.Finance"/>
   </map>
  </class>
</hibernate-mapping>
```

```
<?xml version="1.0"?>
<!DOCTYPE hibernate-mapping PUBLIC
"-//Hibernate/Hibernate Mapping DTD 3.0//EN"
"http://www.hibernate.org/dtd/hibernate-mapping-3.0.dtd">
<hibernate-mapping package="com.ecommerce">
  <class name="Finance" table="finance">
    <id name="FINANCEID" type="long" column="ID">
      <generator class="identity"/>
    </id>
    <property name="name" type="string" column="NAME"/>
    <property name="ftype" type="string" column="FTYPE"/>
  </class>
</hibernate-mapping>
```

```
<?xml version="1.0"?>
<!DOCTYPE hibernate-mapping PUBLIC
"-//Hibernate/Hibernate Mapping DTD 3.0//EN"
"http://www.hibernate.org/dtd/hibernate-mapping-3.0.dtd">
<hibernate-mapping package="com.ecommerce">
    <class name="OS" table="os">
        <id name="OSID" type="long" column="ID">
            <generator class="identity"/>
        </id>
        <property name="name" type="string" column="NAME"/>
    </class>
</hibernate-mapping>
```

```
<?xml version="1.0"?>
<!DOCTYPE hibernate-mapping PUBLIC
"-//Hibernate/Hibernate Mapping DTD 3.0//EN"
"http://www.hibernate.org/dtd/hibernate-mapping-3.0.dtd">
<hibernate-mapping package="com.ecommerce">
    <class name="ScreenSizes" table="screensizes">
        <id name="SCREENID" type="long" column="ID">
            <generator class="identity"/>
        </id>
        <property name="size" type="string" column="SIZE"/>
    </class>
```

```
</hibernate-mapping>
```

```
<?xml version='1.0' encoding='utf-8'?>
<!DOCTYPE hibernate-configuration PUBLIC
"-//Hibernate/Hibernate Configuration DTD 3.0//EN"
"http://www.hibernate.org/dtd/hibernate-configuration-3.0.dtd">
<hibernate-configuration>
  <session-factory>
    <!-- Database connection settings -->
    <property name="connection.driver_class">com.mysql.jdbc.Driver</property>
    <property name="connection.url">jdbc:mysql://localhost:3306/ecommerce</property>
    <property name="connection.username">root</property>
    <property name="connection.password">master</property>
    <mapping resource="com/ecommerce/EProduct.hbm.xml"/>
    <mapping resource="com/ecommerce/Color.hbm.xml"/>
    <mapping resource="com/ecommerce/ScreenSizes.hbm.xml"/>
    <mapping resource="com/ecommerce/Os.hbm.xml"/>
    <mapping resource="com/ecommerce/Finance.hbm.xml"/>
  </session-factory>
</hibernate-configuration>
```

```
<!DOCTYPE html>
<html>
<head>
<meta charset="UTF-8">
<title>Hibernate Collection Mapping With XML</title>
```

```
</head>
<body>
<a href="details">Product Details</a><br>

</body>
</html>

import java.io.IOException;
import java.io.PrintWriter;
import javax.servlet.ServletConfig;
import javax.servlet.ServletException;
import javax.servlet.annotation.WebServlet;
import javax.servlet.http.HttpServlet;
import javax.servlet.http.HttpServletRequest;
import javax.servlet.http.HttpServletResponse;
import javax.transaction.*;
import javax.xml.bind.*;
import java.io.Serializable;
import java.math.BigDecimal;
import java.util.ArrayList;
import java.util.Calendar;
import java.util.Collection;
import java.util.List;
import java.util.Map;
import java.util.Set;

import org.hibernate.Session;
import org.hibernate.SessionFactory;

import org.hibernate.Transaction;

import org.hibernate.cfg.Configuration;


import com.ecommerce.Color;

import com.ecommerce.EProduct;

import com.ecommerce.Finance;

import com.ecommerce.HibernateUtil;

import com.ecommerce.PDescription;


/**

* Servlet implementation class ProductDetails

*/

@WebServlet("/ProductDetails")

public class ProductDetails extends HttpServlet {

        private static final long serialVersionUID = 1L;

    /**

* @see HttpServlet#HttpServlet()

*/

    public ProductDetails() {

        super();

        // TODO Auto-generated constructor stub

    }


        /**

         * @see HttpServlet#doGet(HttpServletRequest request, HttpServletResponse response)

         */
    protected void doGet(HttpServletRequest request, HttpServletResponse response) throws
ServletException, IOException {
        // TODO Auto-generated method stub
         try {
            SessionFactory factory = HibernateUtil.getSessionFactory();
            Session session = factory.openSession();
            List<EProduct> list = session.createQuery("from EProduct").list();


             PrintWriter out = response.getWriter();
             out.println("<html><body>");


             out.println("<b>One to One Mapping</b><br>");
             for(EProduct p: list) {
                 out.println("ID: " + String.valueOf(p.getID()) + ", Name: " + p.getName() +
                         ", Price: " + String.valueOf(p.getPrice()) + ", Date Added: " +
p.getDateAdded().toString());
                 PDescription descrip = p.getPdescrip();
                 out.println("<br>Description:" + descrip.getDescrip());
                 out.println("<hr>");
             }
             out.println("<b>One to Many and Many to One Mapping</b><br>");
             for(EProduct p: list) {
                 out.println("ID: " + String.valueOf(p.getID()) + ", Name: " + p.getName() +
                         ", Price: " + String.valueOf(p.getPrice()) + ", Date Added: " +
p.getDateAdded().toString());
                 List<Color> colors = p.getColors();
                 out.println("<br>Colors: <ul>");
                 for(Color c: colors) {
                     out.print("<li>" + c.getName() + "</li>");
                 }
                 out.println("</ul>");
                 out.println("<hr>");

             }
             out.println("<b>Many to Many Mapping</b><br>");
             for(EProduct p: list) {
                 out.println("ID: " + String.valueOf(p.getID()) + ", Name: " + p.getName() +
                         ", Price: " + String.valueOf(p.getPrice()) + ", Date Added: " +
p.getDateAdded().toString());
                 Set<Finance> finances= p.getFinance();
                 out.println("<br>Finance Options : <ul>");
                 for(Finance f: finances) {
                     out.print("<li>" + f.getFtype() + "</li>");
                 }
                 out.println("</ul>");
                 out.println("<hr>");
             }

                session.close();

           out.println("</body></html>");


         } catch (Exception ex) {
             throw ex;
         }
```

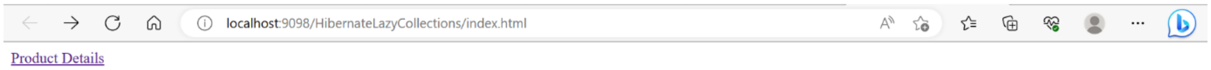
```
	}

	/**
	 * @see HttpServlet#doPost(HttpServletRequest request, HttpServletResponse response)
	 */
	protected void doPost(HttpServletRequest request, HttpServletResponse response) throws
ServletException, IOException {
		// TODO Auto-generated method stub
		doGet(request, response);
	}

}
```

```
<?xml version="1.0" encoding="UTF-8"?>
<web-app xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns="http://xmlns.jcp.org/xml/ns/javaee"
xsi:schemaLocation="http://xmlns.jcp.org/xml/ns/javaee
http://xmlns.jcp.org/xml/ns/javaee/web-app_4_0.xsd" id="WebApp_ID" version="4.0">
  <display-name>HibernateLazyCollections</display-name>
  <welcome-file-list>
    <welcome-file>index.html</welcome-file>
    <welcome-file>index.htm</welcome-file>
    <welcome-file>index.jsp</welcome-file>
    <welcome-file>default.html</welcome-file>
    <welcome-file>default.htm</welcome-file>
    <welcome-file>default.jsp</welcome-file>
  </welcome-file-list>
  <servlet>
    <servlet-name>ProductDetails</servlet-name>
    <servlet-class>ProductDetails</servlet-class>
  </servlet>
  <servlet-mapping>
    <servlet-name>ProductDetails</servlet-name>
    <url-pattern>/details</url-pattern>
  </servlet-mapping>
</web-app>
```

Output:



Product Details