JSF, Entitys, Managed Beans and Database

At This Point

- So far we have concentrated mainly in implementing the UI, so you should be familiar wit the basic consepts how you create UI's and inject data to UI using Managed Beans.
- Next thing to focus is how you use database from your JFS application and how you update and insert data from database and present the data in UI.

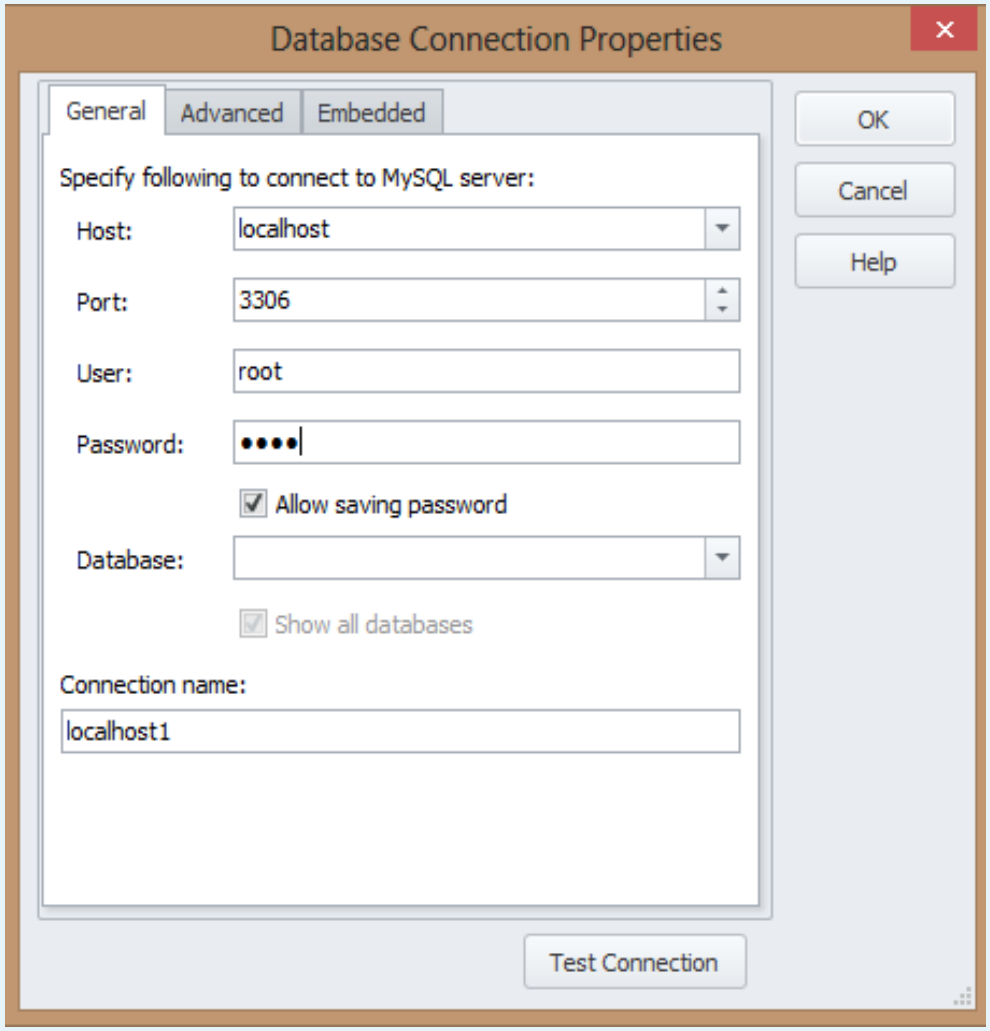
Creating Database

- First we need to create a database.
- We use dbForge Express database designer tool for this. You can download it from here:dbForge
- After downloading just double click the .exe file and follow instructions.

Configuring dbForge

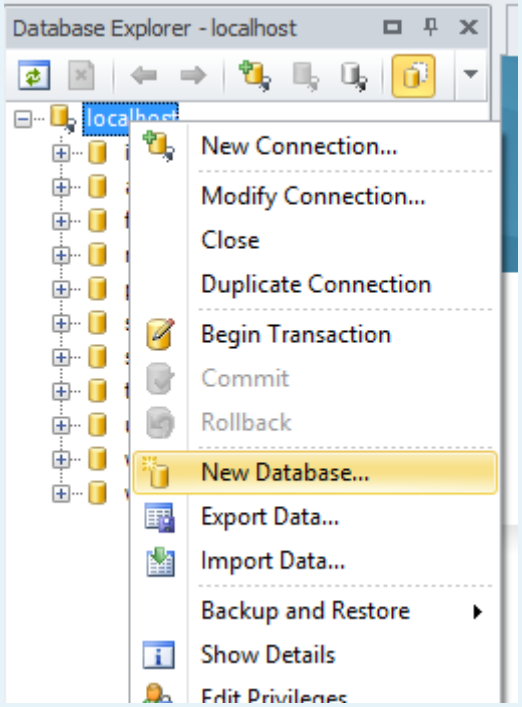
- When you start dbForge for the first time, it will ask you the connection attributes.
- Just fill up the next information into the fields and press Test Connection.
- NOTE! The password is also “root”

Configuring dbForge



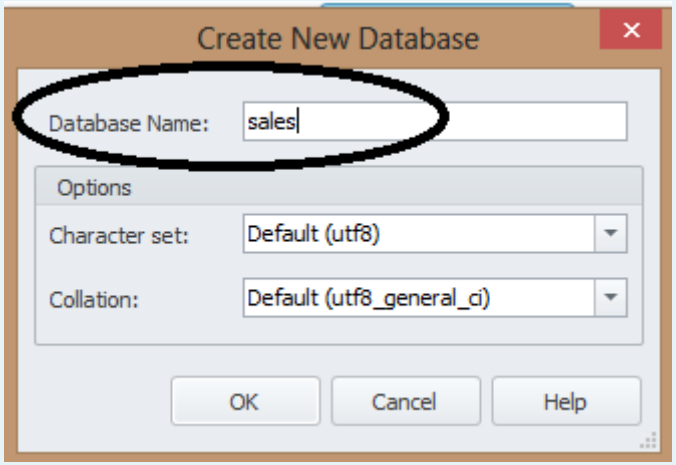
Creating a Database

- Click mouse right over “localhost” in Database explorer and select → New Database



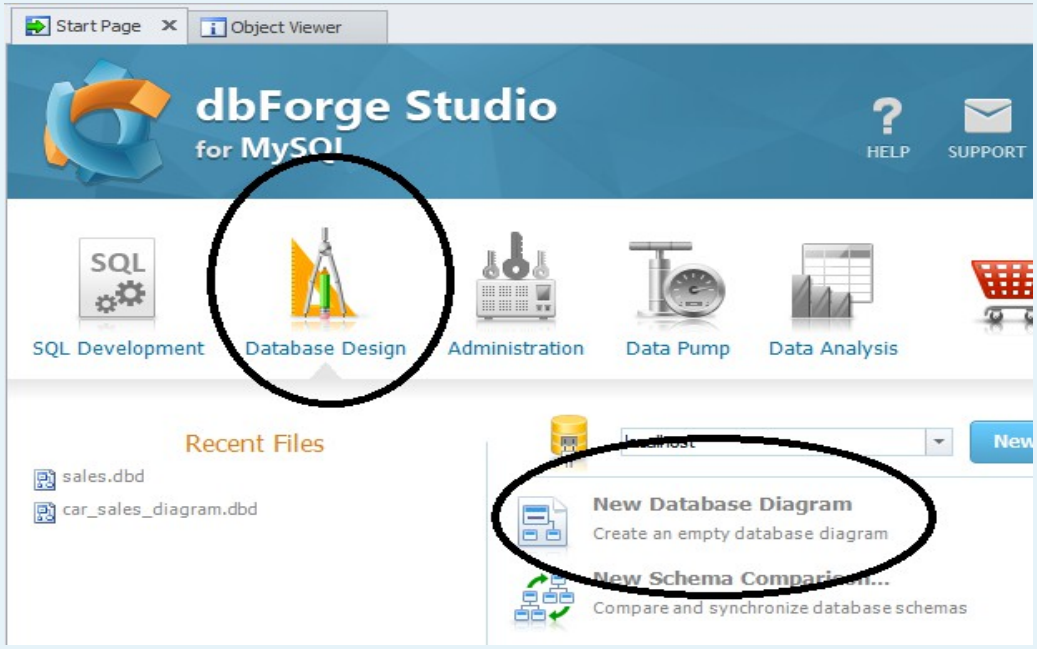
Creating a Database

- Give some name for the database and press Ok button.



Creating a Database

- Next from dbForge Studio select Database Design and click New Database Diagram

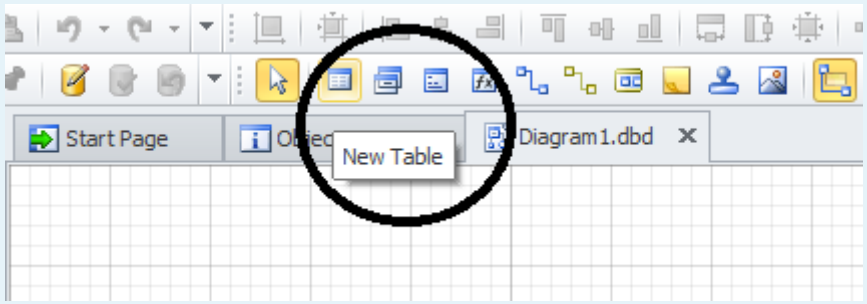


Creating a Database

- You should now have an empty diagram open where you can now start to design database tables...

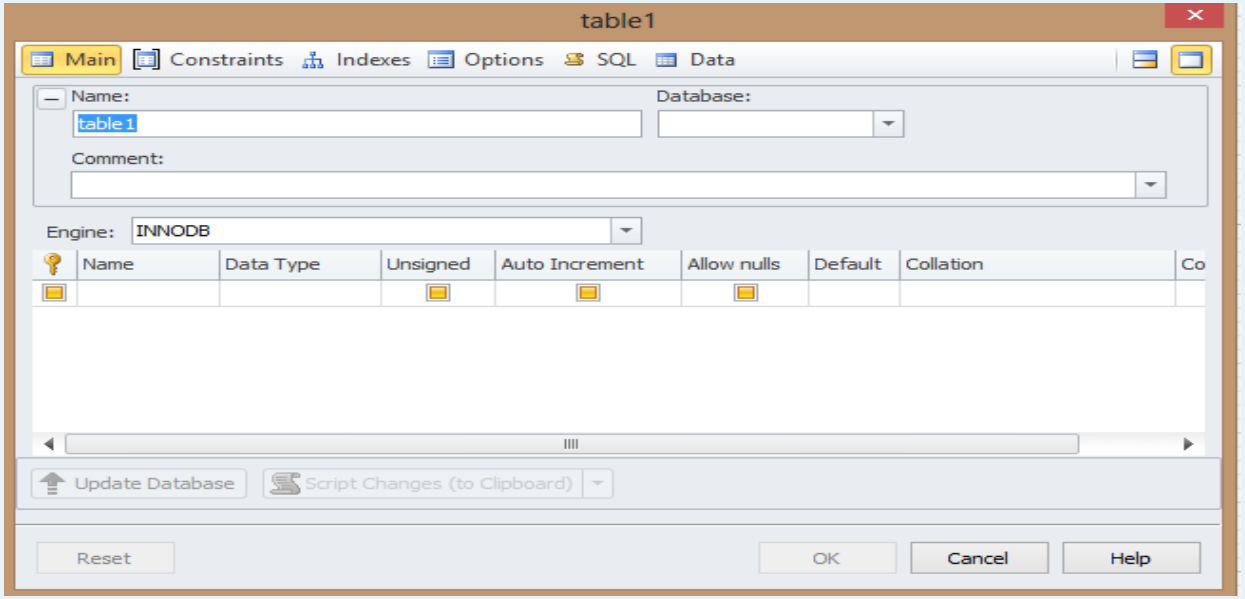
Creating a Table

- On the toolbar click New Table icon



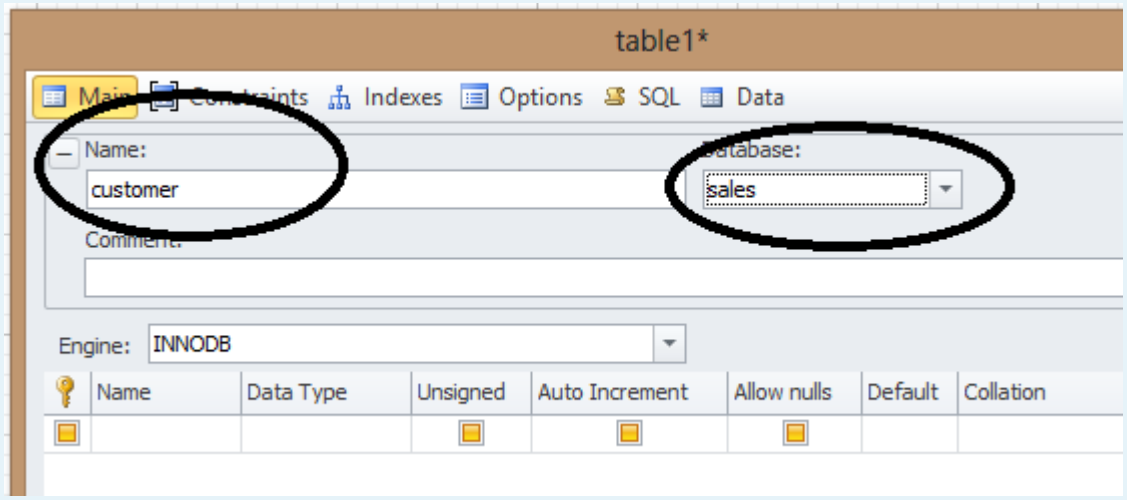
Creating a Table

- When the new table icon is selected you can now click on design area and next kind of editor should be open



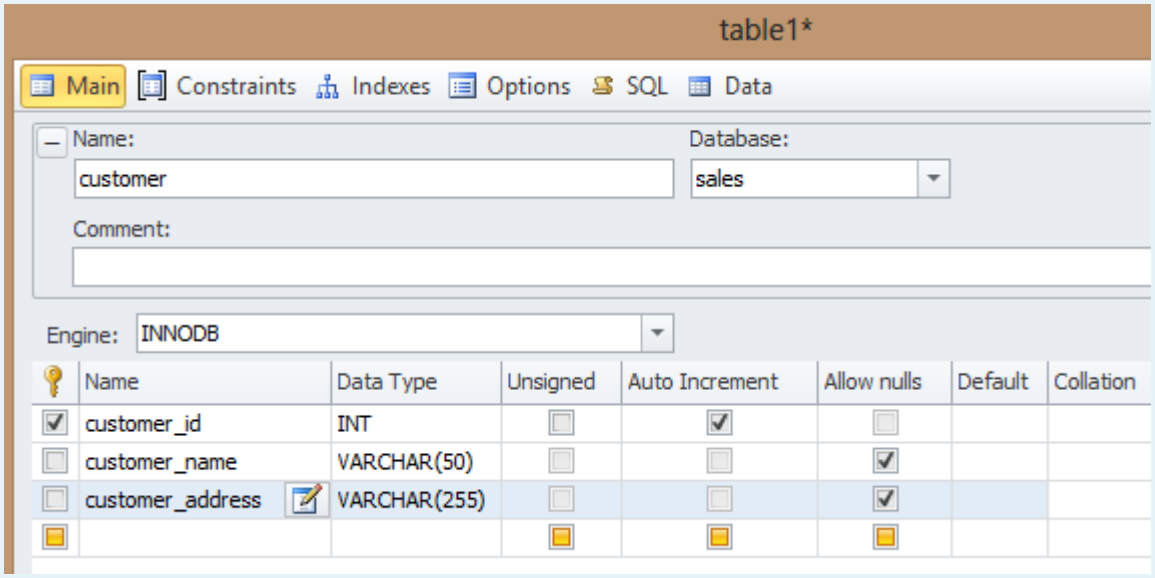
Creating a Table

- Next give a name for the table and select a database where the table should be appended (if you named it sales select that from the list)



Creating a Table

- Next we define database rows. After you have defined the rows, just press ok and the table should be now in design area.



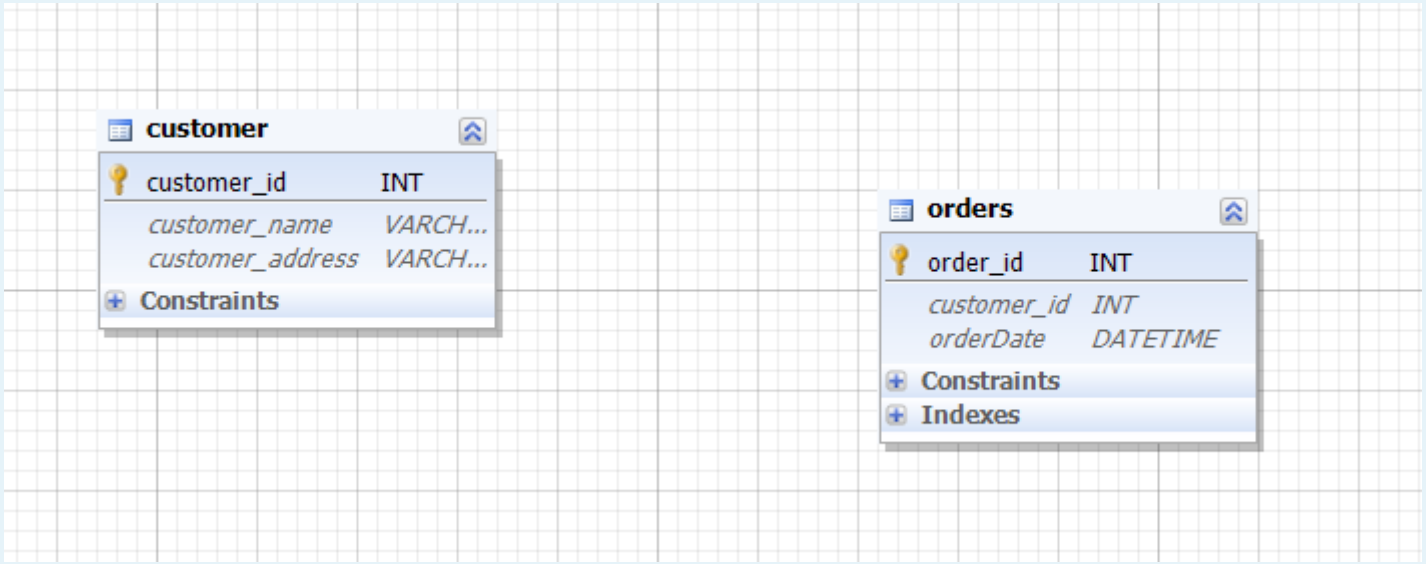
Creating Relations

- Next we want to create a orders table and make a relation to customer table. This relation should be one to many since one customer can have several orders.
- So create a new table called orders with next information and press ok.

	Name	Data Type	Unsigned	Auto Increment	Allow nulls	Default	Colla
☑	order_id	INT(11)	☐	☑	☐		
☐	customer_id	INT(11)	☐	☐	☑	NULL	
☐	orderDate	DATETIME	☐	☐	☑	NULL	

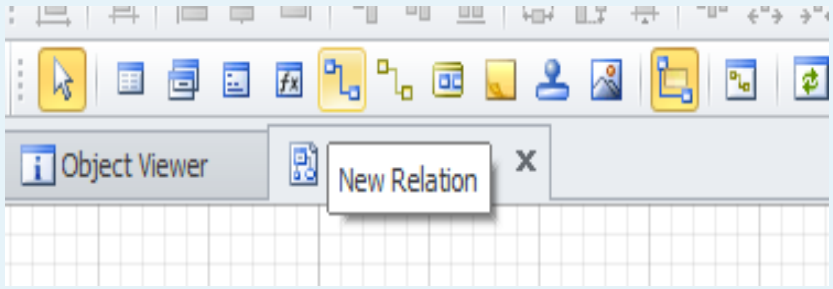
Creating Relations

- Now the situation should be like this:



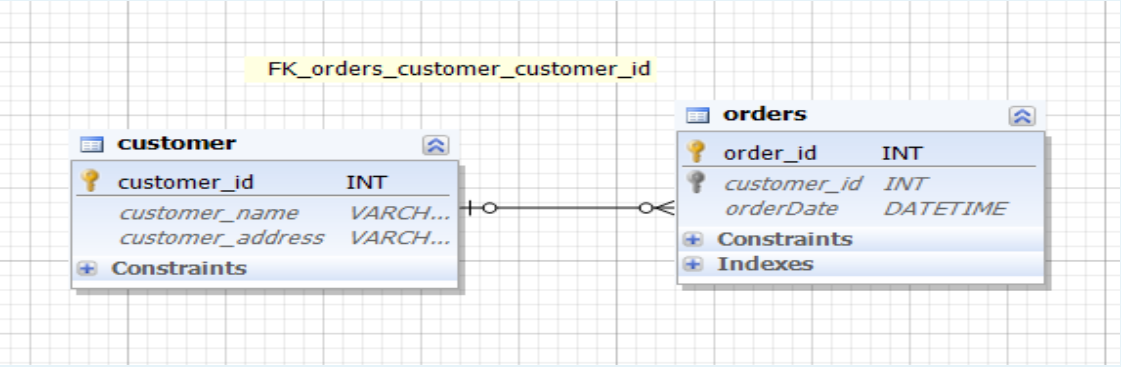
Creating Relations

- Next select New Relation icon from toolbar



Creating Relations

- No when new relation icon is selected, click order_id row in orders table and drag mouse over customer table order_id row. Release now mouse. Press Ok in dialog which opens. Now you should have one to many relation between tables



Exercise

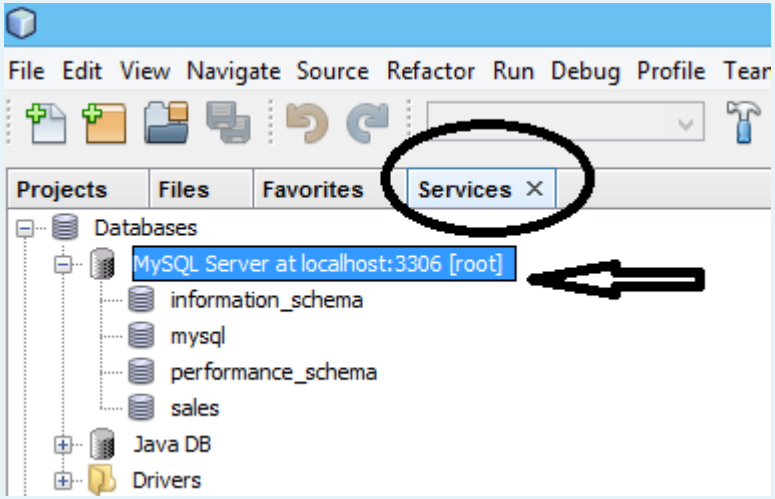
- Now append a new table in our database called product. Insert next rows to that
  - product_id which is a primary key and autoincrement
  - order_id type is int
  - product_name type varchar
  - product_price type is float
- Make one to many relation between orders table and product table.

Integrating DB to JSF project

- Next thing to do is integrate the previously created database in to our JSF appllication.
- This can be done in several way
  - Use JPA and Entities
  - Use Hibernate
  - Use directly Java JDBC
- We follow the first option in this case.

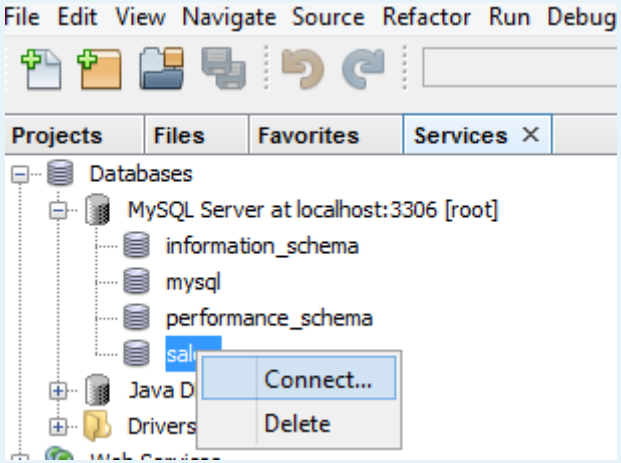
Integrating DB to JSF project

- Now open NetBeans IDE and create a new JSF project.
- Then open the service tab in project explorer. Make sure that you are connected to database server



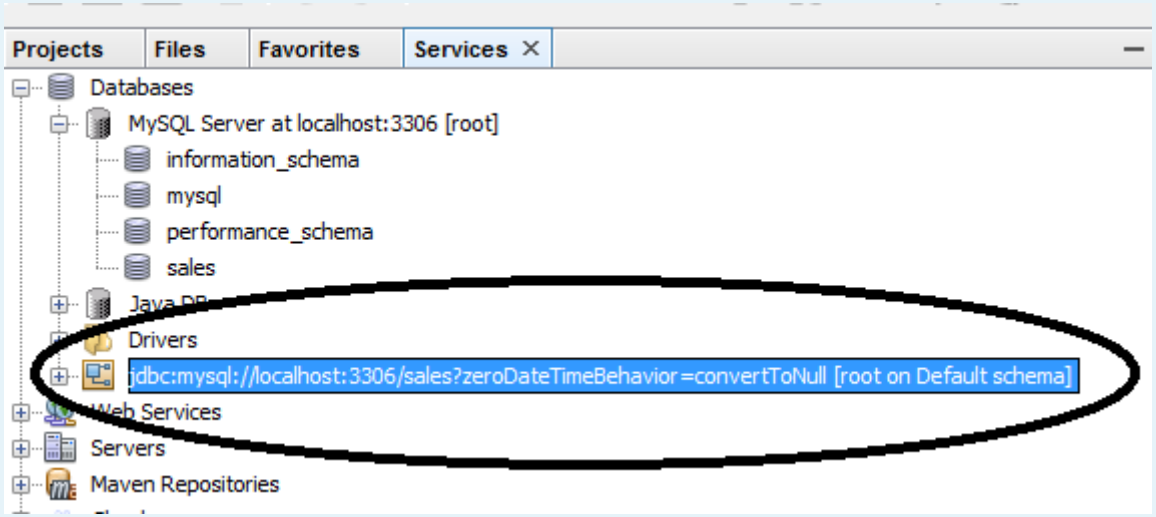
Integrating DB to JSF project

- Right mouse click over the sales database in Databases and select connect...



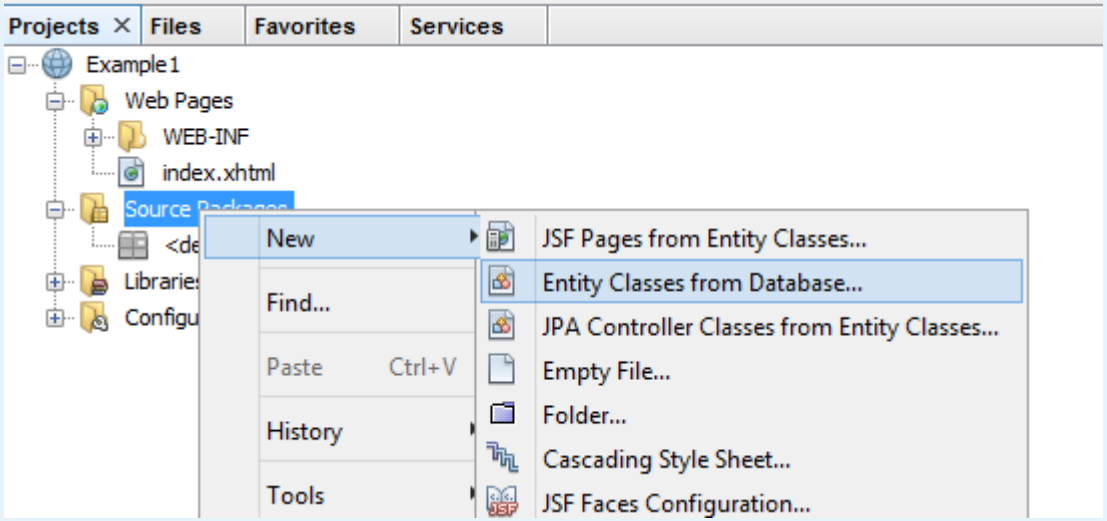
Integrating DB to JSF project

- Now you should see that you are connected to sales database...



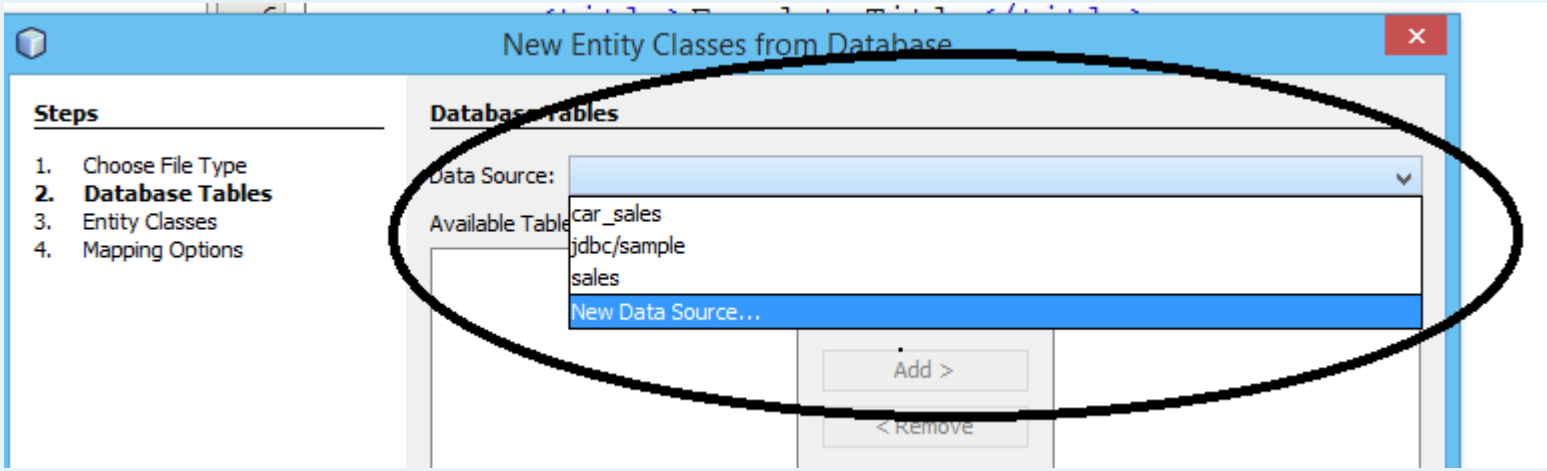
Creating Entitys

- Now open the Projects tab again. Right mouse click over Source Packages folder. Select New-> Entity classes from database



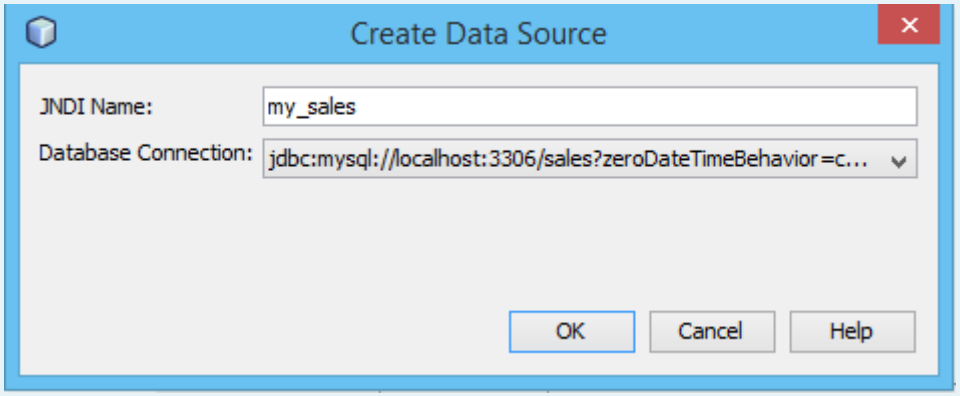
Creating Entitys

- From Data Source select New Data Source



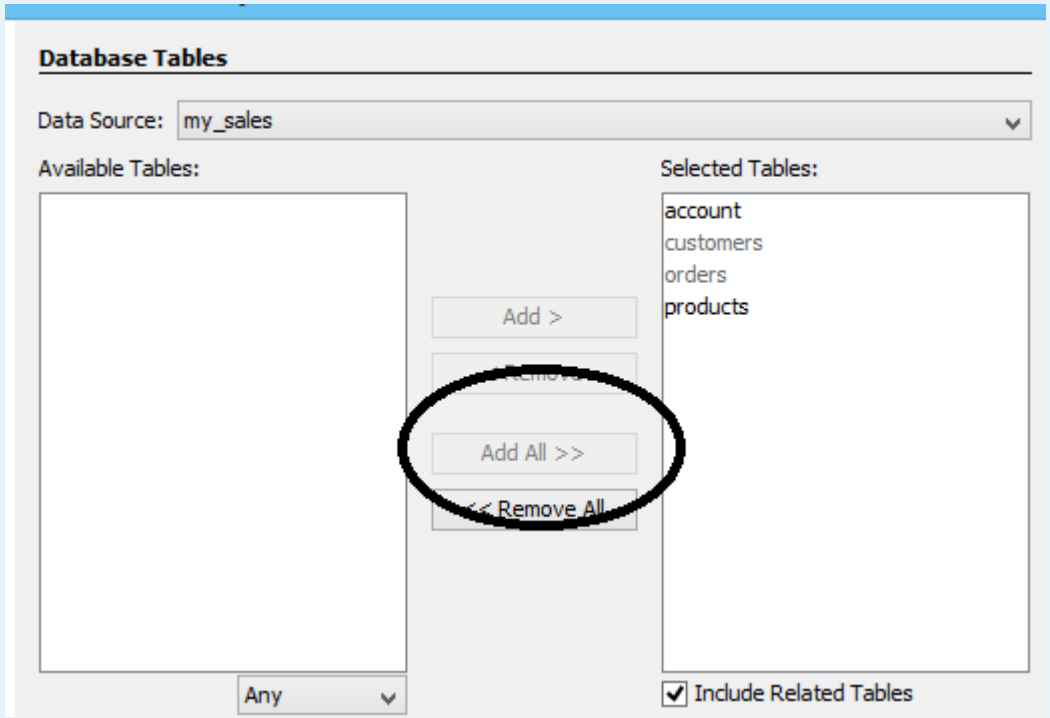
Creating Entitys

- Give some JNDI name and select the sales database connection that we previously created and press ok button.



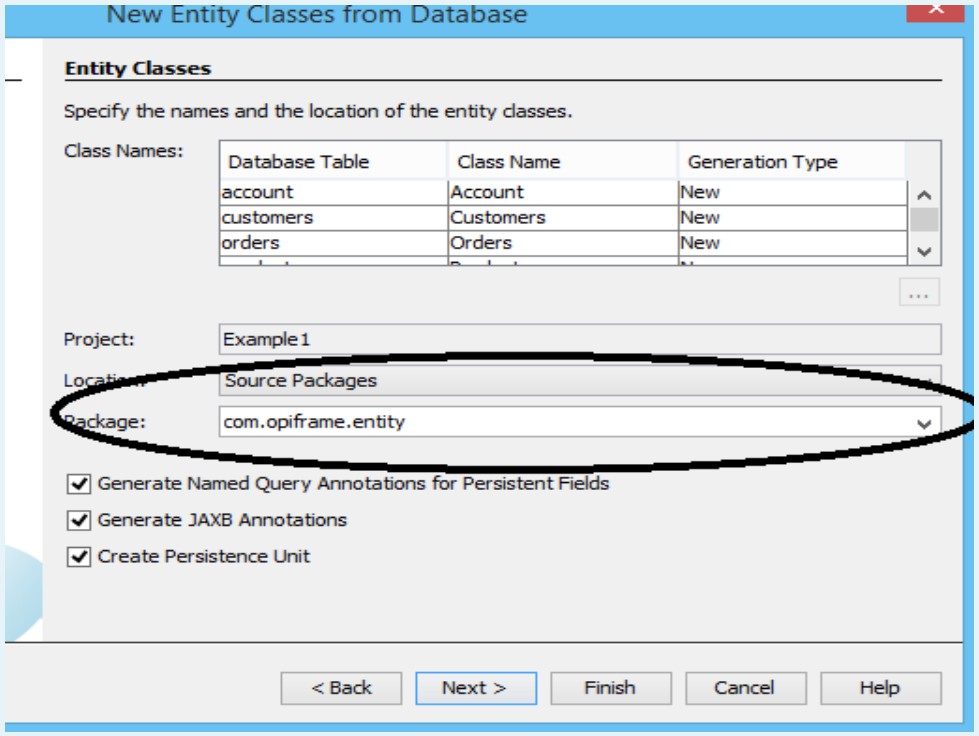
Creating Entitys

- Next press Add all button and press next button



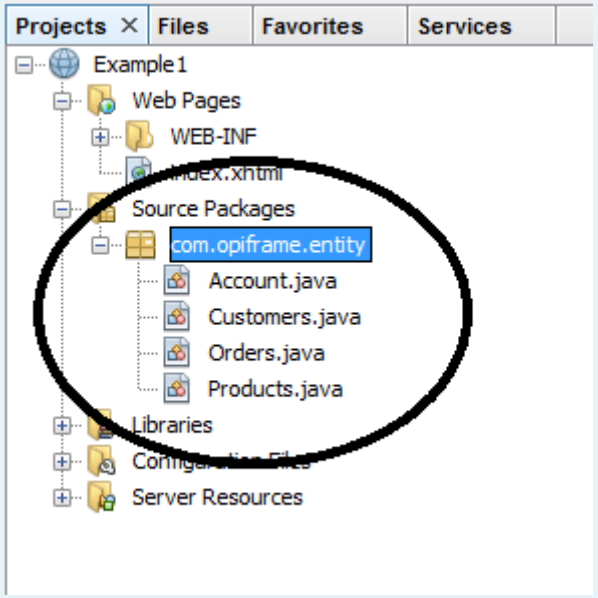
Creating Entitys

- Give some package name for your entity classes and press finsih.



Creating Entitys

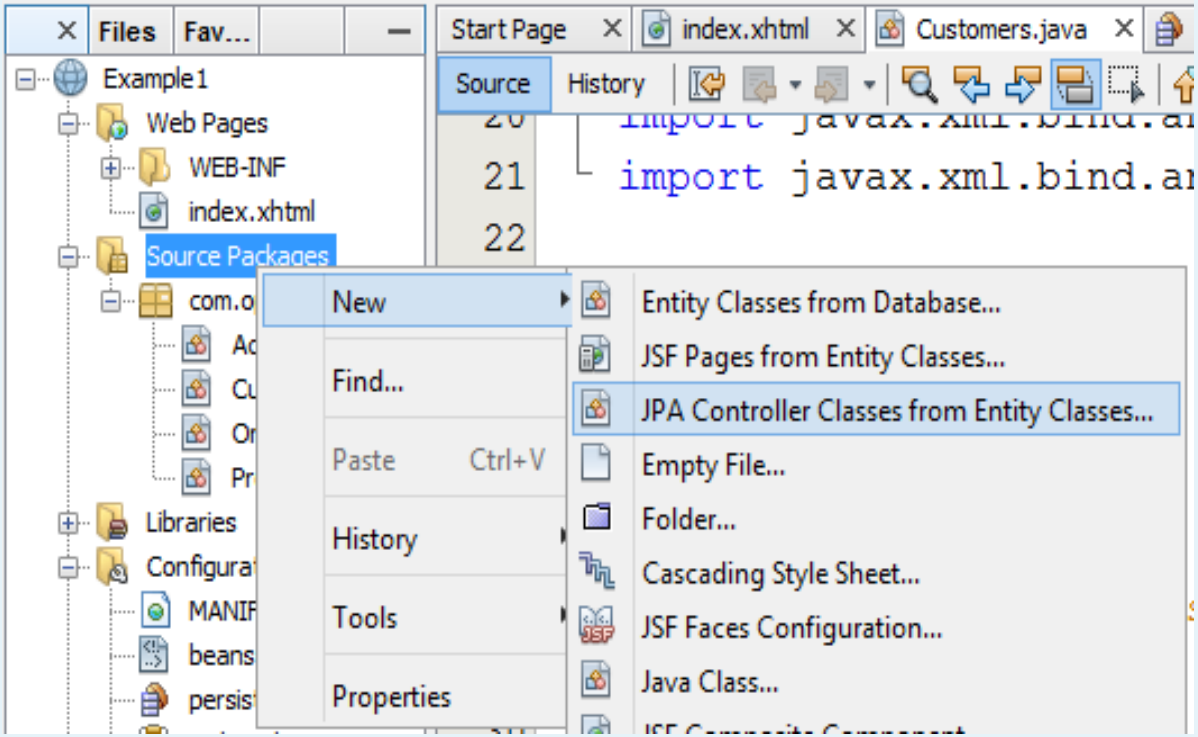
- Now you should have all the entity classes in the package name you defined...



Creating JPA Controller

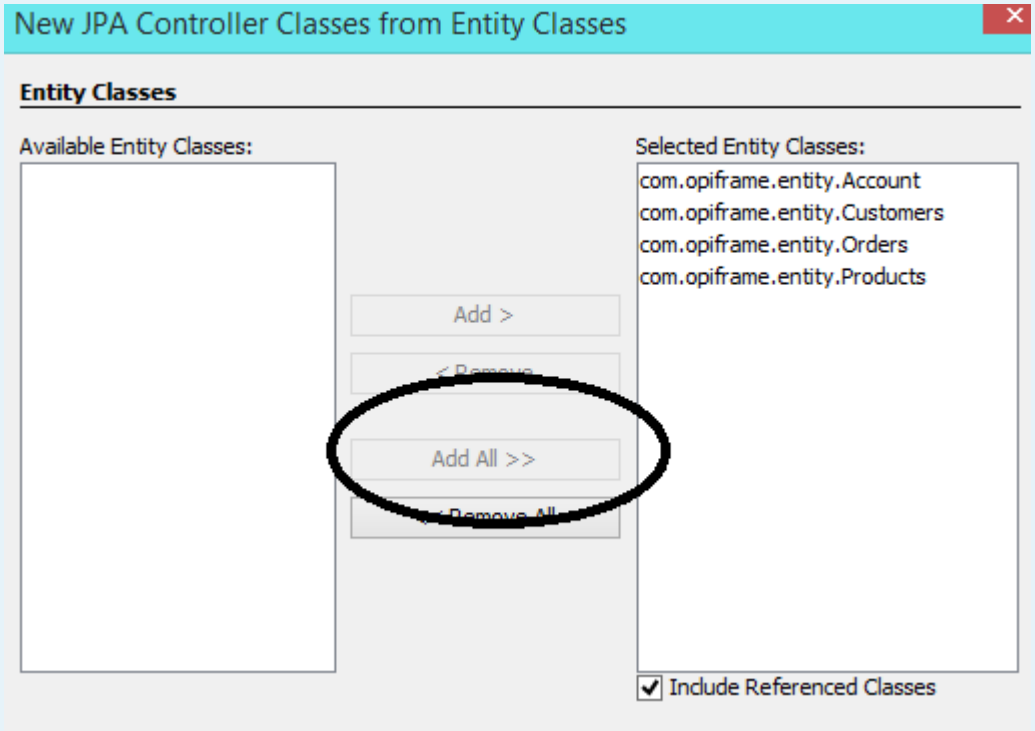
- Next thing to do is to create an JPA controller that actually connects to database and contains all the basic operations so that we can create, delete, update and read from database.
- Click right mouse button over Souorce Packages folder. Select New->JPA Controller Classes from Entity Classes

Creating JPA Controller



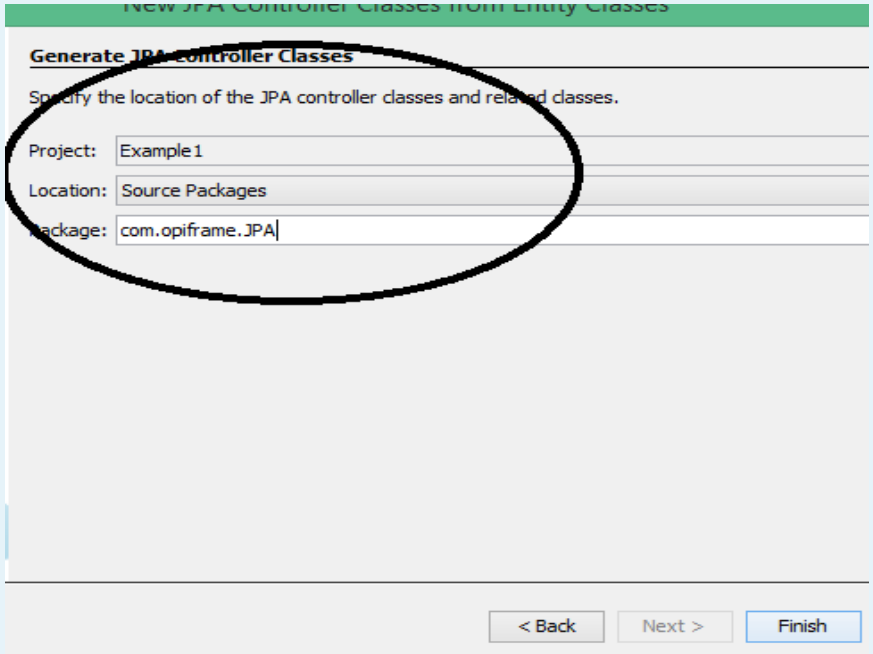
Creating JPA Controller

- From opened window press Add All Button and then next...



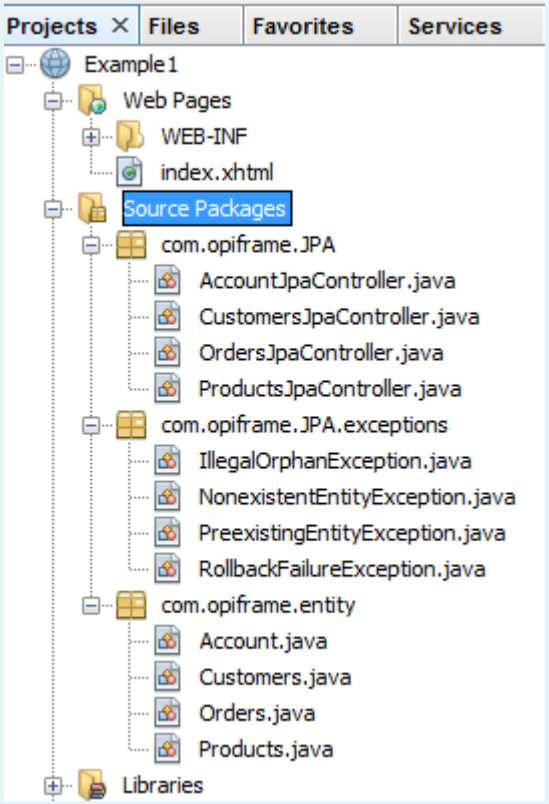
Creating JPA Controller

- Define the package name and press Finsih button...



Creating JPA Controller

- Now you should have following project structure....



JPA Controller

- Now if you open one of the JPA Controllers i.e. CustomersJpaCotnroller.java file you can find the CRUD methods there for customer table operations....

```
public void create(Products products) throws RollbackFailureException,
    EntityManager em = null;
    try {
        utx.begin();
        em = getEntityManager();
        Orders orderId = products.getOrderId();
        if (orderId != null) {
```

JPQL Language

- Now if you open a Customers.java file you can see basic JPQL queries for database table customers

```
@Entity
@Table(name = "customers")
@XmlRootElement
@NamedQueries({
    @NamedQuery(name = "Customers.findAll", query = "SELECT c FROM Customers c"),
    @NamedQuery(name = "Customers.findByCustomerId", query = "SELECT c FROM Customers c WHERE c.customerId =
    @NamedQuery(name = "Customers.findByName", query = "SELECT c FROM Customers c WHERE c.name = :name"),
    @NamedQuery(name = "Customers.findByAddress", query = "SELECT c FROM Customers c WHERE c.address = :addre
    @NamedQuery(name = "Customers.findByEmail", query = "SELECT c FROM Customers c WHERE c.email = :email"),
    @NamedQuery(name = "Customers.findByPhone", query = "SELECT c FROM Customers c WHERE c.phone = :phone")})
```

JPQL Language

- JPQL a.k.a Java Persistence Query Language is language you can use to make queries to database from your application.
- Next slides contains a short tutorial about JPQL language.
- You need to know basic rules of JPQL to make your own custom queries for database.

Query Language Terminology

- **Abstract schema**: The persistent schema abstraction (persistent entities, their state, and their relationships) over which queries operate. The query language translates queries over this persistent schema abstraction into queries that are executed over the database schema to which entities are mapped.

Query Language Terminology

- **Abstract schema type**: The type to which the persistent property of an entity evaluates in the abstract schema. That is, each persistent field or property in an entity has a corresponding state field of the same type in the abstract schema. The abstract schema type of an entity is derived from the entity class and the metadata information provided by Java language annotations.

Query Language Terminology

- **Backus-Naur Form (BNF):** A notation that describes the syntax of high-level languages. The syntax diagrams in this slide set are in BNF notation.

Query Language Terminology

- **Navigation:** The traversal of relationships in a query language expression. The navigation operator is a period.
- **Path expression:** An expression that navigates to a entity's state or relationship field.
- **State field:** A persistent field of an entity.
- **Relationship field:** A persistent field of an entity whose type is the abstract schema type of the related entity.

Creating Queries Using the JPQL

- The EntityManager.createQuery and EntityManager.createNamedQuery methods are used to query the datastore by using Java Persistence query language queries.

Creating Queries Using the JPQL

- The createQuery method is used to create dynamic queries, which are queries defined directly within an application's business logic:

```
public List findWithName(String name) {
return em.createQuery(
    "SELECT c FROM Customer c WHERE c.name LIKE :custName")
    .setParameter("custName", name)
    .setMaxResults(10)
    .getResultList();
}
```

Creating Queries Using the JPQL

- The createNamedQuery method is used to create static queries, or queries that are defined in metadata by using the javax.persistence.NamedQuery annotation.
- The name element of @NamedQuery specifies the name of the query that will be used with the createNamedQuery method.
- The query element of @NamedQuery is the query

Creating Queries Using the JPQL

```
@NamedQuery(
    name="findAllCustomersWithName",
    query="SELECT c FROM Customer c WHERE c.name LIKE :custName"
)
```

Here's an example of `createNamedQuery`, which uses the `@NamedQuery`:

```
@PersistenceContext
public EntityManager em;
...
customers = em.createNamedQuery("findAllCustomersWithName")
    .setParameter("custName", "Smith")
    .getResultList();
```

JPQL

- For more information about JPQL syntax and usage see: JPQL Doc link