Spring Framework 7

Beginner to Guru

Database Relationships

Relational Databases

- JPA is designed to work with relational databases
- Prior to relational databases, data was often stored in flat files which typically were just text files
- Flat files do not have structure or formal rules governing data in them
- E. F. Cobb of IBM originally coined the term “Relational Database” in 1970
- The relational database introduced the concept of storing data in tables and columns
- Complex data can be represented in tables which have relationships
- For example, orders have order lines which have products - 3 tables of data with relationships

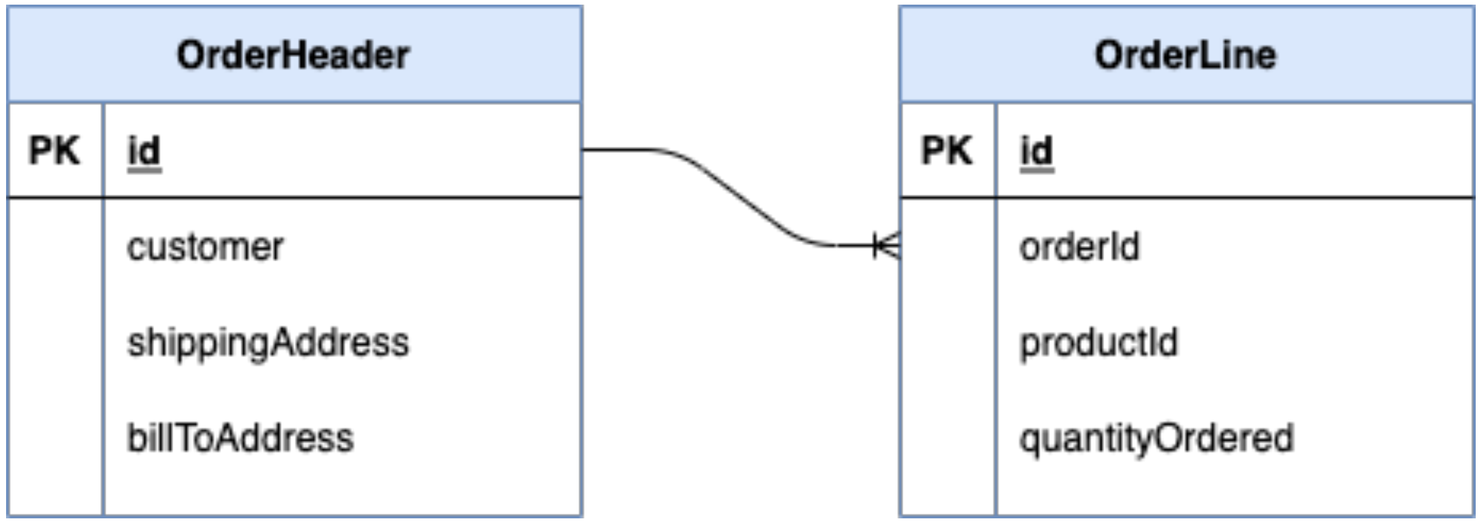
Database Relationships

- **One to One** - Both tables have only one record on each side of the relationship
  - Like an extension of the data row
- **One to Many** - The primary table has one record that relates to zero or many records in the related table
  - An object with a list property
- **Many to Many** - Each record in both tables may be related to zero or many records in the related table
  - Two lists, related to each other

Database Constraints

- Best practice is to use database constraints to enforce relationships
- **One to One** - Both tables can share the primary key value, or one table can have its own primary key and unique key on id column of related table
- **One to Many** - The related table has column for primary key of primary table, with foreign key constraint
- **Many to Many** - Join table is used with composite primary key consisting of the primary key values of related tables, with foreign key constraints

One to Many


OrderHeader
PK
id
customer
shippingAddress
billToAddress
OrderLine
PK
id
orderId
productId
quantityOrdered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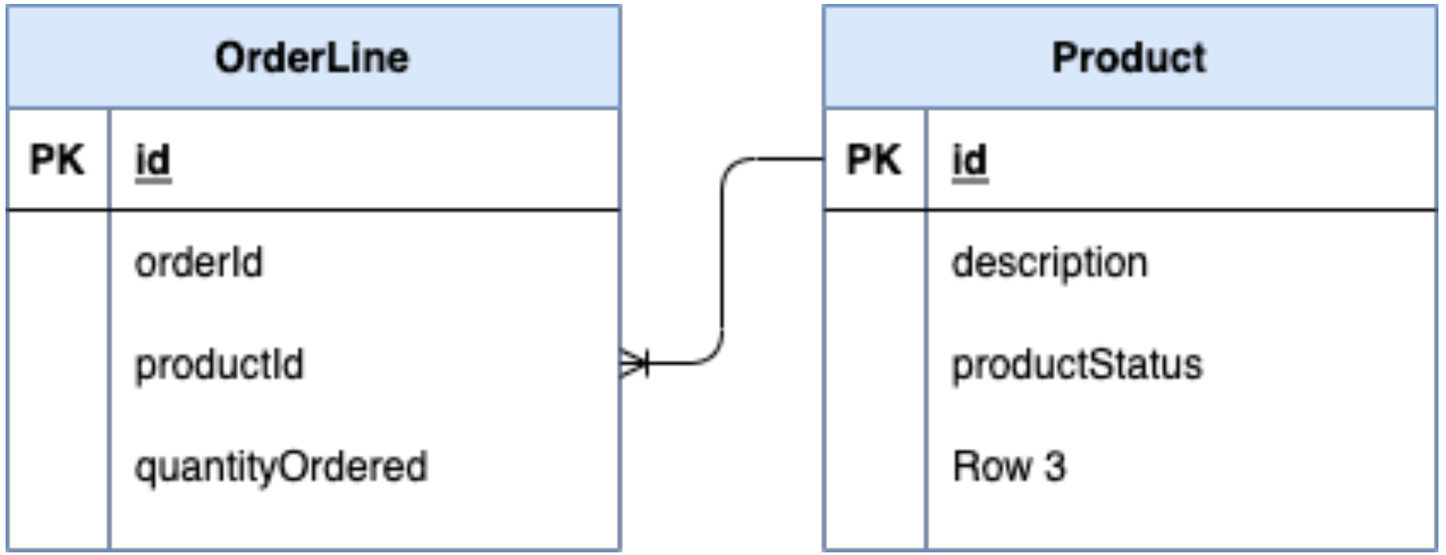
Many to One


OrderLine
PK
id
orderId
productId
quantityOrdered
Product
PK
id
description
productStatus
Row 3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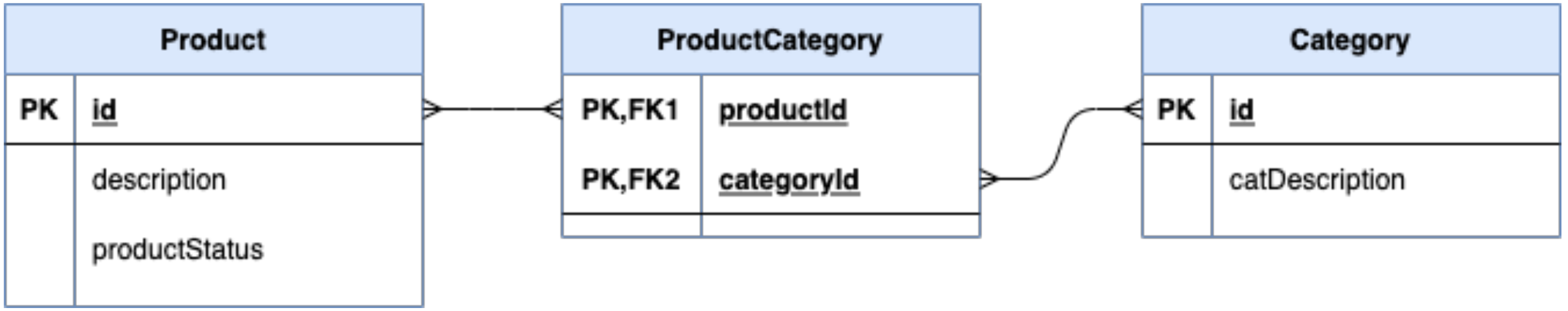
Many to Many


Product
PK
id
description
productStatus
ProductCategory
PK,FK1
productId
PK,FK2
categoryId
Category
PK
id
catDescription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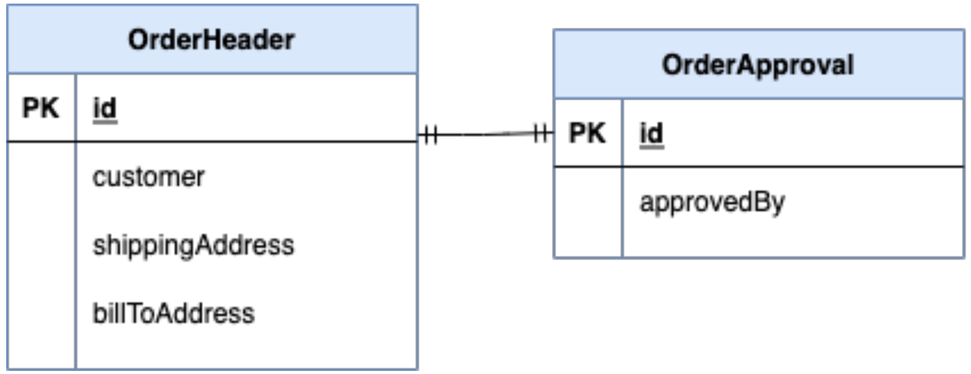
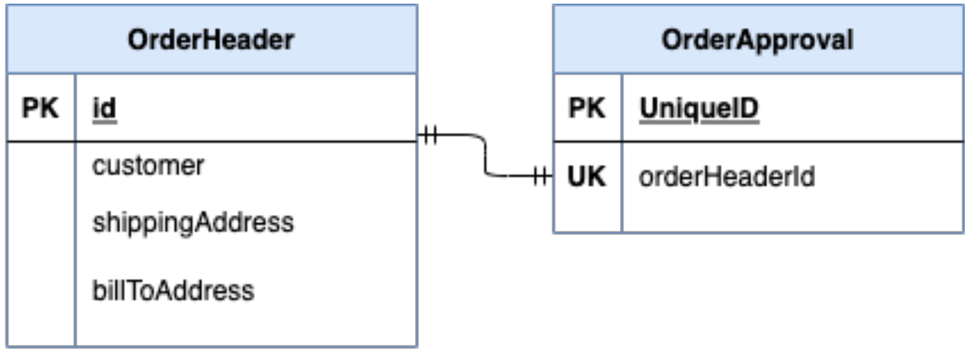
One to One


OrderHeader
PK
id
customer
shippingAddress
billToAddress
OrderApproval
PK
id
approvedBy


OrderHeader
PK
id
customer
shippingAddress
billToAddress
OrderApproval
PK
UniqueID
UK
orderHeaderId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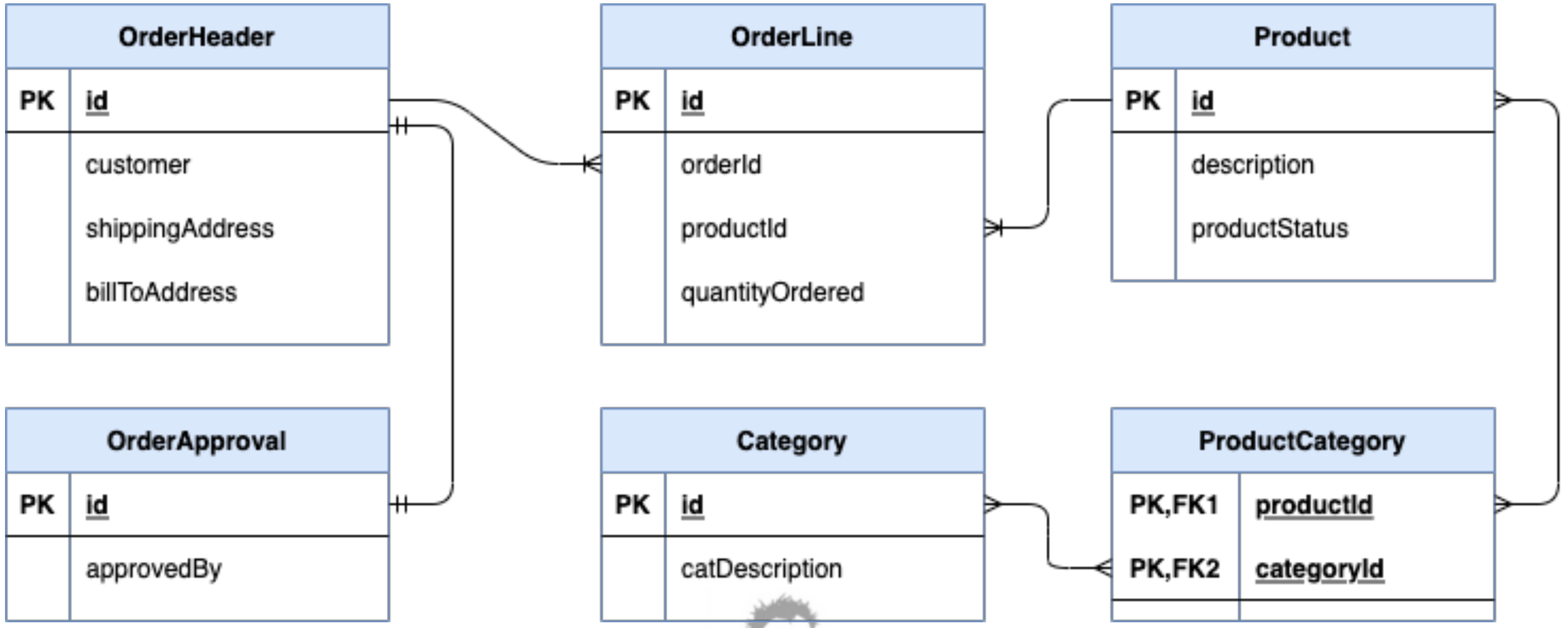
Complete Example



Relationship Direction

- **Bi-Directional** - Relationship can be accessed from either side of the relationship
  - Example OrderHeader and OrderLine - likely needed from either side
- **Uni-Directional** - Relationship can be access from either side of the relationship
  - Example OrderLine and Product - unlikely you will need to access Order Lines from Product
  - The Product entity does not have a reference to OrderLine

Cascade Operations

- Hibernate has the ability to Cascade persistence operations
- Example - A delete of just Order Header would fail on foreign key constraints to OrderLine and OrderApproval
  - Explicitly, you would need to perform deletes of the child records first
  - Optionally, Hibernate can be configured to delete OrderLines and OrderApproval before deleting the OrderHeader
- Use with caution - you would not wish to delete Product records on delete for OrderLine

Foreign Key Declaration

- JPA does have a **`@ForeignKey`** annotation
- This is meta-data information only.
- Hibernate will reference this for schema generation only
- It is not enforced nor generated if missing
- When using schema migration tools like Liquibase or Flyway it is not needed

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