README.MD

Hibernate

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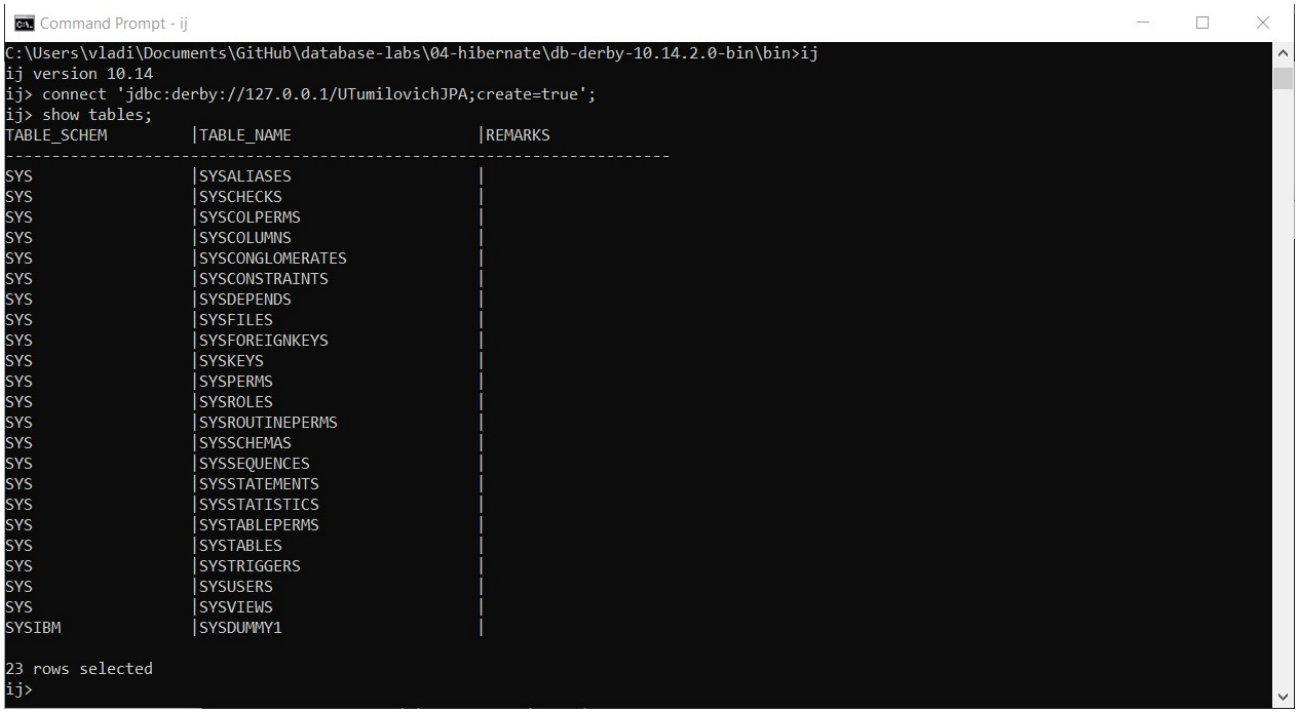
Sprawozdanie

Zadanie II. Basics

a) Został uruchomiony serwer Derby. W konsli ij zostało wywołano polecenie *connect 'jdbc:derby://127.0.0.1/UTumilovichJPA;create=true';* oraz *show tables;*



b) Został stworzony projekt Javowy o nazwie UTumilovichJPAPractice w Intellij

c) Została stworzona klasa Product z polami *ProductName* oraz *UnitsOnStock*. Dodatkowo zostały dołączone potrzebujące Jar-ki dla uruchomienia projektu.

```
@Entity
public class Product {
    @Id
    @GeneratedValue(strategy = GenerationType.AUTO)
    public int productId;
    public String productName;
    public int unitsOnStock;

    public Product() {
    }

    public Product(String productName, int unitsOnStock) {
        this.productName = productName;
        this.unitsOnStock = unitsOnStock;
    }
}
```

d) Zostały uzupełnione potrzebne property w konfiguracji hibernate'a

```
<?xml version='1.0' encoding='utf-8'?>
<!DOCTYPE hibernate-configuration PUBLIC
        "-//Hibernate/Hibernate Configuration DTD//EN"
        "http://www.hibernate.org/dtd/hibernate-configuration-3.0.dtd">
<hibernate-configuration>
    <session-factory>
        <property name="connection.url">jdbc:derby://127.0.0.1/UTumilovichJPA</property>
        <property name="connection.driver_class">org.apache.derby.jdbc.ClientDriver</property>
        <property name="dialect">org.hibernate.dialect.DerbyTenSevenDialect</property>
        <property name="format_sql">true</property>
        <property name="show_sql">true</property>
        <property name="use_sql_comments">true</property>
        <!-- DB schema will be updated if needed -->
        <property name="hibernate.hbm2ddl.auto">update</property>
        <mapping class="Product"></mapping>
    </session-factory>
</hibernate-configuration>
```

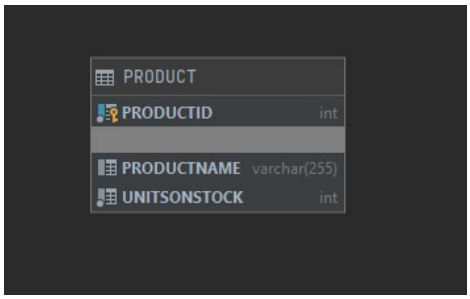
Zadanie III

a) Został stworzony i dodany do bazy przykładowy produkt w metodzie *main* klasy **Main**

```
public class Main {
    private static final SessionFactory ourSessionFactory;

    static {
        try {
            Configuration configuration = new Configuration();
            configuration.configure();

            ourSessionFactory = configuration.buildSessionFactory();
        } catch (Throwable ex) {
            throw new ExceptionInInitializerError(ex);
        }
    }

    public static Session getSession() throws HibernateException {
        return ourSessionFactory.openSession();
    }

    public static void main(final String[] args) throws Exception {
        final Session session = getSession();

        Transaction transaction = session.beginTransaction();
        session.save(new Product("Laptop", 100));
        transaction.commit();

        try {
            System.out.println("querying all the managed entities...");
            final Metamodel metamodel = session.getSessionFactory().getMetamodel();
            for (EntityType<?> entityType : metamodel.getEntities()) {
                final String entityName = entityType.getName();
                final Query query = session.createQuery("from " + entityName);
                System.out.println("executing: " + query.getQueryString());
                for (Object o : query.list()) {
                    System.out.println("  " + o);
                }
            }
        } finally {
            session.close();
        }
    }
}
```

b) Rezultaty działania programu:

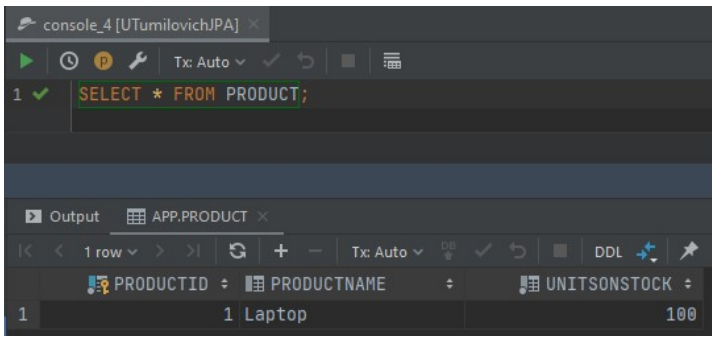
- Schemat bazy danych



- Definicja tabeli *Product* w bazie

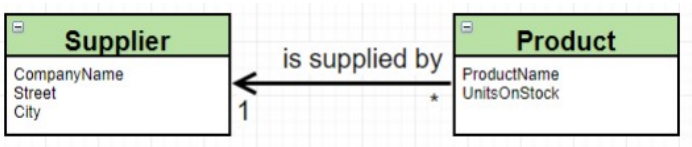
```
-- auto-generated definition
create table PRODUCT
(
    PRODUCTID    INTEGER not null
        primary key,
    PRODUCTNAME  VARCHAR(255),
    UNITSONSTOCK INTEGER not null
);
```

- Select z tabeli *Product*



Zadanie IV

Został zmodyfikowany model wprowadzeniem pojęcia Dostawcy ja poniżej:



a) Najpierw została stworzona klasa **Supplier** z polami *supplierId*, *companyName*, *street*, *city*

```
@Entity
public class Supplier {
    @Id
    @GeneratedValue(strategy = GenerationType.AUTO)
    private int supplierId;
    private String companyName;
    private String street;
    private String city;

    public Supplier() {
    }

    public Supplier(String companyName, String street, String city) {
        this.companyName = companyName;
        this.street = street;
        this.city = city;
    }
}
```

b) Dalej została zmodyfikowana klasa **Product** dodaniem nowego pola *supplier* oraz dodatkowymi konstruktorami i metodą *setSupplier*

```
@Entity
public class Product {
    @Id
    @GeneratedValue(strategy = GenerationType.AUTO)
    private int productId;
    private String productName;
    private int unitsOnStock;

    @ManyToOne
    private Supplier supplier;

    public Product() {
    }

    public Product(String productName, int unitsOnStock) {
        this.productName = productName;
        this.unitsOnStock = unitsOnStock;
    }

    public void setSupplier(Supplier supplier) {
        this.supplier = supplier;
    }
}
```

c) Następnie do pliku konfiguracyjnego został dodany atrybut *mapping* po klasie **Supplier**

```
<?xml version='1.0' encoding='utf-8'?>
<!DOCTYPE hibernate-configuration PUBLIC
        "-//Hibernate/Hibernate Configuration DTD//EN"
        "http://www.hibernate.org/dtd/hibernate-configuration-3.0.dtd">
<hibernate-configuration>
    <session-factory>
        <property name="connection.url">jdbc:derby://127.0.0.1/UTumilovichJPA</property>
        <property name="connection.driver_class">org.apache.derby.jdbc.ClientDriver</property>
        <property name="dialect">org.hibernate.dialect.DerbyTenSevenDialect</property>
        <property name="format_sql">true</property>
        <property name="show_sql">true</property>
        <property name="use_sql_comments">true</property>
        <!-- DB schema will be updated if needed -->
        <property name="hibernate.hbm2ddl.auto">update</property>
        <mapping class="Product"></mapping>
        <mapping class="Supplier"></mapping>
    </session-factory>
</hibernate-configuration>
```

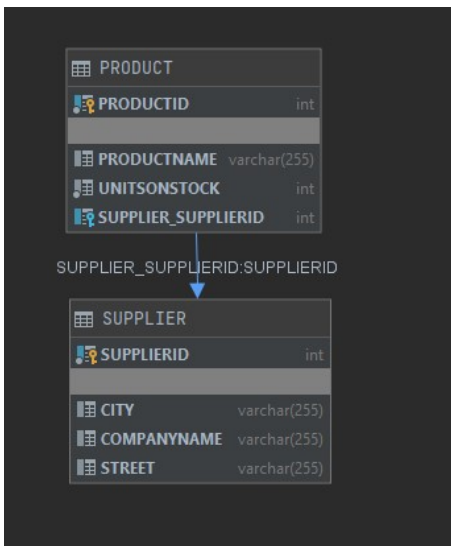
d) Na koniec została zmodyfikowana metoda *main* klasy **Main** na dodanie nowego dostawcy oraz połączenie pola *supplier* istniejącego produktu z dodanym dostawcą

```
public class Main {
    private static final SessionFactory ourSessionFactory;

    static {
        try {
            Configuration configuration = new Configuration();
            configuration.configure();

            ourSessionFactory = configuration.buildSessionFactory();
        } catch (Throwable ex) {
            throw new ExceptionInInitializerError(ex);
        }
    }

    public static Session getSession() throws HibernateException {
        return ourSessionFactory.openSession();
    }
```

```
    public static void main(final String[] args) throws Exception {
        final Session session = getSession();

        Transaction transaction = session.beginTransaction();
        Product product = session.get(Product.class, 1);
        Supplier supplier = new Supplier("Supplier", "Somewhere", "Anywhere");
        product.setSupplier(supplier);
        session.save(supplier);
        session.save(product);
        transaction.commit();

        try {
            System.out.println("querying all the managed entities...");
            final Metamodel metamodel = session.getSessionFactory().getMetamodel();
            for (EntityType<?> entityType : metamodel.getEntities()) {
                final String entityName = entityType.getName();
                final Query query = session.createQuery("from " + entityName);
                System.out.println("executing: " + query.getQueryString());
                for (Object o : query.list()) {
                    System.out.println("  " + o);
                }
            }
        } finally {
            session.close();
        }
    }
}
```

e) Rezultaty działania programu:

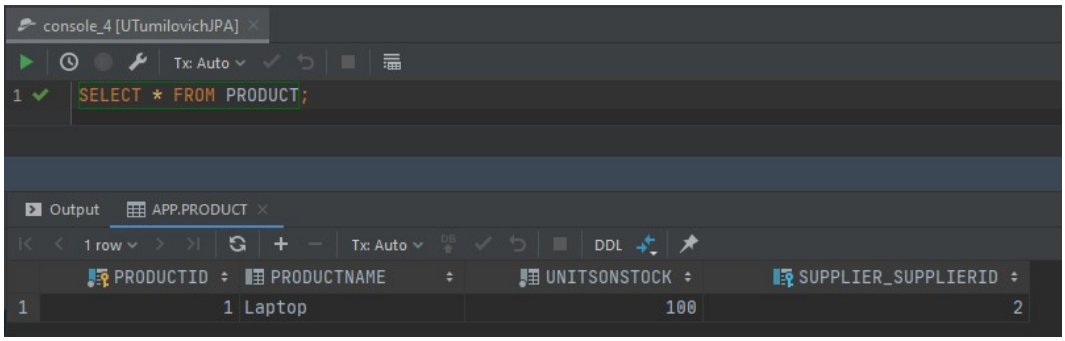
- Schemat bazy danych



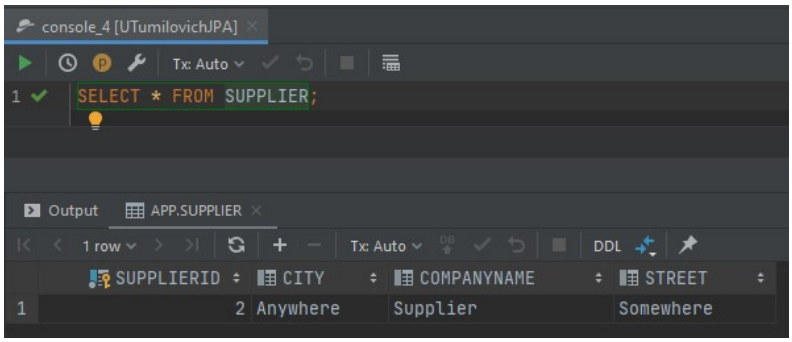
- Definicja tabeli *Supplier* w bazie

```
-- auto-generated definition
create table SUPPLIER
(
    SUPPLIERID  INTEGER not null
        primary key,
    CITY        VARCHAR(255),
    COMPANYNAME VARCHAR(255),
    STREET      VARCHAR(255)
);
```

- Select z tabeli *Product*



- Select z tabeli *Supplier*



Zadanie V

Relacja została odwrócona zgodnie z poniższym schematem

Z tabelą łącznikową

a) Pole *supplier* oraz wszystkie konstruktory i metody związane z tym polem zostały usunięte z klasy **Product**

```
@Entity
public class Product {
    @Id
    @GeneratedValue(strategy = GenerationType.AUTO)
    private int productId;
    private String productName;
    private int unitsOnStock;

    public Product() {
    }

    public Product(String productName, int unitsOnStock) {
        this.productName = productName;
        this.unitsOnStock = unitsOnStock;
    }
}
```

b) Dalej w klasie **Supplier** dodano pole *Set products*, dodatkowy konstruktor oraz metoda *addProduct*

```
@Entity
public class Supplier {
    @Id
```

```
    @GeneratedValue(strategy = GenerationType.AUTO)
    private int supplierId;
    private String companyName;
    private String street;
    private String city;

    @OneToMany
    private final Set<Product> products = new HashSet<>();

    public Supplier() {
    }

    public Supplier(String companyName, String street, String city) {
        this.companyName = companyName;
        this.street = street;
        this.city = city;
    }

    public void addProduct(Product product) {
        this.products.add(product);
    }
}
```

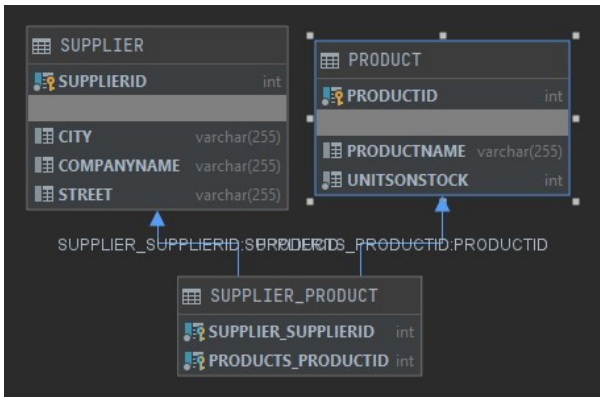
c) Na koniec została zmieniona metoda *main* klasy **Main**

```
public class Main {
    private static final SessionFactory ourSessionFactory;

    static {
        try {
            Configuration configuration = new Configuration();
            configuration.configure();

            ourSessionFactory = configuration.buildSessionFactory();
        } catch (Throwable ex) {
            throw new ExceptionInInitializerError(ex);
        }
    }

    public static Session getSession() throws HibernateException {
        return ourSessionFactory.openSession();
    }

    public static void main(final String[] args) {
        final Session session = getSession();

        Transaction transaction = session.beginTransaction();

        Product product1 = new Product("Filter", 23);
        Product product2 = new Product("Papier", 34);
        Product product3 = new Product("Kubek", 65);

        Supplier supplier = new Supplier("Supplier", "Somewhere", "Anywhere");

        supplier.addProduct(product1);
        supplier.addProduct(product2);
        supplier.addProduct(product3);

        session.save(product1);
        session.save(product2);
        session.save(product3);
        session.save(supplier);

        transaction.commit();

        try {
            System.out.println("querying all the managed entities...");
            final Metamodel metamodel = session.getSessionFactory().getMetamodel();
            for (EntityType<?> entityType : metamodel.getEntities()) {
                final String entityName = entityType.getName();
```

```
                final Query query = session.createQuery("from " + entityName);
                System.out.println("executing: " + query.getQueryString());
                for (Object o : query.list()) {
                    System.out.println("  " + o);
                }
            }
        } finally {
            session.close();
        }
    }
}
```

d) Rezultaty działania programu:

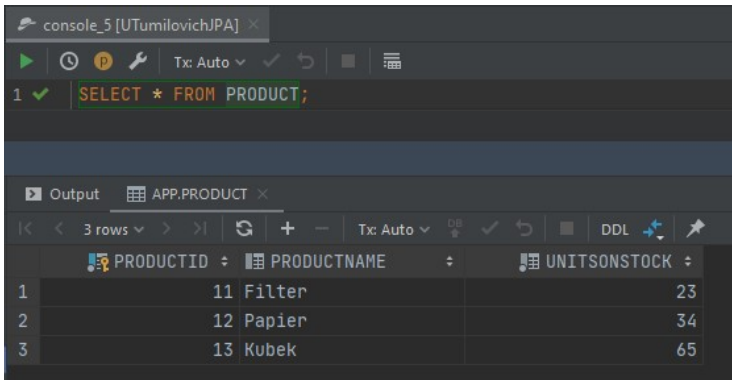
- Schemat bazy danych



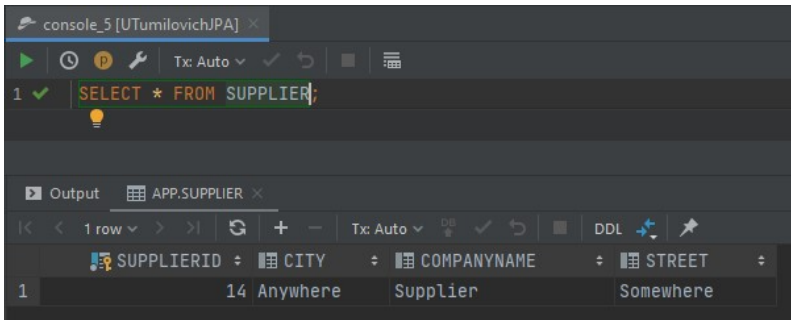
- Definicja tabeli *Supplier_Product* w bazie

```
-- auto-generated definition
create table SUPPLIER_PRODUCT
(
    SUPPLIER_SUPPLIERID INTEGER not null
        constraint FK24J3KWMOYSJ1J4X3TDHPANE6G
            references SUPPLIER,
    PRODUCTS_PRODUCTID  INTEGER not null
        unique
        constraint FKKQ9CRHXKU499AK5YBE26S8WK4
            references PRODUCT,
    primary key (SUPPLIER_SUPPLIERID, PRODUCTS_PRODUCTID)
);
```

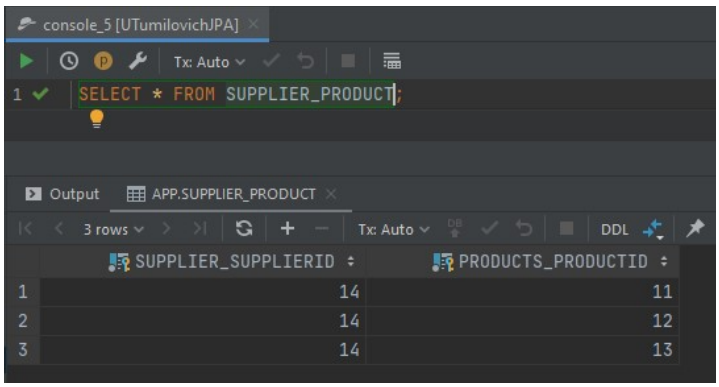
- Select z tabeli *Product*



- Select z tabeli *Supplier*



- Select z tabeli *Supplier_Product*



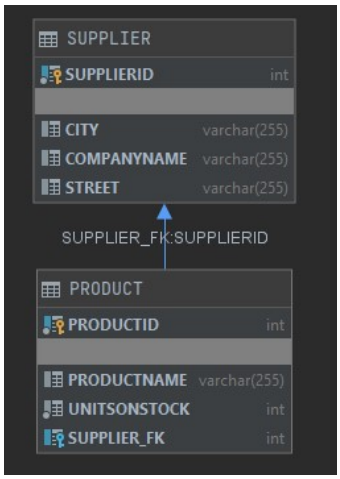
Bez tabeli łącznikowej

e) Została zmodyfikowana klasa **Supplier** dodaniem *@JoinColumn(name="Supplier_FK")*

```
@Entity
public class Supplier {
    @Id
    @GeneratedValue(strategy = GenerationType.AUTO)
    private int supplierId;
    private String companyName;
    private String street;
    private String city;

    @OneToMany
    @JoinColumn(name="Supplier_FK")
    private final Set<Product> products = new HashSet<>();

    public Supplier() {
    }

    public Supplier(String companyName, String street, String city) {
        this.companyName = companyName;
        this.street = street;
        this.city = city;
    }

    public void addProduct(Product product) {
        this.products.add(product);
    }
}
```

f) Rezultaty działania programu:

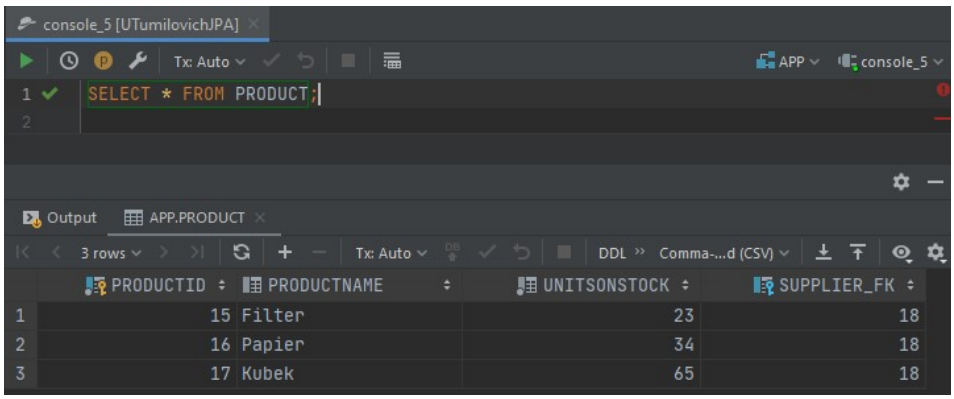
- Schemat bazy danych



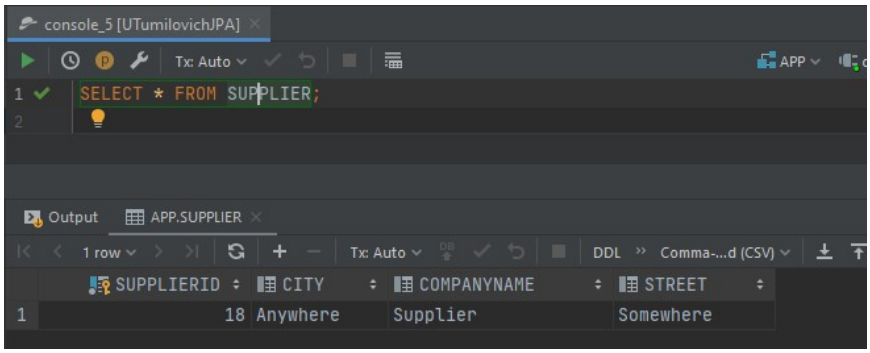
- Definicja bazy:

```
create table SUPPLIER
(
    SUPPLIERID  INTEGER not null
        primary key,
    CITY        VARCHAR(255),
    COMPANYNAME VARCHAR(255),
    STREET      VARCHAR(255)
);

create table PRODUCT
(
    PRODUCTID    INTEGER not null
        primary key,
    PRODUCTNAME  VARCHAR(255),
    UNITSONSTOCK INTEGER not null,
    SUPPLIER_FK  INTEGER
        constraint FKVE96QACVSR1A50RGWL94ENRU
            references SUPPLIER
);
```

- Select z tabeli *Product*

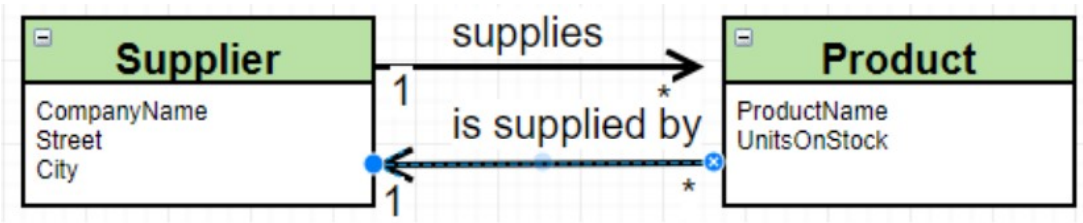


- Select z tabeli *Supplier*



Zadanie VI

Została umodelowana relacja dwustronna jak poniżej:



a) Została zmodyfikowana klasa **Product** dodaniem metody *setSupplier*, która dodaje dostawca do tabeli Products oraz produkt do tabeli Supplier, jeśli jeszcze nie był dodany

```
@Entity
public class Product {
    @Id
    @GeneratedValue(strategy = GenerationType.AUTO)
    private int productId;
    private String productName;
    private int unitsOnStock;

    @ManyToOne
    @JoinColumn(name="Supplier_FK")
    private Supplier supplier;

    public Product() {
    }

    public Product(String productName, int unitsOnStock) {
        this.productName = productName;
        this.unitsOnStock = unitsOnStock;
    }

   public void setSupplier(Supplier supplier) {
        this.supplier = supplier;
        if (!supplier.getProducts().contains(this)) {
            supplier.addProduct(this);
        }
    }
}
```

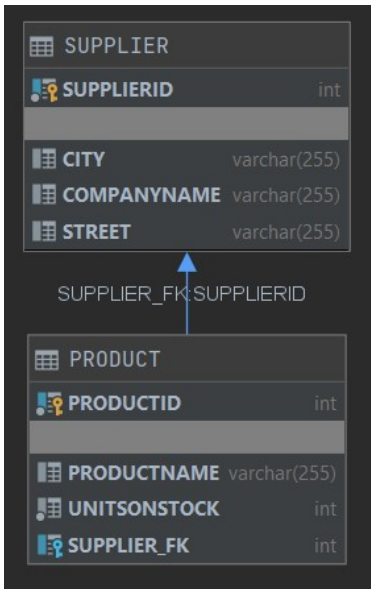
b) Dodatkowo została zmodyfikowana klasa **Supplier**, modyfikowaniem metody *addProduct* oraz dodaniem metody *getProducts*, która zwraca listę produktów

```
@Entity
public class Supplier {
    @Id
    @GeneratedValue(strategy = GenerationType.AUTO)
    private int supplierId;
    private String companyName;
    private String street;
```

```
    private String city;

    @OneToMany
    @JoinColumn(name="Supplier_FK")
    private final Set<Product> products = new HashSet<>();

    public Supplier() {
    }

    public Supplier(String companyName, String street, String city) {
        this.companyName = companyName;
        this.street = street;
        this.city = city;
    }

    public Set<Product> getProducts() {
        return products;
    }

    public void addProduct(Product product) {
        this.products.add(product);
        product.setSupplier(this);
    }
}
```

c) Rezultaty działania programu:

- Schemat bazy danych

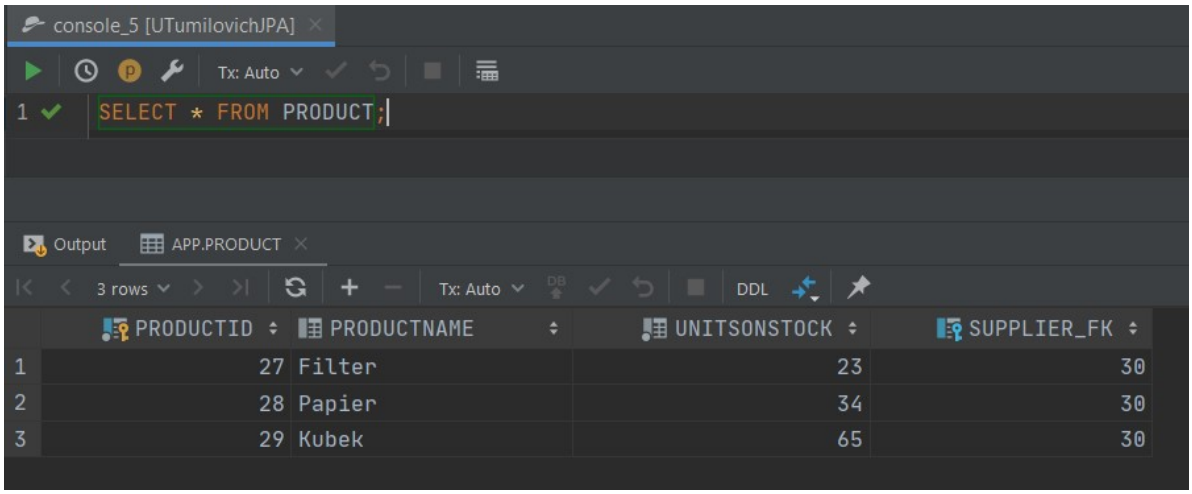


- Definicja bazy:

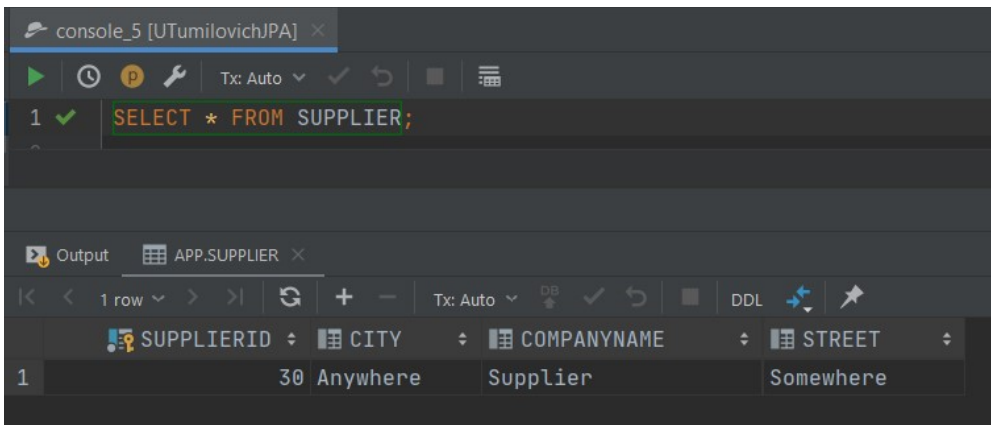
```
create table SUPPLIER
(
    SUPPLIERID  INTEGER not null
        primary key,
    CITY        VARCHAR(255),
    COMPANYNAME VARCHAR(255),
    STREET      VARCHAR(255)
);

create table PRODUCT
(
    PRODUCTID    INTEGER not null
        primary key,
    PRODUCTNAME  VARCHAR(255),
    UNITSONSTOCK INTEGER not null,
    SUPPLIER_FK  INTEGER
```

```
        constraint FKVE96QACVSR1A50RGWL94ENRU
            references SUPPLIER
);
```

- Select z tabeli *Product*



- Select z tabeli *Supplier*



Zadanie VII

a) Została dodana klasa **Category** z property *int categoryId*, *String name* oraz listą produktów *List products*

```
@Entity
public class Category {
    @Id
    @GeneratedValue(strategy = GenerationType.AUTO)
    private int categoryId;
    private String name;

    @OneToMany
    @JoinColumn(name="Category_FK")
    private final List<Product> products = new ArrayList<>();

    public Category() {
    }

    public Category(String name) {
        this.name = name;
    }

    public String getName() {
        return name;
    }
```

```
    public List<Product> getProducts() {
        return products;
    }

    public void addProduct(Product product){
        this.products.add(product);
        product.setCategory(this);
    }
}
```

b) Został zmodyfikowany plik konfiguracyjny, dodaniem klasy **Category** do mapy

```
<?xml version='1.0' encoding='utf-8'?>
<!DOCTYPE hibernate-configuration PUBLIC
        "-//Hibernate/Hibernate Configuration DTD//EN"
        "http://www.hibernate.org/dtd/hibernate-configuration-3.0.dtd">
<hibernate-configuration>
    <session-factory>
        <property name="connection.url">jdbc:derby://127.0.0.1/UTumilovichJPA</property>
        <property name="connection.driver_class">org.apache.derby.jdbc.ClientDriver</property>
        <property name="dialect">org.hibernate.dialect.DerbyTenSevenDialect</property>
        <property name="format_sql">true</property>
        <property name="show_sql">true</property>
        <property name="use_sql_comments">true</property>
        <!-- DB schema will be updated if needed -->
        <property name="hibernate.hbm2ddl.auto">update</property>
        <mapping class="Product"></mapping>
        <mapping class="Supplier"></mapping>
        <mapping class="Category"></mapping>
    </session-factory>
</hibernate-configuration>
```

c) Następnie została zmodyfikowana klasa **Product**, dodaniem pola *supplier* oraz wspomagających metod seterów i geterów

```
@Entity
@Entity
public class Product {
    @Id
    @GeneratedValue(strategy = GenerationType.AUTO)
    private int productId;
    private String productName;
    private int unitsOnStock;

    @ManyToOne
    @JoinColumn(name="Supplier_FK")
    private Supplier supplier;

    @ManyToOne
    @JoinColumn(name="Category_FK")
    private Category category;

    public Product() {
    }

    public Product(String productName, int unitsOnStock) {
        this.productName = productName;
        this.unitsOnStock = unitsOnStock;
    }

    public String getProductName() {
        return productName;
    }

    public void setSupplier(Supplier supplier) {
        this.supplier = supplier;
        if (!supplier.getProducts().contains(this)) {
            supplier.addProduct(this);
        }
```

```
    }

    public Category getCategory() {
        return category;
    }

    public void setCategory(Category category) {
        this.category = category;
        if (!category.getProducts().contains(this)) {
            category.addProduct(this);
        }
    }
}
```

d) Na koniec została zmodyfikowana metoda *main* oraz dodane metody *printCategoryProducts* i *printProductCategory* klasy **Main**, dla testowania poprawności działania programu

```
public class Main {
    private static final SessionFactory ourSessionFactory;

    static {
        try {
            Configuration configuration = new Configuration();
            configuration.configure();

            ourSessionFactory = configuration.buildSessionFactory();
        } catch (Throwable ex) {
            throw new ExceptionInInitializerError(ex);
        }
    }

    public static Session getSession() throws HibernateException {
        return ourSessionFactory.openSession();
    }

    private static void printCategoryProducts(int categoryId) {
        Category category = getSession().get(Category.class, categoryId);
        System.out.println(category.getName() + " product list:");
        for (Product product: category.getProducts()) {
            System.out.println(product.getProductName());
        }
    }

    private static void printProductCategory(int productId) {
        Product product = getSession().get(Product.class, productId);
        System.out.println("Product: " + product.getProductName() + ", Category: " + product.getCategory().getName());
    }

    public static void main(final String[] args) {
        final Session session = getSession();

        Transaction transaction = session.beginTransaction();

        // Adding category to existing products
        Category category1 = new Category("Other");
        Product product1 = session.get(Product.class, 37);
        Product product2 = session.get(Product.class, 38);
        Product product3 = session.get(Product.class, 39);

        category1.addProduct(product1);
        category1.addProduct(product2);
        category1.addProduct(product3);

        session.save(product1);
        session.save(product2);
        session.save(product3);
        session.save(category1);

        // Creating new products, suppliers and categories
```

```
        Product newProduct1 = new Product("Banana", 43);
        Product newProduct2 = new Product("Orange", 54);
        Product newProduct3 = new Product("Lemon", 23);
        Supplier newSupplier = new Supplier("FoodCompany", "Budryka", "Kraków");
        Category newCategory = new Category("Fruits");

        newSupplier.addProduct(newProduct1);
        newSupplier.addProduct(newProduct2);
        newSupplier.addProduct(newProduct3);

        newCategory.addProduct(newProduct1);
        newCategory.addProduct(newProduct2);
        newCategory.addProduct(newProduct3);

        session.save(newProduct1);
        session.save(newProduct2);
        session.save(newProduct3);
        session.save(newSupplier);
        session.save(newCategory);

        printCategoryProducts(41);
        printProductCategory(37);

        transaction.commit();

        try {
            System.out.println("querying all the managed entities...");
            final Metamodel metamodel = session.getSessionFactory().getMetamodel();
            for (EntityType<?> entityType : metamodel.getEntities()) {
                final String entityName = entityType.getName();
                final Query query = session.createQuery("from " + entityName);
                System.out.println("executing: " + query.getQueryString());
                for (Object o : query.list()) {
                    System.out.println("  " + o);
                }
            }
        } finally {
            session.close();
        }
    }
}
```

c) Rezultaty działania programu:

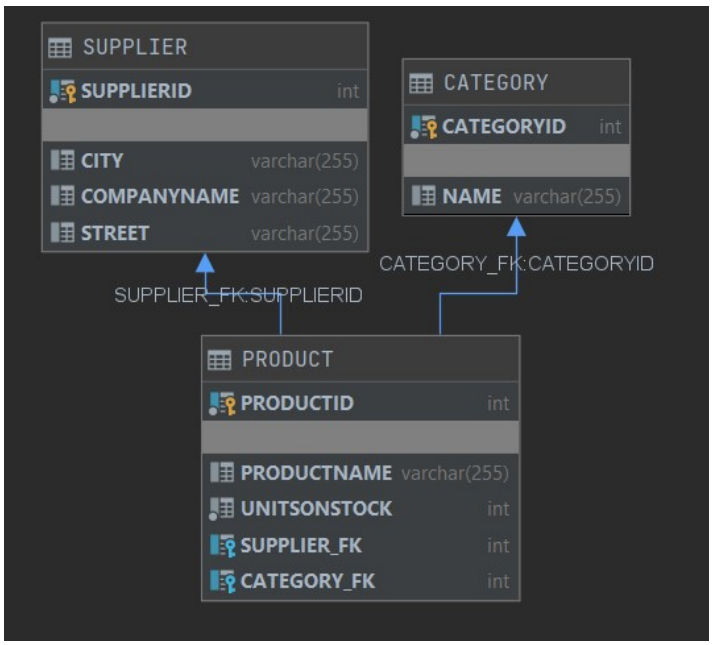
- Rezultat wypisania listy produktów podanej kategorii:

```
Other product list:
Hibernate:
    select
        products0_.Category_FK as category4_1_0_,
        products0_.productId as producti1_1_0_,
        products0_.productId as producti1_1_1_,
        products0_.Category_FK as category4_1_1_,
        products0_.productName as productn2_1_1_,
        products0_.Supplier_FK as supplier5_1_1_,
        products0_.unitsOnStock as unitsons3_1_1_,
        supplier1_.supplierId as supplier1_2_2_,
        supplier1_.city as city2_2_2_,
        supplier1_.companyName as companyn3_2_2_,
        supplier1_.street as street4_2_2_
    from
        Product products0_
    left outer join
        Supplier supplier1_
            on products0_.Supplier_FK=supplier1_.supplierId
    where
        products0_.Category_FK=?
Filter
Papier
Kubek
```

- Rezultat wypisania nazwy kategorii dla podanego produktu:

```
Product: Filter, Category: Other
```

- Schemat bazy danych

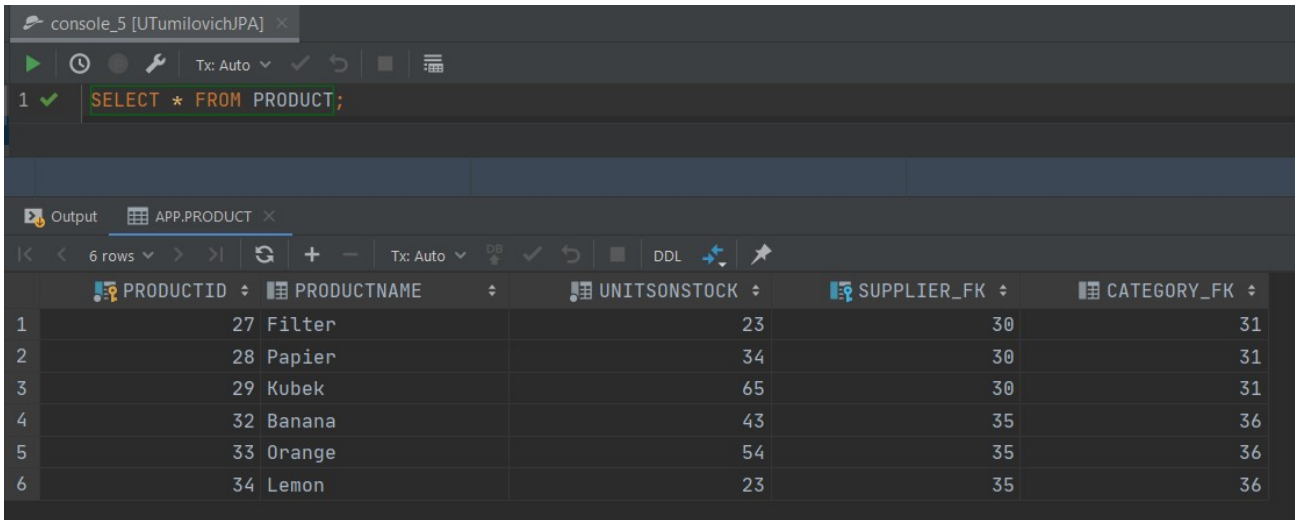


- Definicja bazy:

```
create table CATEGORY
(
    CATEGORYID INTEGER not null
```

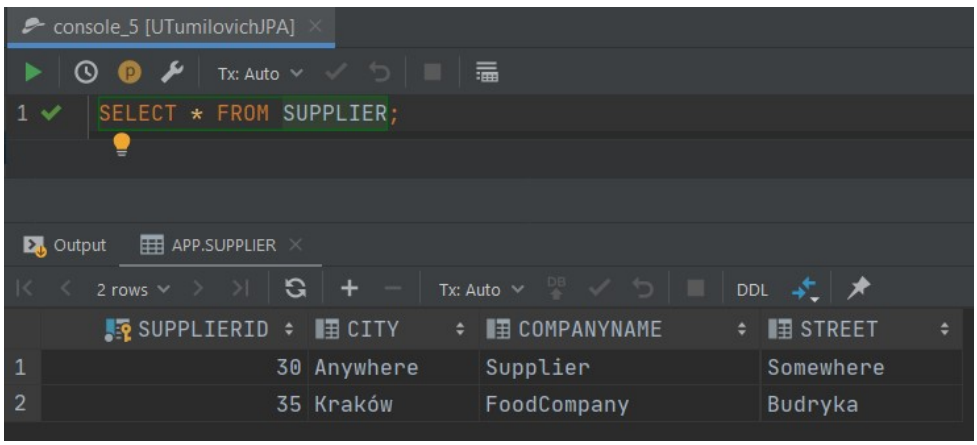
```
        primary key,
    NAME       VARCHAR(255)
);

create table SUPPLIER
(
    SUPPLIERID  INTEGER not null
        primary key,
    CITY        VARCHAR(255),
    COMPANYNAME VARCHAR(255),
    STREET      VARCHAR(255)
);

create table PRODUCT
(
    PRODUCTID    INTEGER not null
        primary key,
    PRODUCTNAME  VARCHAR(255),
    UNITSONSTOCK INTEGER not null,
    SUPPLIER_FK  INTEGER
        constraint FKVE96QACVSR1A50RGWL94ENRU
            references SUPPLIER,
    CATEGORY_FK  INTEGER
        constraint FKKRGKXD6GNQYXWWOAOGK95PT3D
            references CATEGORY
);
```

- Select z tabeli *Product*



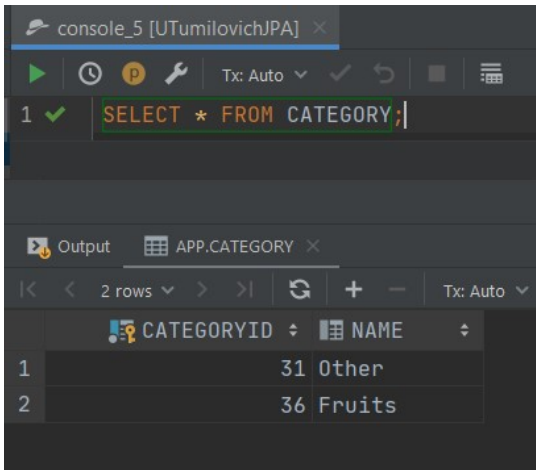
	PRODUCTID	PRODUCTNAME	UNITSONSTOCK	SUPPLIER_FK	CATEGORY_FK
1	27	Filter	23	30	31
2	28	Papier	34	30	31
3	29	Kubek	65	30	31
4	32	Banana	43	35	36
5	33	Orange	54	35	36
6	34	Lemon	23	35	36

- Select z tabeli *Supplier*



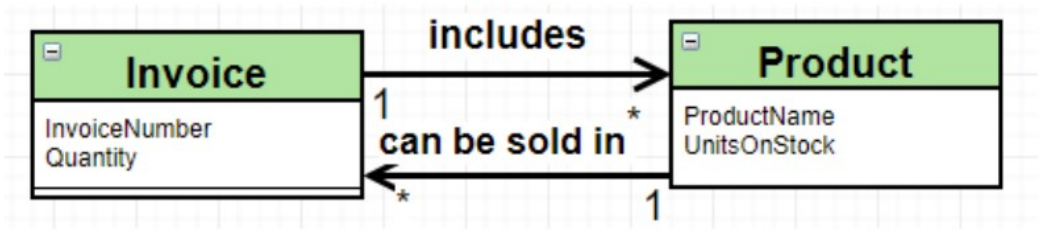
	SUPPLIERID	CITY	COMPANYNAME	STREET
1	30	Anywhere	Supplier	Somewhere
2	35	Kraków	FoodCompany	Budryka

- Select z tabeli *Category*



Zadanie VIII

Została umodelowana relacja wiele-do-wielu jak poniżej:



a) Została utworzona klasa **Invoice** z polami *invoiceNumber* oraz *quantity*

```
@Entity
public class Invoice {
    @Id
    @GeneratedValue(strategy = GenerationType.AUTO)
    private int invoiceNumber;
    private int quantity;

    @ManyToMany
    private final Set<Product> products = new HashSet<>();

    public Invoice() {
    }

    public Invoice(int quantity) {
        this.quantity = quantity;
    }

    public int getInvoiceNumber() {
        return invoiceNumber;
    }

    public int getQuantity() {
        return quantity;
    }

    public Set<Product> getProducts() {
        return products;
    }

    public void addProduct(Product product) {
        products.add(product);
        product.getInvoices().add(this);
        this.quantity++;
    }
}
```

b) Został zmodyfikowany plik konfiguracyjny, dodaniem klasy **Inoice** do mapy

```
<?xml version='1.0' encoding='utf-8'?>
<!DOCTYPE hibernate-configuration PUBLIC
        "-//Hibernate/Hibernate Configuration DTD//EN"
        "http://www.hibernate.org/dtd/hibernate-configuration-3.0.dtd">
<hibernate-configuration>
    <session-factory>
        <property name="connection.url">jdbc:derby://127.0.0.1/UTumilovichJPA</property>
        <property name="connection.driver_class">org.apache.derby.jdbc.ClientDriver</property>
        <property name="dialect">org.hibernate.dialect.DerbyTenSevenDialect</property>
        <property name="format_sql">true</property>
        <property name="show_sql">true</property>
        <property name="use_sql_comments">true</property>
        <!-- DB schema will be updated if needed -->
        <property name="hibernate.hbm2ddl.auto">update</property>
        <mapping class="Product"></mapping>
        <mapping class="Supplier"></mapping>
        <mapping class="Category"></mapping>
        <mapping class="Invoice"></mapping>
    </session-factory>
</hibernate-configuration>
```

c) Następnie została zmodyfikowana klasa **Product**, dodaniem pola setu atrybutów *invoices* oraz metody *getInvoices*

```
@Entity
public class Product {
    @Id
    @GeneratedValue(strategy = GenerationType.AUTO)
    private int productId;
    private String productName;
    private int unitsOnStock;

    @ManyToOne
    @JoinColumn(name="Supplier_FK")
    private Supplier supplier;

    @ManyToOne
    @JoinColumn(name="Category_FK")
    private Category category;

    @ManyToMany(mappedBy = "products")
    private final Set<Invoice> invoices = new HashSet<>();

    public Product() {
    }

    public Product(String productName, int unitsOnStock) {
        this.productName = productName;
        this.unitsOnStock = unitsOnStock;
    }

    public String getProductName() {
        return productName;
    }

    public void setSupplier(Supplier supplier) {
        this.supplier = supplier;
        if (!supplier.getProducts().contains(this)) {
            supplier.addProduct(this);
        }
    }

    public Category getCategory() {
        return category;
    }

    public void setCategory(Category category) {
        this.category = category;
```

```
        if (!category.getProducts().contains(this)) {
            category.addProduct(this);
        }
    }

    public Set<Invoice> getInvoices() {
        return invoices;
    }
}
```

d) Na koniec została zmodyfikowana metoda _main oraz dodane metody *printInvoiceProducts* i *printProductInvoices* klasy **Main**

```
public class Main {
    private static final SessionFactory ourSessionFactory;

    static {
        try {
            Configuration configuration = new Configuration();
            configuration.configure();

            ourSessionFactory = configuration.buildSessionFactory();
        } catch (Throwable ex) {
            throw new ExceptionInInitializerError(ex);
        }
    }

    public static Session getSession() throws HibernateException {
        return ourSessionFactory.openSession();
    }

    private static void printInvoiceProducts(int invoiceNumber) {
        Invoice invoice = getSession().get(Invoice.class, invoiceNumber);
        System.out.println("Invoice number:" + invoiceNumber);
        for (Product product: invoice.getProducts()) {
            System.out.println(product.getProductName());
        }
    }

    private static void printProductInvoices(int productId) {
        Product product = getSession().get(Product.class, productId);
        System.out.println("Product: " + product.getProductName());
        for (Invoice invoice: product.getInvoices()) {
            System.out.println(invoice.getInvoiceNumber());
        }
    }

    public static void main(final String[] args) {
        final Session session = getSession();

        Transaction transaction = session.beginTransaction();

        Product newProduct1 = new Product("Milk", 45);
        Product newProduct2 = new Product("Yogurt", 76);
        Product newProduct3 = new Product("Crisps", 34);
        Product newProduct4 = new Product("Bread", 56);
        Product newProduct5 = new Product("Jam", 65);
        Product newProduct6 = new Product("Meat", 2);
        Product newProduct7 = new Product("Cookies", 3);

        Supplier newSupplier = new Supplier("Grocery store", "Reymonta", "Kraków");
        Category newCategory = new Category("Food");
        Invoice newInvoice1 = new Invoice(0);
        Invoice newInvoice2 = new Invoice(0);

        newSupplier.addProduct(newProduct1);
        newSupplier.addProduct(newProduct2);
        newSupplier.addProduct(newProduct3);
        newSupplier.addProduct(newProduct4);
        newSupplier.addProduct(newProduct5);
        newSupplier.addProduct(newProduct6);
```

```
            newSupplier.addProduct(newProduct7);

            newCategory.addProduct(newProduct1);
            newCategory.addProduct(newProduct2);
            newCategory.addProduct(newProduct3);
            newCategory.addProduct(newProduct4);
            newCategory.addProduct(newProduct5);
            newCategory.addProduct(newProduct6);
            newCategory.addProduct(newProduct7);

            newInvoice1.addProduct(newProduct1);
            newInvoice1.addProduct(newProduct2);
            newInvoice1.addProduct(newProduct3);
            newInvoice1.addProduct(newProduct4);
            newInvoice1.addProduct(newProduct5);
            newInvoice2.addProduct(newProduct4);
            newInvoice2.addProduct(newProduct5);
            newInvoice2.addProduct(newProduct6);
            newInvoice2.addProduct(newProduct7);

            session.save(newProduct1);
            session.save(newProduct2);
            session.save(newProduct3);
            session.save(newProduct4);
            session.save(newProduct5);
            session.save(newProduct6);
            session.save(newProduct7);

            session.save(newSupplier);
            session.save(newCategory);
            session.save(newInvoice1);
            session.save(newInvoice2);

            printInvoiceProducts(56);
            printProductInvoices(50);

            transaction.commit();

            try {
                System.out.println("querying all the managed entities...");
                final Metamodel metamodel = session.getSessionFactory().getMetamodel();
                for (EntityType<?> entityType : metamodel.getEntities()) {
                    final String entityName = entityType.getName();
                    final Query query = session.createQuery("from " + entityName);
                    System.out.println("executing: " + query.getQueryString());
                    for (Object o : query.list()) {
                        System.out.println("  " + o);
                    }
                }
            } finally {
                session.close();
            }
        }
    }
```

e) Rezultaty działania programu:

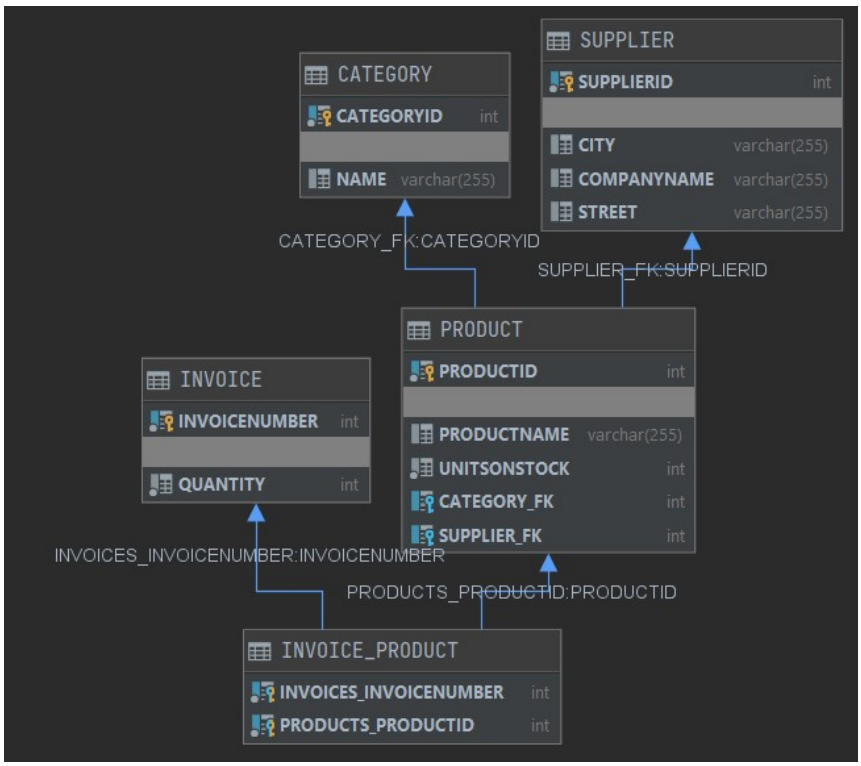
- Rezultat wypisania listy produktów podanej transakcji:

```
Crisps
Yogurt
Bread
Jam
Milk
```

- Rezultat wypisania listy transakcji dla podanego produktu:

```
57
56
```

- Schemat bazy danych

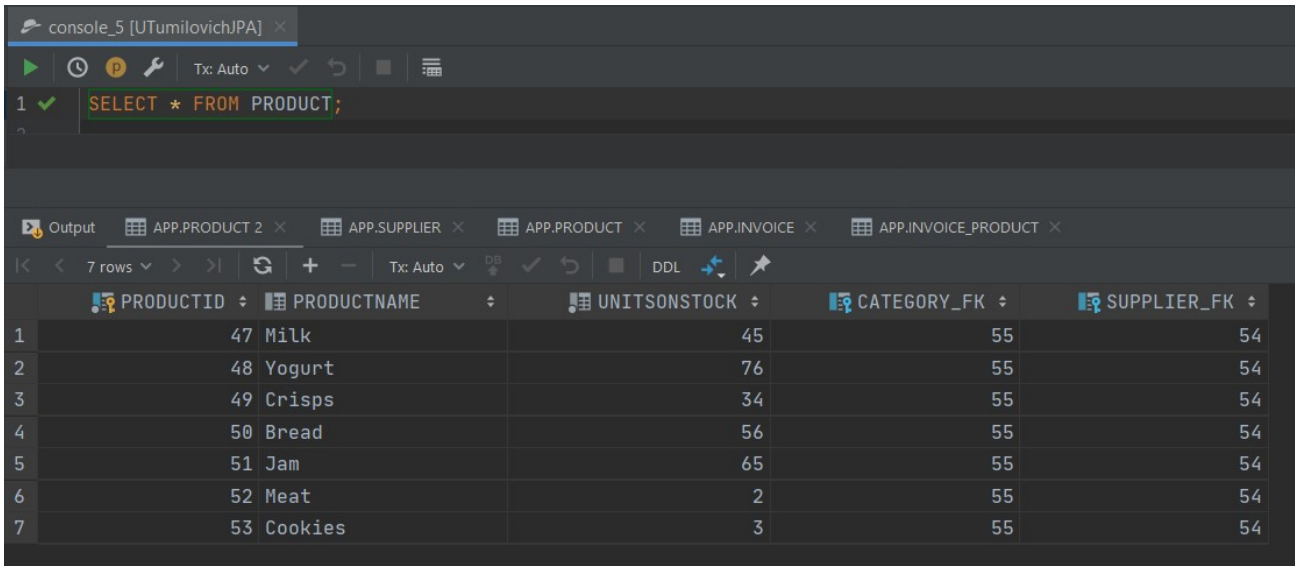


- Definicja bazy:

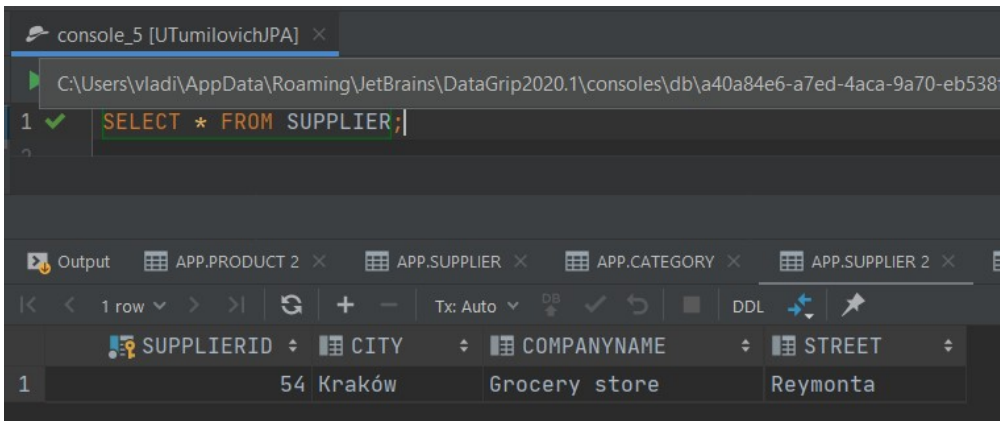
```
create table CATEGORY
(
    CATEGORYID INTEGER not null
        primary key,
    NAME       VARCHAR(255)
);

create table INVOICE
(
    INVOICENUMBER INTEGER not null
        primary key,
    QUANTITY      INTEGER not null
);

create table SUPPLIER
(
    SUPPLIERID  INTEGER not null
        primary key,
    CITY        VARCHAR(255),
    COMPANYNAME VARCHAR(255),
    STREET      VARCHAR(255)
);

create table PRODUCT
(
    PRODUCTID    INTEGER not null
        primary key,
    PRODUCTNAME  VARCHAR(255),
    UNITSONSTOCK INTEGER not null,
    CATEGORY_FK  INTEGER
        constraint FKKRGKXD6GNQYXWWOAOGK95PT3D
            references CATEGORY,
    SUPPLIER_FK  INTEGER
        constraint FKVE96QACVSR1A50RGWL94ENRU
            references SUPPLIER
);
```

```
create table INVOICE_PRODUCT
(
    INVOICES_INVOICENUMBER INTEGER not null
        constraint FKCBQYL9U4EH1TWS13U6PK5J2NT
            references INVOICE,
    PRODUCTS_PRODUCTID     INTEGER not null
        constraint FK3OWFENK1TV2NDEPWLTJO1N1G5
            references PRODUCT,
    primary key (INVOICES_INVOICENUMBER, PRODUCTS_PRODUCTID)
);
```

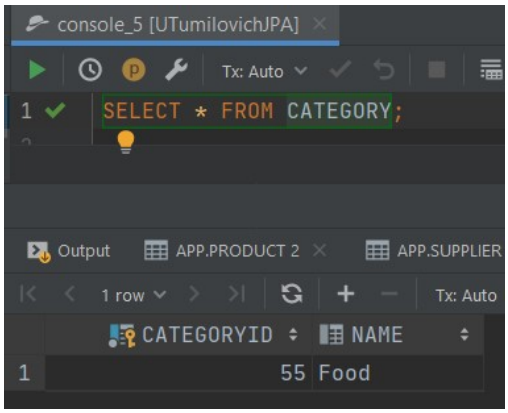
- Select z tabeli *Product*



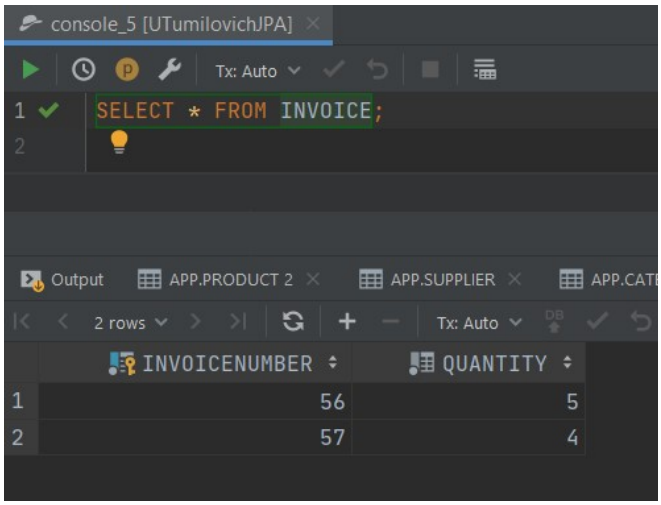
- Select z tabeli *Supplier*



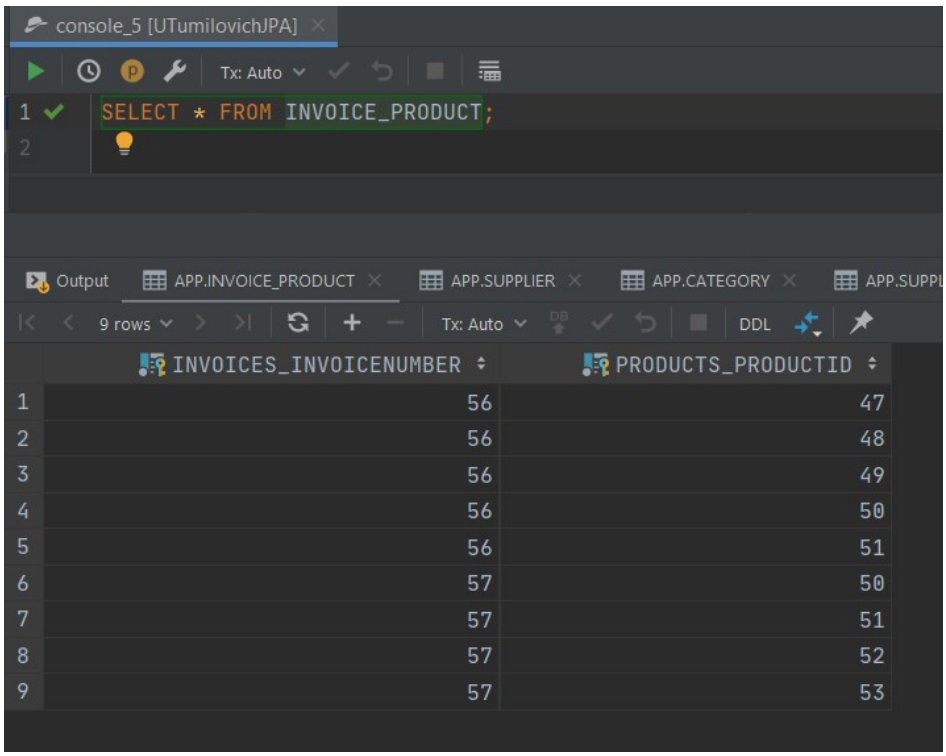
- Select z tabeli *Category*



- Select z tabeli *Invoice*



- Select z tabeli *Invoice_Product*



Zadanie X

a) W folderze *META-INF* został stworzony plik **persistence.xml**

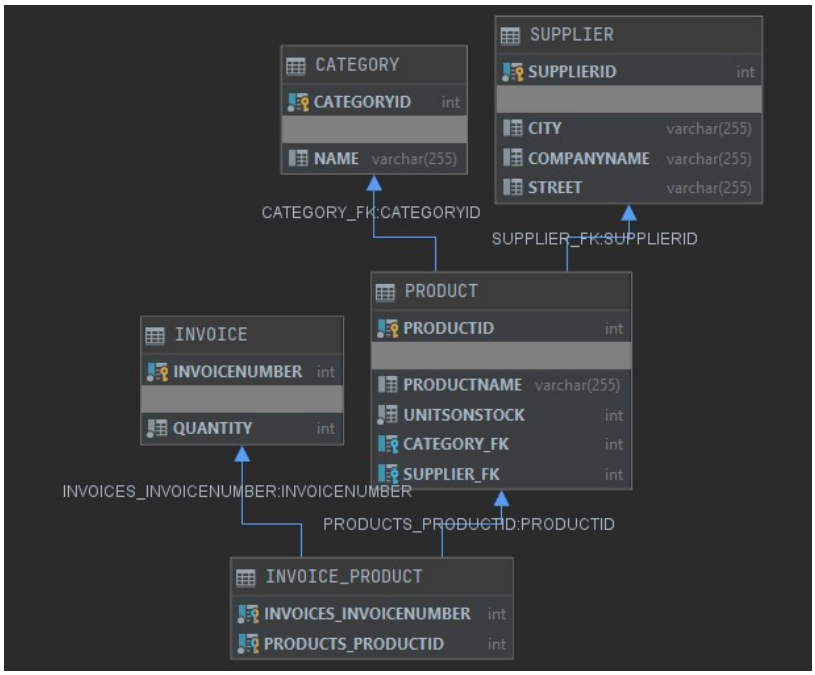
```
<?xml version="1.0"?>
<persistence xmlns="http://java.sun.com/xml/ns/persistence"
             xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
             xsi:schemaLocation="http://java.sun.com/xml/ns/persistence
              http://java.sun.com/xml/ns/persistence/persistence_2_0.xsd"
             version="2.0">
    <persistence-unit name="derby" transaction-type="RESOURCE_LOCAL">
        <properties>
            <property name="hibernate.connection.driver_class" value="org.apache.derby.jdbc.ClientDriver"/>
            <property name="hibernate.connection.url" value="jdbc:derby://127.0.0.1/UTumilovichJPA"/>
            <property name="hibernate.show_sql" value="true"/>
            <property name="hibernate.format_sql" value="true"/>
            <property name="hibernate.hbm2ddl.auto" value="create"/>
        </properties>
    </persistence-unit>
</persistence>
```

b) Została stworzona nowa klasa **MainJPA** z przykładowymi obiektami do uzupełnienia bazy

```
public class MainJPA {
    private static EntityManagerFactory entityManagerFactory;

    private static EntityManager getEntityManager() {
        if (entityManagerFactory == null) {
            entityManagerFactory = Persistence.createEntityManagerFactory("derby");
        }
        return entityManagerFactory.createEntityManager();
    }

    public static void main(String[] argv) {
        EntityManager entityManager = getEntityManager();
        EntityTransaction entityTransaction = entityManager.getTransaction();
        entityTransaction.begin();

        Product product1 = new Product("Filter", 23);
        Product product2 = new Product("Papier", 34);
        Product product3 = new Product("Kubek", 65);

        Supplier supplier = new Supplier("Supplier", "Somewhere", "Anywhere");

        supplier.addProduct(product1);
        supplier.addProduct(product2);
        supplier.addProduct(product3);

        entityManager.persist(product1);
        entityManager.persist(product2);
        entityManager.persist(product3);
        entityManager.persist(supplier);

        entityTransaction.commit();
        entityManager.close();
    }
}
```

c) Rezultaty działania programu:

- Schemat bazy danych

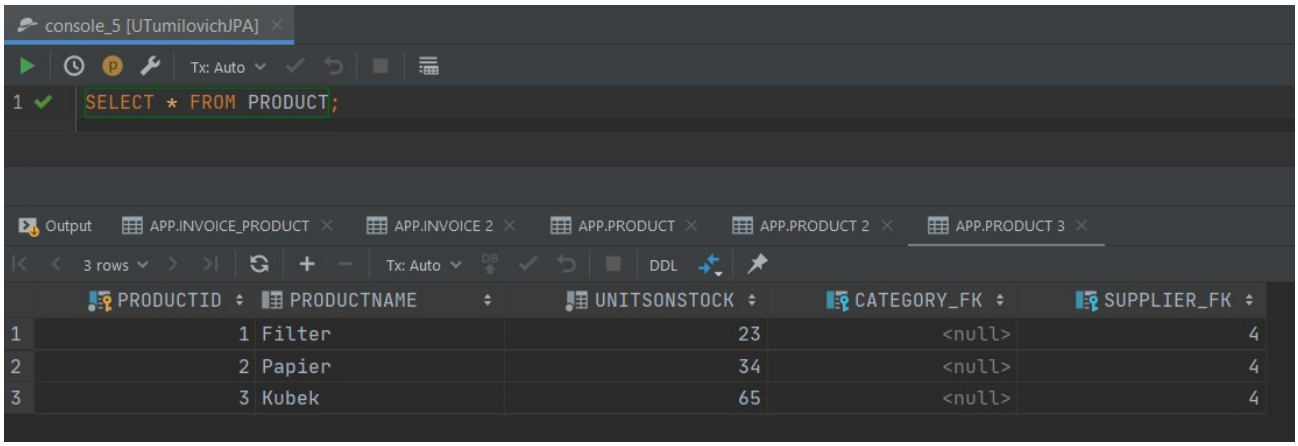


- Definicja bazy:

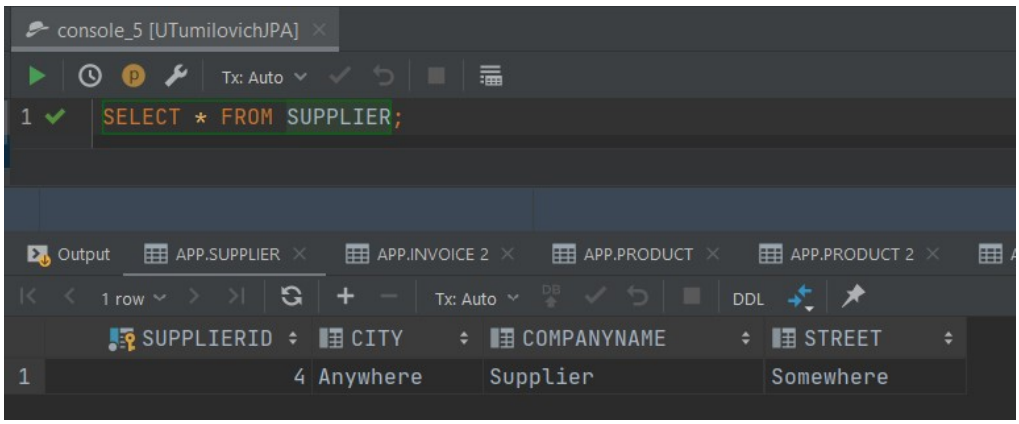
```
create table CATEGORY
(
    CATEGORYID INTEGER not null
        primary key,
    NAME       VARCHAR(255)
);

create table INVOICE
(
    INVOICENUMBER INTEGER not null
        primary key,
    QUANTITY      INTEGER not null
);

create table SUPPLIER
(
    SUPPLIERID  INTEGER not null
        primary key,
    CITY        VARCHAR(255),
    COMPANYNAME VARCHAR(255),
    STREET      VARCHAR(255)
);

create table PRODUCT
(
    PRODUCTID    INTEGER not null
        primary key,
    PRODUCTNAME  VARCHAR(255),
    UNITSONSTOCK INTEGER not null,
    CATEGORY_FK  INTEGER
        constraint FKKRGKXD6GNQYXWWOAOGK95PT3D
            references CATEGORY,
    SUPPLIER_FK  INTEGER
        constraint FKVE96QACVSR1A50RGWL94ENRU
            references SUPPLIER
);

create table INVOICE_PRODUCT
(
    INVOICES_INVOICENUMBER INTEGER not null
        constraint FKCBQYL9U4EH1TWS13U6PK5J2NT
            references INVOICE,
```

```
    PRODUCTS_PRODUCTID     INTEGER not null
        constraint FK3OWFENK1TV2NDEPWLTJO1N1G5
            references PRODUCT,
    primary key (INVOICES_INVOICENUMBER, PRODUCTS_PRODUCTID)
);
```

- Select z tabeli *Product*



- Select z tabeli *Supplier*



Zadanie XI

Zmodyfikowano model w taki sposób, aby było możliwe kaskadowe tworzenie faktur wraz z nowymi produktami oraz produktów wraz z nową fakturą.

a) Została zmodyfikowana klasa **Product** dodaniem dodatkowych parametrów polu *invoices*

```
@Entity
public class Product {
    @Id
    @GeneratedValue(strategy = GenerationType.AUTO)
    private int productId;
    private String productName;
    private int unitsOnStock;

    @ManyToOne
    @JoinColumn(name="Supplier_FK")
    private Supplier supplier;

    @ManyToOne
    @JoinColumn(name="Category_FK")
    private Category category;

    @ManyToMany(mappedBy = "products", fetch = FetchType.EAGER, cascade =  CascadeType.PERSIST)
    private final Set<Invoice> invoices = new HashSet<>();
```

```
    public Product() {
    }

    public Product(String productName, int unitsOnStock) {
        this.productName = productName;
        this.unitsOnStock = unitsOnStock;
    }

    public String getProductName() {
        return productName;
    }

    public void setSupplier(Supplier supplier) {
        this.supplier = supplier;
        if (!supplier.getProducts().contains(this)) {
            supplier.addProduct(this);
        }
    }

    public Category getCategory() {
        return category;
    }

    public void setCategory(Category category) {
        this.category = category;
        if (!category.getProducts().contains(this)) {
            category.addProduct(this);
        }
    }

    public Set<Invoice> getInvoices() {
        return invoices;
    }
}
```

b) Została zmodyfikowana klasa **Invoices** dodaniem dodatkowych parametrów polu *products*

```
@Entity
public class Invoice {
    @Id
    @GeneratedValue(strategy = GenerationType.AUTO)
    private int invoiceNumber;
    private int quantity;

    @ManyToMany(cascade = CascadeType.PERSIST)
    private final Set<Product> products = new HashSet<>();

    public Invoice() {
    }

    public Invoice(int quantity) {
        this.quantity = quantity;
    }

    public int getInvoiceNumber() {
        return invoiceNumber;
    }

    public int getQuantity() {
        return quantity;
    }

    public Set<Product> getProducts() {
        return products;
    }

    public void addProduct(Product product) {
        products.add(product);
        product.getInvoices().add(this);
```

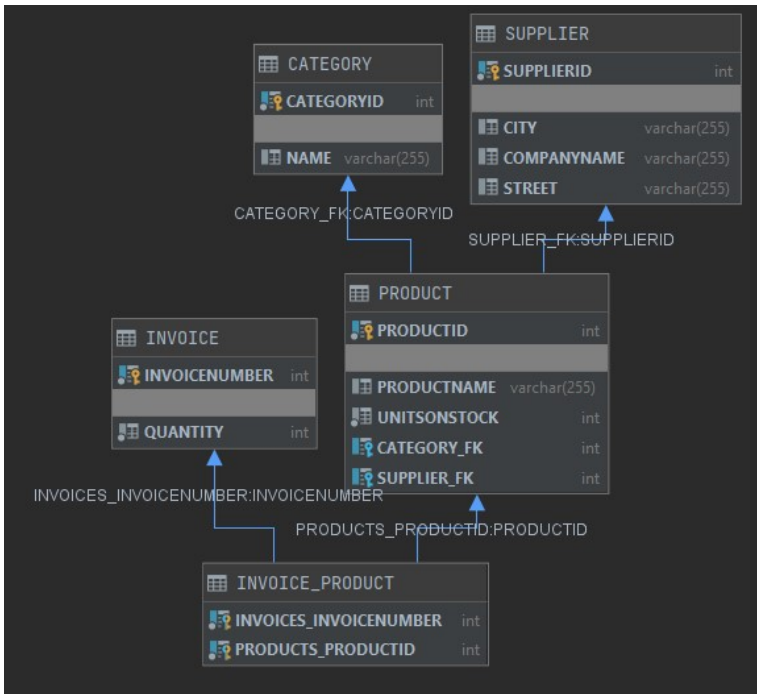
```
        this.quantity++;
    }
}
```

c) Została zmiodyfikowana metoda *main* klasy **MainJPA** w taki sposób, że po utworzeniu produktów i dodaniu ich do transakcii zostały one nie dodane do bazy

```
public class MainJPA {
    private static EntityManagerFactory entityManagerFactory;

    private static EntityManager getEntityManager() {
        if (entityManagerFactory == null) {
            entityManagerFactory = Persistence.createEntityManagerFactory("derby");
        }
        return entityManagerFactory.createEntityManager();
    }

    public static void main(String[] argv) {
        EntityManager entityManager = getEntityManager();
        EntityTransaction entityTransaction = entityManager.getTransaction();
        entityTransaction.begin();

        Product newProduct1 = new Product("Milk", 45);
        Product newProduct2 = new Product("Yogurt", 76);
        Product newProduct3 = new Product("Crisps", 34);
        Product newProduct4 = new Product("Bread", 56);
        Product newProduct5 = new Product("Jam", 65);
        Product newProduct6 = new Product("Meat", 2);
        Product newProduct7 = new Product("Cookies", 3);

        Supplier newSupplier = new Supplier("Grocery store", "Reymonta", "Kraków");
        Category newCategory = new Category("Food");
        Invoice newInvoice1 = new Invoice(0);
        Invoice newInvoice2 = new Invoice(0);

        newSupplier.addProduct(newProduct1);
        newSupplier.addProduct(newProduct2);
        newSupplier.addProduct(newProduct3);
        newSupplier.addProduct(newProduct4);
        newSupplier.addProduct(newProduct5);
        newSupplier.addProduct(newProduct6);
        newSupplier.addProduct(newProduct7);

        newCategory.addProduct(newProduct1);
        newCategory.addProduct(newProduct2);
        newCategory.addProduct(newProduct3);
        newCategory.addProduct(newProduct4);
        newCategory.addProduct(newProduct5);
        newCategory.addProduct(newProduct6);
        newCategory.addProduct(newProduct7);

        newInvoice1.addProduct(newProduct1);
        newInvoice1.addProduct(newProduct2);
        newInvoice1.addProduct(newProduct3);
        newInvoice1.addProduct(newProduct4);
        newInvoice1.addProduct(newProduct5);
        newInvoice2.addProduct(newProduct4);
        newInvoice2.addProduct(newProduct5);
        newInvoice2.addProduct(newProduct6);
        newInvoice2.addProduct(newProduct7);

        entityManager.persist(newSupplier);
        entityManager.persist(newCategory);
        entityManager.persist(newInvoice1);
        entityManager.persist(newInvoice2);

        entityTransaction.commit();
        entityManager.close();
    }
}
```

f) Rezultaty działania programu:

- Schemat bazy danych

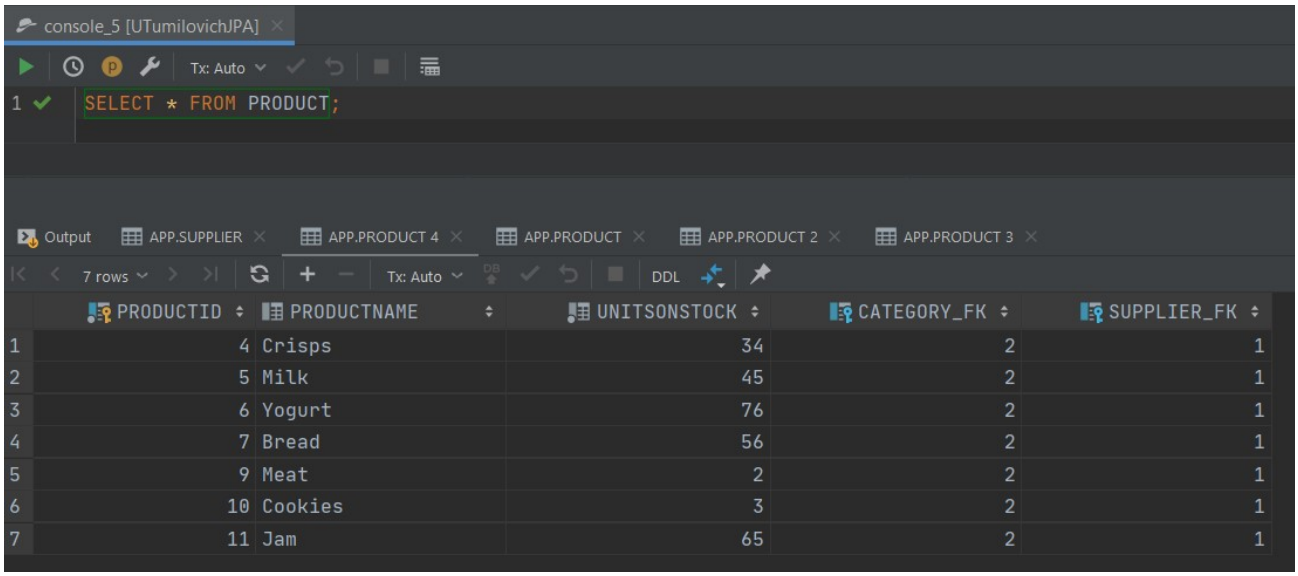


- Definicja bazy:

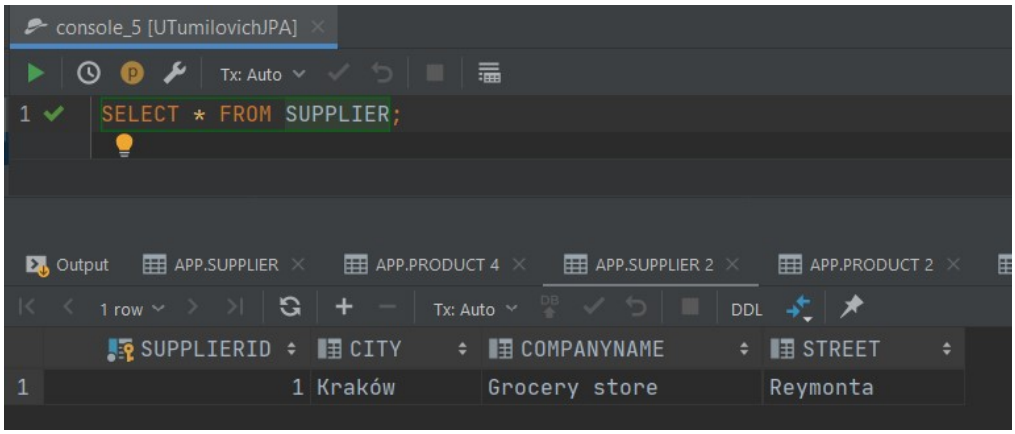
```
create table CATEGORY
(
    CATEGORYID INTEGER not null
        primary key,
    NAME       VARCHAR(255)
);

create table INVOICE
(
    INVOICENUMBER INTEGER not null
        primary key,
    QUANTITY      INTEGER not null
);

create table SUPPLIER
(
    SUPPLIERID  INTEGER not null
        primary key,
    CITY        VARCHAR(255),
    COMPANYNAME VARCHAR(255),
    STREET      VARCHAR(255)
);

create table PRODUCT
(
    PRODUCTID    INTEGER not null
        primary key,
    PRODUCTNAME  VARCHAR(255),
    UNITSONSTOCK INTEGER not null,
    CATEGORY_FK  INTEGER
        constraint FKKRGKXD6GNQYXWWOAOGK95PT3D
            references CATEGORY,
    SUPPLIER_FK  INTEGER
        constraint FKVE96QACVSR1A50RGWL94ENRU
            references SUPPLIER
);
```

```
create table INVOICE_PRODUCT
(
    INVOICES_INVOICENUMBER INTEGER not null
        constraint FKCBQYL9U4EH1TWS13U6PK5J2NT
            references INVOICE,
    PRODUCTS_PRODUCTID     INTEGER not null
        constraint FK3OWFENK1TV2NDEPWLTJO1N1G5
            references PRODUCT,
    primary key (INVOICES_INVOICENUMBER, PRODUCTS_PRODUCTID)
);
```

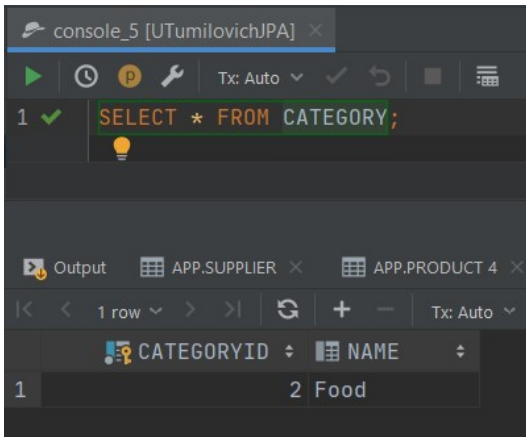
- Select z tabeli *Product*



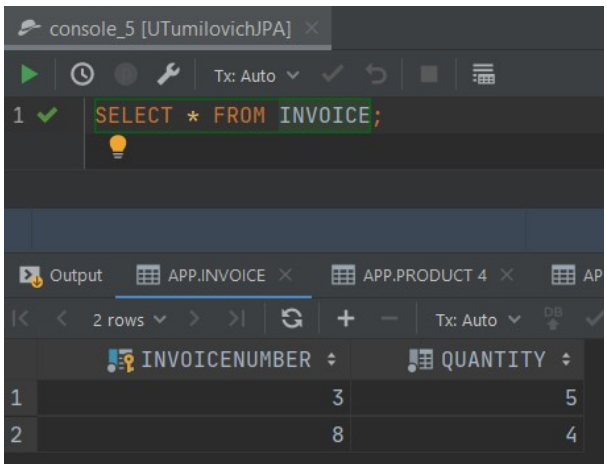
- Select z tabeli *Supplier*



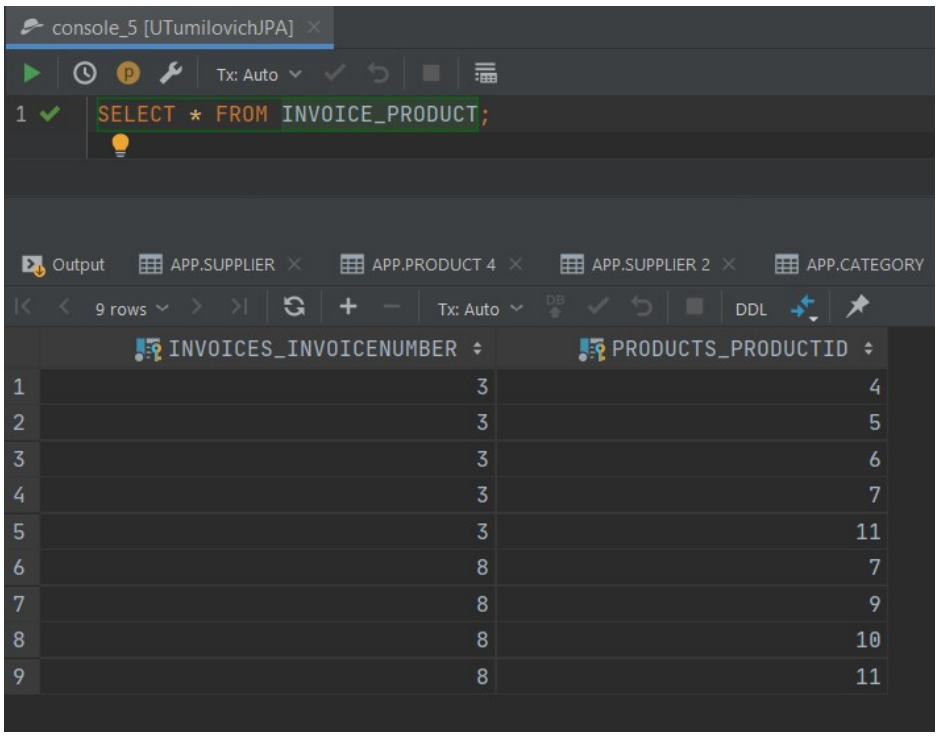
- Select z tabeli *Category*



- Select z tabeli *Invoice*



- Select z tabeli *Invoice_Product*



Zadanie XII

a) Została stworzona klasa **Address** z polami *country*, *city*, *street*, *zipCode*

```
@Embeddable
public class Address {
    private String country;
    private String city;
    private String street;
    private String zipCode;

    public Address() {
    }

    public Address(String country, String city, String street, String zipCode) {
        this.country = country;
        this.city = city;
        this.street = street;
        this.zipCode = zipCode;
    }
}
```

b) Klasa **Address** została wprowadzona do klasy **Supplier**

```
@Entity
public class Supplier {
    @Id
    @GeneratedValue(strategy = GenerationType.AUTO)
    private int supplierId;
    private String companyName;

    @Embedded
    private Address address;

    @OneToMany
    @JoinColumn(name="Supplier_FK")
    private final Set<Product> products = new HashSet<>();

    public Supplier() {
    }

    public Supplier(String companyName, Address address) {
        this.companyName = companyName;
        this.address = address;
    }

    public Set<Product> getProducts() {
        return products;
    }

    public void addProduct(Product product) {
        this.products.add(product);
        product.setSupplier(this);
    }
}
```

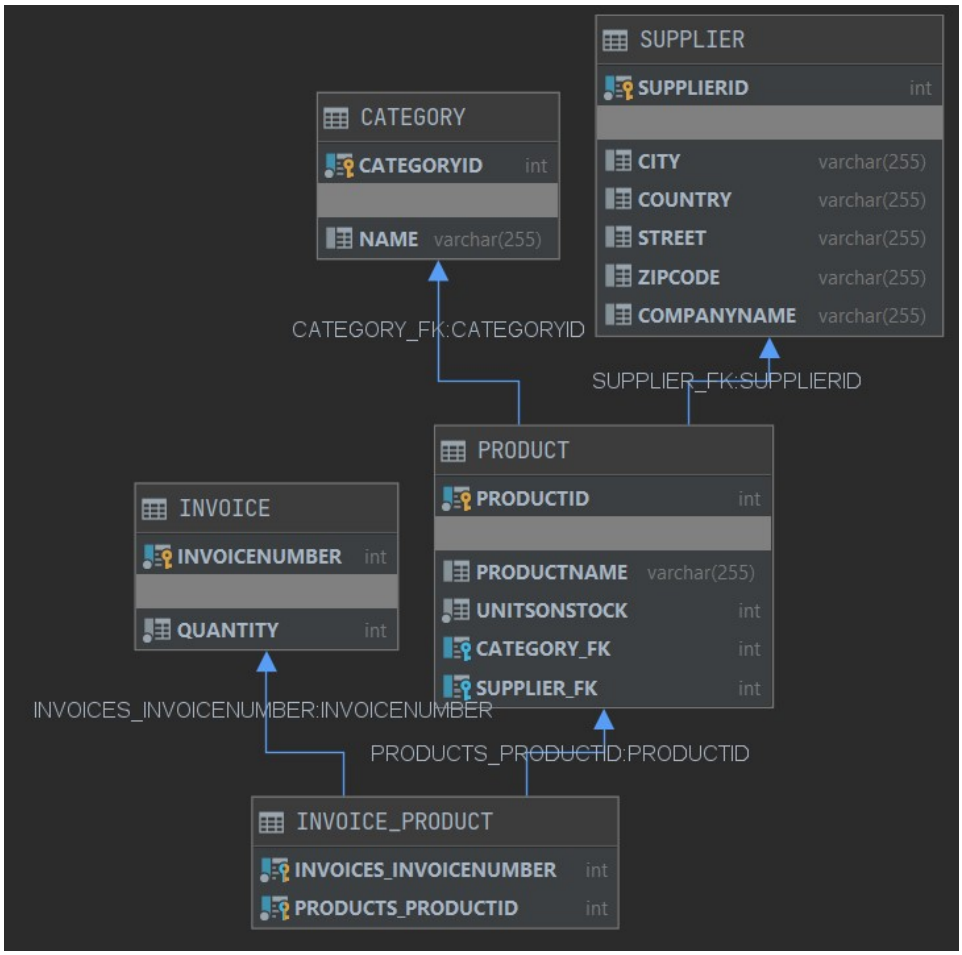
c) Zotali utworzone przykładowe obiekty do zapisywania w bazie w metodzie main klasy **MainJPA**

```
public class MainJPA {
    private static EntityManagerFactory entityManagerFactory;

    private static EntityManager getEntityManager() {
        if (entityManagerFactory == null) {
            entityManagerFactory = Persistence.createEntityManagerFactory("derby");
        }
        return entityManagerFactory.createEntityManager();
    }

    public static void main(String[] argv) {
        EntityManager entityManager = getEntityManager();
        EntityTransaction entityTransaction = entityManager.getTransaction();
        entityTransaction.begin();
```

```
        entityManager.persist(new Supplier("Grocery store",
                new Address("Poland", "Krakow", "Budryka", "30-072")));
        entityManager.persist(new Supplier("Food Supplier",
                new Address("Belarus", "Minsk", "Kammennogorskaya", "220017")));

        entityTransaction.commit();
        entityManager.close();
    }
}
```

d) Rezultaty działania programu:

- Schemat bazy danych

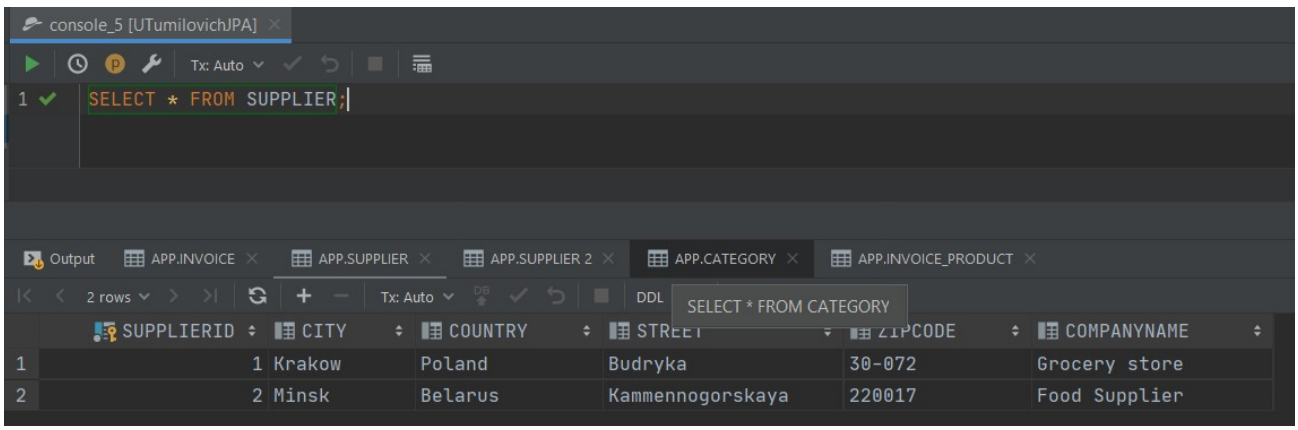


- Definicja bazy:

```
create table CATEGORY
(
    CATEGORYID INTEGER not null
        primary key,
    NAME       VARCHAR(255)
);

create table INVOICE
(
    INVOICENUMBER INTEGER not null
        primary key,
    QUANTITY      INTEGER not null
);

create table SUPPLIER
(
```

```
    SUPPLIERID  INTEGER not null
        primary key,
    CITY        VARCHAR(255),
    COUNTRY     VARCHAR(255),
    STREET      VARCHAR(255),
    ZIPCODE     VARCHAR(255),
    COMPANYNAME VARCHAR(255)
);

create table PRODUCT
(
    PRODUCTID    INTEGER not null
        primary key,
    PRODUCTNAME  VARCHAR(255),
    UNITSONSTOCK INTEGER not null,
    CATEGORY_FK  INTEGER
        constraint FKKRGKXD6GNQYXWWOAOGK95PT3D
            references CATEGORY,
    SUPPLIER_FK  INTEGER
        constraint FKVE96QACVSR1A50RGWL94ENRU
            references SUPPLIER
);

create table INVOICE_PRODUCT
(
    INVOICES_INVOICENUMBER INTEGER not null
        constraint FKCBQYL9U4EH1TWS13U6PK5J2NT
            references INVOICE,
    PRODUCTS_PRODUCTID     INTEGER not null
        constraint FK3OWFENK1TV2NDEPWLTJO1N1G5
            references PRODUCT,
    primary key (INVOICES_INVOICENUMBER, PRODUCTS_PRODUCTID)
);
```

- Select z tabeli *Supplier*



e) Model został zmodyfikowany w taki sposób, że dane adresowe znajdują się w klasie dostawców. Zmapowano do dwóch osobnych tabel. Klasa **Supplier**

```
@Entity
@SecondaryTable(name="Address")
public class Supplier {
    @Id
    @GeneratedValue(strategy = GenerationType.AUTO)
    private int supplierId;
    private String companyName;

    @Column(table="Address")
    private String country;
    @Column(table="Address")
    private String city;
    @Column(table="Address")
    private String street;
```

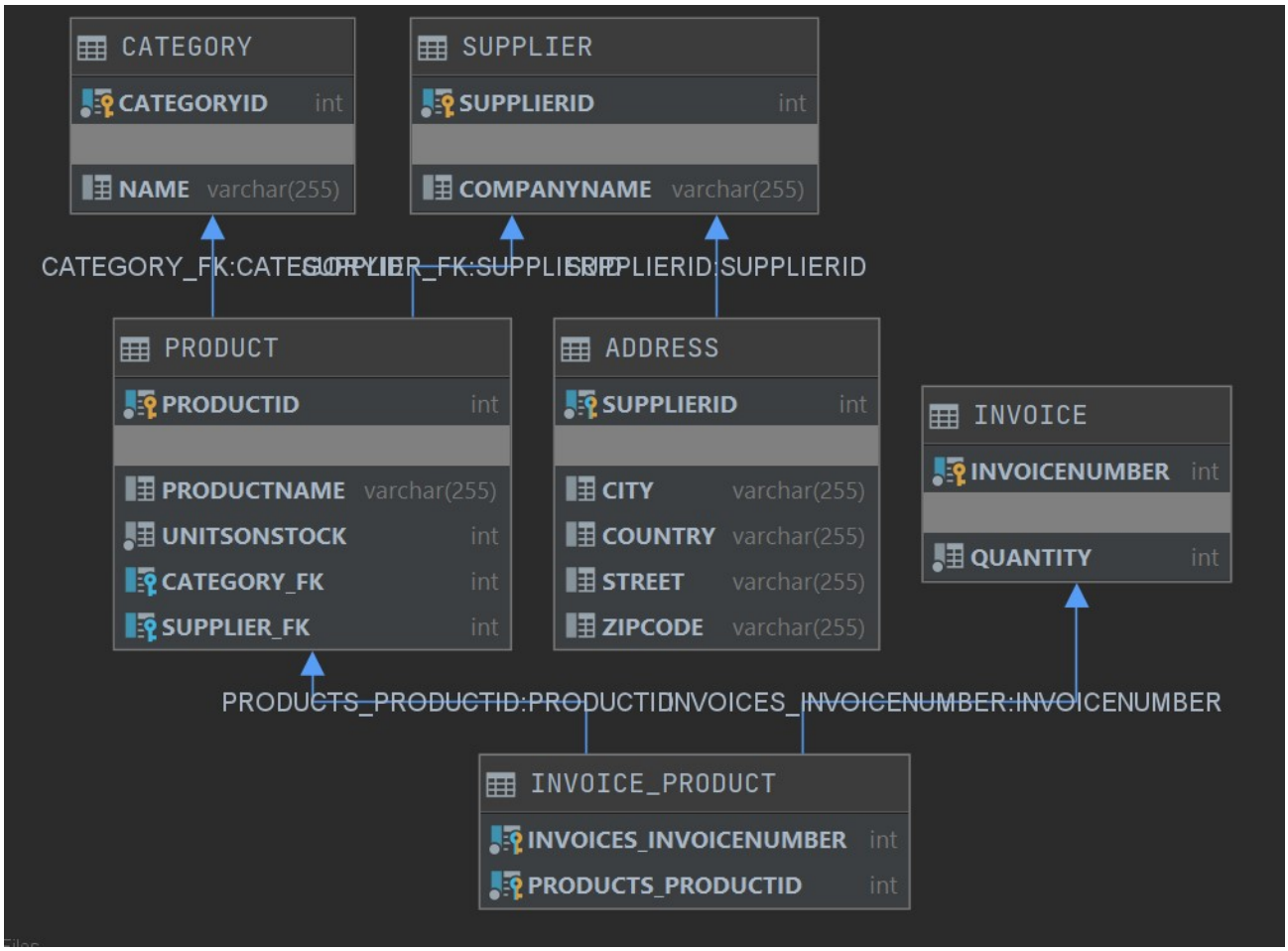
```
    @Column(table="Address")
    private String zipCode;

    @OneToMany
    @JoinColumn(name="Supplier_FK")
    private final Set<Product> products = new HashSet<>();

    public Supplier() {
    }

    public Supplier(String companyName, String country, String city, String street, String zipCode) {
        this.companyName = companyName;
        this.country = country;
        this.city = city;
        this.street = street;
        this.zipCode = zipCode;
    }

    public Set<Product> getProducts() {
        return products;
    }

    public void addProduct(Product product) {
        this.products.add(product);
        product.setSupplier(this);
    }
}
```

f) Została zmieniona metoda *main* klasy **MainJPA**

```
public class MainJPA {
    private static EntityManagerFactory entityManagerFactory;

    private static EntityManager getEntityManager() {
        if (entityManagerFactory == null) {
            entityManagerFactory = Persistence.createEntityManagerFactory("derby");
        }
        return entityManagerFactory.createEntityManager();
    }

    public static void main(String[] argv) {
        EntityManager entityManager = getEntityManager();
        EntityTransaction entityTransaction = entityManager.getTransaction();
        entityTransaction.begin();

        entityManager.persist(new Supplier("Grocery store", "Poland", "Krakow", "Budryka", "30-072"));
        entityManager.persist(new Supplier("Food Supplier", "Belarus", "Minsk", "Kammennogorskaya", "220017"));

        entityTransaction.commit();
        entityManager.close();
    }
}
```

g) Rezultaty działania programu:

- Schemat bazy danych

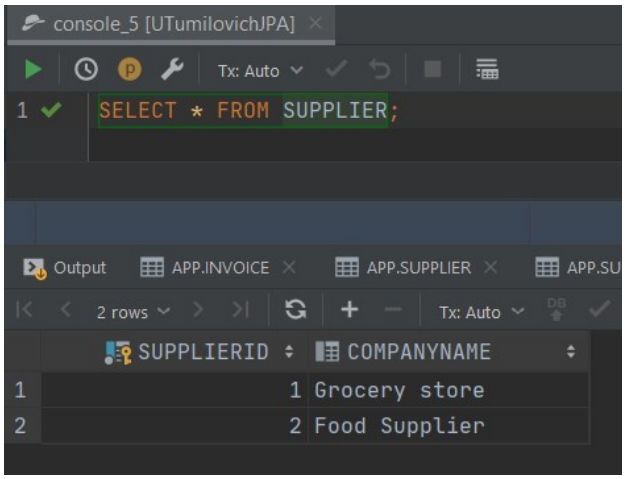


- Definicja bazy:

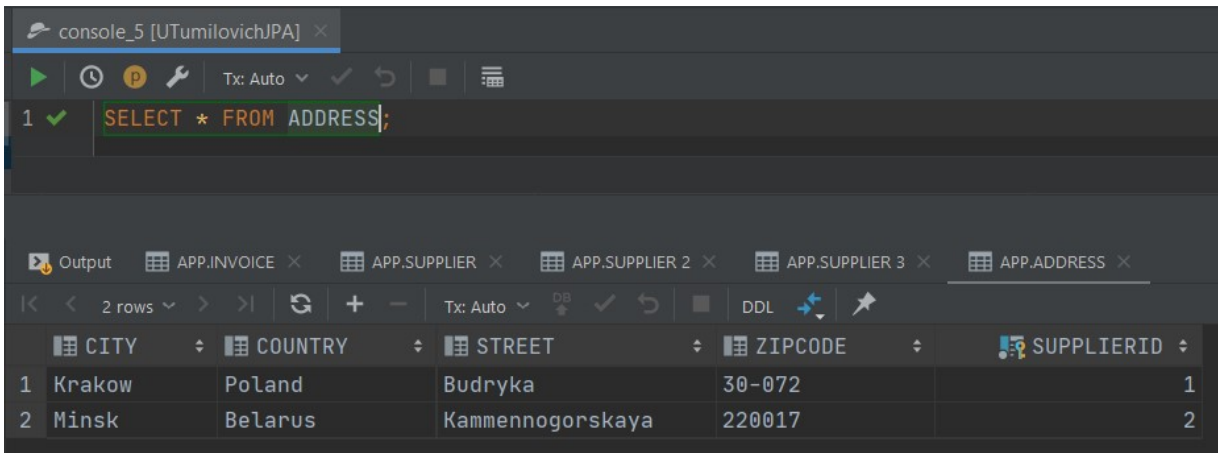
```
create table CATEGORY
(
    CATEGORYID INTEGER not null
        primary key,
    NAME       VARCHAR(255)
);

create table INVOICE
(
    INVOICENUMBER INTEGER not null
        primary key,
    QUANTITY      INTEGER not null
);

create table SUPPLIER
(
    SUPPLIERID  INTEGER not null
        primary key,
    COMPANYNAME VARCHAR(255)
);

create table ADDRESS
(
    CITY       VARCHAR(255),
    COUNTRY    VARCHAR(255),
    STREET     VARCHAR(255),
    ZIPCODE    VARCHAR(255),
    SUPPLIERID INTEGER not null
        primary key
        constraint FKJ5UAJ5TD7CUTXC78VUKFD4A7K
            references SUPPLIER
```

```
);

create table PRODUCT
(
    PRODUCTID    INTEGER not null
        primary key,
    PRODUCTNAME  VARCHAR(255),
    UNITSONSTOCK INTEGER not null,
    CATEGORY_FK  INTEGER
        constraint FKKRGKXD6GNQYXWWOAOGK95PT3D
            references CATEGORY,
    SUPPLIER_FK  INTEGER
        constraint FKVE96QACVSR1A50RGWL94ENRU
            references SUPPLIER
);

create table INVOICE_PRODUCT
(
    INVOICES_INVOICENUMBER INTEGER not null
        constraint FKCBQYL9U4EH1TWS13U6PK5J2NT
            references INVOICE,
    PRODUCTS_PRODUCTID     INTEGER not null
        constraint FK3OWFENK1TV2NDEPWLTJO1N1G5
            references PRODUCT,
    primary key (INVOICES_INVOICENUMBER, PRODUCTS_PRODUCTID)
);
```

- Select z tabeli *Supplier*

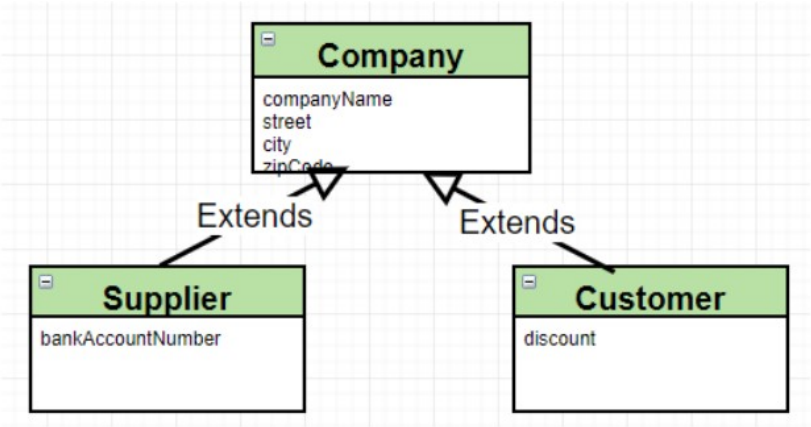


- Select z tabeli *Address*



Zadanie XIII

Do modelu została wprowadzona następująca hierachia:



a) Single table strategy

Klasa **Company**

```
@Entity
@SecondaryTable(name="Address")
@Inheritance(strategy = InheritanceType.SINGLE_TABLE)
public class Company {
    @Id
    @GeneratedValue(strategy = GenerationType.AUTO)
    private int companyId;
    private String companyName;

    @Column(table="Address")
    private String country;
    @Column(table="Address")
    private String city;
    @Column(table="Address")
    private String street;
    @Column(table="Address")
    private String zipCode;

    public Company() {
    }

    public Company(String companyName, String country, String city, String street, String zipCode) {
        this.companyName = companyName;
        this.country = country;
        this.city = city;
        this.street = street;
        this.zipCode = zipCode;
    }
}
```

Klasa **Customer**

```
@Entity
public class Customer extends Company {
    private double discount;

    public Customer() {
    }

    public Customer(String companyName, String country, String city, String street,
                    String zipCode, double discount) {
        super(companyName, country, city, street, zipCode);
        this.discount = discount;
    }

    public double getDiscount() {
        return discount;
```

```
    }

    public void setDiscount(double discount) {
        this.discount = discount;
    }
}
```

Klasa **Supplier**

```
@Entity
public class Supplier extends Company {
    private String bankAccountNumber;

    @OneToMany
    @JoinColumn(name="Supplier_FK")
    private final Set<Product> products = new HashSet<>();

    public Supplier() {
    }

    public Supplier(String companyName, String country, String city, String street,
                    String zipCode, String bankAccountNumber) {
        super(companyName, country, city, street, zipCode);
        this.bankAccountNumber = bankAccountNumber;
    }

    public String getBankAccountNumber() {
        return bankAccountNumber;
    }

    public void setBankAccountNumber(String bankAccountNumber) {
        this.bankAccountNumber = bankAccountNumber;
    }

    public Set<Product> getProducts() {
        return products;
    }

    public void addProduct(Product product) {
        this.products.add(product);
        product.setSupplier(this);
    }
}
```

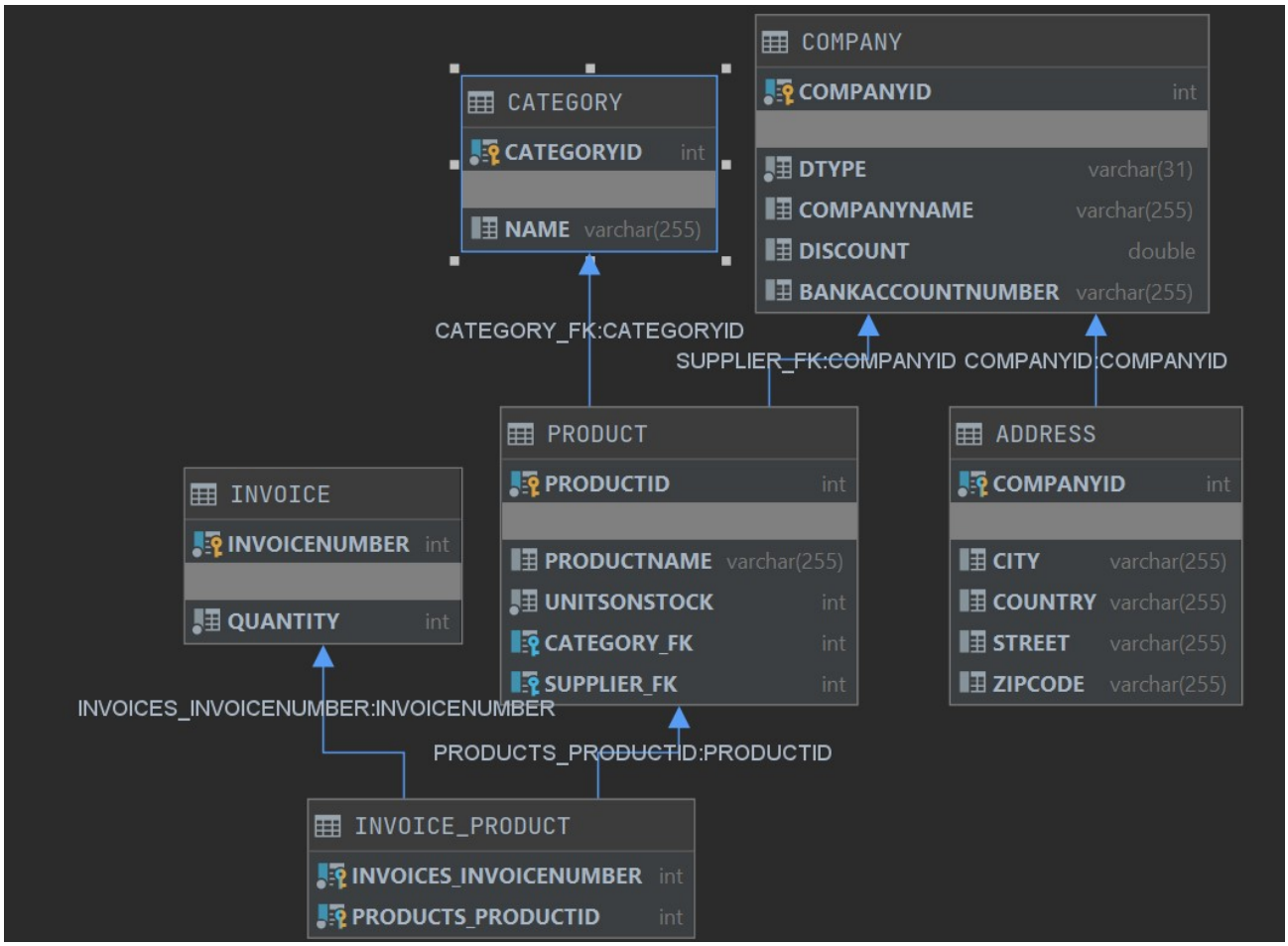
Klasa **MainJPA**

```
public class MainJPA {
    private static EntityManagerFactory entityManagerFactory;

    private static EntityManager getEntityManager() {
        if (entityManagerFactory == null) {
            entityManagerFactory = Persistence.createEntityManagerFactory("derby");
        }
        return entityManagerFactory.createEntityManager();
    }

    public static void main(String[] argv) {
        EntityManager entityManager = getEntityManager();
        EntityTransaction entityTransaction = entityManager.getTransaction();
        entityTransaction.begin();

        Supplier newSupplier1 = new Supplier("Food Store", "Poland", "Kraków",
                "Budryka", "30-072", "12345678");
        Supplier newSupplier2 = new Supplier("Elektronics Store", "Poland", "Warsaw",
                "Centralna", "30-342", "87654321");
        Customer newCustomer1 = new Customer("Techno", "Belarus", "Minsk",
                "Kamennogorskaya", "220017", 0.15);
        Customer newCustomer2 = new Customer("FoodMania", "Belarus", "Brest",
                "Mogilowskaya", "343234", 0.03);
```

```
        entityManager.persist(newSupplier1);
        entityManager.persist(newSupplier2);
        entityManager.persist(newCustomer1);
        entityManager.persist(newCustomer2);

        entityTransaction.commit();
        entityManager.close();
    }
}
```

Rezultaty działania programu:

- Schemat bazy danych

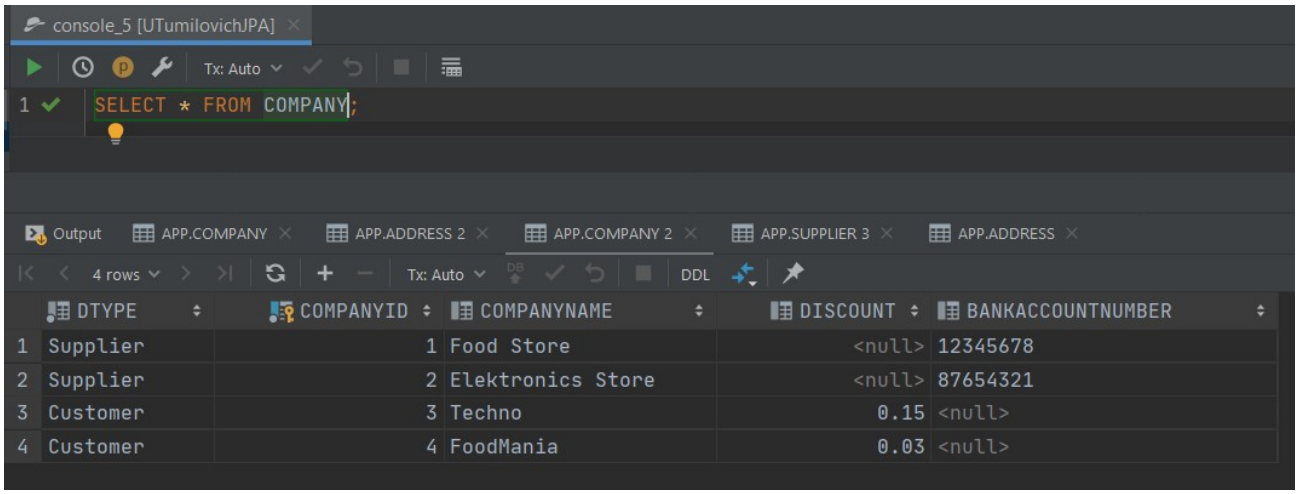


- Definicja bazy:

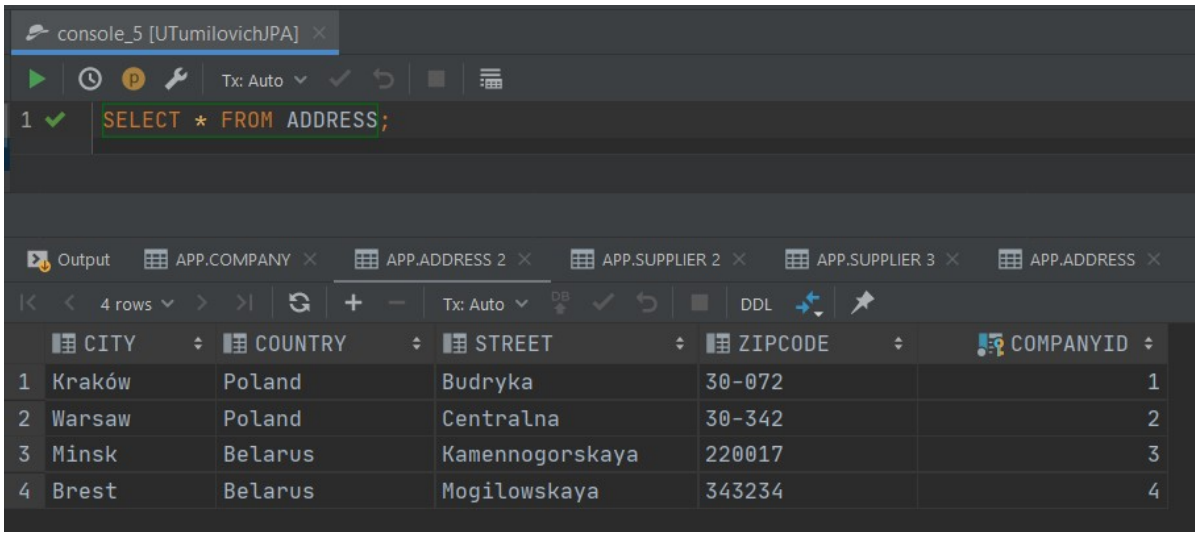
```
create table CATEGORY
(
    CATEGORYID INTEGER not null
        primary key,
    NAME       VARCHAR(255)
);

create table COMPANY
(
    DTYPE             VARCHAR(31) not null,
    COMPANYID         INTEGER     not null
        primary key,
    COMPANYNAME       VARCHAR(255),
    DISCOUNT          DOUBLE,
    BANKACCOUNTNUMBER VARCHAR(255)
);
```

```
create table ADDRESS
(
    CITY      VARCHAR(255),
    COUNTRY   VARCHAR(255),
    STREET    VARCHAR(255),
    ZIPCODE   VARCHAR(255),
    COMPANYID INTEGER not null
        primary key
        constraint FKMDMN12VHMKRO8PII3XAK07XG9
            references COMPANY
);

create table INVOICE
(
    INVOICENUMBER INTEGER not null
        primary key,
    QUANTITY      INTEGER not null
);

create table PRODUCT
(
    PRODUCTID    INTEGER not null
        primary key,
    PRODUCTNAME  VARCHAR(255),
    UNITSONSTOCK INTEGER not null,
    CATEGORY_FK  INTEGER
        constraint FKKRGKXD6GNQYXWWOAOGK95PT3D
            references CATEGORY,
    SUPPLIER_FK  INTEGER
        constraint FK514DWEWBVHDO0SS9KHJQKJDJM
            references COMPANY
);

create table INVOICE_PRODUCT
(
    INVOICES_INVOICENUMBER INTEGER not null
        constraint FKCBQYL9U4EH1TWS13U6PK5J2NT
            references INVOICE,
    PRODUCTS_PRODUCTID     INTEGER not null
        constraint FK3OWFENK1TV2NDEPWLTJO1N1G5
            references PRODUCT,
    primary key (INVOICES_INVOICENUMBER, PRODUCTS_PRODUCTID)
);
```

- Select z tabeli *Company*



- Select z tabeli *Address*



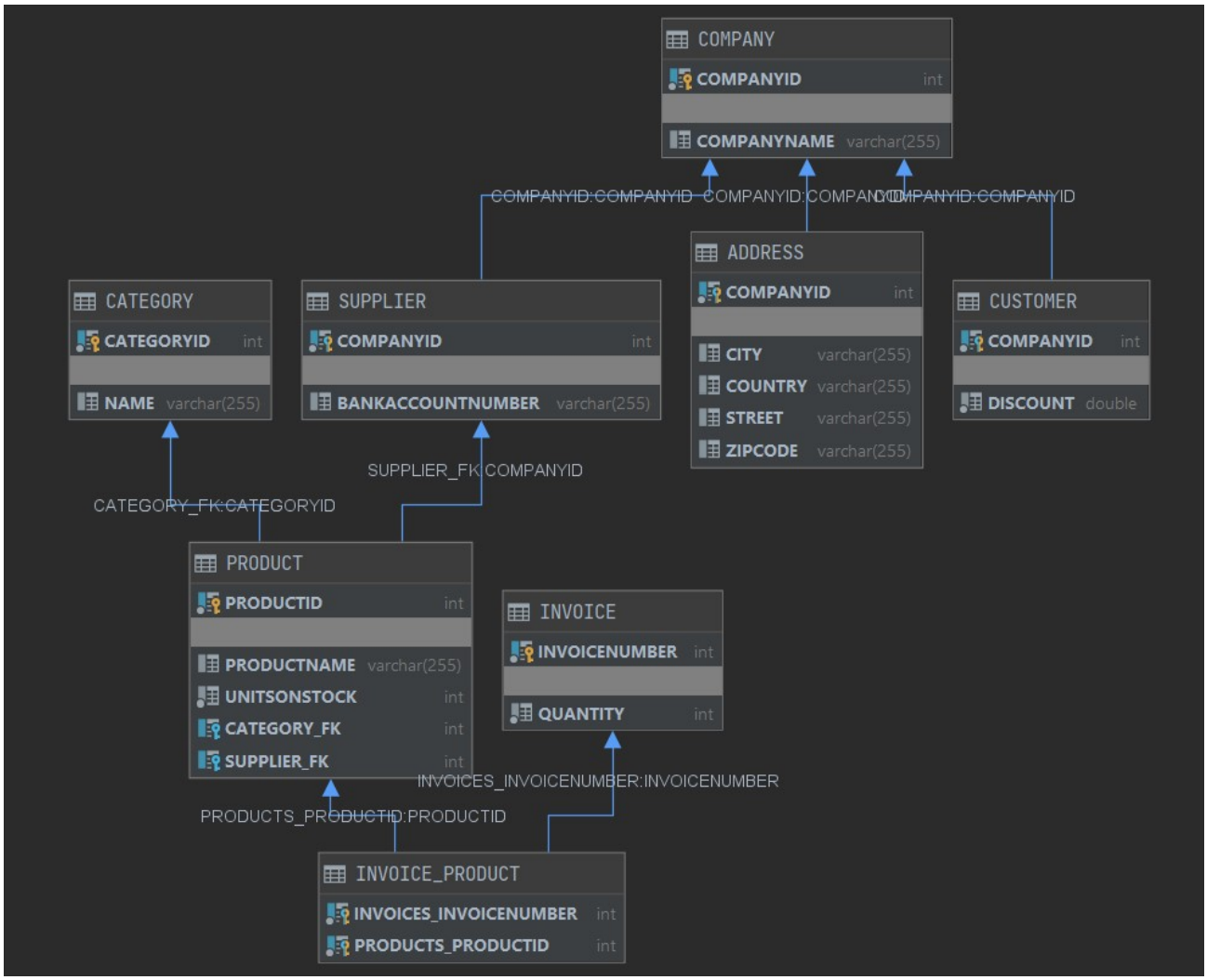
b) Joined strategy

Klasa **Company**

```
@Entity
@SecondaryTable(name="Address")
@Inheritance(strategy = InheritanceType.JOINED)
public class Company {
    @Id
    @GeneratedValue(strategy = GenerationType.AUTO)
    private int companyId;
    private String companyName;

    @Column(table="Address")
    private String country;
    @Column(table="Address")
    private String city;
    @Column(table="Address")
    private String street;
    @Column(table="Address")
    private String zipCode;

    public Company() {
    }

    public Company(String companyName, String country, String city, String street, String zipCode) {
        this.companyName = companyName;
        this.country = country;
        this.city = city;
        this.street = street;
        this.zipCode = zipCode;
    }
}
```

Rezultaty działania programu:

- Schemat bazy danych

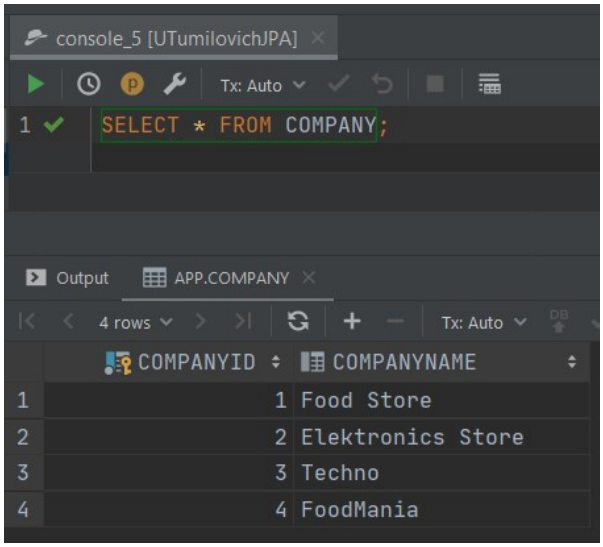


- Definicja bazy:

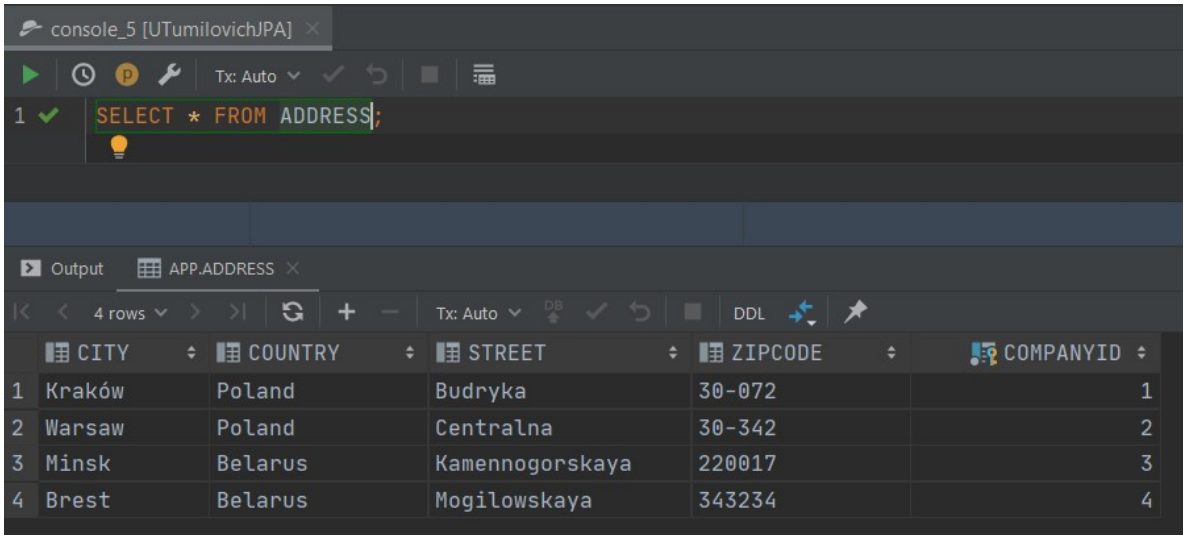
```
create table CATEGORY
(
    CATEGORYID INTEGER not null
        primary key,
    NAME       VARCHAR(255)
);

create table COMPANY
(
    COMPANYID   INTEGER not null
        primary key,
    COMPANYNAME VARCHAR(255)
);

create table ADDRESS
(
    CITY      VARCHAR(255),
    COUNTRY   VARCHAR(255),
    STREET    VARCHAR(255),
    ZIPCODE   VARCHAR(255),
    COMPANYID INTEGER not null
        primary key
        constraint FKMDMN12VHMKRO8PII3XAK07XG9
            references COMPANY
);

create table CUSTOMER
(
```

```
    DISCOUNT  DOUBLE  not null,
    COMPANYID INTEGER not null
        primary key
        constraint FKQ5B9XCMQP3UIH4U11R37L6229
            references COMPANY
);

create table INVOICE
(
    INVOICENUMBER INTEGER not null
        primary key,
    QUANTITY      INTEGER not null
);

create table SUPPLIER
(
    BANKACCOUNTNUMBER VARCHAR(255),
    COMPANYID         INTEGER not null
        primary key
        constraint FK43EKYFATN1CY2AW2U5FGM8ETW
            references COMPANY
);

create table PRODUCT
(
    PRODUCTID    INTEGER not null
        primary key,
    PRODUCTNAME  VARCHAR(255),
    UNITSONSTOCK INTEGER not null,
    CATEGORY_FK  INTEGER
        constraint FKKRGKXD6GNQYXWWOAOGK95PT3D
            references CATEGORY,
    SUPPLIER_FK  INTEGER
        constraint FKVE96QACVSR1A50RGWL94ENRU
            references SUPPLIER
);

create table INVOICE_PRODUCT
(
    INVOICES_INVOICENUMBER INTEGER not null
        constraint FKCBQYL9U4EH1TWS13U6PK5J2NT
            references INVOICE,
    PRODUCTS_PRODUCTID     INTEGER not null
        constraint FK3OWFENK1TV2NDEPWLTJO1N1G5
            references PRODUCT,
    primary key (INVOICES_INVOICENUMBER, PRODUCTS_PRODUCTID)
);
```

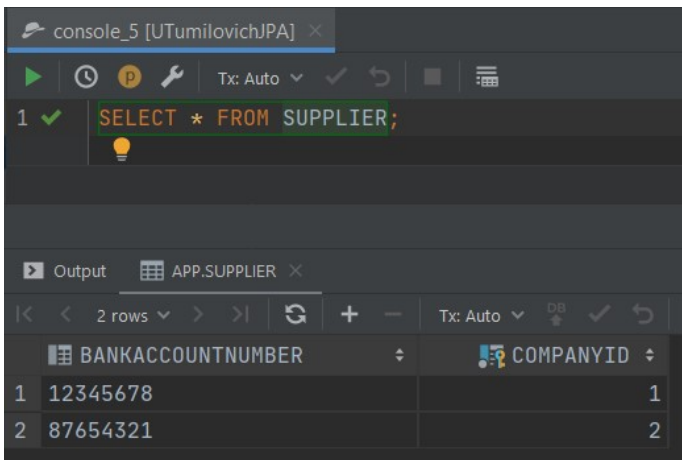
- Select z tabeli *Company*



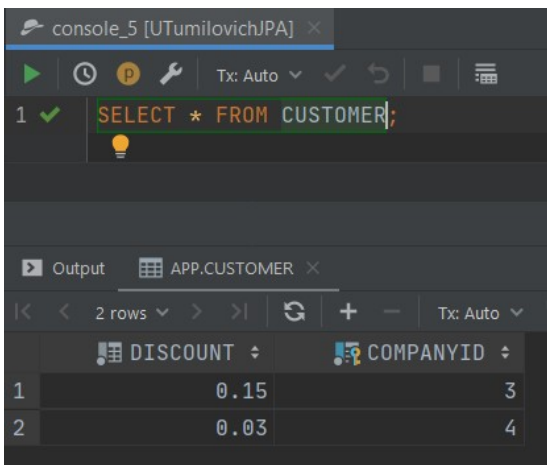
- Select z tabeli *Address*



- Select z tabeli *Supplier*



- Select z tabeli *Customer*



c) Table per class strategy

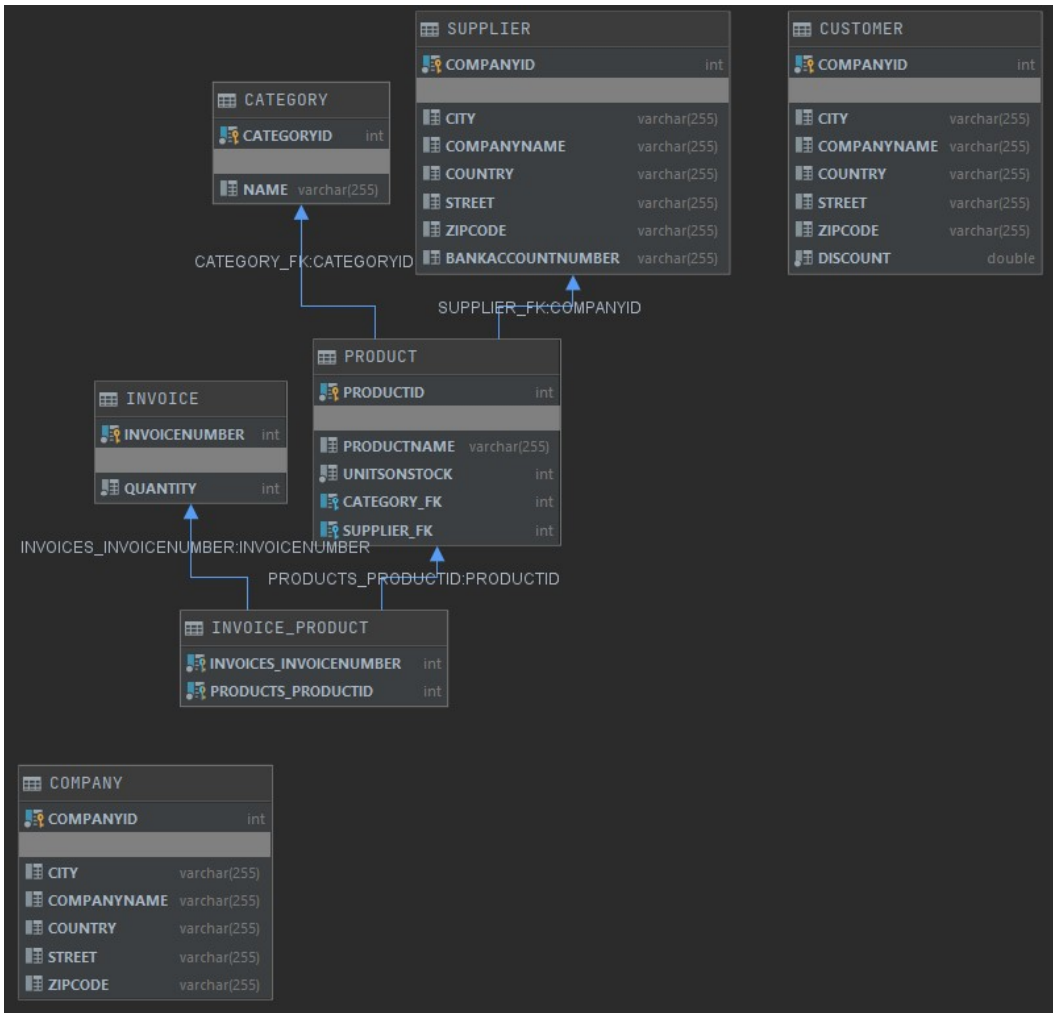
Klasa **Company**

```
@Entity
@Inheritance(strategy = InheritanceType.TABLE_PER_CLASS)
```

```
public class Company {
    @Id
    @GeneratedValue(strategy = GenerationType.AUTO)
    private int companyId;
    private String companyName;

    private String country;
    private String city;
    private String street;
    private String zipCode;

    public Company() {
    }

    public Company(String companyName, String country, String city, String street, String zipCode) {
        this.companyName = companyName;
        this.country = country;
        this.city = city;
        this.street = street;
        this.zipCode = zipCode;
    }
}
```

Rezultaty działania programu:

- Schemat bazy danych

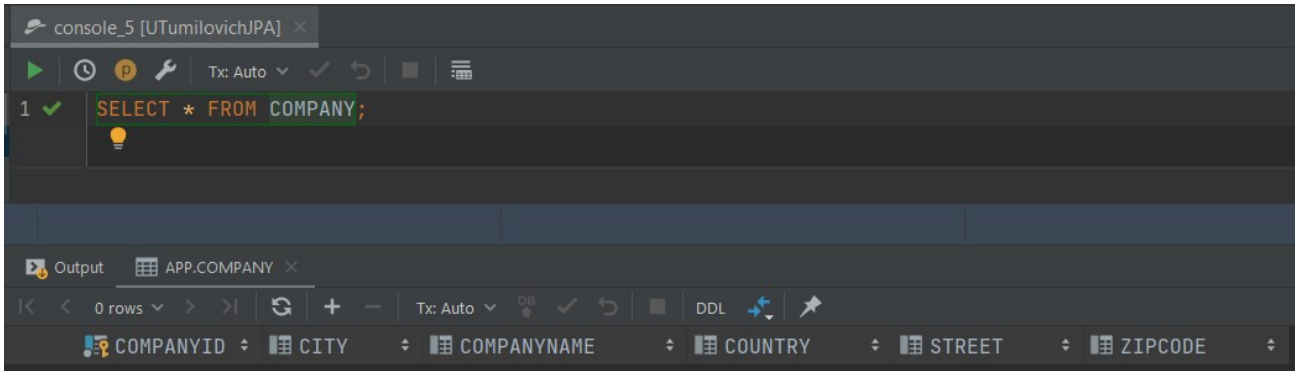


- Definicja bazy:

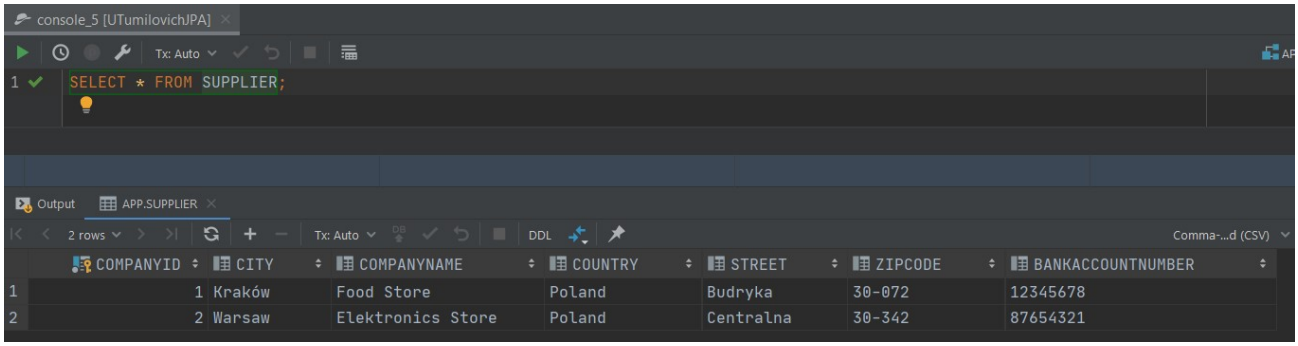
```
create table CATEGORY
```

```
(
    CATEGORYID INTEGER not null
        primary key,
    NAME       VARCHAR(255)
);

create table COMPANY
(
    COMPANYID   INTEGER not null
        primary key,
    CITY        VARCHAR(255),
    COMPANYNAME VARCHAR(255),
    COUNTRY     VARCHAR(255),
    STREET      VARCHAR(255),
    ZIPCODE     VARCHAR(255)
);

create table CUSTOMER
(
    COMPANYID   INTEGER not null
        primary key,
    CITY        VARCHAR(255),
    COMPANYNAME VARCHAR(255),
    COUNTRY     VARCHAR(255),
    STREET      VARCHAR(255),
    ZIPCODE     VARCHAR(255),
    DISCOUNT    DOUBLE  not null
);

create table INVOICE
(
    INVOICENUMBER INTEGER not null
        primary key,
    QUANTITY      INTEGER not null
);

create table SUPPLIER
(
    COMPANYID         INTEGER not null
        primary key,
    CITY              VARCHAR(255),
    COMPANYNAME       VARCHAR(255),
    COUNTRY           VARCHAR(255),
    STREET            VARCHAR(255),
    ZIPCODE           VARCHAR(255),
    BANKACCOUNTNUMBER VARCHAR(255)
);

create table PRODUCT
(
    PRODUCTID    INTEGER not null
        primary key,
    PRODUCTNAME  VARCHAR(255),
    UNITSONSTOCK INTEGER not null,
    CATEGORY_FK  INTEGER
        constraint FKKRGKXD6GNQYXWWOAOGK95PT3D
            references CATEGORY,
    SUPPLIER_FK  INTEGER
        constraint FKVE96QACVSR1A50RGWL94ENRU
            references SUPPLIER
);

create table INVOICE_PRODUCT
(
    INVOICES_INVOICENUMBER INTEGER not null
        constraint FKCBQYL9U4EH1TWS13U6PK5J2NT
            references INVOICE,
    PRODUCTS_PRODUCTID     INTEGER not null
        constraint FK3OWFENK1TV2NDEPWLTJO1N1G5
            references PRODUCT,
    primary key (INVOICES_INVOICENUMBER, PRODUCTS_PRODUCTID)
);
```

- Select z tabeli *Company*



- Select z tabeli *Supplier*



- Select z tabeli *Customer*