Requirements

Develop an application for managing expenses (purchases). The application must allow multiple users and to keep track of each users expense (one user shouldn't see what a different user has bought). An expense (or purchase) is described by the person who made it (purchaser), the cost of the purchase (or price of he item), quantity, product, time of purchase and the shop from where the purchase was made.

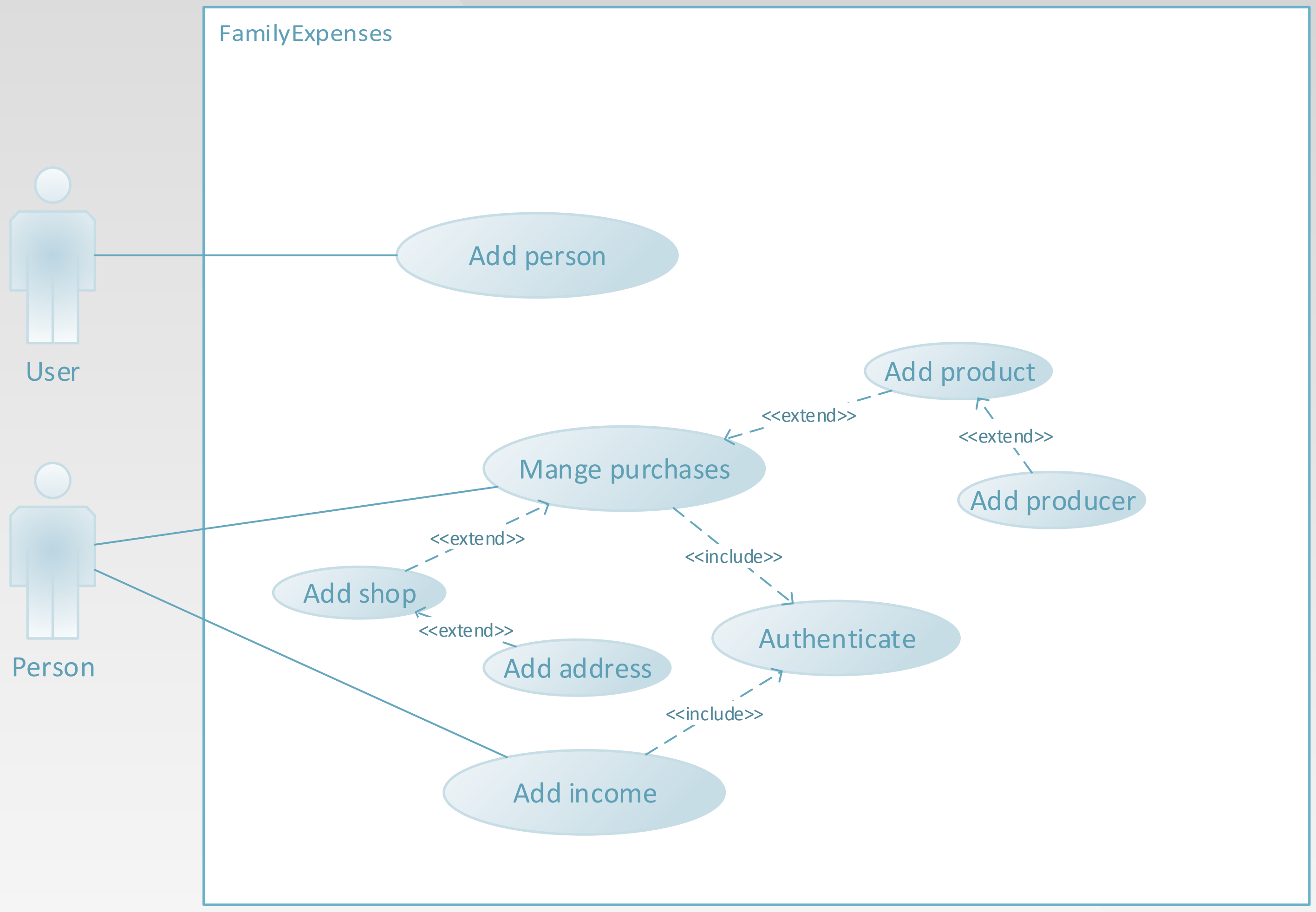
Each product is described by a name and a producer. A producer is described by name and country of origin. This helps to keep track of which countries the products are most popular in ones shopping list. Usually a major part of products are bought over and over (e.g.: milk) and maintaining a list of products will help users with redundancy problems.

Each user can have any number incomes, this is to help the user keep track of his balance and eventually estimate costs. A person is described by a name and a preferred currency, this currency is used for all prices and incomes that person provides.

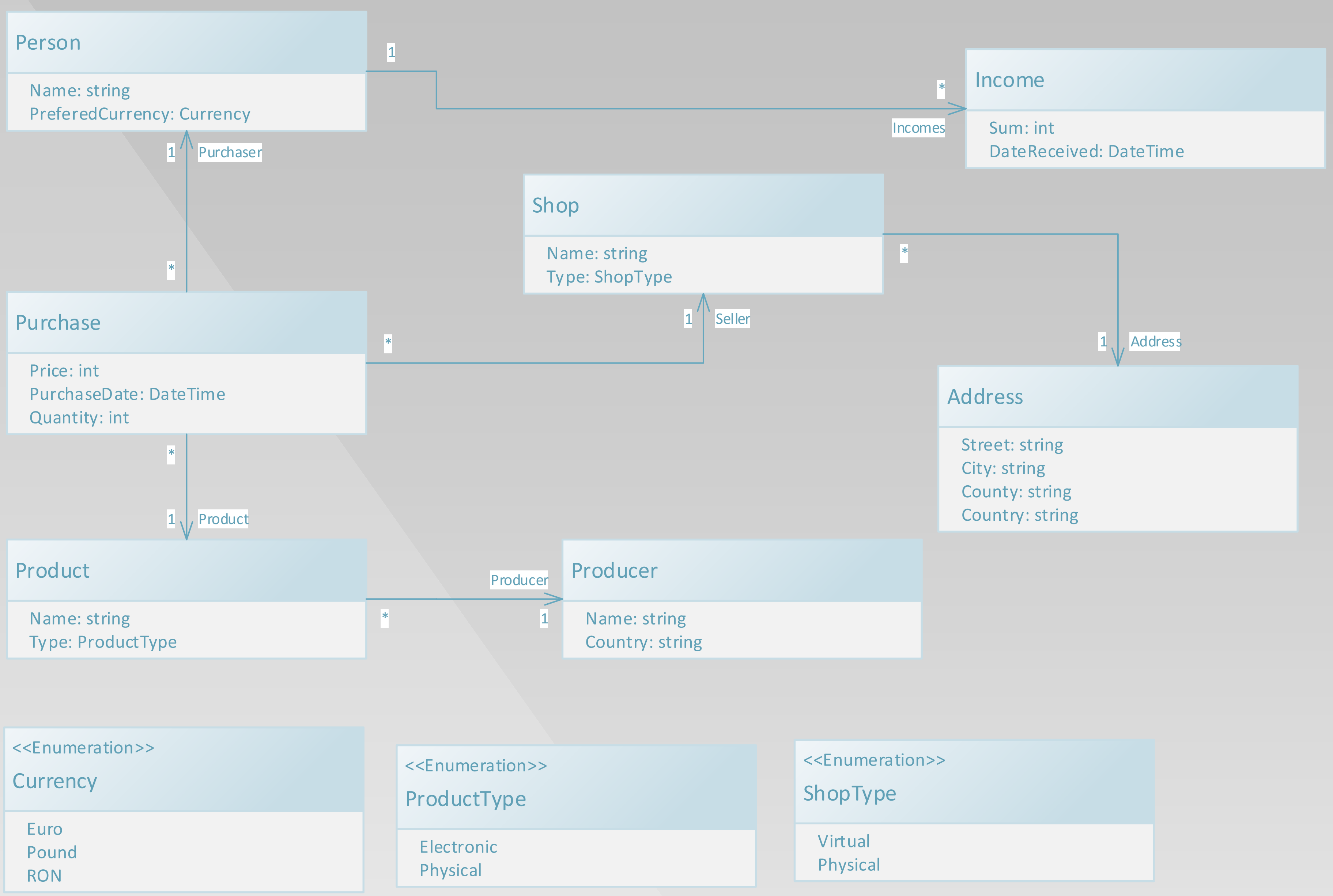
To keep track of shops, each purchase is accompanied by a shop from where that purchase was made. Each shop has a name and an address. This is required because in the same city there can be more shops with the same name but at different addresses (the are at least 3 Carrefour shops in Cluj-Napoca), the address will make the difference between each shop with the same name. An address is described by street, city, county and country. This is to provide help for abroad shopping (e.g. going to visit a relative in Germany and staying there for a few weeks, the user will surely want to shop and would like to keep track of those expenses.

In short, the application needs to manage ones expense, there is no password enforcement for each user which makes the application ideal for family members. Each users expense, product inventory, shop inventory, producer inventory, address inventory and income inventory are kept separate from the others. The application allows adding of any of the above and allows modifying expense (or purchase) details and even deleting them. All data is stored in XML files. The user interface must be friendly and encompass the hierarchical nature of XML (tree views tend to fulfil this role). Also, for viewing expenses and other inventories a list view would provide an adequate interface to the user.

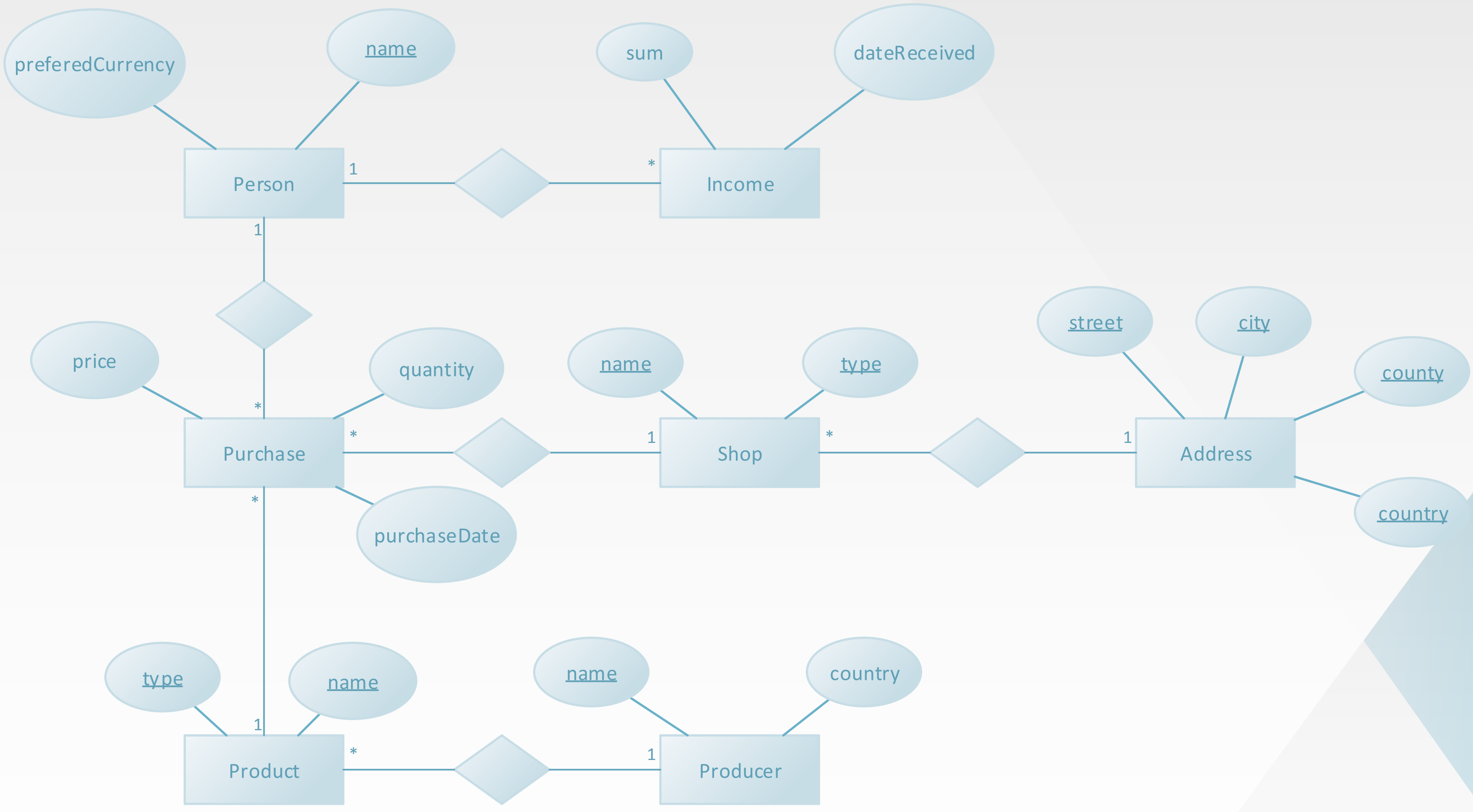
Use cases



Conceptual model



Physical model



Data storage: XML Schema

```
<?xml version="1.0" standalone="yes"?>
<xs:schema id="FamilyExpenses" xmlns="" xmlns:xs="http://www.w3.org/2001/XMLSchema" xmlns:msdata="urn:schemas-microsoft-com:xml-msdata">
 <xs:element name="FamilyExpenses" msdata:IsDataSet="true" msdata:UseCurrentLocale="true">
  <xs:complexType>
   <xs:choice minOccurs="0" maxOccurs="unbounded">
    <xs:element name="Persons">
     <xs:complexType>
      <xs:sequence>
       <xs:element name="name">
        <xs:simpleType>
         <xs:restriction base="xs:string">
          <xs:maxLength value="100" />
         </xs:restriction>
        </xs:simpleType>
       </xs:element>
       <xs:element name="preferedCurrency">
        <xs:simpleType>
         <xs:restriction base="xs:string">
          <xs:maxLength value="10" />
         </xs:restriction>
        </xs:simpleType>
       </xs:element>
       <xs:element name="Incomes" minOccurs="0" maxOccurs="unbounded">
        <xs:complexType>
         <xs:sequence>
          <xs:element name="sum" type="xs:int" msdata:Ordinal="0" />
          <xs:element name="dateReceived" type="xs:dateTime" msdata:Ordinal="1" />
         </xs:sequence>
         <xs:attribute name="person" msdata:AllowDBNull="false" use="prohibited">
          <xs:simpleType>
           <xs:restriction base="xs:string">
            <xs:maxLength value="100" />
           </xs:restriction>
          </xs:simpleType>
         </xs:attribute>
        </xs:complexType>
       </xs:element>
       <xs:element name="Purchases" minOccurs="0" maxOccurs="unbounded">
        <xs:complexType>
         <xs:sequence>
          <xs:element name="price" type="xs:int" msdata:Ordinal="0" />
          <xs:element name="quantity" type="xs:int" msdata:Ordinal="1" />
          <xs:element name="shop" msdata:Ordinal="2">
           <xs:simpleType>
            <xs:restriction base="xs:string">
             <xs:maxLength value="100" />
            </xs:restriction>
           </xs:simpleType>
          </xs:element>
          <xs:element name="shopAddress" type="xs:int" msdata:Ordinal="3" />
          <xs:element name="product" msdata:Ordinal="5">
           <xs:simpleType>
            <xs:restriction base="xs:string">
             <xs:maxLength value="100" />
            </xs:restriction>
           </xs:simpleType>
          </xs:element>
          <xs:element name="productProducer" msdata:Ordinal="6">
           <xs:simpleType>
            <xs:restriction base="xs:string">
             <xs:maxLength value="100" />
            </xs:restriction>
           </xs:simpleType>
          </xs:element>
          <xs:element name="datePurchased" type="xs:dateTime" msdata:Ordinal="7" />
         </xs:sequence>
```

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          <xs:attribute name="purchaser" msdata:AllowDBNull="false" use="prohibited">
            <xs:simpleType>
              <xs:restriction base="xs:string">
                <xs:maxLength value="100" />
              </xs:restriction>
            </xs:simpleType>
          </xs:attribute>
        </xs:complexType>
      </xs:element>
    </xs:sequence>
  </xs:complexType>
</xs:element>
<xs:element name="Addresses">
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    <xs:sequence>
      <xs:element name="id" type="xs:int" />
      <xs:element name="street">
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          <xs:restriction base="xs:string">
            <xs:maxLength value="100" />
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        </xs:simpleType>
      </xs:element>
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        <xs:simpleType>
          <xs:restriction base="xs:string">
            <xs:maxLength value="100" />
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        </xs:simpleType>
      </xs:element>
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            <xs:maxLength value="100" />
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        </xs:simpleType>
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            <xs:maxLength value="100" />
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        </xs:simpleType>
      </xs:element>
      <xs:element name="Shops" minOccurs="0" maxOccurs="unbounded">
        <xs:complexType>
          <xs:sequence>
            <xs:element name="name" msdata:Ordinal="0">
              <xs:simpleType>
                <xs:restriction base="xs:string">
                  <xs:maxLength value="100" />
                </xs:restriction>
              </xs:simpleType>
            </xs:element>
            <xs:element name="type" type="xs:int" msdata:Ordinal="2" />
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          <xs:attribute name="address" type="xs:int" msdata:AllowDBNull="false" use="prohibited" />
        </xs:complexType>
      </xs:element>
    </xs:sequence>
  </xs:complexType>
</xs:element>
<xs:element name="Producers">
  <xs:complexType>
    <xs:sequence>
      <xs:element name="name">
        <xs:simpleType>
          <xs:restriction base="xs:string">
            <xs:maxLength value="100" />
          </xs:restriction>
        </xs:simpleType>
      </xs:element>
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          <xs:element name="country">
            <xs:simpleType>
              <xs:restriction base="xs:string">
                <xs:maxLength value="100" />
              </xs:restriction>
            </xs:simpleType>
          </xs:element>
          <xs:element name="Products" minOccurs="0" maxOccurs="unbounded">
            <xs:complexType>
              <xs:sequence>
                <xs:element name="name" msdata:Ordinal="0">
                  <xs:simpleType>
                    <xs:restriction base="xs:string">
                      <xs:maxLength value="100" />
                    </xs:restriction>
                  </xs:simpleType>
                </xs:element>
                <xs:element name="type" type="xs:int" msdata:Ordinal="1" />
              </xs:sequence>
              <xs:attribute name="producer" msdata:AllowDBNull="false" use="prohibited">
                <xs:simpleType>
                  <xs:restriction base="xs:string">
                    <xs:maxLength value="100" />
                  </xs:restriction>
                </xs:simpleType>
              </xs:attribute>
            </xs:complexType>
          </xs:element>
        </xs:sequence>
      </xs:complexType>
    </xs:element>
  </xs:choice>
</xs:complexType>
<xs:unique name="Constraint1" msdata:PrimaryKey="true">
  <xs:selector xpath=".//Persons" />
  <xs:field xpath="name" />
</xs:unique>
<xs:unique name="Shops_Constraint1" msdata:ConstraintName="Constraint1" msdata:PrimaryKey="true">
  <xs:selector xpath=".//Shops" />
  <xs:field xpath="name" />
  <xs:field xpath="@address" />
</xs:unique>
<xs:unique name="Addresses_Constraint1" msdata:ConstraintName="Constraint1" msdata:PrimaryKey="true">
  <xs:selector xpath=".//Addresses" />
  <xs:field xpath="id" />
</xs:unique>
<xs:unique name="Products_Constraint1" msdata:ConstraintName="Constraint1" msdata:PrimaryKey="true">
  <xs:selector xpath=".//Products" />
  <xs:field xpath="name" />
  <xs:field xpath="@producer" />
</xs:unique>
<xs:unique name="Constraint2">
  <xs:selector xpath=".//Products" />
  <xs:field xpath="name" />
</xs:unique>
<xs:unique name="Producers_Constraint1" msdata:ConstraintName="Constraint1" msdata:PrimaryKey="true">
  <xs:selector xpath=".//Producers" />
  <xs:field xpath="name" />
</xs:unique>
<xs:keyref name="fkProductsToProducer" refer="Producers_Constraint1" msdata:IsNested="true">
  <xs:selector xpath=".//Products" />
  <xs:field xpath="@producer" />
</xs:keyref>
<xs:keyref name="fkShopsToAddress" refer="Addresses_Constraint1" msdata:IsNested="true">
  <xs:selector xpath=".//Shops" />
  <xs:field xpath="@address" />
</xs:keyref>
<xs:keyref name="fkPurchasesToShop" refer="Shops_Constraint1">
  <xs:selector xpath=".//Purchases" />
  <xs:field xpath="shop" />
  <xs:field xpath="shopAddress" />
</xs:keyref>
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    <xs:keyref name="fkPurchasesToProduct" refer="Constraint2">
      <xs:selector xpath=".//Purchases" />
      <xs:field xpath="product" />
    </xs:keyref>
    <xs:keyref name="fkPurchasesToPerson" refer="Constraint1" msdata:IsNested="true">
      <xs:selector xpath=".//Purchases" />
      <xs:field xpath="@purchaser" />
    </xs:keyref>
    <xs:keyref name="fkIncomesToPerson" refer="Constraint1" msdata:IsNested="true">
      <xs:selector xpath=".//Incomes" />
      <xs:field xpath="@person" />
    </xs:keyref>
  </xs:element>
</xs:schema>
```

System architecture