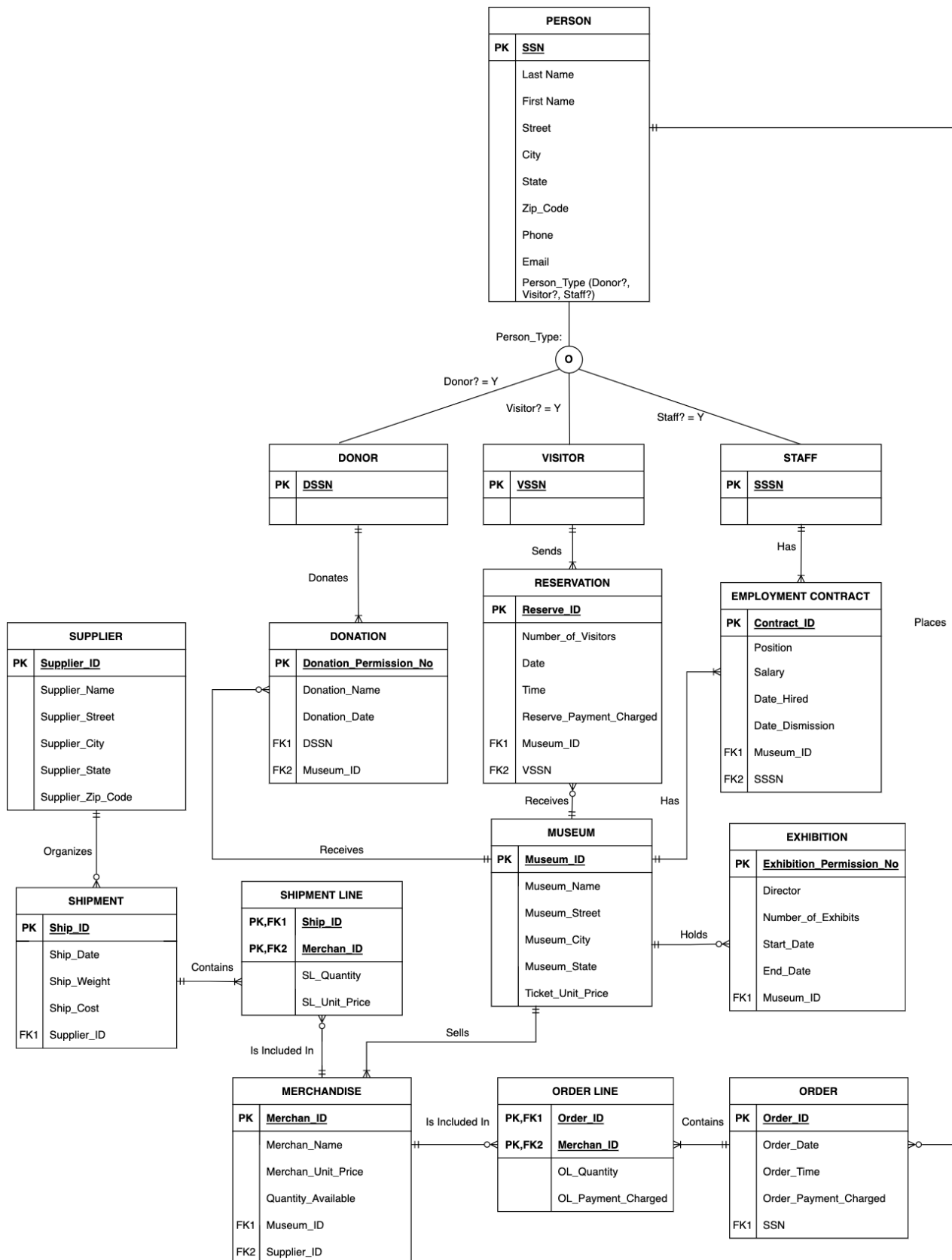


P2. Initial ERD and Database Design

1. ERD



2. Business Problems

2.1. Project Overview

In this project, we aim to establish a database to organize the data of five cardinal functions of the museums i.e., Donations, Reservations, Employment and Merchandise Selling and Merchandise Inventory Management. Benefiting from this database system, museums can provide their donors, visitors and staff with better experiences, and be more competitive.

2.2. Business Objectives

- 1) Museums need to record information of donors who have provided donations to receive more precious exhibits and get more influential.
- 2) Museums need to record reservations from visitors, and only visitors with tickets can enter the museums. For advertising purposes, museums also need to keep records of basic contact information of visitors who have at least one reservation, such as name, address, phone number when visitors reserve.
- 3) To give staff better management, such as salary adjustment and position improvement, museums need to record employment contracts of all their staff. The contracts should include basic employment information, such as hired date, dismissal date, position, and salary.
- 4) To make more profits, museums need to sell related merchandise to people.
- 5) In the case that museums need to sell merchandise to make more profits, merchandise management is important. Museums need to record information of merchandise on sell, such as price, supplies and inventories.

2.3. Entities and Their Necessities

- 1) To achieve objective 1, DONORs which inherit PERSON supertype storing contact information are needed to provide DONATIONs to MUSEUMs. And MUSEUMs need to receive DONATIONs.
- 2) To achieve objective 2, VISITORs which inherit PERSON supertype will send RESERVATIONs to MUSEUMs, and MUSEUMs will receive RESERVATIONs from VISITORs. Also, MUSEUMs will hold many EXHIBITIONs to attract more VISITORs.
- 3) To achieve objective 3, STAFF which inherit PERSON supertype needs to sign EMPLOYMENT CONTRACTs with MUSEUMs, and MUSEUMs need to hire many STAFF.
- 4) To achieve objective 4, PERSONs can place ORDERs. One ORDER will contain many ORDER LINEs where includes one MERCHANDISE for each line.
- 5) To achieve objective 5, SUPPLIERs will organize several SHIPMENTs on fixed dates. Each SHIPMENT contains many SHIPMENT LINEs where ships one

MERCHANDISE for each line. Each MERCHANDISE has an INVENTORY HISTORY to record change of inventories after selling and supplies from supplier.

2.4. Business Rules

- 1) A person can be a donor, a visitor, a staff or either two or all of them. Not all people belong to these three types. A person is identified by SSN (Social Security Number), whose contact information such as names, addresses, phone numbers, email addresses and person types also need to be recorded.
- 2) A donor should donate at least one donation, who is identified by DSSN which inherits SSN. A donation identified by Donation Permission Number is donated by only one donor. A museum identified by Museum ID may receive many donations, while a donation donated by a specific donor can only be donated to exactly one museum.
- 3) A visitor identified by VSSN which inherits SSN, should send at least one reservation to museums. Each reservation specified by Reservation ID must be sent by only one visitor. A museum may receive many reservations from visitors, while each reservation must be sent to exactly one museum. Reservation information such as number of visitors, reservation date and time, reservation payment charged should be recorded.
- 4) A staff identified by SSSN which inherits SSN, should have at least one employment contract with museums, while one museum should have at least one staff working for it. Within one employment contract, Contract ID is its identifier, position, salary, hired date and dismissal date should be confirmed.
- 5) A museum uses Museum ID as identifier. Basic information like museum names, addresses, and unit ticket prices should be recorded. One museum may hold many exhibitions, while an exhibition identified by Exhibition Permission Number must be held by exactly one museum. Basic information, such as directors, numbers of exhibits, starting date and ending date should be recorded.
- 6) A museum will sell many merchandises to make extra profits, while one merchandise identified by Merchant ID can only be sold by one museum. Basic information about selling, such as merchandise names, unit prices and inventories, also should be recorded. One merchandise has at least one inventory history where Record Date is partial identifier, and inventories are recorded.
- 7) A person may place many orders identified by Order ID at museums, while an order must belong to one person. One order should contain at least one order line where the information of merchandise to buy should be recorded, such as quantity and payment charged for each line. One order line must belong to exactly one order. A merchandise may be included in many order lines, while each order line must contain exactly one merchandise.

- 8) A merchandise sold in museums will receive many supplies from suppliers to restock. A merchandise may be included in many shipment lines where exactly one merchandise is contained for each line. The shipment information of merchandise, like quantity and unit shipping price should be recorded in each shipment line. One shipment line must belong to one shipment, while one shipment should contain at least one shipment line. The shipments are organized by suppliers. A supplier may organize many shipments, while each shipment must be organized by exactly one supplier.