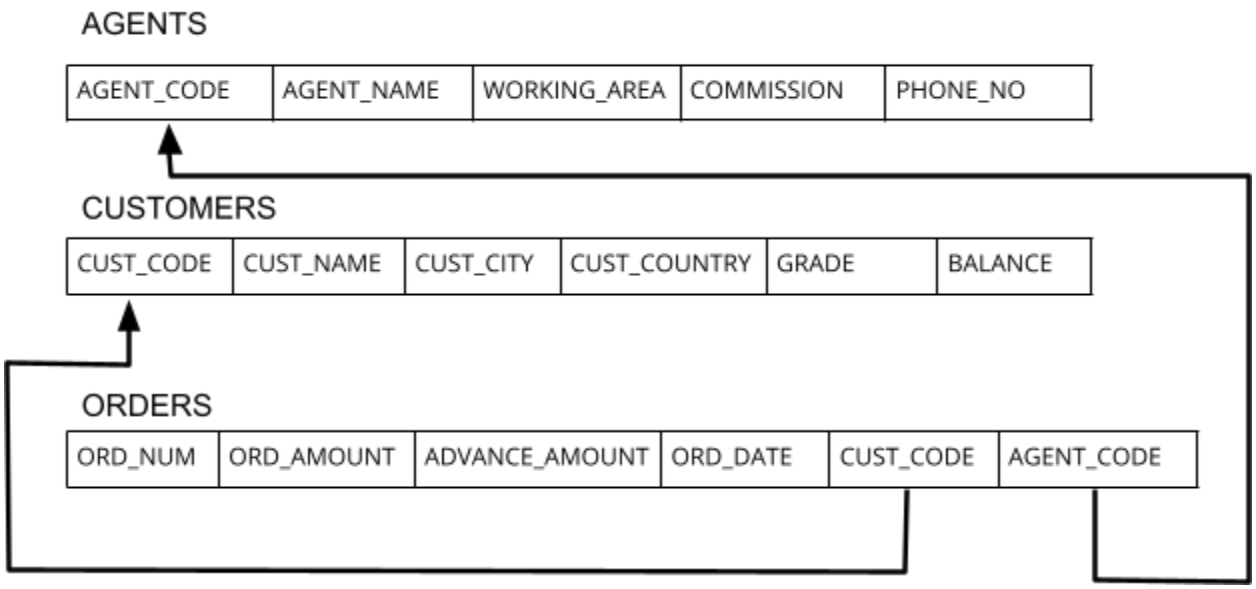
MIDTERM PROJECT DEMO CASE

For the demo case in your midterm project please consider the following SALES relational model.



Data Definition Operations Demo

For this model, using your relational model emulator, create the following relations with the attributes, using the specified data types. Names of relations and attributes are not case sensitive. In your report, please include the Java code (as a code block) you used for creating these relations.

```
AGENTS (
        AGENT_CODE          String,
        AGENT_NAME          String,
        WORKING_AREA        String,
        COMMISSION_PER      Integer,
        PHONE_NO            Integer
        )
```

```
CUSTOMERS (
        CUST_CODE           String,
        CUST_NAME           String,
        CUST_CITY           String,
        CUST_COUNTRY        String,
        GRADE               Integer,
        BALANCE             Integer
)

ORDERS (
        ORD_NUM             Integer,
        ORD_AMOUNT          Integer,
        ADVANCE_AMOUNT      Integer,
        ORD_DATE            String,
        CUST_CODE           String,
        AGENT_CODE          String
        )
```

The following attributes uniquely identify the tuples in their corresponding tables (namely, they are the primary keys)

- AGENT_CODE is the primary key of AGENTS
- CUST_CODE is the primary key of CUSTOMERS
- ORD_NUM is the primary key of ORDERS

Additionally, ORDERS relation maps an M:N relationship, meaning that the following referential integrity constraints are present in the given SALES relational model

- ORDERS(CUST_CODE) references CUSTOMERS(CUST_CODE)
- ORDERS(AGENT_CODE) references AGENTS(CUST_CODE)

Data Manipulation Operations Demo

After creating these tables, use your data manipulation operations to insert and therefore populate the above mentioned relations. Below you will see data modification operations. After each major step, show the state of your relations. Npte that some of the operations are supposed to be rejected. Demonstrate that your relational model emulator rejects those ‘illegal’ operations as well (you can show a simple log print in Java).

Step 1: Insertions into AGENTS relation

The order of attributes is

AGENTS(AGENT_CODE,AGENT_NAME,WORKING_AREA,COMMISSION,PHONE_NO)

INSERT TUPLE INTO AGENTS (A001,Hugo,Paris,14,12346674)
INSERT TUPLE INTO AGENTS (A002,Mukesh,Mumbai,11,12358964)
INSERT TUPLE INTO AGENTS (A003,Alex,London,13,12458969)
INSERT TUPLE INTO AGENTS (A004,Ivan,Toronto,15,22544166)
INSERT TUPLE INTO AGENTS (A005,Anderson,Brisbane,13,21447739)
INSERT TUPLE INTO AGENTS (A006,McDenny,London,15,22255588)
INSERT TUPLE INTO AGENTS (A007,Ramasundar,Bangalore,15,25814763)
INSERT TUPLE INTO AGENTS (A008,Alfred,New York,12,25874365)
INSERT TUPLE INTO AGENTS (A009,Benjamin,Hampshire,11,22536178)
INSERT TUPLE INTO AGENTS (A010,Sanchez,Madrid,14,22388644)
INSERT TUPLE INTO AGENTS (A001,Stevens,Dublin,15,45625874) -- Reject
INSERT TUPLE INTO AGENTS (A011,Stevens,Dublin,15,45625874)
INSERT TUPLE INTO AGENTS (A012,Lucida,San Jose,12,52981425)
INSERT TUPLE INTO AGENTS (A005,Anderson,Brisbane,13,21447739) -- Reject

Step 2: Insertions into CUSTOMERS relation

The order of attributes is

CUSTOMERS(CUST_CODE,CUST_NAME,CUST_CITY,CUST_COUNTRY,GRADE,BALANCE)

INSERT TUPLE INTO CUSTOMERS (C00014,Victor,Paris,France,2,8000)
INSERT TUPLE INTO CUSTOMERS (C00005,Sasikant,Mumbai,India,1,7000)
INSERT TUPLE INTO CUSTOMERS (C00009,Ramesh,Mumbai,India,3,8000)
INSERT TUPLE INTO CUSTOMERS (C00022,Avinash,Mumbai,India,2,7000)
INSERT TUPLE INTO CUSTOMERS (C00013,Holmes,London,UK,2,6000)
INSERT TUPLE INTO CUSTOMERS (C00015,Stuart,London,UK,1,6000)
INSERT TUPLE INTO CUSTOMERS (C00003,Martin,Toronto,Canada,2,8000)
INSERT TUPLE INTO CUSTOMERS (C00006,Shilton,Toronto,Canada,1,10000)
INSERT TUPLE INTO CUSTOMERS (C00008,Karolina,Toronto,Canada,1,7000)
INSERT TUPLE INTO CUSTOMERS (C00004,Winston,Brisbane,Australia,1,5000)
INSERT TUPLE INTO CUSTOMERS (C00018,Fleming,Brisbane,Australia,2,7000)
INSERT TUPLE INTO CUSTOMERS (C01011,Salvador,Madrid,0,Spain,1000) -- Reject
INSERT TUPLE INTO CUSTOMERS (C00021,Jacks,Brisbane,Australia,1,7000)

INSERT TUPLE INTO CUSTOMERS (C00023,Karl,London,UK,0,4000)
INSERT TUPLE INTO CUSTOMERS (C00024,Cook,London,UK,2,4000)
INSERT TUPLE INTO CUSTOMERS (C00016,Venkatpati,Bangalore,India,2,8000)
INSERT TUPLE INTO CUSTOMERS (C00017,Srinivas,Bangalore,India,2,8000)
INSERT TUPLE INTO CUSTOMERS (C00001,Micheal,New York,USA,2,3000)
INSERT TUPLE INTO CUSTOMERS (C00002,Bolt,New York,USA,3,5000)
INSERT TUPLE INTO CUSTOMERS (C00013,Erin,Los Angeles,USA,5,7000) -- Reject
INSERT TUPLE INTO CUSTOMERS (C00020,Albert,New York,USA,3,5000)
INSERT TUPLE INTO CUSTOMERS (C00010,Charles,Hampshire,UK,3,6000)
INSERT TUPLE INTO CUSTOMERS (C00007,Oscar,Madrid,Spain,1,7000)
INSERT TUPLE INTO CUSTOMERS (C00011,Sergio,Madrid,Spain,3,7000)
INSERT TUPLE INTO CUSTOMERS (C00019,Alberto,Madrid,Spain,1,8000)
INSERT TUPLE INTO CUSTOMERS (C00011,Tara,London,UK,2,1000) -- Reject
INSERT TUPLE INTO CUSTOMERS (C00025,Gary,Dublin,Ireland,2,5000)
INSERT TUPLE INTO CUSTOMERS (C00012,Steven,San Jose,USA,1,5000)

Step 3: Insertions into ORDERS relation

The order of attributes is

ORDERS(ORD_NUM,ORD_AMOUNT,ADVANCE_AMOUNT,
ORD_DATE,CUST_CODE,AGENT_CODE)

INSERT TUPLE INTO ORDERS (200117,800,200,10/20/2008,C00014,A001)
INSERT TUPLE INTO ORDERS (200106,2500,700,04/20/2008,C00005,A002)
INSERT TUPLE INTO ORDERS (200113,4000,600,06/10/2008,C00022,A002)
INSERT TUPLE INTO ORDERS (200120,500,100,07/20/2008,C00009,A002)
INSERT TUPLE INTO ORDERS (200123,500,100,09/16/2008,C00022,A002)
INSERT TUPLE INTO ORDERS (200126,500,100,06/24/2008,C00022,A002)
INSERT TUPLE INTO ORDERS (200128,3500,1500,07/20/2008,C00009,A002)
INSERT TUPLE INTO ORDERS (200133,1200,400,06/29/2008,C00009,A002)
INSERT TUPLE INTO ORDERS (200117,1200,400,06/29/2008,C00009,A002) -- Reject
INSERT TUPLE INTO ORDERS (200127,2500,400,07/20/2008,C00015,A003)
INSERT TUPLE INTO ORDERS (200104,1500,500,03/13/2008,C00006,A004)
INSERT TUPLE INTO ORDERS (200108,4000,600,02/15/2008,C00008,A004)
INSERT TUPLE INTO ORDERS (200121,1500,600,09/23/2008,C00008,A004)
INSERT TUPLE INTO ORDERS (200122,2500,400,09/16/2008,C00003,A004)
INSERT TUPLE INTO ORDERS (200222,2500,400,09/16/2008,C00004,A004)
INSERT TUPLE INTO ORDERS (200103,1500,700,05/15/2008,C00021,A005)

INSERT TUPLE INTO ORDERS (200125,2000,600,10/10/2008,C00018,A005)
INSERT TUPLE INTO ORDERS (200134,4200,1800,09/25/2008,C00004,A005)
INSERT TUPLE INTO ORDERS (200136,4200,1800,09/25/2008,C40004,A005) -- Reject
INSERT TUPLE INTO ORDERS (200118,500,100,07/20/2008,C00023,A006)
INSERT TUPLE INTO ORDERS (200129,2500,500,07/20/2008,C00024,A006)
INSERT TUPLE INTO ORDERS (200112,2000,400,05/30/2008,C00016,A007)
INSERT TUPLE INTO ORDERS (200124,500,100,06/20/2008,C00017,A007)
INSERT TUPLE INTO ORDERS (200101,3000,1000,07/15/2008,C00001,A008)
INSERT TUPLE INTO ORDERS (200111,1000,300,07/10/2008,C00020,A008)
INSERT TUPLE INTO ORDERS (200114,3500,2000,08/15/2008,C00002,A008)
INSERT TUPLE INTO ORDERS (200116,500,100,07/13/2008,C00010,A009)
INSERT TUPLE INTO ORDERS (200107,4500,900,08/30/2008,C00007,A010)
INSERT TUPLE INTO ORDERS (200109,3500,800,07/30/2008,C00011,A010)
INSERT TUPLE INTO ORDERS (200110,3000,500,04/15/2008,C00019,A010)
INSERT TUPLE INTO ORDERS (200119,4000,700,09/16/2008,C00007,A010)
INSERT TUPLE INTO ORDERS (200135,2000,800,09/16/2008,C00007,A010)
INSERT TUPLE INTO ORDERS (200105,2500,500,07/18/2008,C00025,A011)
INSERT TUPLE INTO ORDERS (200130,2500,400,07/30/2008,C00025,A011)
INSERT TUPLE INTO ORDERS (200102,2000,300,05/25/2008,C00012,A012)
INSERT TUPLE INTO ORDERS (200131,900,150,08/26/2008,C00012,A012)
INSERT TUPLE INTO ORDERS (200137,2000,800,09/16/2008,C00007,A110) -- Reject

Step 4: Update and Delete operations

UPDATE TUPLE IN AGENTS WHERE AGENT_ID = A007
    SET AGENT_CODE = A017
UPDATE TUPLE IN ORDERS WHERE ORDER_ID = 200222
    SET ORD_AMOUNT=3400
UPDATE TUPLE IN ORDERS WHERE ORDER_ID = 200222
    SET CUST_CODE=C1000 – Reject

DELETE TUPLE IN ORDERS WHERE ORDER_ID = 200222

DELETE TUPLE IN AGENTS WHERE AGENT_CODE = A017

Data Querying Operations Demo

Below you are provided with a set of queries on the SALES relational model and instances. Transform these queries into relational algebra statements and find (and display) the result sets for each query. In your report, show the relational algebra query, how you implemented it (as Java code block) and the result set.

0. Example – Retrieve the names of all UK customers, who have an order greater than $4,000, together with the agent names.

- Step 1: Relational Algebra
    - $\pi_{\text{CUST\_NAME, AGENT\_NAME}}(\sigma_{\text{ORD\_AMOUNT>4000}}\text{ORDERS}) * \text{AGENTS} * \text{CUSTOMERS})$
- Step 2: Implement it in Java using your own querying methods
- Step 3: Display the result

1. Retrieve the names of all customers.

2. Retrieve the names and phone numbers of all agents in Bangalore.

3. Retrieve the names of all customers and all agents

4. Retrieve the orders of all customers who are from the USA.

5. Retrieve the total number of customers and total order amount (ORD_AMOUNT) for each agent. List names and phone numbers for agents.