Creating table based on ERD

ITC 6000 - Database Management Systems

GROUP 2 REPRESENTATIVES

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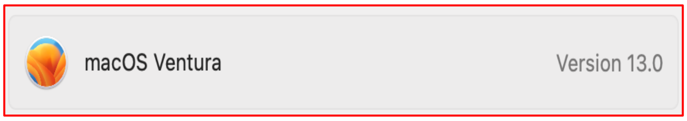
I. NTRODUCTION

The following report has been created by Group G2of ITC 6000 - Database Management Systems. In this report, we deal with Creating the bank database related to previous ERD in relational database software MS SQL Server. And since having and installing the proper software is important for every operating system, we provide some description for installing this software on mac. Then we talk about components of related table and state conclusion.

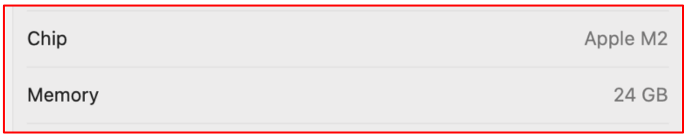
II. HOW TO INSTALL SQL?

First we need to recognize about our software version; based on our software which is mac 13.0 .we should see the require software for SQL Based on Microsoft website minimum requirement :for SQL is like this figure

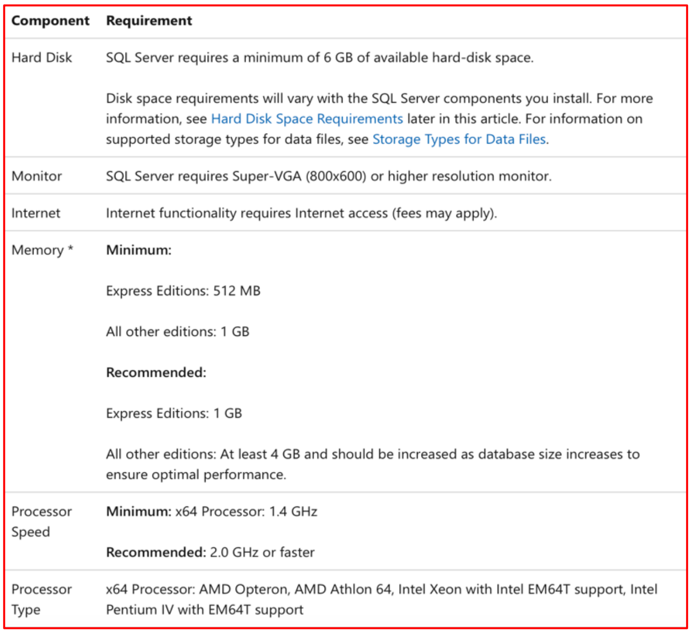
So compare with our MacOS version which is show below, are completely set to each other and can be :prepare to download



macOS Ventura Version 13.0



Chip	Apple M2
Memory	24 GB



Component	Requirement
Hard Disk	SQL Server requires a minimum of 6 GB of available hard-disk space. Disk space requirements will vary with the SQL Server components you install. For more information, see Hard Disk Space Requirements later in this article. For information on supported storage types for data files, see Storage Types for Data Files.
Monitor	SQL Server requires Super-VGA (800x600) or higher resolution monitor.
Internet	Internet functionality requires Internet access (fees may apply).
Memory *	**Minimum:** Express Editions: 512 MB All other editions: 1 GB **Recommended:** Express Editions: 1 GB All other editions: At least 4 GB and should be increased as database size increases to ensure optimal performance.
Processor Speed	**Minimum:** x64 Processor: 1.4 GHz **Recommended:** 2.0 GHz or faster
Processor Type	x64 Processor: AMD Opteron, AMD Athlon 64, Intel Xeon with Intel EM64T support, Intel Pentium IV with EM64T support

As we can seen and compare, the minimum memory for SQL is 512 MB. The recommended memory is 1 GB but we have 24 GB which is great for installing it.
Generally, SQL Server Management Studio (SSMS) only runs on Windows, but there are two ways you can install it on Mac.

The first way is to install a virtual machine (VM) using programs like VirtualBox, Parallels Desktop, etc. Then you'll install Windows onto that VM, which requires a payment for the license, and finally, you'll use the VM to install SSMS.
The second option which we use is to install the SQL server using Docker. Microsoft provides Azure Data Studio as a graphical user interface to run the SQL server on Mac. This article covers the second option.
Docker is a tool designed to make the creation, deployment, and running of applications by using containers much easier. Below are the following steps to run SSMS on Mac.

So, in this step we should begin install it FROM 7 STEPS TO INSTALLING SQL SERVER MANAGEMENT STUDIO ON MAC:

STEP 1: DOWNLOAD AND INSTALL DOCKER

Then you'll select whether to download it to a Mac with an Intel chip or an Apple chip. Which we choose an Apple chip one. By default, docker allocates 2 GB of memory, and an SQL server needs 3.25 GB to run, so we need to increase the memory to 4 GB in Docker. To do that, go to settings, then preferences, then select the "Resources" screen and slide the memory slider up to at least 4 GB. Click "Apply & Restart."

STEP 2: DOWNLOAD THE MS SQL SERVER IMAGE TO DOCKER

Open the terminal in the Mac and run the following code. This will install the 2022 MS SQL Server image on your device. Once we run the above command, Docker will start extracting the image from the web and downloading the same into your local machine.

STEP 3: LAUNCH THE SQL SERVER IMAGE IN DOCKER

Run the following command in the terminal again to launch the image that was downloaded in Docker:

```
docker run -d --name sql_server_test -e 'ACCEPT_EULA=Y' -e 'SA_PASSWORD=reallyStrongPwd123' -p 1433:1433 mcr.microsoft.com/mssql/server:2022-latest
```

Once the above command runs successfully, go to Docker desktop and select the container option. Then look for the container "sql_server_test" as we mentioned in the above command.

STEP 4: INSTALL THE MS SQL CLI

We need to install sql-cli via npm. Before proceeding, npm should be installed on the Mac.

STEP 5: TEST THE INSTALLATION

You can now go ahead and run SQL queries against the SQL server.

STEP 6: DOWNLOAD AND INSTALL THE GUI APPLICATION - AZURE DATA STUDIO

We need to install a graphical user interface (GUI). For that, we'll download Azure Data Studio. Azure Data Studio is available on Mac as well as on Windows because SSMS won't work on Mac.

STEP 7: CLOSING AND RESTARTING

Once you complete your work, you can save your progress and quit the workspace. Enter the mssql prompt [press ctrl+c] and stop the running Docker container using the `docker stop` command. If you want to re-open it, restart the existing docker container and start the SQL server via the terminal giving your username and password.

For this assignment, some of the SQL commands we used in the script are:

CREATE TABLE table name (Column 1 datatype (#characters)Define column you want to have)

(Column 2 datatype (#characters)Define column you want to have)

.

.

.

(Column n datatype (#characters)Define column you want to have)

PRIMARY KEY (column)Has to be identified.

Note: before creating table in SQL, first we should create a data base.

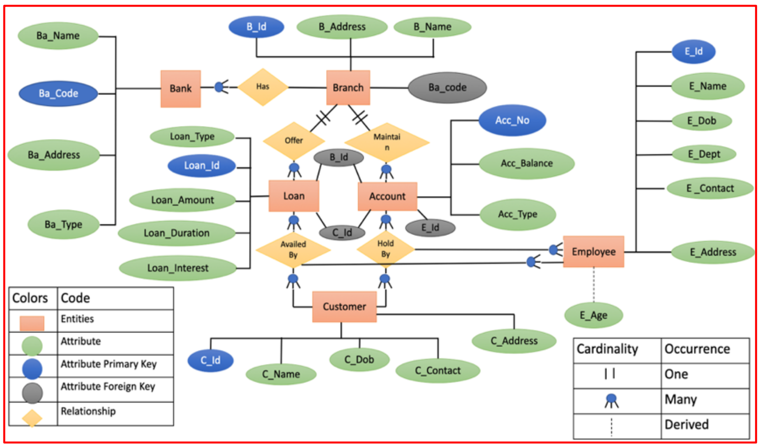
The command would be

CREATE DATABASE name

In our case we use the command below

CREATE DATABASE bank_ca

According to the following ERD :



Since we have 6 entities in bank domain, we ;should identify 6 separate tables

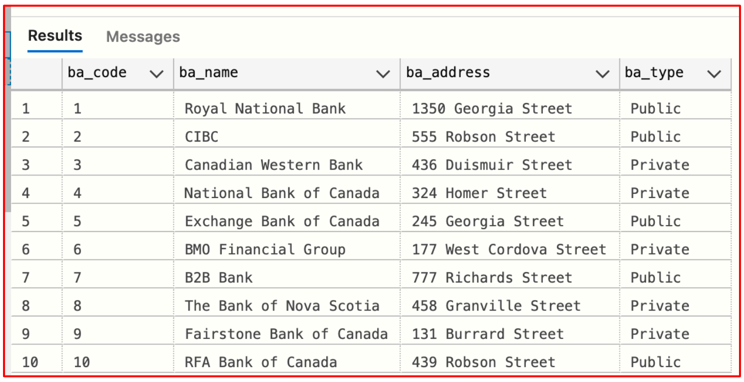
1. Table ~ Bank
2. Table ~ Branch
3. Table ~ loan
4. Table ~ Account
5. Table ~ Customer
6. Table ~ Employee

For table 1 (bank table) we have 4 attributes whose names are ba_code, ba_name, ba_address and ba_type. We need to define 4 columns with these names along with their types. It should be mentioned that among these attributes ba_code is primary key.

For filling each table we use INSERT INTO table VALUES () command for 10 times to have a table of 10 rows. It is done by considering the number of attributes and their types.

Here is the output,

```
CREATE TABLE bank(
    ba_code INT NOT NULL,
    ba_name NVARCHAR(50) NOT NULL,
    ba_address NVARCHAR(100) NOT NULL,
    ba_type NVARCHAR(50) NOT NULL,
        CONSTRAINT pk_bank_ba_code PRIMARY KEY (ba_code)
    );
```

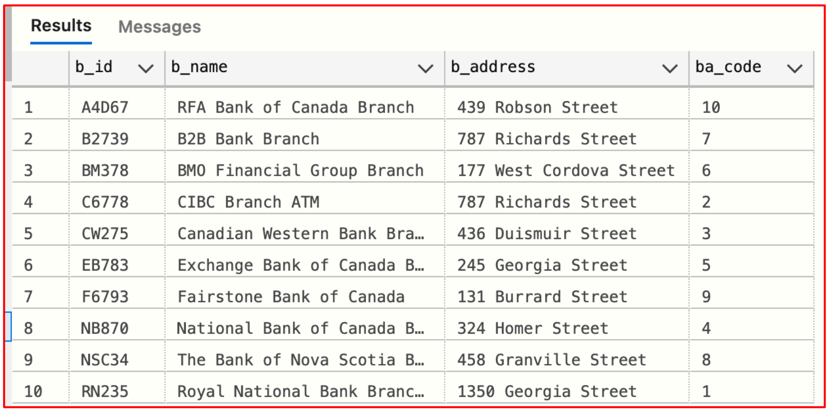


	ba_code	ba_name	ba_address	ba_type
1	1	Royal National Bank	1350 Georgia Street	Public
2	2	CIBC	555 Robson Street	Public
3	3	Canadian Western Bank	436 Duismuir Street	Private
4	4	National Bank of Canada	324 Homer Street	Private
5	5	Exchange Bank of Canada	245 Georgia Street	Public
6	6	BMO Financial Group	177 West Cordova Street	Private
7	7	B2B Bank	777 Richards Street	Public
8	8	The Bank of Nova Scotia	458 Granville Street	Private
9	9	Fairstone Bank of Canada	131 Burrard Street	Private
10	10	RFA Bank of Canada	439 Robson Street	Public

For table 2, branch table, we have 3 columns of b_id which is primary key , b_name, and b_address and a foreign key of ba_code from bank table. So the command will be:

```
CREATE TABLE branch (
    b_id VARCHAR(6) NOT NULL,
    b_name NVARCHAR(100) NOT NULL,
    b_address NVARCHAR(100) NOT NULL,
    ba_code INT NOT NULL,
    CONSTRAINT pk_branch_b_id PRIMARY KEY (b_id),
        CONSTRAINT fk_branch_ba_code FOREIGN KEY(ba_code) REFERENCES bank(ba_code)
   );
```

Here is the output table:

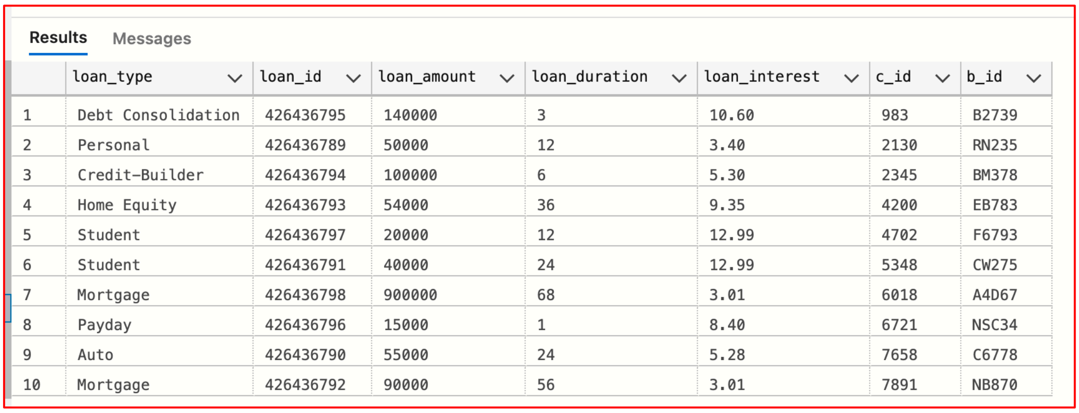


	b_id	b_name	b_address	ba_code
1	A4D67	RFA Bank of Canada Branch	439 Robson Street	10
2	B2739	B2B Bank Branch	787 Richards Street	7
3	BM378	BMO Financial Group Branch	177 West Cordova Street	6
4	C6778	CIBC Branch ATM	787 Richards Street	2
5	CW275	Canadian Western Bank Bra…	436 Duismuir Street	3
6	EB783	Exchange Bank of Canada B…	245 Georgia Street	5
7	F6793	Fairstone Bank of Canada	131 Burrard Street	9
8	NB870	National Bank of Canada B…	324 Homer Street	4
9	NSC34	The Bank of Nova Scotia B…	458 Granville Street	8
10	RN235	Royal National Bank Branc…	1350 Georgia Street	1

Table 3, loan table, would be a table of 7 attributes like loan_type , loan_id, ... , c_id and b_id in which c_id and b_id are the foreign keys and loan_id is primary key. We selected decimal type for interest attribute because usually interests are shown with .decimal

```
)CREATE TABLE loan
,loan_type VARCHAR(20) NOT NULL
,loan_id INT NOT NULL
,loan_amount NUMERIC NOT NULL
,loan_duration INT NOT NULL
,loan_interest DECIMAL(5,2) NOT NULL
,c_id INT
,b_id VARCHAR(6)
CONSTRAINT pk_loan_customer_c_id_branch_b_id
,PRIMARY KEY(c_id,b_id)
CONSTRAINT fk_loan_c_id FOREIGN KEY(c_id)
,REFERENCES customer(c_id)
CONSTRAINT fk_loan_b_id FOREIGN KEY(b_id)
REFERENCES branch(b_id)
;(
```

Here is the output table:



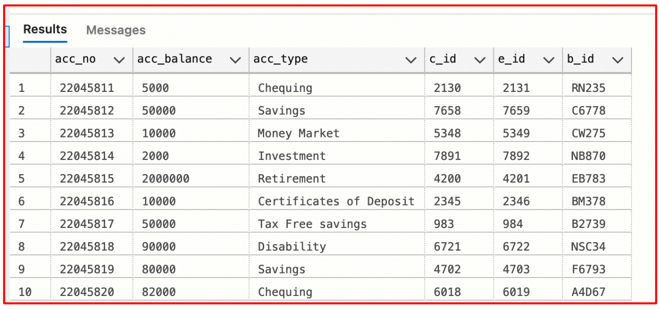
Results Messages

	loan_type	loan_id	loan_amount	loan_duration	loan_interest	c_id	b_id
1	Debt Consolidation	426436795	140000	3	10.60	983	B2739
2	Personal	426436789	50000	12	3.40	2130	RN235
3	Credit-Builder	426436794	100000	6	5.30	2345	BM378
4	Home Equity	426436793	54000	36	9.35	4200	EB783
5	Student	426436797	20000	12	12.99	4702	F6793
6	Student	426436791	40000	24	12.99	5348	CW275
7	Mortgage	426436798	900000	68	3.01	6018	A4D67
8	Payday	426436796	15000	1	8.40	6721	NSC34
9	Auto	426436790	55000	24	5.28	7658	C6778
10	Mortgage	426436792	90000	56	3.01	7891	NB870

Table 4 or account table is consist of 6 columns, 3 of which are foreign keys and acc_no is the primary key. We choose numeric type for balance attribute.

```
CREATE TABLE account (
    acc_no INT NOT NULL,
    acc_balance NUMERIC,
    acc_type VARCHAR(100) NOT NULL,
    c_id INT NOT NULL,
    e_id INT NOT NULL,
    b_id VARCHAR(6) NOT NULL,
    CONSTRAINT pk_account_acc_no PRIMARY KEY (acc_no),
    CONSTRAINT fk_account_c_id FOREIGN KEY(c_id) REFERENCES customer(c_id),
    CONSTRAINT fk_account_eid FOREIGN KEY(e_id) REFERENCES employee(e_id),
    CONSTRAINT fk_account_b_id FOREIGN KEY(b_id) REFERENCES branch(b_id)
    );
```

Here we can see account table;



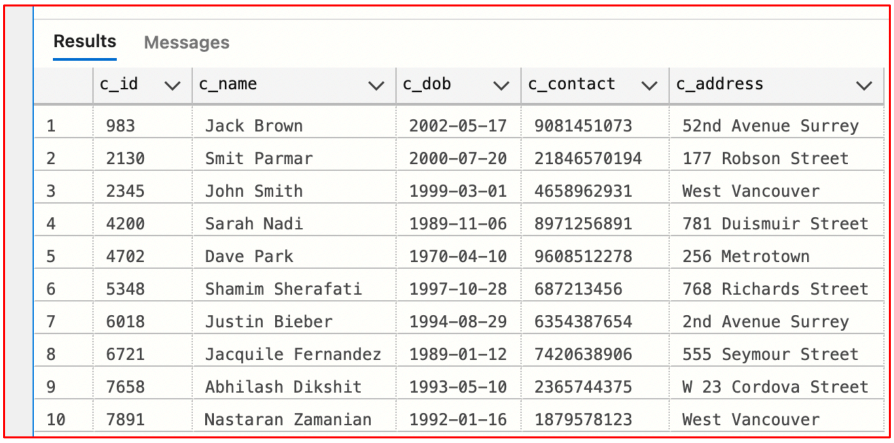
Results Messages

	acc_no	acc_balance	acc_type	c_id	e_id	b_id
1	22045811	5000	Chequing	2130	2131	RN235
2	22045812	50000	Savings	7658	7659	C6778
3	22045813	10000	Money Market	5348	5349	CW275
4	22045814	2000	Investment	7891	7892	NB870
5	22045815	2000000	Retirement	4200	4201	EB783
6	22045816	10000	Certificates of Deposit	2345	2346	BM378
7	22045817	50000	Tax Free savings	983	984	B2739
8	22045818	90000	Disability	6721	6722	NSC34
9	22045819	80000	Savings	4702	4703	F6793
10	22045820	82000	Chequing	6018	6019	A4D67

Table 5, customer table, include 5 attributes of c_id, c_name, c_dob, c_contact and c_address , among which c_id is the Primary key should be mentioned that for dob column we choose date type and for c_contact we select bigint type.

```
CREATE TABLE customer
  (
   c_id INT NOT NULL,
   c_name NVARCHAR(40) NOT NULL,
   c_dob DATE NOT NULL,
   c_contact BIGINT NOT NULL,
   c_address NVARCHAR(100) NOT NULL,
   CONSTRAINT pk_customer_cid PRIMARY KEY (c_id)
  );
```

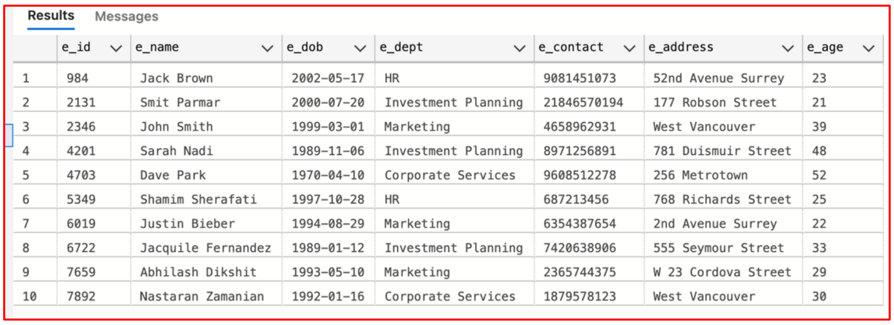
Here we can see account table;



	c_id	c_name	c_dob	c_contact	c_address
1	983	Jack Brown	2002-05-17	9081451073	52nd Avenue Surrey
2	2130	Smit Parmar	2000-07-20	21846570194	177 Robson Street
3	2345	John Smith	1999-03-01	4658962931	West Vancouver
4	4200	Sarah Nadi	1989-11-06	8971256891	781 Duismuir Street
5	4702	Dave Park	1970-04-10	9608512278	256 Metrotown
6	5348	Shamim Sherafati	1997-10-28	687213456	768 Richards Street
7	6018	Justin Bieber	1994-08-29	6354387654	2nd Avenue Surrey
8	6721	Jacquile Fernandez	1989-01-12	7420638906	555 Seymour Street
9	7658	Abhilash Dikshit	1993-05-10	2365744375	W 23 Cordova Street
10	7891	Nastaran Zamanian	1992-01-16	1879578123	West Vancouver

In table 6, employment table, we define 6 attributes totally like e_id, e_name, e_dob, e_dept, e_contact, e_address, e_age in which e_id is the primary key . For e_contact we choose bigint type.

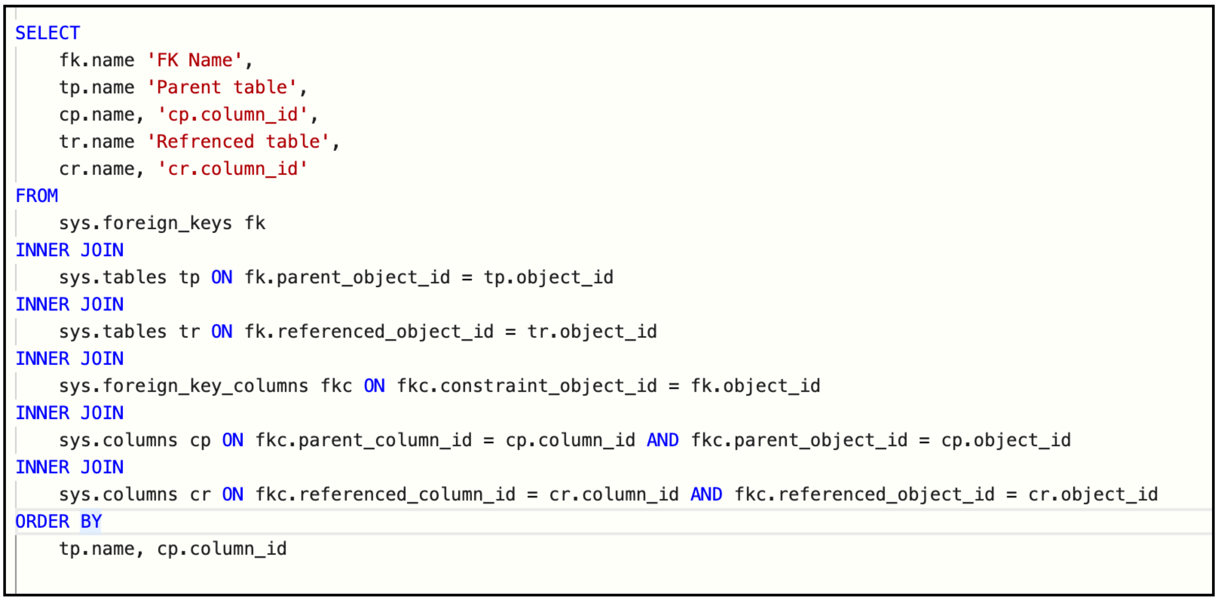
```
CREATE TABLE employee
  (
   e_id INT NOT NULL,
   e_name NVARCHAR(40) NOT NULL,
   e_dob DATE NOT NULL,
   e_dept NVARCHAR(30) NOT NULL,
   e_contact BIGINT NOT NULL,
   e_address NVARCHAR(100) NOT
NULL,
   e_age INT NOT NULL
   CONSTRAINT pk_employee_eid
PRIMARY KEY (e_id)
  );
```



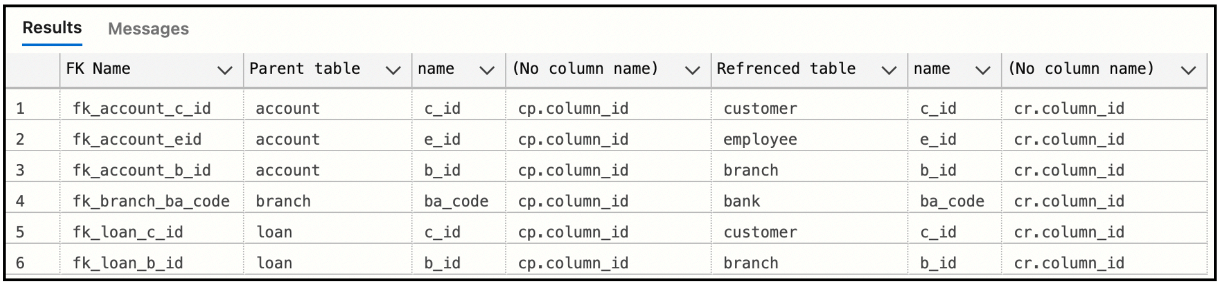
	e_id	e_name	e_dob	e_dept	e_contact	e_address	e_age
1	984	Jack Brown	2002-05-17	HR	9081451073	52nd Avenue Surrey	23
2	2131	Smit Parmar	2000-07-20	Investment Planning	21846570194	177 Robson Street	21
3	2346	John Smith	1999-03-01	Marketing	4658962931	West Vancouver	39
4	4201	Sarah Nadi	1989-11-06	Investment Planning	8971256891	781 Duismuir Street	48
5	4703	Dave Park	1970-04-10	Corporate Services	9608512278	256 Metrotown	52
6	5349	Shamim Sherafati	1997-10-28	HR	687213456	768 Richards Street	25
7	6019	Justin Bieber	1994-08-29	Marketing	6354387654	2nd Avenue Surrey	22
8	6722	Jacquile Fernandez	1989-01-12	Investment Planning	7420638906	555 Seymour Street	33
9	7659	Abhilash Dikshit	1993-05-10	Marketing	2365744375	W 23 Cordova Street	29
10	7892	Nastaran Zamanian	1992-01-16	Corporate Services	1879578123	West Vancouver	30

Creating a Relational Database.

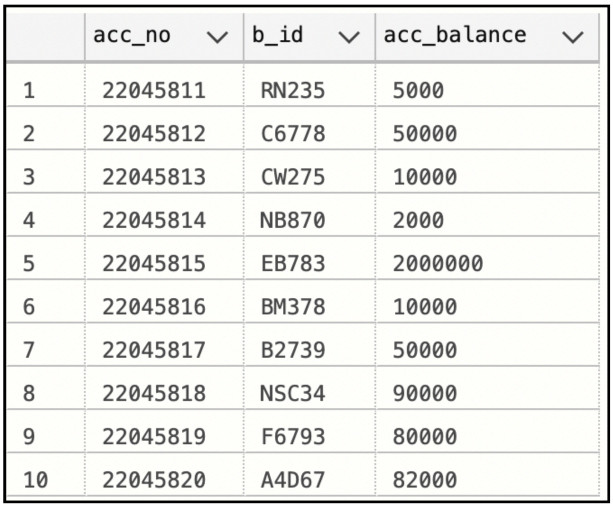
In this part, we shall be creating a relational database by using the primary keys from different tables. In the different table the same primary key shall be a foreign key. Hence we shall use JOIN commands to create the relational databases.



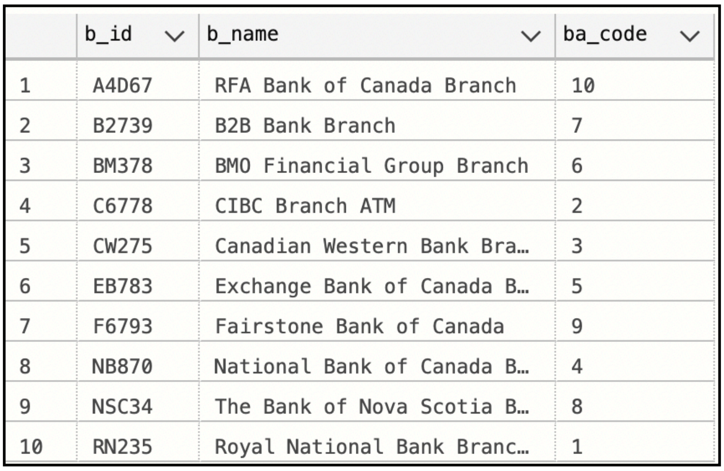
```
SELECT
    fk.name 'FK Name',
    tp.name 'Parent table',
    cp.name, 'cp.column_id',
    tr.name 'Refrenced table',
    cr.name, 'cr.column_id'
FROM
    sys.foreign_keys fk
INNER JOIN
    sys.tables tp ON fk.parent_object_id = tp.object_id
INNER JOIN
    sys.tables tr ON fk.referenced_object_id = tr.object_id
INNER JOIN
    sys.foreign_key_columns fkc ON fkc.constraint_object_id = fk.object_id
INNER JOIN
    sys.columns cp ON fkc.parent_column_id = cp.column_id AND fkc.parent_object_id = cp.object_id
INNER JOIN
    sys.columns cr ON fkc.referenced_column_id = cr.column_id AND fkc.referenced_object_id = cr.object_id
ORDER BY
    tp.name, cp.column_id
```



	FK Name	Parent table	name	(No column name)	Refrenced table	name	(No column name)
1	fk_account_c_id	account	c_id	cp.column_id	customer	c_id	cr.column_id
2	fk_account_eid	account	e_id	cp.column_id	employee	e_id	cr.column_id
3	fk_account_b_id	account	b_id	cp.column_id	branch	b_id	cr.column_id
4	fk_branch_ba_code	branch	ba_code	cp.column_id	bank	ba_code	cr.column_id
5	fk_loan_c_id	loan	c_id	cp.column_id	customer	c_id	cr.column_id
6	fk_loan_b_id	loan	b_id	cp.column_id	branch	b_id	cr.column_id

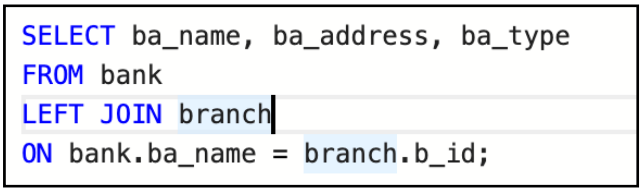


	acc_no	b_id	acc_balance
1	22045811	RN235	5000
2	22045812	C6778	50000
3	22045813	CW275	10000
4	22045814	NB870	2000
5	22045815	EB783	2000000
6	22045816	BM378	10000
7	22045817	B2739	50000
8	22045818	NSC34	90000
9	22045819	F6793	80000
10	22045820	A4D67	82000

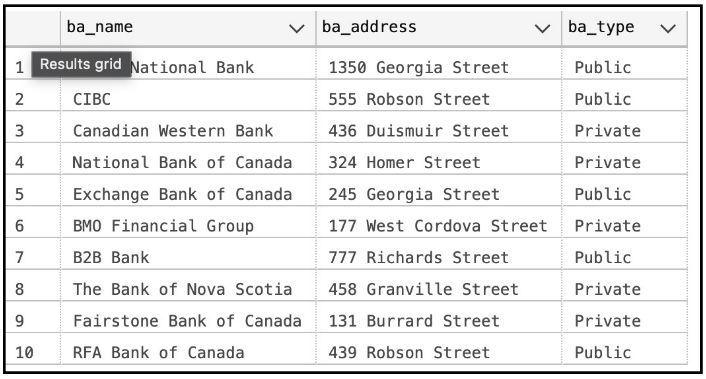


	b_id	b_name	ba_code
1	A4D67	RFA Bank of Canada Branch	10
2	B2739	B2B Bank Branch	7
3	BM378	BMO Financial Group Branch	6
4	C6778	CIBC Branch ATM	2
5	CW275	Canadian Western Bank Bra…	3
6	EB783	Exchange Bank of Canada B…	5
7	F6793	Fairstone Bank of Canada	9
8	NB870	National Bank of Canada B…	4
9	NSC34	The Bank of Nova Scotia B…	8
10	RN235	Royal National Bank Branc…	1

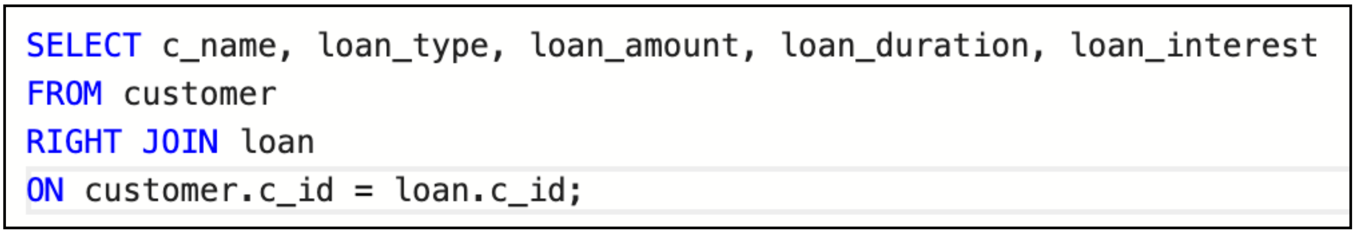
We shall create some more relational table using Cross Join and as follows



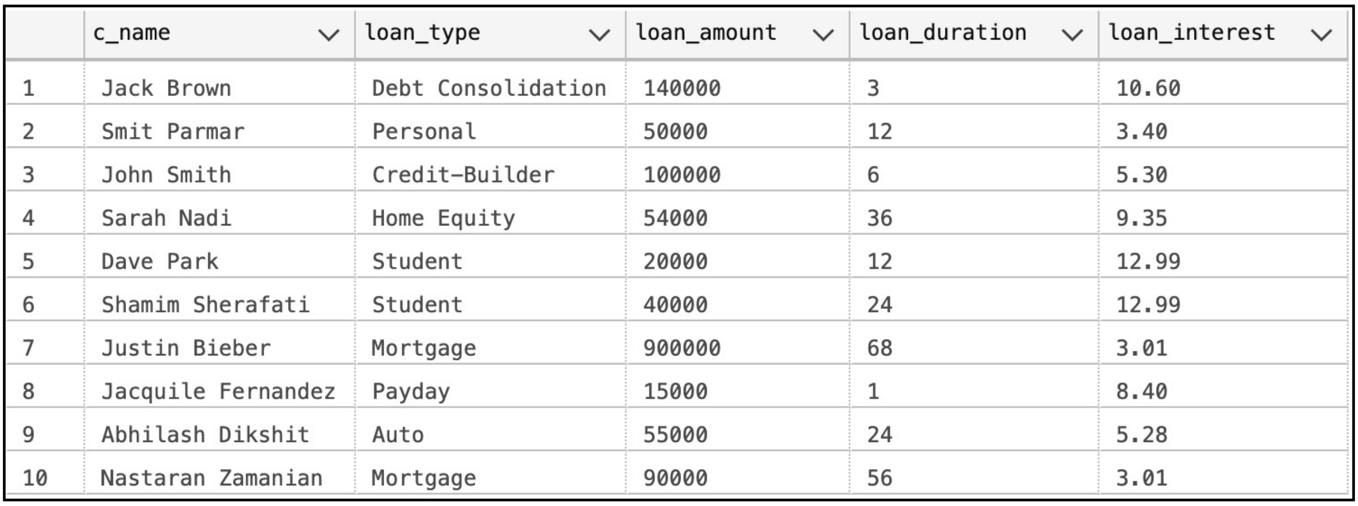
```
SELECT ba_name, ba_address, ba_type
FROM bank
LEFT JOIN branch
ON bank.ba_name = branch.b_id;
```



	ba_name	ba_address	ba_type
1	National Bank	1350 Georgia Street	Public
2	CIBC	555 Robson Street	Public
3	Canadian Western Bank	436 Duismuir Street	Private
4	National Bank of Canada	324 Homer Street	Private
5	Exchange Bank of Canada	245 Georgia Street	Public
6	BMO Financial Group	177 West Cordova Street	Private
7	B2B Bank	777 Richards Street	Public
8	The Bank of Nova Scotia	458 Granville Street	Private
9	Fairstone Bank of Canada	131 Burrard Street	Private
10	RFA Bank of Canada	439 Robson Street	Public



```
SELECT c_name, loan_type, loan_amount, loan_duration, loan_interest
FROM customer
RIGHT JOIN loan
ON customer.c_id = loan.c_id;
```



	c_name	loan_type	loan_amount	loan_duration	loan_interest
1	Jack Brown	Debt Consolidation	140000	3	10.60
2	Smit Parmar	Personal	50000	12	3.40
3	John Smith	Credit-Builder	100000	6	5.30
4	Sarah Nadi	Home Equity	54000	36	9.35
5	Dave Park	Student	20000	12	12.99
6	Shamim Sherafati	Student	40000	24	12.99
7	Justin Bieber	Mortgage	900000	68	3.01
8	Jacquile Fernandez	Payday	15000	1	8.40
9	Abhilash Dikshit	Auto	55000	24	5.28
10	Nastaran Zamanian	Mortgage	90000	56	3.01

III.Conclusion

In this report, we explained the process of installing SQL in MacOS software. After that, we create tables based on our entities which we showed in ER Diagram. There are several attributes which each of them have different characters like CHAR, VARCHAR and etc. Then we used this command “INSERT INTO” for filling each table. Moreover we created relational tables using different types of JOIN commands.

IV.References

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