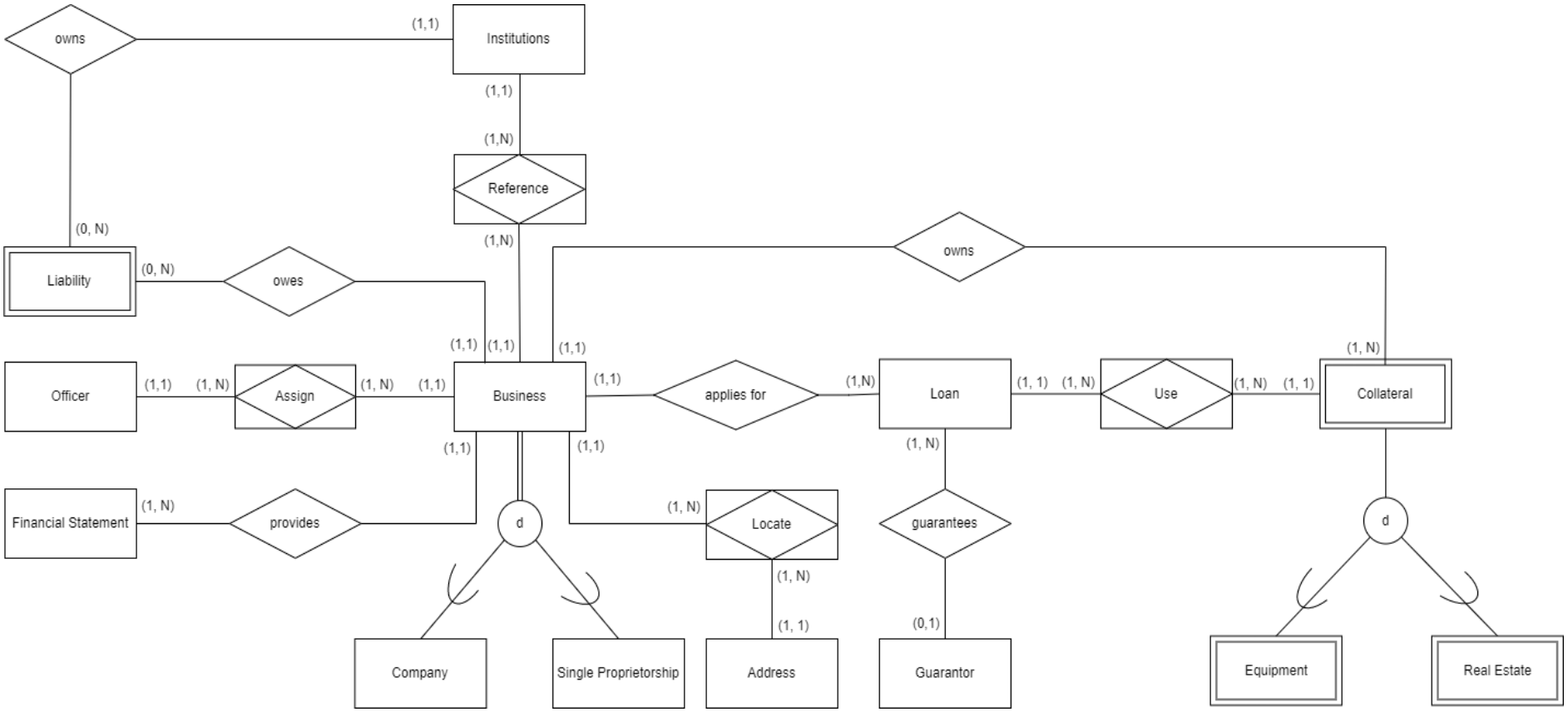
Interim DB HW#3 F2022

Loan Application Form Group

1. Documentation

a. Entity-Relationship diagram:



https://app.diagrams.net/?mode=google#G134VzndOLCIBrHcLtxkScMe00iWIdOXw_

Assumptions:

1. One business could apply for multiple loans throughout time.
2. One business will assign at least one officer and one officer could be assigned to different positions at multiple businesses.
3. One business will have at least one collateral. Of those collaterals at least one will be used for the loan application. One collateral may be used in multiple applications.
4. One guarantor could guarantee multiple loan applications but one application will have at most one guarantor.
5. One address could accommodate multiple businesses throughout time.

b. Relational schema:

Business (Bus_ID, type, GFI_Type, Num_Employee, Reg_No, Phone_Num, Email, Fax_Num, TIN_No, Nature, Start_OP_Year, Product)

Company (Bus_ID@, Name, SEC)

Single_Proprietorship (Bus_ID@, First_Name, Last_Name, DoB, Birth_Place, Nationality, Gender, DTI)

Officer (Officer_ID, Name, Address)

Assign (Bus_ID@, Officer_ID@, Position)

Locate (Address_ID@, Bus_ID@ ,Status, Present, Length_Of_Stay, Type)

Address (Address_ID, Street, City, State, Zip_Code)

Loan (Loan ID, Bus_ID@, Guarantor_ID@, Date_Filed, Amount_Request, Repayment_Term, Repayment_Mode, P1_Working_Capital, P2_Equipment, P3_Building_Construction_Renovation, P4_Purchace_of_Lot) * Note 1

Guarantor(Guarantor_ID, First_Name, Last_Name, Address)

Use (Loan_ID@, Bus_ID@, Collateral_ID@) * Note 2

Collateral (Bus_ID@, Collateral_ID, Name, Description, Type)

Equipment (Bus_ID@, Collateral_ID@, Serial_Number)

Real Estate (Bus_ID@, Collateral_ID@, Address, Land_Title, Lastest_Tax_Paid)

Reference (Bus_ID@, Institution_ID@, Ref_Type, Deposit_loan_type, Contact_person, Contact_no)

Institution (Institution_ID, Name, Branch)

Liability (Bus_ID@, Liability_ID, Institution_ID@, Loan_type, Amount, Date_granted, OS_balance, Collateral) * Note 3

Financial_Statement (Bus_ID@, Operation_year, Asset_size, Liabilities, Equities, Gross_sales, Expenses, Net_income)

** Note 1: P1-P4 represents loan purpose: a value of 0 means not a purpose, a value > 0 represents cost of the specific purpose. Total cost of the loan application will be derived by summing up the 4 loan purpose costs while querying.*

** Note 2: Bus_ID and Collateral_ID is a composite foreign key referring to the composite primary key from table Collateral.*

** Note 3: Our team decide that it is unnecessary and inconvenient to relate the collateral here with the Collateral entity*

c. Check constraints:

Check constraint 1: br_loan_ar_ck

- Logical rule: to check the Amount_Request attribute from the Loan table to see whether it is less than 10,000,000
- Business purpose: it is enforcing the business rule that the maximum amount of loan requested must be less than 10 million dollars

Check constraint 2: br_business_startyear_ck

- Logical rule: to check the Start_OP_Year attribute from the Business table to see whether it is more than 2 years from now
- Business purpose: it is enforcing the business rule that only businesses that have been established for more than 2 years could apply for a loan at our organization * Note 1

Check constraint 3: br_financial_statement_liabilities_ck

- Logical rule: to check the Liabilities attribute from the Financial_Statement table to see whether it is less than 1000000
- Business purpose: it is enforcing the business rule that the current liability of a business must not exceed 1 million dollars to be able to apply for a loan at our organization

** Note 1: We tried to use sysdate to compare but it failed, so we hardcoded 2022 in this check constraint*

d. Multi-table queries:

Query 1: find the businesses that own the top 2 largest liabilities amounts (including aggregate functions)

- Business purpose: these businesses might have higher risk in failing to pay back the loan and therefore need our closer monitoring

Query 2: find the names and addresses of all key officers from business that applied for a loan with a purpose of building construction/renovation

- Business purpose: we want to notify them about a policy change in local building construction/renovation and its impact on our loan policies

Query 3: find the number of each type of businesses that applied for a loan in the recent 180 days (include aggregate functions)

- Business purpose: we want to have an idea of how many businesses of each type have applied for a loan application with our organization to make a mid-year report

Query 4: find the name of businesses that have a loan application with a repayment term greater than 3 years and a requested amount greater than 500000 dollars

- Business purpose: these businesses may have higher risk of default and therefore need our closer monitoring

2. Script execution

a. Create tables including primary keys

```
SQL> BEGIN
  2      EXECUTE IMMEDIATE 'DROP TABLE business CASCADE CONSTRAINTS';
  3  EXCEPTION
  4      WHEN OTHERS THEN NULL;
  5  END;
  6  /

PL/SQL procedure successfully completed.

SQL> CREATE TABLE business  (
  2  Bus_ID VARCHAR2(20) PRIMARY KEY,
  3  Type VARCHAR2(10) CONSTRAINT business_type_ck CHECK (type IN ('Micro', 'Small', 'Medium')),
  4  GFI_Type VARCHAR2(20) CONSTRAINT business_gfitype_ck CHECK (GFI_Type IN ('New Application', 'Old with O/S Balance',
'Existing Borrower', 'Old but fully paid', 'Restructured')),
  5  Num_Employee NUMBER(10) CONSTRAINT business_num_employee_ck CHECK (Num_Employee > 0),
  6  Reg_No VARCHAR2(25),
  7  Phone_Num VARCHAR2(20),
  8  Email VARCHAR2(50),
  9  Fax_Num VARCHAR2(20),
```

```
 10  TIN_No VARCHAR2(20) CONSTRAINT business_tin_no_nn NOT NULL,
 11  Nature VARCHAR2(30),
 12  Start_OP_Year DATE,
 13  Product VARCHAR2(30)
 14  );

Table created.

SQL>
SQL> BEGIN
  2      EXECUTE IMMEDIATE 'DROP TABLE company CASCADE CONSTRAINTS';
  3  EXCEPTION
  4      WHEN OTHERS THEN NULL;
  5  END;
  6  /

PL/SQL procedure successfully completed.

SQL> CREATE TABLE company  (
  2  Bus_ID VARCHAR2(20) PRIMARY KEY,
  3  Name VARCHAR2(60) CONSTRAINT company_name_nn NOT NULL,
  4  Sec NUMBER(1) CONSTRAINT company_sec_ck CHECK (Sec in (0, 1))
  5  );

Table created.

SQL>
SQL>
SQL> BEGIN
  2      EXECUTE IMMEDIATE 'DROP TABLE single_proprietorship CASCADE CONSTRAINTS';
  3  EXCEPTION
  4      WHEN OTHERS THEN NULL;
  5  END;
  6  /

PL/SQL procedure successfully completed.

SQL> CREATE TABLE single_proprietorship  (
  2  Bus_ID VARCHAR2(20) PRIMARY KEY,
  3  First_Name VARCHAR2(20) CONSTRAINT single_proprietorship_fn_nn NOT NULL,
  4  Last_Name VARCHAR2(20) CONSTRAINT single_proprietorship_ln_nn NOT NULL,
  5  DoB DATE CONSTRAINT single_proprietorship_dob_nn NOT NULL,
  6  Birth_Place VARCHAR2(40) CONSTRAINT single_proprietorship_bp_nn NOT NULL,
  7  Nationality VARCHAR2(20) CONSTRAINT single_proprietorship_na_nn NOT NULL,
```

```
  8  Gender VARCHAR2(10) CONSTRAINT single_proprietorship_gender_nn NOT NULL,
  9  Dti NUMBER(1) CONSTRAINT single_proprietorship_dti_ck CHECK(Dti in (0, 1))
 10  );

Table created.

SQL>
SQL> BEGIN
  2      EXECUTE IMMEDIATE 'DROP TABLE officer CASCADE CONSTRAINTS';
  3  EXCEPTION
  4      WHEN OTHERS THEN NULL;
  5  END;
  6  /

PL/SQL procedure successfully completed.

SQL> CREATE TABLE officer  (
  2  Officer_ID VARCHAR2(20) PRIMARY KEY,
  3  Name VARCHAR2(20),
  4  Address VARCHAR2(50)
  5  );

Table created.

SQL>
SQL> BEGIN
  2      EXECUTE IMMEDIATE 'DROP TABLE assign CASCADE CONSTRAINTS';
  3  EXCEPTION
  4      WHEN OTHERS THEN NULL;
  5  END;
  6  /

PL/SQL procedure successfully completed.

SQL> CREATE TABLE assign  (
  2  Bus_ID VARCHAR2(20),
  3  Officer_ID VARCHAR2(20),
  4  Position VARCHAR2(50),
  5  CONSTRAINT assign_pk PRIMARY KEY (Bus_ID, Officer_ID)
  6  );

Table created.

SQL>
```

```
SQL> BEGIN
  2      EXECUTE IMMEDIATE 'DROP TABLE address CASCADE CONSTRAINTS';
  3  EXCEPTION
  4      WHEN OTHERS THEN NULL;
  5  END;
  6  /

PL/SQL procedure successfully completed.

SQL> CREATE TABLE address  (
  2  Address_ID VARCHAR2(20) PRIMARY KEY,
  3  Street VARCHAR2(50),
  4  City VARCHAR2(20),
  5  State VARCHAR2(20),
  6  Zip_Code VARCHAR2(10)
  7  );

Table created.

SQL>
SQL> BEGIN
  2      EXECUTE IMMEDIATE 'DROP TABLE locate CASCADE CONSTRAINTS';
  3  EXCEPTION
  4      WHEN OTHERS THEN NULL;
  5  END;
  6  /

PL/SQL procedure successfully completed.

SQL> CREATE TABLE locate  (
  2  Address_ID VARCHAR2(20),
  3  Bus_ID VARCHAR2(20),
  4  Status VARCHAR2(10) CONSTRAINT locate_status_ck CHECK (Status IN ('Owned', 'Rented')),
  5  Present NUMBER(1) CONSTRAINT locate_present_ck CHECK (Present in (0, 1)),
  6  Type VARCHAR2(10),
  7  Length_of_Stay NUMBER(4),
  8  CONSTRAINT locate_pk PRIMARY KEY (Address_ID, Bus_ID)
  9  );

Table created.

SQL>
SQL> BEGIN
  2      EXECUTE IMMEDIATE 'DROP TABLE loan CASCADE CONSTRAINTS';
```

```
  3  EXCEPTION
  4      WHEN OTHERS THEN NULL;
  5  END;
  6  /

PL/SQL procedure successfully completed.

SQL> CREATE TABLE loan  (
  2  Loan_ID VARCHAR2(20) PRIMARY KEY,
  3  Bus_ID VARCHAR2(20),
  4  Guarantor_ID VARCHAR2(20),
  5  Date_Filed DATE DEFAULT SYSDATE,
  6  Amount_Request DECIMAL(20, 2) CONSTRAINT loan_ar_ck CHECK (Amount_Request BETWEEN 0 AND 10000000),
  7  Repayment_Term NUMBER(3),
  8  Repayment_Mode VARCHAR2(10),
  9  P1_Working_Capital DECIMAL(20, 2),
 10  P2_Equipment DECIMAL(20, 2),
 11  P3_Building_Construction_Renovation DECIMAL(20, 2),
 12  P4_Purchase_of_Lot DECIMAL(20, 2)
 13  );

Table created.

SQL>
SQL> BEGIN
  2      EXECUTE IMMEDIATE 'DROP TABLE guarantor CASCADE CONSTRAINTS';
  3  EXCEPTION
  4      WHEN OTHERS THEN NULL;
  5  END;
  6  /

PL/SQL procedure successfully completed.

SQL> CREATE TABLE guarantor  (
  2  Guarantor_ID VARCHAR2(20) PRIMARY KEY,
  3  First_Name VARCHAR2(20) CONSTRAINT guarantor_fn_nn NOT NULL,
  4  Last_Name VARCHAR2(20) CONSTRAINT guarantor_ln_nn NOT NULL,
  5  Address VARCHAR2(50) CONSTRAINT guarantor_addr_nn NOT NULL
  6  );

Table created.

SQL>
SQL> BEGIN
```

```
  2      EXECUTE IMMEDIATE 'DROP TABLE use CASCADE CONSTRAINTS';
  3  EXCEPTION
  4      WHEN OTHERS THEN NULL;
  5  END;
  6  /

PL/SQL procedure successfully completed.

SQL> CREATE TABLE use  (
  2  Loan_ID VARCHAR2(20),
  3  Bus_ID VARCHAR2(20),
  4  Collateral_ID VARCHAR2(20),
  5  CONSTRAINT use_pk PRIMARY KEY (Bus_ID, Loan_ID, Collateral_ID)
  6  );

Table created.

SQL>
SQL> BEGIN
  2      EXECUTE IMMEDIATE 'DROP TABLE collateral CASCADE CONSTRAINTS';
  3  EXCEPTION
  4      WHEN OTHERS THEN NULL;
  5  END;
  6  /

PL/SQL procedure successfully completed.

SQL> CREATE TABLE collateral  (
  2  Bus_ID VARCHAR2(20),
  3  Collateral_ID VARCHAR2(20),
  4  Name VARCHAR2(20),
  5  Description VARCHAR2(100),
  6  Type VARCHAR2(20),
  7  CONSTRAINT collateral_pk PRIMARY KEY (Bus_ID, Collateral_ID)
  8  );

Table created.

SQL>
SQL> BEGIN
  2      EXECUTE IMMEDIATE 'DROP TABLE equipment CASCADE CONSTRAINTS';
  3  EXCEPTION
  4      WHEN OTHERS THEN NULL;
  5  END;
```

```
  6  /

PL/SQL procedure successfully completed.

SQL> CREATE TABLE equipment  (
  2  Bus_ID VARCHAR2(20),
  3  Collateral_ID VARCHAR2(20),
  4  Serial_number VARCHAR2(50),
  5  CONSTRAINT equipment_pk PRIMARY KEY (Bus_ID, Collateral_ID)
  6  );

Table created.

SQL>
SQL> BEGIN
  2      EXECUTE IMMEDIATE 'DROP TABLE real_estate CASCADE CONSTRAINTS';
  3  EXCEPTION
  4      WHEN OTHERS THEN NULL;
  5  END;
  6  /

PL/SQL procedure successfully completed.

SQL> CREATE TABLE real_estate  (
  2  Bus_ID VARCHAR2(20),
  3  Collateral_ID VARCHAR2(20),
  4  Address VARCHAR2(100),
  5  Land_title VARCHAR2(20),
  6  Lastest_tax_paid VARCHAR2(20),
  7  CONSTRAINT real_estate_pk PRIMARY KEY (Bus_ID, Collateral_ID)
  8  );

Table created.

SQL>
SQL> BEGIN
  2      EXECUTE IMMEDIATE 'DROP TABLE  reference CASCADE CONSTRAINTS';
  3  EXCEPTION
  4      WHEN OTHERS THEN NULL;
  5  END;
  6  /

PL/SQL procedure successfully completed.
```

```
SQL> CREATE TABLE reference  (
  2  Bus_ID VARCHAR2(20),
  3  Institution_ID VARCHAR2(20),
  4  Ref_type VARCHAR2(20) CONSTRAINT reference_reftype_ck CHECK (ref_type in ('Depository Bank','Creditor')),
  5  Deposit_loan_type VARCHAR2(20),
  6  Contact_person VARCHAR2(20),
  7  Contanct_no VARCHAR2(20),
  8  CONSTRAINT reference_pk PRIMARY KEY (Bus_ID, Institution_ID, Ref_type)
  9  );

Table created.

SQL>
SQL> BEGIN
  2      EXECUTE IMMEDIATE 'DROP TABLE  institution CASCADE CONSTRAINTS';
  3  EXCEPTION
  4      WHEN OTHERS THEN NULL;
  5  END;
  6  /

PL/SQL procedure successfully completed.

SQL> CREATE TABLE institution  (
  2  Institution_ID VARCHAR2(20) PRIMARY KEY,
  3  Name VARCHAR2(20),
  4  Branch VARCHAR2(20)
  5  );

Table created.

SQL>
SQL> BEGIN
  2      EXECUTE IMMEDIATE 'DROP TABLE  liability CASCADE CONSTRAINTS';
  3  EXCEPTION
  4      WHEN OTHERS THEN NULL;
  5  END;
  6  /

PL/SQL procedure successfully completed.

SQL> CREATE TABLE liability  (
  2  Bus_ID VARCHAR2(20),
  3  Liability_ID VARCHAR2(20),
  4  Institution_ID VARCHAR2(20),
```

```
  5  Loan_type VARCHAR2(20),
  6  Amount Number(10,2),
  7  Date_granted DATE,
  8  OS_balance Number(10,2),
  9  Collateral VARCHAR2(20),
 10  CONSTRAINT liability_pk PRIMARY KEY (Bus_ID, Liability_ID)
 11  );

Table created.

SQL>
SQL> BEGIN
  2      EXECUTE IMMEDIATE 'DROP TABLE  financial_statement CASCADE CONSTRAINTS';
  3  EXCEPTION
  4      WHEN OTHERS THEN NULL;
  5  END;
  6  /

PL/SQL procedure successfully completed.

SQL> CREATE TABLE financial_statement  (
  2  Bus_ID VARCHAR2(20),
  3  Operation_year VARCHAR2(20),
  4  Asset_size Number(10,2),
  5  Liabilities VARCHAR2(20),
  6  Equities VARCHAR2(20),
  7  Gross_sales Number(10,2),
  8  Expenses Number(10,2),
  9  Net_income Number(10,2),
 10  CONSTRAINT financial_statement_pk PRIMARY KEY (Bus_ID, Operation_year)
 11  );

Table created.
```

b. Create foreign keys

```
SQL> ALTER TABLE company
  2  ADD CONSTRAINT company_busid_fk FOREIGN KEY (Bus_ID) REFERENCES business (Bus_ID);

Table altered.

SQL>
```

```
SQL> ALTER TABLE single_proprietorship
  2  ADD CONSTRAINT single_prop_busid_fk FOREIGN KEY (Bus_ID) REFERENCES business (Bus_ID);

Table altered.

SQL>
SQL> ALTER TABLE assign
  2  ADD CONSTRAINT assign_busid_fk FOREIGN KEY (Bus_ID) REFERENCES business (Bus_ID);

Table altered.

SQL> ALTER TABLE assign
  2  ADD CONSTRAINT assign_officerid_fk FOREIGN KEY (Officer_ID) REFERENCES officer (Officer_ID);

Table altered.

SQL>
SQL> ALTER TABLE locate
  2  ADD CONSTRAINT locate_addressid_fk FOREIGN KEY (Address_ID) REFERENCES address (Address_ID);

Table altered.

SQL> ALTER TABLE locate
  2  ADD CONSTRAINT locate_busid_fk FOREIGN KEY (Bus_ID) REFERENCES business (Bus_ID);

Table altered.

SQL>
SQL> ALTER TABLE loan
  2  ADD CONSTRAINT loan_busid_fk FOREIGN KEY (Bus_ID) REFERENCES business (Bus_ID);

Table altered.

SQL> ALTER TABLE loan
  2  ADD CONSTRAINT loan_guarantorid_fk FOREIGN KEY (Guarantor_ID) REFERENCES guarantor (Guarantor_ID);

Table altered.

SQL>
SQL> ALTER TABLE use
  2  ADD CONSTRAINT use_loanid_fk FOREIGN KEY (Loan_ID) REFERENCES loan (Loan_ID);

Table altered.
```

```
SQL> ALTER TABLE use
  2  ADD CONSTRAINT use_buscollaid_fk FOREIGN KEY (Bus_ID, Collateral_ID) REFERENCES collateral (Bus_ID, Collateral_ID);

Table altered.

SQL>
SQL> ALTER TABLE collateral
  2  ADD CONSTRAINT collateral_busid_fk FOREIGN KEY (Bus_ID) REFERENCES business (Bus_ID);

Table altered.

SQL>
SQL> ALTER TABLE equipment
  2  ADD CONSTRAINT equipment_buscollaid_fk FOREIGN KEY (Bus_ID, Collateral_ID) REFERENCES collateral (Bus_ID,
Collateral_ID);

Table altered.

SQL>
SQL> ALTER TABLE real_estate
  2  ADD CONSTRAINT real_estate_buscollaid_fk FOREIGN KEY (Bus_ID, Collateral_ID) REFERENCES collateral (Bus_ID,
Collateral_ID);

Table altered.

SQL>
SQL> ALTER TABLE reference
  2  ADD CONSTRAINT reference_busid_fk FOREIGN KEY (Bus_ID) REFERENCES business (Bus_ID);

Table altered.

SQL> ALTER TABLE reference
  2  ADD CONSTRAINT reference_instid_fk FOREIGN KEY (Institution_ID) REFERENCES institution (Institution_ID);

Table altered.

SQL>
SQL> ALTER TABLE liability
  2  ADD CONSTRAINT liability_busid_fk FOREIGN KEY (Bus_ID) REFERENCES business (Bus_ID);

Table altered.

SQL> ALTER TABLE liability
  2  ADD CONSTRAINT liability_instid_fk FOREIGN KEY (Institution_ID) REFERENCES institution (Institution_ID);
```

```
Table altered.

SQL>
SQL> ALTER TABLE financial_statement
  2  ADD CONSTRAINT financial_statement_busid_fk FOREIGN KEY (Bus_ID) REFERENCES business (Bus_ID);

Table altered.
```

c. Create 3 check constraints

```
SQL> ALTER TABLE loan
  2  ADD CONSTRAINT br_loan_ar_ck CHECK (Amount_Request < 10000000);

Table altered.

SQL>
SQL> ALTER TABLE business
  2  ADD CONSTRAINT br_business_startyear_ck CHECK ( 2022 - EXTRACT(year from Start_OP_Year) >= 2);

Table altered.

SQL>
SQL> ALTER TABLE financial_statement
  2  ADD CONSTRAINT br_financial_statement_liabilities_ck CHECK (Liabilities < 1000000);

Table altered.
```

d. Insert data into tables

```
SQL> Insert Into business Values
  2  ('C1','Medium','New
Application',1000,'125NISFEW','8142341000','heinz_storage@hs.com','8142341000','123985624','Storage',TO_DATE('2018-01-01','
YYYY-MM-DD'),'Storage garages');

1 row created.

SQL> Insert Into business Values
```

```
  2
('C2','Micro','Restructured',30,'RN178','21387842062','fantastic_pizza@gmail.com','21387842062','1768234343','Restaurant',T
O_DATE('2018-01-01','YYYY-MM-DD'),'Italian Food');

1 row created.

SQL> Insert Into business Values
  2  ('C3','Medium','New
Application',200,'01012009','1231231234','candy_king@outlook.com','1231231234','92872764','Retailer',TO_DATE('2009-01-01','
YYYY-MM-DD'),'Food');

1 row created.

SQL> Insert Into business Values
  2  ('C4','Micro','Existing
Borrower',36,'01091999','467383922','hh@heinz.com','467383922','92872764','Food',TO_DATE('2014-01-01','YYYY-MM-DD'),'Hambur
gers and Wine');

1 row created.

SQL> Insert Into business Values
  2  ('C5','Medium','Old with O/S
Balance',521,'OIQP8162','387464683','jinzhoushakao_pitts@gmail.com','387464683','78262764','Food',TO_DATE('1897-01-01','YYY
Y-MM-DD'),'Barbeque');

1 row created.

SQL> Insert Into business Values
  2  ('S1','Small','New
Application',40,'001NISFEW','8142341240','HeinzBeauty@hs.com','2248901000','312985624','Beauty',TO_DATE('2018-01-01','YYYY-
MM-DD'),'Beauty Salon');

1 row created.

SQL> Insert Into business Values
  2  ('S2','Small','Existing
Borrower',20,'CF3452','2731435141','consulting_carol@gmail.com','2731435141','1357924682','Consulting',TO_DATE('2015-01-01'
,'YYYY-MM-DD'),'Financial Services');

1 row created.

SQL> Insert Into business Values
  2  ('S3','Micro','Existing Borrower', 3,'987623','7757242393','jianbingguozi@gmail.com','4234901752','1188990033','Food',
TO_DATE('2019-01-01','YYYY-MM-DD'),'Pancake');
```

```
1 row created.

SQL> Insert Into business Values
  2  ('S4','Small','New Application',
55,'999923923','2732242393','themostbeautifulclothes@gmail.com','5906901752','2967990033','Clothes',
TO_DATE('2012-01-01','YYYY-MM-DD'),'Clothes');

1 row created.

SQL> Insert Into business Values
  2  ('S5','Micro','Restructured',
21,'175823923','5739242393','sarah_gupta@gmail.com','4234901752','1188990033','Education',
TO_DATE('2012-01-01','YYYY-MM-DD'),'German Lessons');

1 row created.

SQL>
SQL> Insert Into company Values ('C1', 'Heinz Storage', 1);

1 row created.

SQL> Insert Into company Values ('C2', 'Fantastic Pizza', 1);

1 row created.

SQL> Insert Into company Values ('C3', 'Candy King', 1);

1 row created.

SQL> Insert Into company Values ('C4', 'Heinz for Hamburger', 1);

1 row created.

SQL> Insert Into company Values ('C5', 'Jinzhou Barbeque', 1);

1 row created.

SQL>
SQL> Insert Into single_proprietorship Values ('S1','Akshita','Patil', TO_DATE('08-30-1999','MM-DD-YYYY'),
'India','Indian', 'F',0);

1 row created.
```

```
SQL> Insert Into single_proprietorship Values ('S2','Carol','Hu', TO_DATE('09-12-2000','MM-DD-YYYY'),'Canada','Canadian' ,
'F',1);

1 row created.

SQL> Insert Into single_proprietorship Values ('S3','Kathy','Wang', TO_DATE('07-06-1980','MM-DD-YYYY'),'China', 'Chinese',
'F',0);

1 row created.

SQL> Insert Into single_proprietorship Values ('S4','Jeff','Liu', TO_DATE('09-30-1991','MM-DD-YYYY'),'America', 'American',
'M',1);

1 row created.

SQL> Insert Into single_proprietorship Values ('S5','Sarah','Gupta', TO_DATE('08-14-1987','MM-DD-YYYY'),
'Germany','German', 'F', 0);

1 row created.

SQL>
SQL> Insert Into officer Values ('O1','Carnegie Heinz','Pittsburgh');

1 row created.

SQL> Insert Into officer Values ('O2','Adam Smith','Los Angeles');

1 row created.

SQL> Insert Into officer Values ('O3','Carl Smith','Pittsburgh');

1 row created.

SQL> Insert Into officer Values ('O4','Jeremy Smith','Seattle');

1 row created.

SQL> Insert Into officer Values ('O5','Carly Smith','Austin');

1 row created.

SQL> Insert Into officer Values ('O6','Karen White','Pittsburgh');

1 row created.
```

```
SQL> Insert Into officer Values ('O7','Sarah Gupta','Pittsburgh');

1 row created.

SQL>
SQL> Insert Into assign Values ('C1','O1','Senior Director');

1 row created.

SQL> Insert Into assign Values ('C2','O2','CFO');

1 row created.

SQL> Insert Into assign Values ('C3','O3','CEO');

1 row created.

SQL> Insert Into assign Values ('C4','O1','CFO');

1 row created.

SQL> Insert Into assign Values ('C5','O4','MD');

1 row created.

SQL> Insert Into assign Values ('C5','O5','Boss');

1 row created.

SQL> Insert Into assign Values ('S1','O3','SVP');

1 row created.

SQL> Insert Into assign Values ('S2','O2','Managing Director');

1 row created.

SQL> Insert Into assign Values ('S5','O7','Headmaster');

1 row created.

SQL> Insert Into assign Values ('S3','O3','Boss');
```

```
1 row created.

SQL> Insert Into assign Values ('S4','O4','Boss');

1 row created.

SQL>
SQL> Insert Into address Values ('Addr1','5000 Forbes Avenue','Pittsburgh','PA','15213');

1 row created.

SQL> Insert Into address Values ('Addr2','8th Avenue','Pittsburgh','PA','15432');

1 row created.

SQL> Insert Into address Values ('Addr3','4091 Forbes Avenue','Pittsburgh','PA','12317');

1 row created.

SQL> Insert Into address Values ('Addr4','5th Avenue','Pittsburgh','PA','43215');

1 row created.

SQL> Insert Into address Values ('Addr5','Denniston Avenue','Pittsburgh','PA','14217');

1 row created.

SQL> Insert Into address Values ('Addr6','4999 Forbes Avenue','Pittsburgh','PA','15213');

1 row created.

SQL> Insert Into address Values ('Addr7','CH Avenue','Pittsburgh','PA','18924');

1 row created.

SQL> Insert Into address Values ('Addr8','555 Forbes Avenue','Pittsburgh','PA','15213');

1 row created.

SQL>
SQL> Insert Into locate Values ('Addr1', 'C1', 'Owned', 1, 'Office', 5);

1 row created.
```

```
SQL> Insert Into locate Values ('Addr2', 'C2', 'Owned', 0, 'Office', 3);

1 row created.

SQL> Insert Into locate Values ('Addr3', 'C3', 'Owned', 1, 'Office', 5);

1 row created.

SQL> Insert Into locate Values ('Addr4', 'C4', 'Owned', 0, 'Office', 4);

1 row created.

SQL> Insert Into locate Values ('Addr5', 'C5', 'Rented', 1, 'Office', 6);

1 row created.

SQL> Insert Into locate Values ('Addr6', 'C1', 'Owned', 1, 'Factory', 5);

1 row created.

SQL> Insert Into locate Values ('Addr7', 'S2', 'Owned', 0, 'Office', 2);

1 row created.

SQL> Insert Into locate Values ('Addr8','S5','Rented', 1,'Office', 1);

1 row created.

SQL> Insert Into locate Values ('Addr7', 'S3','Rented', 0, 'Office', 2);

1 row created.

SQL> Insert Into locate Values ('Addr8','S4','Rented', 1,'Office', 1);

1 row created.

SQL> Insert Into locate Values ('Addr8','S1','Rented', 1,'Office', 1);

1 row created.

SQL>
SQL> Insert Into guarantor Values ('G1','Mellon','Heinz','Pittsburgh');

1 row created.
```

```
SQL> Insert Into guarantor Values ('G2','Alexander','Hamilton','Boston');

1 row created.

SQL> Insert Into guarantor Values ('G3','Joshua','Green','Pittsburgh');

1 row created.

SQL> Insert Into guarantor Values ('G4','Bill','Gates','New York');

1 row created.

SQL> Insert Into guarantor Values ('G5','Yiping','He','Chicago');

1 row created.

SQL> Insert Into guarantor Values ('G6','Qinruo','Hu','Los Angeles');

1 row created.

SQL>
SQL> Insert Into loan Values
  2  ('L1','C1','G1',TO_DATE('08-30-2019','MM-DD-YYYY'), 1200000,4,'Monthly', 100000, 30000, 40000, 30000);

1 row created.

SQL> Insert Into loan Values
  2  ('L2','C2','G2',TO_DATE('09-30-2022','MM-DD-YYYY'),1034000,5,'Quarterly', 50000, 50000, 50000, 50000);

1 row created.

SQL> Insert Into loan Values
  2  ('L3','C3','G3',TO_DATE('01-01-2022','MM-DD-YYYY'),1405300,8,'Monthly', 60000, 70000, 100000, 70000);

1 row created.

SQL> Insert Into loan Values
  2  ('L4','C4','G4',TO_DATE('01-01-2000','MM-DD-YYYY'),1504400,10,'Monthly', 100000, 100000, 100000, 100000);

1 row created.

SQL> Insert Into loan Values
  2  ('L5','C5','G4',TO_DATE('01-27-2021','MM-DD-YYYY'),123000,6,'Quarterly', 10000, 10000, 10000, 20000);
```

```
1 row created.

SQL> Insert Into loan Values
  2  ('L6','S2','G6',TO_DATE('03-01-2019','MM-DD-YYYY'),1243340,8,'Quarterly', 0, 0, 60000, 0);

1 row created.

SQL> Insert Into loan Values
  2  ('L7','S1','G1',TO_DATE('08-30-2020','MM-DD-YYYY'),200000,4,'Monthly', 100000, 30000, 40000, 30000);

1 row created.

SQL> Insert Into loan Values
  2  ('L8','S5','G5',TO_DATE('02-02-2022','MM-DD-YYYY'), 70000, 2,'Quarterly', 10000, 60000, 0, 0);

1 row created.

SQL> Insert Into loan Values
  2  ('L9','S3','G5',TO_DATE('03-30-2017','MM-DD-YYYY'),140000,4,'Quarterly', 100000, 30000, 4000, 3000);

1 row created.

SQL> Insert Into loan Values
  2  ('L10','S4','G2',TO_DATE('02-05-2019','MM-DD-YYYY'),190000,4,'Monthly', 100000, 12000, 25000, 30000);

1 row created.

SQL>
SQL>
SQL> Insert Into collateral Values
  2  ('C1','CO1','House','A 3b2b','Real Estate');

1 row created.

SQL> Insert Into collateral Values
  2  ('C1','CO2','Car','A red car','Equipment');

1 row created.

SQL> Insert Into collateral Values
  2  ('C2','CO1','House','A 5b2b with a garden','Real Estate');

1 row created.
```

```
SQL> Insert Into collateral Values
  2  ('C3','CO1','Truck','A big truck','Equipment');

1 row created.

SQL> Insert Into collateral Values
  2  ('C4','CO1','Bracelet','A 100-year-old bracelet','Equipment');

1 row created.

SQL> Insert Into collateral Values
  2  ('C5','CO1','Farm','A 500-acre farm','Real Estate');

1 row created.

SQL> Insert Into collateral Values
  2  ('S1','CO1','Factory','A 100-acre factory','Real Estate');

1 row created.

SQL> Insert Into collateral Values
  2  ('S2','CO1','Air Plane','A Boeing 747','Equipment');

1 row created.

SQL> Insert Into collateral Values
  2  ('S3','CO1','Golf Course','A 100-acre golf course','Real Estate');

1 row created.

SQL> Insert Into collateral Values
  2  ('S4','CO1','Excavator','A beautiful excavator','Equipment');

1 row created.

SQL> Insert Into collateral Values
  2  ('S5','CO1','Warehouse','A 10000-square feet warehouse','Real Estate');

1 row created.

SQL>
SQL> Insert Into use Values ('L1','C1','CO1');
```

```
1 row created.

SQL> Insert Into use Values ('L1','C1','CO2');

1 row created.

SQL> Insert Into use Values ('L2','C2','CO1');

1 row created.

SQL> Insert Into use Values ('L3','C3','CO1');

1 row created.

SQL> Insert Into use Values ('L4','C4','CO1');

1 row created.

SQL> Insert Into use Values ('L5','C5','CO1');

1 row created.

SQL> Insert Into use Values ('L6','S2','CO1');

1 row created.

SQL> Insert Into use Values ('L7','S1','CO1');

1 row created.

SQL> Insert Into use Values ('L8','S5','CO1');

1 row created.

SQL> Insert Into use Values ('L9','S3','CO1');

1 row created.

SQL> Insert Into use Values ('L10','S4','CO1');

1 row created.

SQL>
SQL> Insert Into equipment Values ('C1','CO2','APPL');
```

```
1 row created.

SQL> Insert Into equipment Values ('C3','CO1','ABCD');

1 row created.

SQL> Insert Into equipment Values ('C4','CO1','120120110');

1 row created.

SQL> Insert Into equipment Values ('S2','CO1','97262');

1 row created.

SQL> Insert Into equipment Values ('S4','CO1','1802729355');

1 row created.

SQL>
SQL> Insert Into real_estate Values ('C1','CO1','Pittsburgh','Land1','298383');

1 row created.

SQL> Insert Into real_estate Values ('C2','CO1','Chicago','Land2','3333');

1 row created.

SQL> Insert Into real_estate Values ('C5','CO1','Los Angeles','Land3','12344');

1 row created.

SQL> Insert Into real_estate Values ('S1','CO1','Pittsburgh','Lan4','59949');

1 row created.

SQL> Insert Into real_estate Values ('S3','CO1','Pittsburgh','Land5','457494');

1 row created.

SQL> Insert Into real_estate Values ('S5','CO1','Pittsburgh','Land6','555457494');

1 row created.
```

```
SQL>
SQL> Insert Into institution Values ('I1','ABC Bank', 'Pittsburgh');

1 row created.

SQL> Insert Into institution Values ('I2','Chase Bank', 'Chicago');

1 row created.

SQL> Insert Into institution Values ('I3','BOA','Los Angeles');

1 row created.

SQL> Insert Into institution Values ('I4','BOA','Seattle');

1 row created.

SQL> Insert Into institution Values ('I5','Chase','Austin');

1 row created.

SQL> Insert Into institution Values ('I6','Huntington','Pittsburgh');

1 row created.

SQL> Insert Into institution Values ('I7','BOA','San Fran');

1 row created.

SQL> Insert Into institution Values ('I8','HDFC','Jersey City');

1 row created.

SQL> Insert Into institution Values ('I9','Credit Suisse','Pittsburgh');

1 row created.

SQL>
SQL> Insert Into reference Values ('C1','I1','Depository Bank','Checking','Mary Lee','123873999');

1 row created.

SQL> Insert Into reference Values ('C2','I2','Creditor','Personal','Chloe Wang','21345678');
```

```
1 row created.

SQL> Insert Into reference Values ('C3','I3','Depository Bank', 'Fixed-Term','William White','1245678900');

1 row created.

SQL> Insert Into reference Values ('C4','I4','Creditor','Long-Term','Jeremy Smith','9773672299');

1 row created.

SQL> Insert Into reference Values ('C5','I5','Creditor','Personal','David Lie','9277339293');

1 row created.

SQL> Insert Into reference Values ('S1','I6','Creditor','Personal','Lara Lee','34252789');

1 row created.

SQL> Insert Into reference Values ('S2','I7','Creditor','Personal','Tommy lee','38733737');

1 row created.

SQL> Insert Into reference Values ('S3','I8','Depository Bank','Fixed-Term','Sam Andrew','26737633');

1 row created.

SQL> Insert Into reference Values ('S4','I9','Creditor','Long-Term','Nicholas Brown','876266373');

1 row created.

SQL> Insert Into reference Values ('S5','I1','Depository Bank','Personal','Meimei Han','20001231');

1 row created.

SQL> Insert Into reference Values ('S5','I6','Creditor','Personal','Lei Li','20000127');

1 row created.

SQL>
SQL> Insert Into liability Values ('C1','L1','I1','Checking',5000, TO_DATE('09-20-2018','MM-DD-YYYY'),0,'Stocks');

1 row created.
```

```
SQL> Insert Into liability Values ('C2','L1','I2','Personal',100000, TO_DATE('07-01-2020','MM-DD-YYYY'),30000,'Company
Van');

1 row created.

SQL> Insert Into liability Values ('C3','L1','I3','Fixed-Term',100000,
TO_DATE('02-01-2018','MM-DD-YYYY'),80000,'Factories');

1 row created.

SQL> Insert Into liability Values ('C4','L1','I4','Long-Term',100000, TO_DATE('01-01-2002','MM-DD-YYYY'),0,'House');

1 row created.

SQL> Insert Into liability Values ('C5','L1','I5','Personal',600000, TO_DATE('01-25-2015','MM-DD-YYYY'),200000,'Car');

1 row created.

SQL> Insert Into liability Values ('S1','L1','I6','Checking',5000, TO_DATE('09-20-2018','MM-DD-YYYY'),0,'Stocks');

1 row created.

SQL> Insert Into liability Values ('S2','L1','I7','Personal',100000, TO_DATE('07-01-2020','MM-DD-YYYY'),30000,'Company
Van');

1 row created.

SQL> Insert Into liability Values ('S3','L1','I8','Fixed-Term',100000,
TO_DATE('02-01-2018','MM-DD-YYYY'),80000,'Factories');

1 row created.

SQL> Insert Into liability Values ('S4','L1','I9','Long-Term',100000, TO_DATE('01-01-2002','MM-DD-YYYY'),0,'House');

1 row created.

SQL> Insert Into liability Values ('S5','L1','I6','Personal',600000, TO_DATE('01-25-2015','MM-DD-YYYY'),200000,'Car');

1 row created.

SQL>
SQL> Insert Into financial_statement Values ('C1','2018',55000,50000,5000,30000,15000,1500);

1 row created.
```

```
SQL> Insert Into financial_statement Values ('C2','2021',2500000,200000,415000,800000,90000,890000);

1 row created.

SQL> Insert Into financial_statement Values ('C3','2021',1000000,200000,800000,3000000,1000000,20000000);

1 row created.

SQL> Insert Into financial_statement Values ('C4','1999',200000,150000,50000,90000,85000,1500);

1 row created.

SQL> Insert Into financial_statement Values ('C5','2020',340000,800000,2600000,2900000,1200000,1600000);

1 row created.

SQL> Insert Into financial_statement Values ('S1','2019',102000,50000,52000,150000,20000,130000);

1 row created.

SQL> Insert Into financial_statement Values ('S2','2018',20000,20000,50000,415000,80000,890000);

1 row created.

SQL> Insert Into financial_statement Values ('S3','2016',100000,20000,800,3000,1000,20000);

1 row created.

SQL> Insert Into financial_statement Values ('S4','2018',20000,15000,5000,9000,8500,15000);

1 row created.

SQL> Insert Into financial_statement Values ('S5','2021',3400,8000,26000,29000,12000,16000);

1 row created.
```

e. Execution of 4 SQL queries

```
SQL> ALTER TABLE assign
```

```
  2  ADD CONSTRAINT assign_busid_fk FOREIGN KEY (Bus_ID) REFERENCES business (Bus_ID);

Table altered.

SQL> SELECT * FROM (
  2  SELECT Bus_ID, SUM(Liabilities) as Sum_Liability
  3  From Financial_Statement
  4  GROUP BY Bus_ID
  5  ORDER BY Sum_Liability DESC)
  6  WHERE ROWNUM <= 2;

BUS_ID               SUM_LIABILITY
-------------------- -------------
C5                         800000
C2                         200000

SQL>
SQL> SELECT o.name, o.address
  2  FROM Officer o JOIN Assign USING (Officer_ID)
  3  JOIN Business USING (Bus_ID)
  4  JOIN Loan l USING (Bus_ID)
  5  WHERE l.P3_Building_Construction_Renovation > 0;

NAME                 ADDRESS
-------------------- --------------------------------------------------
Carnegie Heinz       Pittsburgh
Adam Smith           Los Angeles
Carl Smith           Pittsburgh
Carnegie Heinz       Pittsburgh
Jeremy Smith         Seattle
Carly Smith          Austin
Adam Smith           Los Angeles
Carl Smith           Pittsburgh
Carl Smith           Pittsburgh
Jeremy Smith         Seattle

10 rows selected.

SQL>
SQL> SELECT b.type, count(distinct b.Bus_ID) as BUSINESS_COUNT
  2  FROM business b, loan l
  3  WHERE b.Bus_ID = l.Bus_ID AND l.Date_Filed > TRUNC(sysdate)-180
  4  GROUP BY b.type
  5  ORDER BY BUSINESS_COUNT desc ;
```

```
TYPE       BUSINESS_COUNT
---------- --------------
Micro                   1

SQL>
SQL> SELECT Bus_ID, l.Loan_ID, l.Amount_Request
  2  FROM Loan l
  3  JOIN Business b USING (Bus_ID)
  4  WHERE l.Repayment_Term > 3 and l.Amount_Request > 500000;

BUS_ID               LOAN_ID              AMOUNT_REQUEST
-------------------- -------------------- --------------
C1                   L1                          1200000
C2                   L2                          1034000
C3                   L3                          1405300
C4                   L4                          1504400
S2                   L6                          1243340
```

3. Complete Script

```
BEGIN
   EXECUTE IMMEDIATE 'DROP TABLE business CASCADE CONSTRAINTS';
EXCEPTION
   WHEN OTHERS THEN NULL;
END;
/
CREATE TABLE business  (
Bus_ID VARCHAR2(20) PRIMARY KEY,
Type VARCHAR2(10) CONSTRAINT business_type_ck CHECK (type IN ('Micro', 'Small', 'Medium')),
GFI_Type VARCHAR2(20) CONSTRAINT business_gfitype_ck CHECK (GFI_Type IN ('New Application', 'Old with O/S Balance', 'Existing
Borrower', 'Old but fully paid', 'Restructured')),
```

```
Num_Employee NUMBER(10) CONSTRAINT business_num_employee_ck CHECK (Num_Employee > 0),
Reg_No VARCHAR2(25),
Phone_Num VARCHAR2(20),
Email VARCHAR2(50),
Fax_Num VARCHAR2(20),
TIN_No VARCHAR2(20) CONSTRAINT business_tin_no_nn NOT NULL,
Nature VARCHAR2(30),
Start_OP_Year DATE,
Product VARCHAR2(30)
);

BEGIN
   EXECUTE IMMEDIATE 'DROP TABLE company CASCADE CONSTRAINTS';
EXCEPTION
   WHEN OTHERS THEN NULL;
END;
/
CREATE TABLE company  (
Bus_ID VARCHAR2(20) PRIMARY KEY,
Name VARCHAR2(60) CONSTRAINT company_name_nn NOT NULL,
Sec NUMBER(1) CONSTRAINT company_sec_ck CHECK (Sec in (0, 1))
);


BEGIN
   EXECUTE IMMEDIATE 'DROP TABLE single_proprietorship CASCADE CONSTRAINTS';
EXCEPTION
```

```
   WHEN OTHERS THEN NULL;
END;
/
CREATE TABLE single_proprietorship  (
Bus_ID VARCHAR2(20) PRIMARY KEY,
First_Name VARCHAR2(20) CONSTRAINT single_proprietorship_fn_nn NOT NULL,
Last_Name VARCHAR2(20) CONSTRAINT single_proprietorship_ln_nn NOT NULL,
DoB DATE CONSTRAINT single_proprietorship_dob_nn NOT NULL,
Birth_Place VARCHAR2(40) CONSTRAINT single_proprietorship_bp_nn NOT NULL,
Nationality VARCHAR2(20) CONSTRAINT single_proprietorship_na_nn NOT NULL,
Gender VARCHAR2(10) CONSTRAINT single_proprietorship_gender_nn NOT NULL,
Dti NUMBER(1) CONSTRAINT single_proprietorship_dti_ck CHECK(Dti in (0, 1))
);

BEGIN
   EXECUTE IMMEDIATE 'DROP TABLE officer CASCADE CONSTRAINTS';
EXCEPTION
   WHEN OTHERS THEN NULL;
END;
/
CREATE TABLE officer  (
Officer_ID VARCHAR2(20) PRIMARY KEY,
Name VARCHAR2(20),
Address VARCHAR2(50)
);

BEGIN
```

```
   EXECUTE IMMEDIATE 'DROP TABLE assign CASCADE CONSTRAINTS';
EXCEPTION
   WHEN OTHERS THEN NULL;
END;
/
CREATE TABLE assign  (
Bus_ID VARCHAR2(20),
Officer_ID VARCHAR2(20),
Position VARCHAR2(50),
CONSTRAINT assign_pk PRIMARY KEY (Bus_ID, Officer_ID)
);

BEGIN
   EXECUTE IMMEDIATE 'DROP TABLE address CASCADE CONSTRAINTS';
EXCEPTION
   WHEN OTHERS THEN NULL;
END;
/
CREATE TABLE address  (
Address_ID VARCHAR2(20) PRIMARY KEY,
Street VARCHAR2(50),
City VARCHAR2(20),
State VARCHAR2(20),
Zip_Code VARCHAR2(10)
);

BEGIN
```

```
   EXECUTE IMMEDIATE 'DROP TABLE locate CASCADE CONSTRAINTS';
EXCEPTION
   WHEN OTHERS THEN NULL;
END;
/
CREATE TABLE locate  (
Address_ID VARCHAR2(20),
Bus_ID VARCHAR2(20),
Status VARCHAR2(10) CONSTRAINT locate_status_ck CHECK (Status IN ('Owned', 'Rented')),
Present NUMBER(1) CONSTRAINT locate_present_ck CHECK (Present in (0, 1)),
Type VARCHAR2(10),
Length_of_Stay NUMBER(4),
CONSTRAINT locate_pk PRIMARY KEY (Address_ID, Bus_ID)
);

BEGIN
   EXECUTE IMMEDIATE 'DROP TABLE loan CASCADE CONSTRAINTS';
EXCEPTION
   WHEN OTHERS THEN NULL;
END;
/
CREATE TABLE loan  (
Loan_ID VARCHAR2(20) PRIMARY KEY,
Bus_ID VARCHAR2(20),
Guarantor_ID VARCHAR2(20),
Date_Filed DATE DEFAULT SYSDATE,
Amount_Request DECIMAL(20, 2) CONSTRAINT loan_ar_ck CHECK (Amount_Request BETWEEN 0 AND 10000000),
```

```
Repayment_Term NUMBER(3),
Repayment_Mode VARCHAR2(10),
P1_Working_Capital DECIMAL(20, 2),
P2_Equipment DECIMAL(20, 2),
P3_Building_Construction_Renovation DECIMAL(20, 2),
P4_Purchase_of_Lot DECIMAL(20, 2)
);

BEGIN
   EXECUTE IMMEDIATE 'DROP TABLE guarantor CASCADE CONSTRAINTS';
EXCEPTION
   WHEN OTHERS THEN NULL;
END;
/
CREATE TABLE guarantor  (
Guarantor_ID VARCHAR2(20) PRIMARY KEY,
First_Name VARCHAR2(20) CONSTRAINT guarantor_fn_nn NOT NULL,
Last_Name VARCHAR2(20) CONSTRAINT guarantor_ln_nn NOT NULL,
Address VARCHAR2(50) CONSTRAINT guarantor_addr_nn NOT NULL
);

BEGIN
   EXECUTE IMMEDIATE 'DROP TABLE use CASCADE CONSTRAINTS';
EXCEPTION
   WHEN OTHERS THEN NULL;
END;
/
```

```
CREATE TABLE use  (
Loan_ID VARCHAR2(20),
Bus_ID VARCHAR2(20),
Collateral_ID VARCHAR2(20),
CONSTRAINT use_pk PRIMARY KEY (Bus_ID, Loan_ID, Collateral_ID)
);

BEGIN
   EXECUTE IMMEDIATE 'DROP TABLE collateral CASCADE CONSTRAINTS';
EXCEPTION
   WHEN OTHERS THEN NULL;
END;
/
CREATE TABLE collateral  (
Bus_ID VARCHAR2(20),
Collateral_ID VARCHAR2(20),
Name VARCHAR2(20),
Description VARCHAR2(100),
Type VARCHAR2(20),
CONSTRAINT collateral_pk PRIMARY KEY (Bus_ID, Collateral_ID)
);

BEGIN
   EXECUTE IMMEDIATE 'DROP TABLE equipment CASCADE CONSTRAINTS';
EXCEPTION
   WHEN OTHERS THEN NULL;
END;
```

```
/
CREATE TABLE equipment  (
Bus_ID VARCHAR2(20),
Collateral_ID VARCHAR2(20),
Serial_number VARCHAR2(50),
CONSTRAINT equipment_pk PRIMARY KEY (Bus_ID, Collateral_ID)
);

BEGIN
   EXECUTE IMMEDIATE 'DROP TABLE real_estate CASCADE CONSTRAINTS';
EXCEPTION
   WHEN OTHERS THEN NULL;
END;
/
CREATE TABLE real_estate  (
Bus_ID VARCHAR2(20),
Collateral_ID VARCHAR2(20),
Address VARCHAR2(100),
Land_title VARCHAR2(20),
Lastest_tax_paid VARCHAR2(20),
CONSTRAINT real_estate_pk PRIMARY KEY (Bus_ID, Collateral_ID)
);

BEGIN
   EXECUTE IMMEDIATE 'DROP TABLE  reference CASCADE CONSTRAINTS';
EXCEPTION
   WHEN OTHERS THEN NULL;
```

```
END;
/
CREATE TABLE reference  (
Bus_ID VARCHAR2(20),
Institution_ID VARCHAR2(20),
Ref_type VARCHAR2(20) CONSTRAINT reference_reftype_ck CHECK (ref_type in ('Depository Bank','Creditor')),
Deposit_loan_type VARCHAR2(20),
Contact_person VARCHAR2(20),
Contanct_no VARCHAR2(20),
CONSTRAINT reference_pk PRIMARY KEY (Bus_ID, Institution_ID, Ref_type)
);

BEGIN
   EXECUTE IMMEDIATE 'DROP TABLE  institution CASCADE CONSTRAINTS';
EXCEPTION
   WHEN OTHERS THEN NULL;
END;
/
CREATE TABLE institution  (
Institution_ID VARCHAR2(20) PRIMARY KEY,
Name VARCHAR2(20),
Branch VARCHAR2(20)
);

BEGIN
   EXECUTE IMMEDIATE 'DROP TABLE  liability CASCADE CONSTRAINTS';
EXCEPTION
```

```
   WHEN OTHERS THEN NULL;
END;
/
CREATE TABLE liability  (
Bus_ID VARCHAR2(20),
Liability_ID VARCHAR2(20),
Institution_ID VARCHAR2(20),
Loan_type VARCHAR2(20),
Amount Number(10,2),
Date_granted DATE,
OS_balance Number(10,2),
Collateral VARCHAR2(20),
CONSTRAINT liability_pk PRIMARY KEY (Bus_ID, Liability_ID)
);

BEGIN
   EXECUTE IMMEDIATE 'DROP TABLE  financial_statement CASCADE CONSTRAINTS';
EXCEPTION
   WHEN OTHERS THEN NULL;
END;
/
CREATE TABLE financial_statement  (
Bus_ID VARCHAR2(20),
Operation_year VARCHAR2(20),
Asset_size Number(10,2),
Liabilities VARCHAR2(20),
Equities VARCHAR2(20),
```

```
Gross_sales Number(10,2),
Expenses Number(10,2),
Net_income Number(10,2),
CONSTRAINT financial_statement_pk PRIMARY KEY (Bus_ID, Operation_year)
);

ALTER TABLE company
ADD CONSTRAINT company_busid_fk FOREIGN KEY (Bus_ID) REFERENCES business (Bus_ID);

ALTER TABLE single_proprietorship
ADD CONSTRAINT single_prop_busid_fk FOREIGN KEY (Bus_ID) REFERENCES business (Bus_ID);

ALTER TABLE assign
ADD CONSTRAINT assign_busid_fk FOREIGN KEY (Bus_ID) REFERENCES business (Bus_ID);
ALTER TABLE assign
ADD CONSTRAINT assign_officerid_fk FOREIGN KEY (Officer_ID) REFERENCES officer (Officer_ID);

ALTER TABLE locate
ADD CONSTRAINT locate_addressid_fk FOREIGN KEY (Address_ID) REFERENCES address (Address_ID);
ALTER TABLE locate
ADD CONSTRAINT locate_busid_fk FOREIGN KEY (Bus_ID) REFERENCES business (Bus_ID);

ALTER TABLE loan
ADD CONSTRAINT loan_busid_fk FOREIGN KEY (Bus_ID) REFERENCES business (Bus_ID);
ALTER TABLE loan
ADD CONSTRAINT loan_guarantorid_fk FOREIGN KEY (Guarantor_ID) REFERENCES guarantor (Guarantor_ID);
```

```
ALTER TABLE use
ADD CONSTRAINT use_loanid_fk FOREIGN KEY (Loan_ID) REFERENCES loan (Loan_ID);
ALTER TABLE use
ADD CONSTRAINT use_buscollaid_fk FOREIGN KEY (Bus_ID, Collateral_ID) REFERENCES collateral (Bus_ID, Collateral_ID);

ALTER TABLE collateral
ADD CONSTRAINT collateral_busid_fk FOREIGN KEY (Bus_ID) REFERENCES business (Bus_ID);

ALTER TABLE equipment
ADD CONSTRAINT equipment_buscollaid_fk FOREIGN KEY (Bus_ID, Collateral_ID) REFERENCES collateral (Bus_ID, Collateral_ID);

ALTER TABLE real_estate
ADD CONSTRAINT real_estate_buscollaid_fk FOREIGN KEY (Bus_ID, Collateral_ID) REFERENCES collateral (Bus_ID, Collateral_ID);

ALTER TABLE reference
ADD CONSTRAINT reference_busid_fk FOREIGN KEY (Bus_ID) REFERENCES business (Bus_ID);
ALTER TABLE reference
ADD CONSTRAINT reference_instid_fk FOREIGN KEY (Institution_ID) REFERENCES institution (Institution_ID);

ALTER TABLE liability
ADD CONSTRAINT liability_busid_fk FOREIGN KEY (Bus_ID) REFERENCES business (Bus_ID);
ALTER TABLE liability
ADD CONSTRAINT liability_instid_fk FOREIGN KEY (Institution_ID) REFERENCES institution (Institution_ID);

ALTER TABLE financial_statement
ADD CONSTRAINT financial_statement_busid_fk FOREIGN KEY (Bus_ID) REFERENCES business (Bus_ID);
```

```
ALTER TABLE loan
ADD CONSTRAINT br_loan_ar_ck CHECK (Amount_Request < 10000000);

ALTER TABLE business
ADD CONSTRAINT br_business_startyear_ck CHECK ( 2022 - EXTRACT(year from Start_OP_Year) >= 2);

ALTER TABLE financial_statement
ADD CONSTRAINT br_financial_statement_liabilities_ck CHECK (Liabilities < 1000000);

Insert Into business Values
('C1','Medium','New
Application',1000,'125NISFEW','8142341000','heinz_storage@hs.com','8142341000','123985624','Storage',TO_DATE('2018-01-01','YYYY-MM
-DD'),'Storage garages');
Insert Into business Values
('C2','Micro','Restructured',30,'RN178','21387842062','fantastic_pizza@gmail.com','21387842062','1768234343','Restaurant',TO_DATE('2018-
01-01','YYYY-MM-DD'),'Italian Food');
Insert Into business Values
('C3','Medium','New
Application',200,'01012009','1231231234','candy_king@outlook.com','1231231234','92872764','Retailer',TO_DATE('2009-01-01','YYYY-MM-D
D'),'Food');
Insert Into business Values
('C4','Micro','Existing
Borrower',36,'01091999','467383922','hh@heinz.com','467383922','92872764','Food',TO_DATE('2014-01-01','YYYY-MM-DD'),'Hamburgers
and Wine');
Insert Into business Values
```

```
('C5','Medium','Old with O/S
Balance',521,'OIQP8162','387464683','jinzhoushakao_pitts@gmail.com','387464683','78262764','Food',TO_DATE('1897-01-01','YYYY-MM-DD
'),'Barbeque');
Insert Into business Values
('S1','Small','New
Application',40,'001NISFEW','8142341240','HeinzBeauty@hs.com','2248901000','312985624','Beauty',TO_DATE('2018-01-01','YYYY-MM-DD'
),'Beauty Salon');
Insert Into business Values
('S2','Small','Existing
Borrower',20,'CF3452','2731435141','consulting_carol@gmail.com','2731435141','1357924682','Consulting',TO_DATE('2015-01-01','YYYY-M
M-DD'),'Financial Services');
Insert Into business Values
('S3','Micro','Existing Borrower', 3,'987623','7757242393','jianbingguozi@gmail.com','4234901752','1188990033','Food',
TO_DATE('2019-01-01','YYYY-MM-DD'),'Pancake');
Insert Into business Values
('S4','Small','New Application', 55,'999923923','2732242393','themostbeautifulclothes@gmail.com','5906901752','2967990033','Clothes',
TO_DATE('2012-01-01','YYYY-MM-DD'),'Clothes');
Insert Into business Values
('S5','Micro','Restructured', 21,'175823923','5739242393','sarah_gupta@gmail.com','4234901752','1188990033','Education',
TO_DATE('2012-01-01','YYYY-MM-DD'),'German Lessons');

Insert Into company Values ('C1', 'Heinz Storage', 1);
Insert Into company Values ('C2', 'Fantastic Pizza', 1);
Insert Into company Values ('C3', 'Candy King', 1);
Insert Into company Values ('C4', 'Heinz for Hamburger', 1);
Insert Into company Values ('C5', 'Jinzhou Barbeque', 1);
```

```
Insert Into single_proprietorship Values ('S1','Akshita','Patil', TO_DATE('08-30-1999','MM-DD-YYYY'), 'India','Indian', 'F',0);
Insert Into single_proprietorship Values ('S2','Carol','Hu', TO_DATE('09-12-2000','MM-DD-YYYY'),'Canada','Canadian' , 'F',1);
Insert Into single_proprietorship Values ('S3','Kathy','Wang', TO_DATE('07-06-1980','MM-DD-YYYY'),'China', 'Chinese', 'F',0);
Insert Into single_proprietorship Values ('S4','Jeff','Liu', TO_DATE('09-30-1991','MM-DD-YYYY'),'America', 'American', 'M',1);
Insert Into single_proprietorship Values ('S5','Sarah','Gupta', TO_DATE('08-14-1987','MM-DD-YYYY'), 'Germany','German', 'F', 0);

Insert Into officer Values ('O1','Carnegie Heinz','Pittsburgh');
Insert Into officer Values ('O2','Adam Smith','Los Angeles');
Insert Into officer Values ('O3','Carl Smith','Pittsburgh');
Insert Into officer Values ('O4','Jeremy Smith','Seattle');
Insert Into officer Values ('O5','Carly Smith','Austin');
Insert Into officer Values ('O6','Karen White','Pittsburgh');
Insert Into officer Values ('O7','Sarah Gupta','Pittsburgh');

Insert Into assign Values ('C1','O1','Senior Director');
Insert Into assign Values ('C2','O2','CFO');
Insert Into assign Values ('C3','O3','CEO');
Insert Into assign Values ('C4','O1','CFO');
Insert Into assign Values ('C5','O4','MD');
Insert Into assign Values ('C5','O5','Boss');
Insert Into assign Values ('S1','O3','SVP');
Insert Into assign Values ('S2','O2','Managing Director');
Insert Into assign Values ('S5','O7','Headmaster');
Insert Into assign Values ('S3','O3','Boss');
Insert Into assign Values ('S4','O4','Boss');

Insert Into address Values ('Addr1','5000 Forbes Avenue','Pittsburgh','PA','15213');
```

```
Insert Into address Values ('Addr2','8th Avenue','Pittsburgh','PA','15432');
Insert Into address Values ('Addr3','4091 Forbes Avenue','Pittsburgh','PA','12317');
Insert Into address Values ('Addr4','5th Avenue','Pittsburgh','PA','43215');
Insert Into address Values ('Addr5','Denniston Avenue','Pittsburgh','PA','14217');
Insert Into address Values ('Addr6','4999 Forbes Avenue','Pittsburgh','PA','15213');
Insert Into address Values ('Addr7','CH Avenue','Pittsburgh','PA','18924');
Insert Into address Values ('Addr8','555 Forbes Avenue','Pittsburgh','PA','15213');

Insert Into locate Values ('Addr1', 'C1', 'Owned', 1, 'Office', 5);
Insert Into locate Values ('Addr2', 'C2', 'Owned', 0, 'Office', 3);
Insert Into locate Values ('Addr3', 'C3', 'Owned', 1, 'Office', 5);
Insert Into locate Values ('Addr4', 'C4', 'Owned', 0, 'Office', 4);
Insert Into locate Values ('Addr5', 'C5', 'Rented', 1, 'Office', 6);
Insert Into locate Values ('Addr6', 'C1', 'Owned', 1, 'Factory', 5);
Insert Into locate Values ('Addr7', 'S2', 'Owned', 0, 'Office', 2);
Insert Into locate Values ('Addr8','S5','Rented', 1,'Office', 1);
Insert Into locate Values ('Addr7', 'S3','Rented', 0, 'Office', 2);
Insert Into locate Values ('Addr8','S4','Rented', 1,'Office', 1);
Insert Into locate Values ('Addr8','S1','Rented', 1,'Office', 1);

Insert Into guarantor Values ('G1','Mellon','Heinz','Pittsburgh');
Insert Into guarantor Values ('G2','Alexander','Hamilton','Boston');
Insert Into guarantor Values ('G3','Joshua','Green','Pittsburgh');
Insert Into guarantor Values ('G4','Bill','Gates','New York');
Insert Into guarantor Values ('G5','Yiping','He','Chicago');
Insert Into guarantor Values ('G6','Qinruo','Hu','Los Angeles');
```

```
Insert Into loan Values
('L1','C1','G1',TO_DATE('08-30-2019','MM-DD-YYYY'), 1200000,4,'Monthly', 100000, 30000, 40000, 30000);
Insert Into loan Values
('L2','C2','G2',TO_DATE('09-30-2022','MM-DD-YYYY'),1034000,5,'Quarterly', 50000, 50000, 50000, 50000);
Insert Into loan Values
('L3','C3','G3',TO_DATE('01-01-2022','MM-DD-YYYY'),1405300,8,'Monthly', 60000, 70000, 100000, 70000);
Insert Into loan Values
('L4','C4','G4',TO_DATE('01-01-2000','MM-DD-YYYY'),1504400,10,'Monthly', 100000, 100000, 100000, 100000);
Insert Into loan Values
('L5','C5','G4',TO_DATE('01-27-2021','MM-DD-YYYY'),123000,6,'Quarterly', 10000, 10000, 10000, 20000);
Insert Into loan Values
('L6','S2','G6',TO_DATE('03-01-2019','MM-DD-YYYY'),1243340,8,'Quarterly', 0, 0, 60000, 0);
Insert Into loan Values
('L7','S1','G1',TO_DATE('08-30-2020','MM-DD-YYYY'),200000,4,'Monthly', 100000, 30000, 40000, 30000);
Insert Into loan Values
('L8','S5','G5',TO_DATE('02-02-2022','MM-DD-YYYY'), 70000, 2,'Quarterly', 10000, 60000, 0, 0);
Insert Into loan Values
('L9','S3','G5',TO_DATE('03-30-2017','MM-DD-YYYY'),140000,4,'Quarterly', 100000, 30000, 4000, 3000);
Insert Into loan Values
('L10','S4','G2',TO_DATE('02-05-2019','MM-DD-YYYY'),190000,4,'Monthly', 100000, 12000, 25000, 30000);


Insert Into collateral Values
('C1','CO1','House','A 3b2b','Real Estate');
Insert Into collateral Values
('C1','CO2','Car','A red car','Equipment');
Insert Into collateral Values
```

```
('C2','CO1','House','A 5b2b with a garden','Real Estate');
Insert Into collateral Values
('C3','CO1','Truck','A big truck','Equipment');
Insert Into collateral Values
('C4','CO1','Bracelet','A 100-year-old bracelet','Equipment');
Insert Into collateral Values
('C5','CO1','Farm','A 500-acre farm','Real Estate');
Insert Into collateral Values
('S1','CO1','Factory','A 100-acre factory','Real Estate');
Insert Into collateral Values
('S2','CO1','Air Plane','A Boeing 747','Equipment');
Insert Into collateral Values
('S3','CO1','Golf Course','A 100-acre golf course','Real Estate');
Insert Into collateral Values
('S4','CO1','Excavator','A beautiful excavator','Equipment');
Insert Into collateral Values
('S5','CO1','Warehouse','A 10000-square feet warehouse','Real Estate');

Insert Into use Values ('L1','C1','CO1');
Insert Into use Values ('L1','C1','CO2');
Insert Into use Values ('L2','C2','CO1');
Insert Into use Values ('L3','C3','CO1');
Insert Into use Values ('L4','C4','CO1');
Insert Into use Values ('L5','C5','CO1');
Insert Into use Values ('L6','S2','CO1');
Insert Into use Values ('L7','S1','CO1');
Insert Into use Values ('L8','S5','CO1');
```

```
Insert Into use Values ('L9','S3','CO1');
Insert Into use Values ('L10','S4','CO1');

Insert Into equipment Values ('C1','CO2','APPL');
Insert Into equipment Values ('C3','CO1','ABCD');
Insert Into equipment Values ('C4','CO1','120120110');
Insert Into equipment Values ('S2','CO1','97262');
Insert Into equipment Values ('S4','CO1','1802729355');

Insert Into real_estate Values ('C1','CO1','Pittsburgh','Land1','298383');
Insert Into real_estate Values ('C2','CO1','Chicago','Land2','3333');
Insert Into real_estate Values ('C5','CO1','Los Angeles','Land3','12344');
Insert Into real_estate Values ('S1','CO1','Pittsburgh','Lan4','59949');
Insert Into real_estate Values ('S3','CO1','Pittsburgh','Land5','457494');
Insert Into real_estate Values ('S5','CO1','Pittsburgh','Land6','555457494');

Insert Into institution Values ('I1','ABC Bank', 'Pittsburgh');
Insert Into institution Values ('I2','Chase Bank', 'Chicago');
Insert Into institution Values ('I3','BOA','Los Angeles');
Insert Into institution Values ('I4','BOA','Seattle');
Insert Into institution Values ('I5','Chase','Austin');
Insert Into institution Values ('I6','Huntington','Pittsburgh');
Insert Into institution Values ('I7','BOA','San Fran');
Insert Into institution Values ('I8','HDFC','Jersey City');
Insert Into institution Values ('I9','Credit Suisse','Pittsburgh');

Insert Into reference Values ('C1','I1','Depository Bank','Checking','Mary Lee','123873999');
```

```
Insert Into reference Values ('C2','I2','Creditor','Personal','Chloe Wang','21345678');
Insert Into reference Values ('C3','I3','Depository Bank', 'Fixed-Term','William White','1245678900');
Insert Into reference Values ('C4','I4','Creditor','Long-Term','Jeremy Smith','9773672299');
Insert Into reference Values ('C5','I5','Creditor','Personal','David Lie','9277339293');
Insert Into reference Values ('S1','I6','Creditor','Personal','Lara Lee','34252789');
Insert Into reference Values ('S2','I7','Creditor','Personal','Tommy lee','38733737');
Insert Into reference Values ('S3','I8','Depository Bank','Fixed-Term','Sam Andrew','26737633');
Insert Into reference Values ('S4','I9','Creditor','Long-Term','Nicholas Brown','876266373');
Insert Into reference Values ('S5','I1','Depository Bank','Personal','Meimei Han','20001231');
Insert Into reference Values ('S5','I6','Creditor','Personal','Lei Li','20000127');

Insert Into liability Values ('C1','L1','I1','Checking',5000, TO_DATE('09-20-2018','MM-DD-YYYY'),0,'Stocks');
Insert Into liability Values ('C2','L1','I2','Personal',100000, TO_DATE('07-01-2020','MM-DD-YYYY'),30000,'Company Van');
Insert Into liability Values ('C3','L1','I3','Fixed-Term',100000, TO_DATE('02-01-2018','MM-DD-YYYY'),80000,'Factories');
Insert Into liability Values ('C4','L1','I4','Long-Term',100000, TO_DATE('01-01-2002','MM-DD-YYYY'),0,'House');
Insert Into liability Values ('C5','L1','I5','Personal',600000, TO_DATE('01-25-2015','MM-DD-YYYY'),200000,'Car');
Insert Into liability Values ('S1','L1','I6','Checking',5000, TO_DATE('09-20-2018','MM-DD-YYYY'),0,'Stocks');
Insert Into liability Values ('S2','L1','I7','Personal',100000, TO_DATE('07-01-2020','MM-DD-YYYY'),30000,'Company Van');
Insert Into liability Values ('S3','L1','I8','Fixed-Term',100000, TO_DATE('02-01-2018','MM-DD-YYYY'),80000,'Factories');
Insert Into liability Values ('S4','L1','I9','Long-Term',100000, TO_DATE('01-01-2002','MM-DD-YYYY'),0,'House');
Insert Into liability Values ('S5','L1','I6','Personal',600000, TO_DATE('01-25-2015','MM-DD-YYYY'),200000,'Car');

Insert Into financial_statement Values ('C1','2018',55000,50000,5000,30000,15000,1500);
Insert Into financial_statement Values ('C2','2021',2500000,200000,415000,800000,90000,890000);
Insert Into financial_statement Values ('C3','2021',1000000,200000,800000,3000000,1000000,20000000);
Insert Into financial_statement Values ('C4','1999',200000,150000,50000,90000,85000,1500);
Insert Into financial_statement Values ('C5','2020',340000,800000,2600000,2900000,1200000,1600000);
```

```
Insert Into financial_statement Values ('S1','2019',102000,50000,52000,150000,20000,130000);
Insert Into financial_statement Values ('S2','2018',20000,20000,50000,415000,80000,890000);
Insert Into financial_statement Values ('S3','2016',100000,20000,800,3000,1000,20000);
Insert Into financial_statement Values ('S4','2018',20000,15000,5000,9000,8500,15000);
Insert Into financial_statement Values ('S5','2021',3400,8000,26000,29000,12000,16000);

SELECT * FROM (
SELECT Bus_ID, SUM(Liabilities) as Sum_Liability
From Financial_Statement
GROUP BY Bus_ID
ORDER BY Sum_Liability DESC)
WHERE ROWNUM <= 2;

SELECT o.name, o.address
FROM Officer o JOIN Assign USING (Officer_ID)
    JOIN Business USING (Bus_ID)
    JOIN Loan l USING (Bus_ID)
WHERE l.P3_Building_Construction_Renovation > 0;

SELECT b.type, count(distinct b.Bus_ID) as BUSINESS_COUNT
FROM business b, loan l
WHERE b.Bus_ID = l.Bus_ID AND l.Date_Filed > TRUNC(sysdate)-180
GROUP BY b.type
ORDER BY BUSINESS_COUNT desc ;

SELECT Bus_ID, l.Loan_ID, l.Amount_Request
FROM Loan l
```

```
JOIN Business b USING (Bus_ID)
WHERE l.Repayment_Term > 3 and l.Amount_Request > 500000;
```