

Database Project

Library Management System

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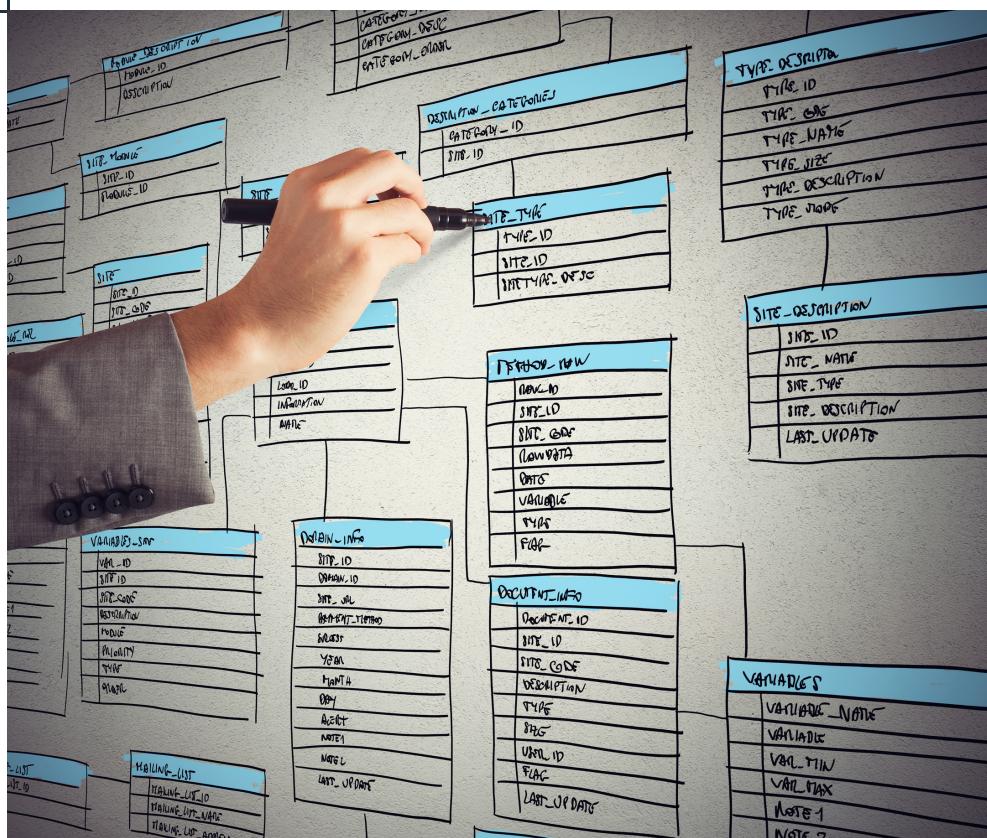
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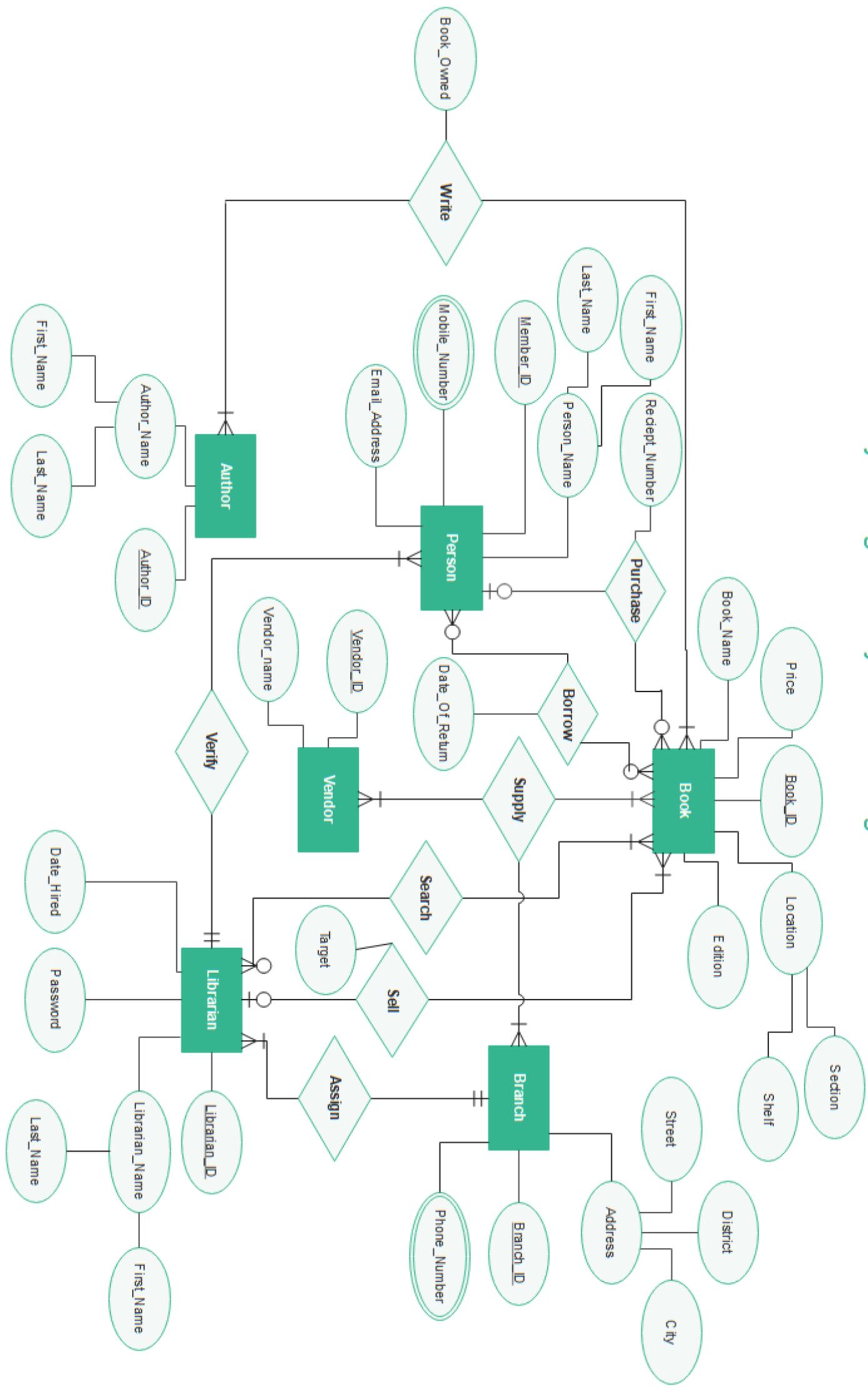
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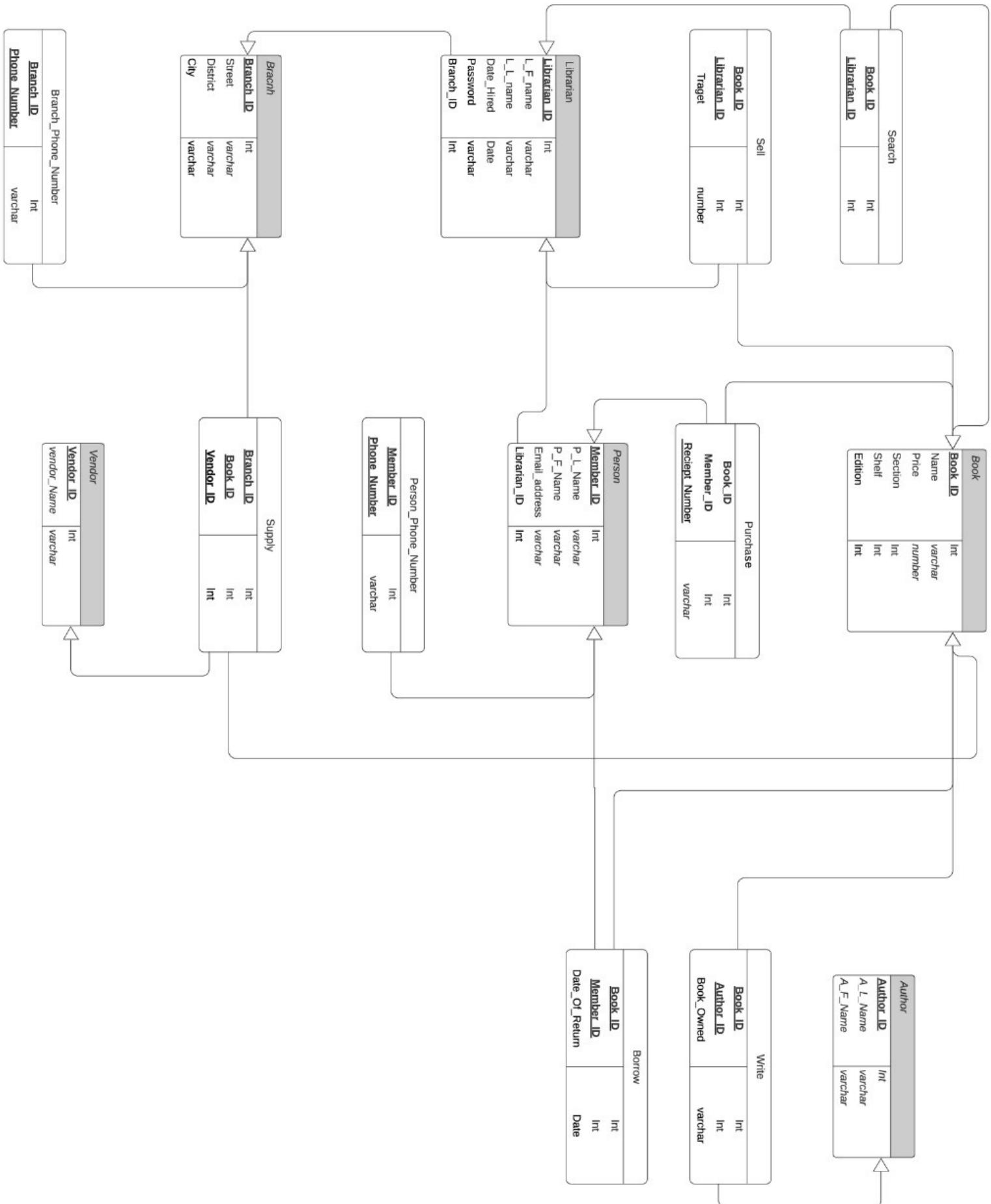
Library Management System ER Diagram



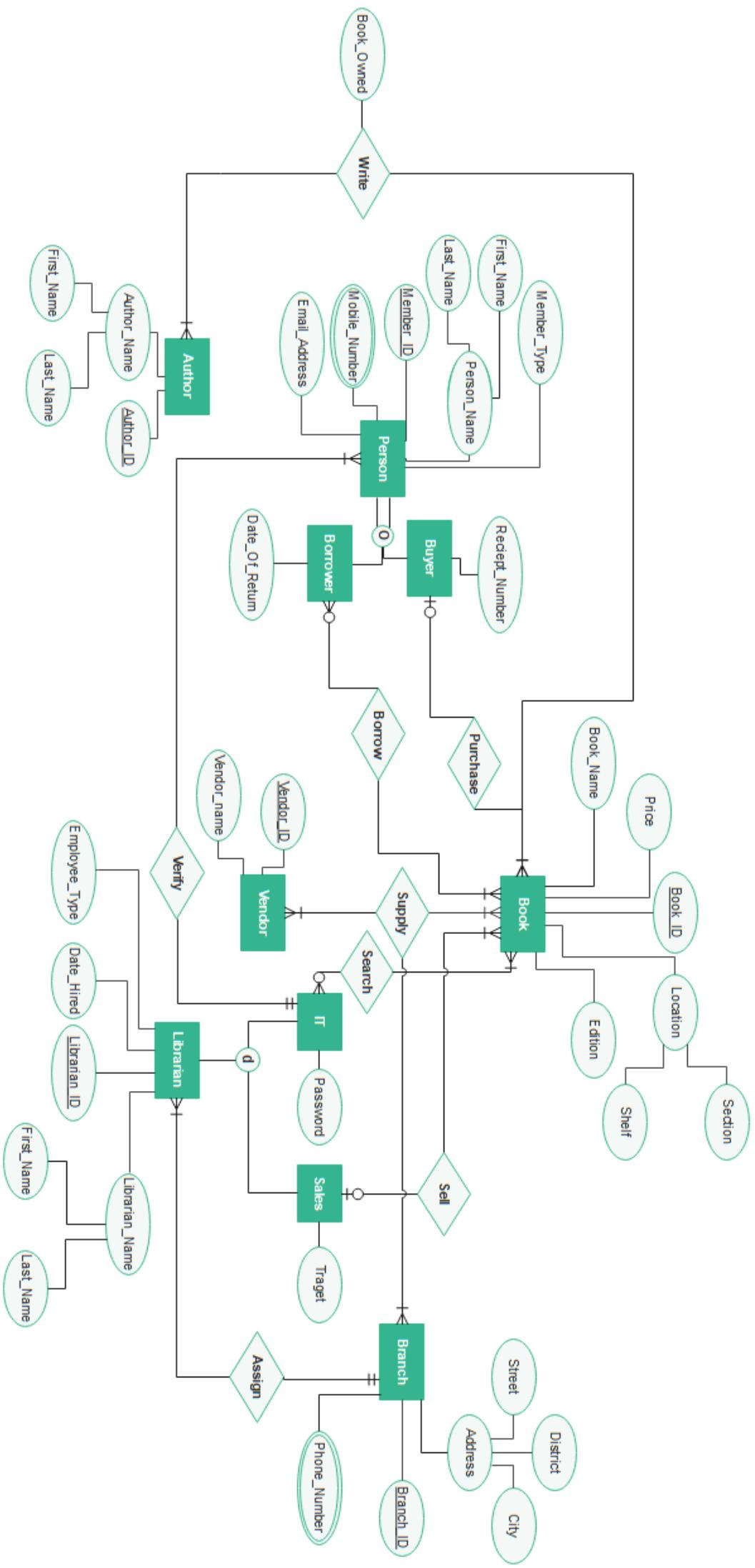
Business Rules

- 1)**
 - A Branch must assign one or more Librarians.
 - A Librarian must be assigned to one Branch only.
- 2)**
 - A Librarian may verify one or more Persons.
 - A Person must be verified by one Librarian only.
- 3)**
 - A Librarian may search for one or more books.
 - A Book may be searched for by a number of Librarians.
- 4)**
 - A Librarian may sell one or more Books.
 - A Book may be sold by one Librarian.
- 5)**
 - A Person may purchase a number of Books.
 - A Book may be purchased by one person only.
- 6)**
 - A Person may borrow a number of books.
 - A Book may be borrowed by a number of Persons.
- 7)**
 - An Author may write one or more Books.
 - A Book may be written by one or more Authors.
- 8)**
 - A Vendor may supply a number of Books to one or more Branches.
 - A Vendor may supply one or more Books to a certain Branch.
 - A Book may be supplied to a certain Branch by one or more Vendors.

Relational Model



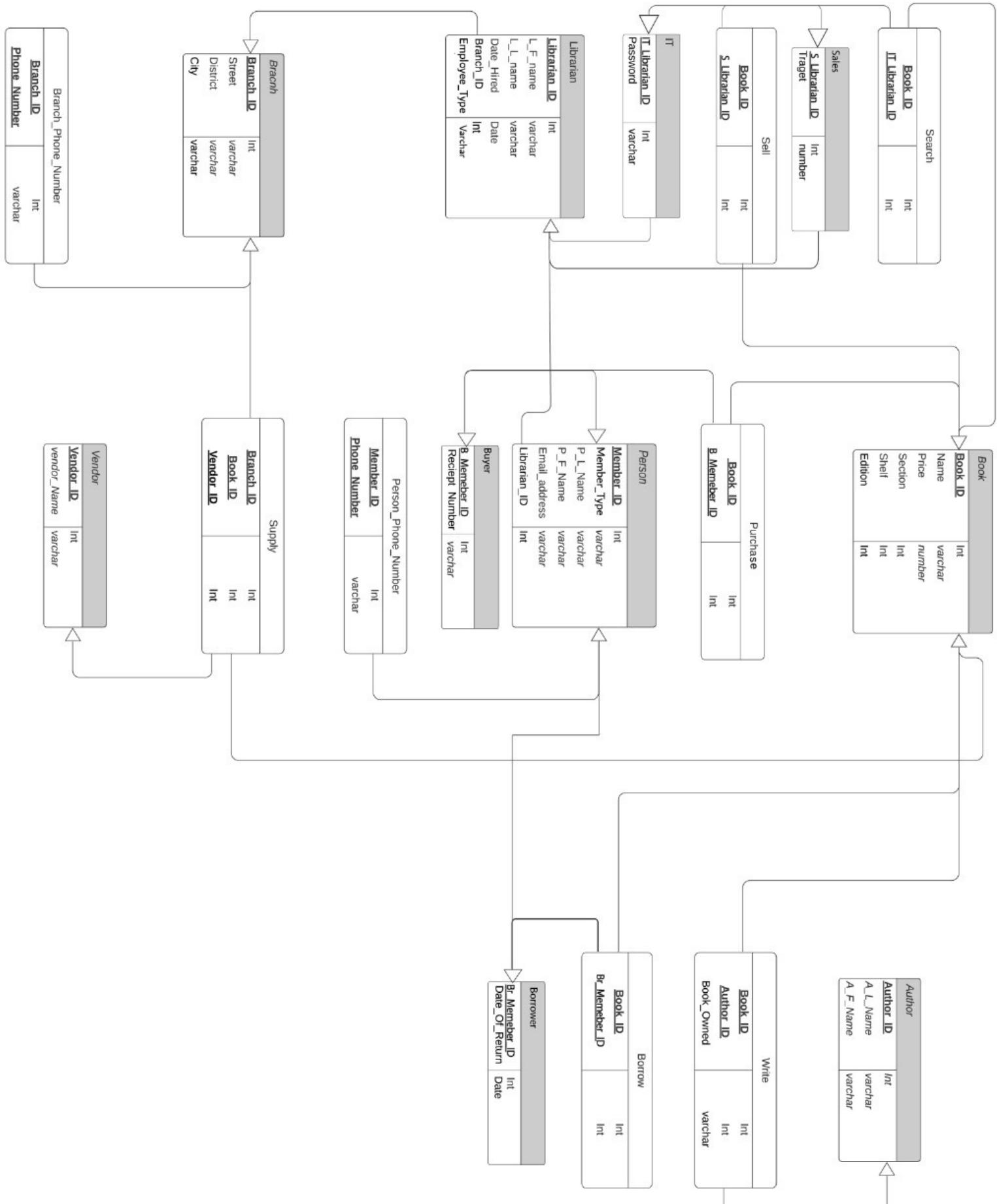
Library Management System EER Diagram



Enhanced ERD

- The ‘Librarian’ Entity is Partially Specialized into ‘IT’ and ‘Sales’ Entities by the Disjoint Rule.
- An ‘Employee_Type’ attribute is added to the Supertype (‘Librarian’ Entity) that works as a discriminator to indicate the Subtype (whether the Librarian is ‘IT’ or ‘Sales’).
 - 1)
 - The IT Librarian has a ‘Password’ attribute to access the system.
 - An IT Librarian may verify one or more Persons.
 - A Person must be verified by one IT Librarian only.
 - An IT librarian may search for one or more books.
 - A Book may be searched for by a number of IT Librarians.
 - 2)
 - The Sales Librarian has a ‘Target’ attribute to set his monthly target.
 - A Sales Librarian may sell one or more Books.
 - A Book may be sold by one Sales Librarian only.
- The ‘Person’ Entity is Totally Specialized into ‘Buyer’ and ‘Borrower’ Entities (Overlap Rule):
 - 1)
 - The Buyer has the ‘Receipt Number’ attribute.
 - A Buyer may purchase one or more Books.
 - A Book must be purchased by one Buyer only.
 - 2)
 - A Borrower has the ‘Date of Return’ attribute.
 - A Borrower may borrow one or more Books.
 - A Book may be borrowed by a number of Borrowers.

Enhanced Relational Model



Oracle DBMS

Describe Book

Autocommit Rows 10 Save Run

```
DESCRIBE Book;
```

Results Explain Describe Saved SQL History

Object Type TABLE Object BOOK

Table	Column	Data Type	Length	Precision	Scale	Primary Key	Nullable	Default	Comment
BOOK	BOOK_ID	NUMBER	22	-	0	1	-	-	-
	NAME	VARCHAR2	30	-	-	-	✓	-	-
	PRICE	NUMBER	-	9	5	-	✓	-	-
	BRANCH	VARCHAR2	30	-	-	-	✓	-	-
	SECTION	VARCHAR2	5	-	-	-	✓	-	-
	SHELF	NUMBER	22	-	0	-	✓	-	-
	EDITION	NUMBER	22	-	0	-	✓	-	-

1 - 7

Select * from Book

Autocommit Rows 10 Save Run

```
SELECT * FROM Book;
```

Results Explain Describe Saved SQL History

BOOK_ID	NAME	PRICE	BRANCH	SECTION	SHELF	EDITION
111	Flowers	200	Sidi Gaber	1A	1	1
112	Ada Masali	150	Sidi Gaber	1B	1	2
113	Royals	250	Cleopatra	1C	2	2
116	The Sun Also Rises	500	Miami	2B	3	6
117	Jane Eyre	200.15	Sidi Gaber	1A	1	1
114	As I Lay Dying	249.99	Cleopatra	1D	2	3
115	Beloved	250	Mosatafa Kamel	2A	2	1
118	Animal Farm	300	Sidi Gaber	3B	2	6
119	Flowers	700	Stanley	1A	1	1
120	The Beloved	200.75	Smouha	5C	2	5

Oracle DBMS

Describe Author

```
Autocommit Rows 10 Save Run
DESCRIBE Author;

Results Explain Describe Saved SQL History
Object Type TABLE Object AUTHOR
Table Column Data Type Length Precision Scale Primary Key Nullable Default Comment
AUTHOR AUTHOR_ID NUMBER 22 - 0 1 - - -
          A_F_NAME VARCHAR2 30 - - - ✓ - -
          A_L_NAME VARCHAR2 30 - - - - ✓ - -
1 - 3
```

Select * from Author

```
Autocommit Rows 10 Save Run
SELECT * FROM AUTHOR
ORDER BY Author_ID;

Results Explain Describe Saved SQL History
AUTHOR_ID A_F_NAME A_L_NAME
1 Ahmed Mourad
2 Sarah Mohamed
3 Mohamed Sadek
4 Charlotte Bronte
5 Ahmed Mustafa
6 Manal Mohamed
7 Charles Dickens
8 Waleed Mustafa
9 Khaled Ahmed
10 Mohaned Tawfeek
```

Oracle DBMS

Describe Write

Autocommit Rows 10 Save Run

```
DESCRIBE Write;
```

Results Explain Describe Saved SQL History

Object Type TABLE Object WRITE

Table	Column	Data Type	Length	Precision	Scale	Primary Key	Nullable	Default	Comment
WRITE	FK_BOOK_ID	NUMBER	22	-	0	1	-	-	-
	FK_AUTHOR_ID	NUMBER	22	-	0	2	-	-	-
	BOOK OWNED	VARCHAR2	30	-	-	-	✓	-	-

1 - 3

Select * from Write

Autocommit Rows 10 Save Run

```
SELECT * FROM Write
ORDER BY fk_Book_ID;
```

Results Explain Describe Saved SQL History

FK_BOOK_ID	FK_AUTHOR_ID	BOOK OWNED
111	6	Flowers
111	2	Flowers
112	1	Ada Masali
112	8	Ada Masali
113	10	Royals
114	7	As I Lay Dying
115	6	Beloved
117	4	Jane Eyre
118	9	Animal Farm
120	10	The Beloved

Oracle DBMS

Describe Vendor

The screenshot shows the Oracle SQL Developer interface. At the top, there are buttons for Autocommit (checked), Rows (set to 10), Save, and Run. Below the toolbar is a text input field containing the SQL command: DESCRIBE Vendor;. The main area shows the results of the DESCRIBE command, which displays the structure of the VENDOR table, including columns VENDOR_ID and VENDOR_NAME.

Table	Column	Data Type	Length	Precision	Scale	Primary Key	Nullable	Default	Comment
VENDOR	VENDOR_ID	NUMBER	22	-	0	1	-	-	-
VENDOR	VENDOR_NAME	VARCHAR2	30	-	-	-	✓	-	-

Select * from Vendor

The screenshot shows the Oracle SQL Developer interface. At the top, there are buttons for Autocommit (checked), Rows (set to 10), Save, and Run. Below the toolbar is a text input field containing the SQL command: SELECT * FROM Vendor;. The main area shows the results of the query, which lists 11 rows of data from the VENDOR table.

VENDOR_ID	VENDOR_NAME
222	Ahmed
223	Mostafa
224	Alaa
225	Maged
226	Samer
227	Mohamed
228	Sarah
229	Lamia
230	Emad
231	Ahmed

Oracle DBMS

Describe Branch

```
Autocommit Rows 10 Save Run  
DESCRIBE Branch;  
  
Results Explain Describe Saved SQL History  
Object Type TABLE Object BRANCH  


| Table  | Column    | Data Type | Length | Precision | Scale | Primary Key | Nullable | Default | Comment |
|--------|-----------|-----------|--------|-----------|-------|-------------|----------|---------|---------|
| BRANCH | BRANCH_ID | NUMBER    | 22     | -         | 0     | 1           | -        | -       | -       |
|        | STREET    | VARCHAR2  | 30     | -         | -     | -           | ✓        | -       | -       |
|        | DISTRICT  | VARCHAR2  | 30     | -         | -     | -           | ✓        | -       | -       |
|        | CITY      | VARCHAR2  | 30     | -         | -     | -           | ✓        | -       | -       |
|        |           |           |        |           |       |             |          | 1 - 4   |         |


```

Select * from Branch

```
Autocommit Rows 10 Save Run  
SELECT * FROM Branch  
ORDER BY Branch_ID;  
  
Results Explain Describe Saved SQL History  


| BRANCH_ID | STREET      | DISTRICT      | CITY       |
|-----------|-------------|---------------|------------|
| 30        | 24th Street | Smouha        | Alexandria |
| 31        | 27th Street | Sidi Gaber    | Alexandria |
| 32        | 28th Street | Mostafa Kamel | Alexandria |
| 33        | 29th Street | Sporting      | Alexandria |
| 34        | 30th Street | Sheikh Zayed  | Giza       |
| 35        | 35th Street | 6th October   | Giza       |
| 36        | 24th Street | Miami         | Alexandria |
| 37        | 23rd Street | Mansheya      | Alexandria |
| 38        | 24th Street | Zamalek       | Giza       |
| 39        | 29th Street | Nasr City     | Cairo      |


```

Oracle DBMS

Describe Branch Phone Number

```
Autocommit Rows 10 Save Run
DESCRIBE Branch.Phone_Number;
```

Results Explain Describe Saved SQL History

Object Type TABLE Object BRANCH_PHONE_NUMBER

Table	Column	Data Type	Length	Precision	Scale	Primary Key	Nullable	Default	Comment
BRANCH_PHONE_NUMBER	PHONE_NUMBER	VARCHAR2	15	-	-	1	-	-	-
	FK_BRANCH_ID	NUMBER	22	-	0	2	-	-	-
							1 - 2		

Select * from Branch Phone Number

```
SELECT * FROM Branch.Phone_Number
ORDER BY fk_Branch_ID;
```

Results Explain Describe Saved SQL History

PHONE_NUMBER	FK_BRANCH_ID
+036728809	30
+201070809920	30
+036121837	31
+035932108	32
+030923809	33
+022987210	34
+021209385	35
+035836190	36
+032109188	37
+022327823	38
+022871290	39

Oracle DBMS

Describe Supply

Autocommit Rows 15 Save Run

```
DESCRIBE Supply;
```

Results Explain Describe Saved SQL History

Object Type TABLE Object SUPPLY

Table	Column	Data Type	Length	Precision	Scale	Primary Key	Nullable	Default	Comment
SUPPLY	FK_BRANCH_ID	NUMBER	22	-	0	1	-	-	-
	FK_BOOK_ID	NUMBER	22	-	0	2	-	-	-
	FK_VENDOR_ID	NUMBER	22	-	0	3	-	-	-

1 - 3

Select * from Supply

Autocommit Rows 15 Save Run

```
SELECT * FROM Supply;
```

Results Explain Describe Saved SQL History

FK_BRANCH_ID	FK_BOOK_ID	FK_VENDOR_ID
30	111	222
31	112	223
32	113	224
33	114	225
34	115	226
35	116	227
36	117	228
37	118	229
38	119	230
39	120	231

Oracle DBMS

Describe Librarian

```
Autocommit  Rows  10  Save  Run
DESCRIBE Librarian;

Results Explain Describe Saved SQL History

Object Type TABLE Object LIBRARIAN
Table Column Data Type Length Precision Scale Primary Key Nullable Default Comment
LIBRARIAN LIBRARIAN_ID NUMBER 22 - 0 1 - - -
L_F_NAME L_L_NAME VARCHAR2 30 - - - ✓ - -
PASSWORD DATE_HIRED DATE 7 - - - ✓ - -
FK_BRANCH_ID NUMBER 22 - 0 - - ✓ - -
1 - 6
```

Select * from Librarian

```
Autocommit  Rows  10  Save  Run
SELECT * FROM Librarian;

Results Explain Describe Saved SQL History

LIBRARIAN_ID L_F_NAME L_L_NAME PASSWORD DATE_HIRED FK_BRANCH_ID
1 Emad Ahmed #2020 11/27/2018 30
2 Mustafa Mohamed #2021 11/12/2018 33
3 Tarek Ahmed @1271 06/07/2017 30
4 Ali Ahmed #21020 08/27/2018 35
5 Emad Mustafa #2020sh 11/27/2018 39
6 Peter George #20201sh 01/27/2017 36
7 Sally Mohamed %%%%##### 03/17/2020 38
8 Mayar Kamel @@@@\\2 04/27/2021 38
9 Alp Navruz *0*3 06/04/2019 34
10 Maya Mustafa #sT$S3 07/07/2017 37
```

Oracle DBMS

Describe Person

The screenshot shows the Oracle SQL Developer interface. At the top, there are buttons for Autocommit (checked), Rows (set to 10), Save, and Run. Below the toolbar is a text input field containing the SQL command: DESCRIBE Person;. Underneath the input field, there is a navigation bar with tabs: Results, Explain, **Describe**, Saved SQL, and History. The main area displays the table structure for the PERSON table:

Table	Column	Data Type	Length	Precision	Scale	Primary Key	Nullable	Default	Comment
PERSON	MEMBER_ID	NUMBER	22	-	0	1	-	-	-
	P_F_NAME	VARCHAR2	30	-	-	-	✓	-	-
	P_L_NAME	VARCHAR2	30	-	-	-	✓	-	-
	EMAIL_ADDRESS	VARCHAR2	30	-	-	-	✓	-	-
	FK_LIBRARIAN_ID	NUMBER	22	-	0	-	✓	-	-

At the bottom right of the table, there is a page number indicator: 1 - 5.

Select * from Person

The screenshot shows the Oracle SQL Developer interface. At the top, there are buttons for Autocommit (checked), Rows (set to 10), Save, and Run. Below the toolbar is a text input field containing the SQL command: SELECT * FROM Person;. Underneath the input field, there is a navigation bar with tabs: Results, Explain, Describe, Saved SQL, and History. The main area displays the results of the query:

MEMBER_ID	P_F_NAME	P_L_NAME	EMAIL_ADDRESS	FK_LIBRARIAN_ID
1	Mustafa	Ahmed	mustafaahmed@gmail.com	1
2	Ahmed	Mustafa	ahmedmustafa@gmail.com	2
3	Tarek	Ahmed	tarekahmed@gmail.com	3
4	Ali	Ahmed	aliahmed@gmail.com	4
5	Waleed	Ahmed	waleedahmed@gmail.com	4
6	Menna	Elnashar	mennamagdy@gmail.com	2
7	Yara	Hassan	yarahassan@gmail.com	1
8	Ayca	Turan	aycaturan@gmail.com	9
9	Nardin	Philip	nardinphilip@gmail.com	5
10	Doha	Mahmoud	dohamahmoud@gmail.com	8

Oracle DBMS

Describe Person Phone Number

```
Autocommit Rows 10 Save Run
DESCRIBE Person.Phone_Number;

Results Explain Describe Saved SQL History
Object Type TABLE Object PERSON_PHONE_NUMBER
Table Column Data Type Length Precision Scale Primary Key Nullable Default Comment
PERSON_PHONE_NUMBER FK_MEMBER_ID NUMBER 22 - 0 1 - - -
PHONE_NUMBER VARCHAR2 15 - - 2 - - -
1 - 2
```

Select * from Person Phone Number

```
Autocommit Rows 10 Save Run
SELECT * FROM Person.Phone_Number;

Results Explain Describe Saved SQL History
FK_MEMBER_ID PHONE_NUMBER
1 +201198320987
2 +020107090890
3 +201298797561
4 +201030112098
4 +201287680940
6 +201109180913
7 +201190987917
8 +201290829032
9 +201038991380
10 +201189742892
```

Oracle DBMS

Describe Purchase

The screenshot shows the Oracle SQL Developer interface. At the top, there are buttons for Autocommit (checked), Rows (set to 10), Save, and Run. Below the toolbar is a code editor window containing the SQL command: `DESCRIBE Purchase;`. Underneath the code editor is a navigation bar with tabs: Results, Explain, **Describe**, Saved SQL, and History. The main content area displays the results of the DESCRIBE command as a table:

Table	Column	Data Type	Length	Precision	Scale	Primary Key	Nullable	Default	Comment
PURCHASE	RECEIPT_NUMBER	VARCHAR2	15	-	-	1	-	-	-
	FK_BOOK_ID	NUMBER	22	-	0	-	✓	-	-
	FK_MEMBER_ID	NUMBER	22	-	0	-	✓	-	-

At the bottom right of the table, there is a note: `1 - 3`.

Select * from Purchase

The screenshot shows the Oracle SQL Developer interface. At the top, there are buttons for Autocommit (checked), Rows (set to 10), Save, and Run. Below the toolbar is a code editor window containing the SQL query: `SELECT * FROM Purchase ORDER BY Receipt_Number;`. Underneath the code editor is a navigation bar with tabs: Results, Explain, Describe, Saved SQL, and History. The main content area displays the results of the query as a table:

RECEIPT_NUMBER	FK_BOOK_ID	FK_MEMBER_ID
A2-111	111	1
A2-112	112	1
B1-116	115	4
B1-118	118	6
B2-120	117	5
C3-114	113	2
C4-115	114	3
D5-119	116	5
D7-118	119	7
F4-117	120	8

Oracle DBMS

Describe Borrow

```
Autocommit Rows 10 Save Run
DESCRIBE Borrow;

Results Explain Describe Saved SQL History
Object Type TABLE Object BORROW
Table Column Data Type Length Precision Scale Primary Key Nullable Default Comment
BORROW FK_MEMBER_ID NUMBER 22 - 0 1 - - -
          FK_BOOK_ID NUMBER 22 - 0 2 - - -
          DATE_OF_RETURN DATE 7 - - - ✓ - -
1 - 3
```

Select * from Borrow

```
Autocommit Rows 10 Save Run
SELECT * FROM Borrow
ORDER BY Date_of_Return;

Results Explain Describe Saved SQL History
FK_MEMBER_ID FK_BOOK_ID DATE_OF_RETURN
4           114          08/08/2013
8           118          01/08/2016
9           119          04/05/2016
7           117          05/07/2016
3           113          04/08/2020
2           112          03/01/2021
5           115          04/06/2021
6           116          09/08/2021
10          120          04/01/2022
1           111          04/02/2022
```

Oracle DBMS

Describe Sell

```
Autocommit Rows 10 Save Run
DESCRIBE Sell;

Results Explain Describe Saved SQL History
Object Type TABLE Object SELL
Table Column Data Type Length Precision Scale Primary Key Nullable Default Comment
SELL FK_BOOK_ID NUMBER 22 - 0 1 - - -
          FK_LIBRARIAN_ID NUMBER 22 - 0 2 - - -
          TARGET NUMBER - 10 5 - ✓ - -
1 - 3
```

Select * from Sell

```
Autocommit Rows 10 Save Run
SELECT * FROM Sell
ORDER BY Target DESC;

Results Explain Describe Saved SQL History
FK_BOOK_ID FK_LIBRARIAN_ID TARGET
119         8             3000
118         8             3000
115         5             2000
112         2             1500
114         4             1050
111         1             1000
113         3             900.55
120         9             850
117         7             800.95
116         6             790.75
```