

ONLINE BANKING SYSTEM

Final Project for Advanced Database Management System



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Topic Area	Description	Group Member	Weightage
Database Design	This part should include a logical database design (for the relational model), using normalization to control redundancy and integrity constraints for data quality.	Prasuna Challa	25%
Query Writing	This part is another chance to write SQL queries, explore transactions, and even do some database programming for stored procedures.	Mounica Pothureddy	25%
Performance Tuning	In this section, you can capitalize and extend your prior experiments with indexing, optimizer modes, partitioning, parallel execution and any other techniques you want to further explore.	Sree Krishnakanth Gurram	25%
Other Topics	Here you are free to explore any other topics of interest. Suggestions include DBA scripts, database security, interface design, data visualization, data mining, and NoSQL databases.	Manikantha Varaprasad Inakollu	25%

Summary

Online Banking System that we considered for the project would help the banking management to manage the customer profile with ease. Online banking is referred to as internet banking, e-banking, or virtual banking, It is an electronic payment system that enables clients of banks or other financial institutions to carry out a variety of financial transactions via the financial institution's website.

In contrast to branch banking, which was the conventional method through which clients received banking services, the online banking system will generally link to or be a component of the core banking system managed by a bank. A consumer with internet connection must register with the financial institution for the service, set up a password, and provide other credentials for customer verification before they may access the online banking platform of the institution.

Also, this design helps in careful analysis into comprehensive discussion on the database design for scaling this to multiple mobile banking apps. The database is designed in Oracle database. We have included all the essential data integrity constraints to ensure that data quality is up to standards.

We tried enhancing our database access performance using query optimization. In this process we have created indexes and data partitioning to enhance the time to access the data. For certain Functional requirements we have used stored procedures and they are precompiled to save the execution time. For Further enhancement, we can migrate the databased to Google Cloud, which will be easier to access based on the requirements.

Business Requirements and Rules

The online banking system application will be used by customers of bank to view their profile and to know about their monthly spends and credits that they are equipped with, also to update their personal information of updating the phone number, address. This application's usability and security are the important aspects to be considered. Also considering the security we have added an additional encryption feature for login.

While designing this application , We have considered the below business rules that should be implemented as the design part of the application:

- Customer should be able to apply for loan and get the status of the application. Also , they can look for the loan amount and the loan type they are eligible for.
- They should be able to apply for new credit card and track their spendings online.
- Historical data is maintained by making use of triggers, for internal audit purposes
- Regular point intime snapshots of Database are taken in the cloud environment to back up the entire database.

Assumptions

- This Online banking application can scaled to different banking and financial sectors keeping the common features as references.
- There are no social networking Features connected to this application.

Entity relationship diagram

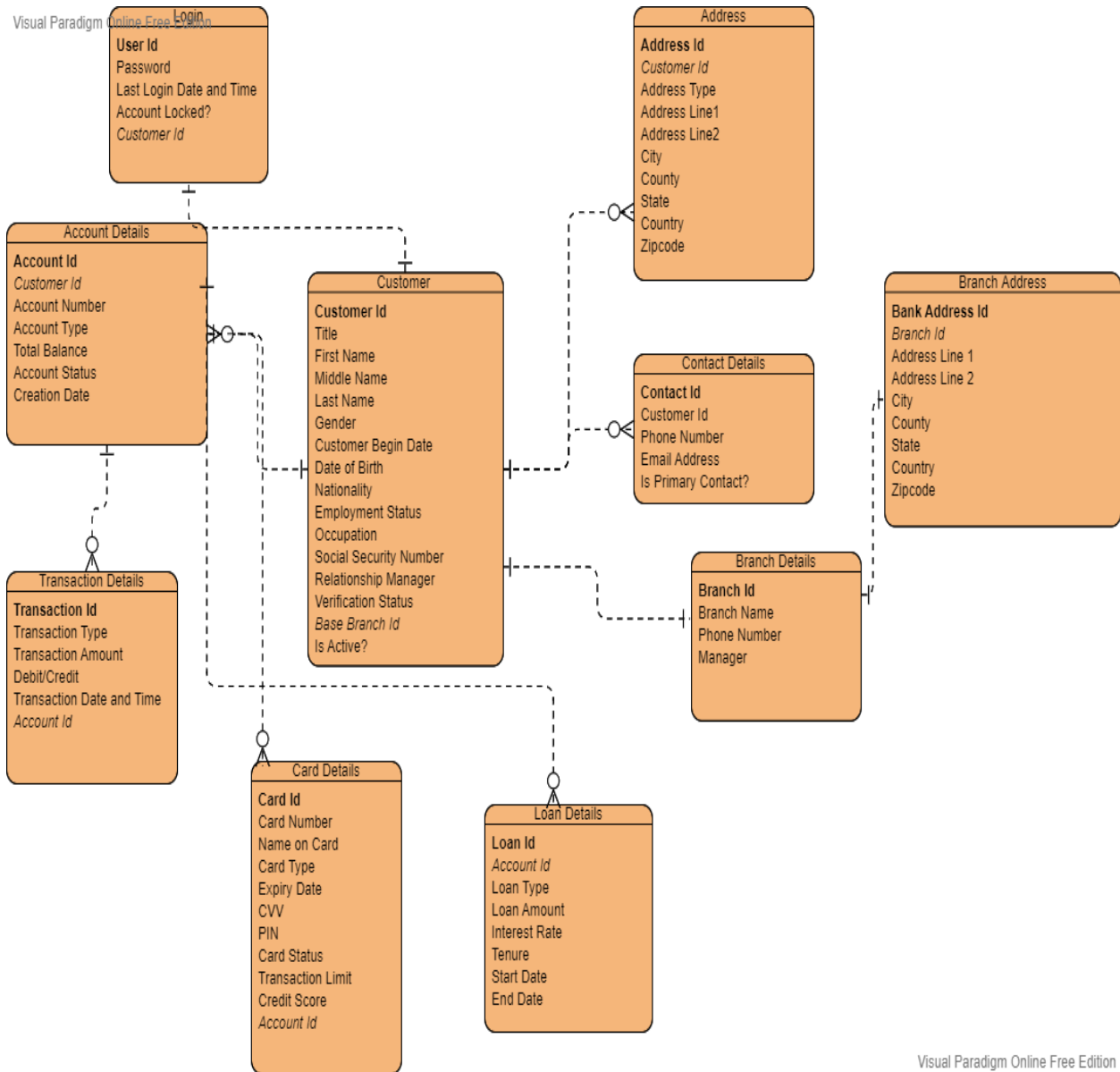
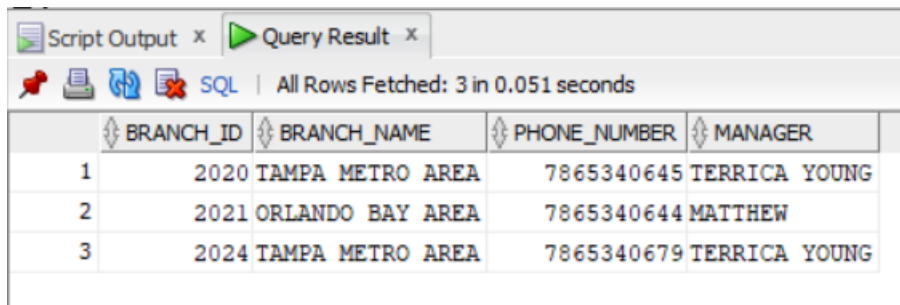


TABLE STRUCTURE

BRANCH_DETAILS

```
CREATE TABLE BRANCH_DETAILS(  
  BRANCH_ID NUMBER(10) PRIMARY KEY,  
  BRANCH_NAME VARCHAR2(100),  
  PHONE_NUMBER NUMBER(10),  
  MANAGER VARCHAR2(100)  
);
```

```
INSERT INTO BRANCH_DETAILS VALUES (2022, 'TAMPA BAY AREA',7865340643,'  
KRISTINA');  
INSERT INTO BRANCH_DETAILS VALUES(2021, 'ORLANDO BAY AREA',  
7865340644,'MATTHEW');  
INSERT INTO BRANCH_DETAILS VALUES(2024, 'TAMPA METRO  
AREA',7865340679,'TERRICA YOUNG');
```



The screenshot shows a SQL query result window with two tabs: 'Script Output' and 'Query Result'. The 'Query Result' tab is active, displaying the results of the INSERT statements. The window title is 'SQL | All Rows Fetched: 3 in 0.051 seconds'. The results are shown in a table with four columns: BRANCH_ID, BRANCH_NAME, PHONE_NUMBER, and MANAGER. The data is as follows:

	BRANCH_ID	BRANCH_NAME	PHONE_NUMBER	MANAGER
1	2020	TAMPA METRO AREA	7865340645	TERRICA YOUNG
2	2021	ORLANDO BAY AREA	7865340644	MATTHEW
3	2024	TAMPA METRO AREA	7865340679	TERRICA YOUNG

CUSTOMER

```
CREATE TABLE CUSTOMER(  
  CUSTOMER_ID NUMBER(10) PRIMARY KEY,  
  TITLE VARCHAR2(100),  
  FIRST_NAME VARCHAR2(100) NOT NULL,  
  MIDDLE_NAME VARCHAR2(100),  
  LAST_NAME VARCHAR2(100) NOT NULL,
```



```

GENDER VARCHAR2(100),
CUSTOMER_BEGIN_DATE DATE,
DATE_OF_BIRTH DATE,
NATIONALITY VARCHAR2(100),
EMPLOYMENT_STATUS VARCHAR2(100),
OCCUPATION VARCHAR2(100),
SSN VARCHAR2(100),
RELATIONSHIP_MANAGER VARCHAR2(100),
VARIFICATION_STATUS VARCHAR2(100),
BASE_BRANCHID NUMBER(10),
IS_ACTIVE CHAR,
FOREIGN KEY(BASE_BRANCHID) REFERENCES BRANCH_DETAILS(BRANCH_ID)
);

```

```

INSERT INTO
CUSTOMER(CUSTOMER_ID,TITLE,FIRST_NAME,MIDDLE_NAME,LAST_NAME,GENDER,C
USTOMER_BEGIN_DATE,DATE_OF_BIRTH,NATIONALITY,EMPLOYMENT_STATUS,OCCU
PATION,SSN,RELATIONSHIP_MANAGER,VARIFICATION_STATUS,BASE_BRANCHID,IS_A
CTIVE)
VALUES
(1000, 'Ms','Mounica',null,'Pothureddy','Female',TO_DATE('08-10-2022','mm-dd-
yyyy'),TO_DATE('09-05-1997','mm-dd-
yyyy'),'India','NO','STUDENT',1234567,'Henry','YES',2021,'Y');

```

```

INSERT INTO
CUSTOMER(CUSTOMER_ID,TITLE,FIRST_NAME,MIDDLE_NAME,LAST_NAME,GENDER,C
USTOMER_BEGIN_DATE,DATE_OF_BIRTH,NATIONALITY,EMPLOYMENT_STATUS,OCCU
PATION,SSN,RELATIONSHIP_MANAGER,VARIFICATION_STATUS,BASE_BRANCHID,IS_A
CTIVE)
VALUES(1003, 'Ms','Prasuna',null,'Reddy','Female',TO_DATE('08-11-2012','mm-dd-
yyyy'),TO_DATE('11-10-1997','mm-dd-
yyyy'),'India','NO','STUDENT',1234568,'Henry','YES',2021,'Y');

```

```

INSERT INTO
CUSTOMER(CUSTOMER_ID,TITLE,FIRST_NAME,MIDDLE_NAME,LAST_NAME,GENDER,C
USTOMER_BEGIN_DATE,DATE_OF_BIRTH,NATIONALITY,EMPLOYMENT_STATUS,OCCU
PATION,SSN,RELATIONSHIP_MANAGER,VARIFICATION_STATUS,BASE_BRANCHID,IS_A
CTIVE)

```

```
VALUES(1004, 'Mr','Srikanth',null,'Gurram','Male',TO_DATE('08-08-2022','mm-dd-yyyy'),  
TO_DATE('01-18-1996','mm-dd-yyyy'),'India',  
'NO','STUDENT',1235567,'Rachel','YES',2024,'Y');
```

```
INSERT INTO  
CUSTOMER(CUSTOMER_ID,TITLE,FIRST_NAME,MIDDLE_NAME,LAST_NAME,GENDER,C  
USTOMER_BEGIN_DATE,DATE_OF_BIRTH,NATIONALITY,EMPLOYMENT_STATUS,OCCU  
PATION,SSN,RELATIONSHIP_MANAGER,VARIFICATION_STATUS,BASE_BRANCHID,IS_A  
CTIVE)  
VALUES(2050, 'Mr','Charlie','Francis','Xavier', 'Male',TO_DATE('08-10-1995','mm-dd-yyyy'),  
TO_DATE('11-02-1986','mm-dd-  
yyyy'),'America','YES','ACTOR',1254567,'GRACY','YES',2021,'Y');
```

```
INSERT INTO  
CUSTOMER(CUSTOMER_ID,TITLE,FIRST_NAME,MIDDLE_NAME,LAST_NAME,GENDER,C  
USTOMER_BEGIN_DATE,DATE_OF_BIRTH,NATIONALITY,EMPLOYMENT_STATUS,OCCU  
PATION,SSN,RELATIONSHIP_MANAGER,VARIFICATION_STATUS,BASE_BRANCHID,IS_A  
CTIVE)  
VALUES(2051, 'Ms','Phobe',null,'Buffay','Female',TO_DATE('08-10-2001','mm-dd-  
yyyy'),TO_DATE('11-05-1986','mm-dd-yyyy'),'ENGLAND',  
'YES','CONSULTANT',1134567,'SHELDON','YES',2021,'Y');
```

```
INSERT INTO  
CUSTOMER(CUSTOMER_ID,TITLE,FIRST_NAME,MIDDLE_NAME,LAST_NAME,GENDER,C  
USTOMER_BEGIN_DATE,DATE_OF_BIRTH,NATIONALITY,EMPLOYMENT_STATUS,OCCU  
PATION,SSN,RELATIONSHIP_MANAGER,VARIFICATION_STATUS,BASE_BRANCHID,IS_A  
CTIVE)  
VALUES(1050, 'MR','Howard',null,'WOLOWITZ','MALE',TO_DATE('08-10-2002','mm-dd-yyyy'),  
TO_DATE('11-05-1990','mm-dd-yyyy'),'ISREAL',  
'YES','SCIENTIST',128567,'RACHEL','YES',2024,'Y');
```

```
INSERT INTO  
CUSTOMER(CUSTOMER_ID,TITLE,FIRST_NAME,MIDDLE_NAME,LAST_NAME,GENDER,C  
USTOMER_BEGIN_DATE,DATE_OF_BIRTH,NATIONALITY,EMPLOYMENT_STATUS,OCCU  
PATION,SSN,RELATIONSHIP_MANAGER,VARIFICATION_STATUS,BASE_BRANCHID,IS_A  
CTIVE)  
VALUES(1051, 'Ms','AMY','FARRAH', 'FOWLER','Female',TO_DATE('08-10-2000','mm-dd-  
yyyy'), TO_DATE('11-05-1997','mm-dd-yyyy'),'AMERICA',  
'YES','ENGINEER',1134567,'Henry','YES',2020,'Y');
```

```
INSERT INTO  
CUSTOMER(CUSTOMER_ID,TITLE,FIRST_NAME,MIDDLE_NAME,LAST_NAME,GENDER,C  
USTOMER_BEGIN_DATE,DATE_OF_BIRTH,NATIONALITY,EMPLOYMENT_STATUS,OCCU  
PATION,SSN,RELATIONSHIP_MANAGER,VARIFICATION_STATUS,BASE_BRANCHID,IS_A  
CTIVE)  
VALUES(1030, 'MR','RAJESH',null,'KOOTHRAPALLI','MALE',TO_DATE('08-01-2022','mm-dd-  
yyyy'), TO_DATE('11-05-1997','mm-dd-yyyy'),'ITALY',  
'YES','REALTOR',2234567,'WILLIAM','YES',2024,'Y');
```

```

INSERT INTO
CUSTOMER(CUSTOMER_ID,TITLE,FIRST_NAME,MIDDLE_NAME,LAST_NAME,GENDER,C
USTOMER_BEGIN_DATE,DATE_OF_BIRTH,NATIONALITY,EMPLOYMENT_STATUS,OCCU
PATION,SSN,RELATIONSHIP_MANAGER,VARIFICATION_STATUS,BASE_BRANCHID,IS_A
CTIVE)
VALUES(3050, 'Ms','KAYLEY',null,'CUCUO','Female',TO_DATE('08-10-2012','mm-dd-yyyy'),
TO_DATE('11-05-1990','mm-dd-yyyy'),'MEXICO',
'NO','STUDENT',1236567,'SHELDON','YES',2021,'Y');

```

```

INSERT INTO
CUSTOMER(CUSTOMER_ID,TITLE,FIRST_NAME,MIDDLE_NAME,LAST_NAME,GENDER,C
USTOMER_BEGIN_DATE,DATE_OF_BIRTH,NATIONALITY,EMPLOYMENT_STATUS,OCCU
PATION,SSN,RELATIONSHIP_MANAGER,VARIFICATION_STATUS,BASE_BRANCHID,IS_A
CTIVE)
VALUES(3071, 'MR','LEONARD',null,'HOFFSTADDER','MALE',TO_DATE('08-10-2005','mm-dd-
yyyy'), TO_DATE('11-05-1989','mm-dd-yyyy'),'GERMANY',
'YES','ARCHITECT',1244568,'WILLIAM','YES',2024,'Y');

```

CUSTOMER_ID	TITLE	FIRST_NAME	MIDDLE_NAME	LAST_NAME	GENDER	CUSTOMER_BEGIN_DATE	DATE_OF_BIRTH	NATIONALITY	EMPLOYMENT_STATUS	OCCUPATION	SSN	RELATIONSHIP_MANAGER	VARIFICATION_STATUS	BASE_BRANCHID	IS_ACTIVE
1000	Ms	Mounica	(null)	Pothureddy	Female	10-AUG-22	05-SEP-97	India	NO	STUDENT	1234567	Henry	YES		2021Y
1003	Ms	Prasuna	(null)	Reddy	Female	11-AUG-12	10-NOV-97	India	NO	STUDENT	1234568	Henry	YES		2021Y
1004	Mr	Srikanth	(null)	Gurram	Male	08-AUG-22	18-JAN-96	India	NO	STUDENT	1235567	Rachel	YES		2024Y
2050	Mr	Charlie	Francis	Xavier	Male	10-AUG-95	02-NOV-86	America	YES	ACTOR	1254567	GRACY	YES		2021Y
2051	Ms	Phobe	(null)	Buffay	Female	10-AUG-01	05-NOV-86	ENGLAND	YES	CONSULTANT	1134567	SHELDON	YES		2021Y
1050MR	Howard	(null)	WOLOWITZ	MALE	10-AUG-02	05-NOV-90	ISREAL	YES	SCIENTIST	128567	RACHEL	YES	YES		2024Y
1051Ms	AMY	FARRAH	POWLER	Female	10-AUG-00	05-NOV-97	AMERICA	YES	ENGINEER	1134567	Henry	YES	YES		2020Y
1030MR	RAJESH	(null)	KOOTHRAFULLI	MALE	01-AUG-22	05-NOV-97	ITALY	YES	REALTOR	2234567	WILLIAM	YES	YES		2024Y
3050Ms	KAYLEY	(null)	CUCUO	Female	10-AUG-12	05-NOV-90	MEXICO	NO	STUDENT	1236567	SHELDON	YES	YES		2021Y
3071MR	LEONARD	(null)	HOFFSTADDER	MALE	10-AUG-05	05-NOV-89	GERMANY	YES	ARCHITECT	1244568	WILLIAM	YES	YES		2024Y

ADDRESS

```

CREATE TABLE ADDRESS(
ADDRESS_ID NUMBER(10) NOT NULL,
CUSTOMER_ID NUMBER(10) NOT NULL,
ADDRESS_TYPE VARCHAR2(100),
ADDRESS_LINE1 VARCHAR2(100),
ADDRESS_LINE2 VARCHAR2(100),
CITY VARCHAR2(100),
COUNTY VARCHAR2(100),
STATE VARCHAR2(100),

```

```

COUNTRY VARCHAR2(100),
ZIPCODE NUMBER(10),
FOREIGN KEY(CUSTOMER_ID) REFERENCES CUSTOMER(CUSTOMER_ID)
);

```

```

insert into address values(102,1003,'RESIDENTIAL','7820 CLUB CITY', 'APT 301',
'ST.PETERSBURG','ORANGE','TEXAS','AMERICA',53612)

```

```

insert into address values(101,1004,'RESIDENTIAL','9921 TEMPLE DR', 'APT 512',
'ASHBURN','MIAMI-DADE','GEORGIA','AMERICA',20147)

```

```

insert into address values(103,2050,'RESIDENTIAL','8714 COUNTY DR', 'APT 301',
'CHARLOTTE','BREVARD','VIRGINIA','AMERICA',20145)

```

```

insert into address values(101,2051,'RESIDENTIAL','12814 COUNTRY DR', 'APT 421',
'BOSTON','PALM BEACH','NORTH CAROLINA','AMERICA',33745)

```

```

insert into address values(104,1050,'RESIDENTIAL','41821 VARSITY DR', 'APT 502',
'NEWYORK','HAMILTON','NEW JERSEY','AMERICA',50729)

```

```

insert into address values(105,1051,'RESIDENTIAL','2321 FLETCHER DR', 'APT 212', 'LAS
VEGAS','PINELLAS','NEVADA','AMERICA',70653)

```

```

insert into address values(106,1030,'RESIDENTIAL','20062 SADDLE DR', 'APT 222',
'AUSTIN','HENDRY','ARIZONA','AMERICA',33512)

```

```

insert into address values(107,3050,'RESIDENTIAL','30061 CAMBRIDGE DR', 'APT 502',
'HOUSTON','LAKE','KANSAS','AMERICA',98731)

```

```

insert into address values(108,3071,'RESIDENTIAL','43120 LAKE VIEW', 'APT 765',
'DALLAS','GLADES','SOUTH CAROLINA','AMERICA',21047)

```

	ADDRESS_ID	CUSTOMER_ID	ADDRESS_TYPE	ADDRESS_LINE1	ADDRESS_LINE2	CITY	COUNTY	STATE	COUNTRY	ZIPCODE
1	101	1000	RESIDENTIAL	7819 CLUB DR	APT 202	TAMPA	HILSBOROUGH	FLORIDA	AMERICA	33612
2	102	1003	RESIDENTIAL	7820 CLUB CITY	APT 301	ST.PETERSBURG	ORANGE	TEXAS	AMERICA	53612
3	101	1004	RESIDENTIAL	9921 TEMPLE DR	APT 512	ASHBURN	MIAMI-DADE	GEORGIA	AMERICA	20147
4	103	2050	RESIDENTIAL	8714 COUNTY DR	APT 301	CHARLOTTE	BREVARD	VIRGINIA	AMERICA	20145
5	101	2051	RESIDENTIAL	12814 COUNTRY DR	APT 421	BOSTON	PALM BEACH	NORTH CAROLINA	AMERICA	33745
6	104	1050	RESIDENTIAL	41821 VARSITY DR	APT 502	NEWYORK	HAMILTON	NEW JERSEY	AMERICA	50729
7	105	1051	RESIDENTIAL	2321 FLETCHER DR	APT 212	LAS VEGAS	PINELLAS	NEVADA	AMERICA	70653
8	106	1030	RESIDENTIAL	20062 SADDLE DR	APT 222	AUSTIN	HENDRY	ARIZONA	AMERICA	33512
9	107	3050	RESIDENTIAL	30061 CAMBRIDGE DR	APT 502	HOUSTON	LAKE	KANSAS	AMERICA	98731
10	108	3071	RESIDENTIAL	43120 LAKE VIEW	APT 765	DALLAS	GLADES	SOUTH CAROLINA	AMERICA	21047

CONTACT_DETAILS

```
CREATE TABLE CONTACT_DETAILS(  
CONTACT_ID NUMBER(10),  
CUSTOMER_ID NUMBER(10) NOT NULL,  
PHONE_NUMBER NUMBER(10),  
EMAIL_ADDRESS VARCHAR2(100),  
IS_PRIMARY_CONTACT CHAR,  
FOREIGN KEY(CUSTOMER_ID) REFERENCES CUSTOMER(CUSTOMER_ID)  
);
```

```
insert into contact_details values(100,1000,9000885561,'mounica@gmail.com','Y');  
insert into contact_details values(101,1003,7799800515,'prasuna@gmail.com','Y');  
insert into contact_details values(102,1004,9949907437,'srikanth@gmail.com','Y');  
insert into contact_details values(103,2050,9848022331,'charlie@gmail.com','Y');  
insert into contact_details values(104,2051,9899123456,'buffay@gmail.com','Y');  
insert into contact_details values(105,1050,9763451234,'wolowitz@gmail.com','Y');  
insert into contact_details values(106,1051,9456781234,'fowlers@gmail.com','Y');  
insert into contact_details values(107,1030,9008885561,'rajs@gmail.com','Y');  
insert into contact_details values(108,3050,9000088551,'kayley@gmail.com','Y');  
insert into contact_details values(109,3071,9949988561,'leonard@gmail.com','Y');
```

	CONTACT_ID	CUSTOMER_ID	PHONE_NUMBER	EMAIL_ADDRESS	IS_PRIMARY_CONTACT
1	100	1000	9000885561	mounica@gmail.com	Y
2	101	1003	7799800515	prasuna@gmail.com	Y
3	102	1004	9949907437	srikanth@gmail.com	Y
4	103	2050	9848022331	charlie@gmail.com	Y
5	104	2051	9899123456	buffay@gmail.com	Y
6	105	1050	9763451234	wolowitz@gmail.com	Y
7	106	1051	9456781234	fowlers@gmail.com	Y
8	107	1030	9008885561	rajs@gmail.com	Y
9	108	3050	9000088551	kayley@gmail.com	Y
10	109	3071	9949988561	leonard@gmail.com	Y

BRANCH_ADDRESS

```
CREATE TABLE BRANCH_ADDRESS(  
  BRANCH_ADDRESSSID NUMBER(10),  
  BRANCH_ID NUMBER(10),  
  ADDRESS_LINE1 VARCHAR2(100),  
  ADDRESS_LINE2 VARCHAR2(100),  
  CITY VARCHAR2(100),  
  COUNTY VARCHAR2(100),  
  STATE VARCHAR2(100),  
  COUNTRY VARCHAR2(100),  
  ZIPCODE NUMBER(10),  
  FOREIGN KEY(BRANCH_ID) REFERENCES BRANCH_DETAILS(BRANCH_ID)  
);
```

```
insert into branch_address values(800,2020,'33612 FLETCHER AVENUE','SUITE  
2212','TAMPA','HILSBOROUGH','FLORIDA','AMERICA',33612)
```

```
insert into branch_address values(801,2024,'20147 FOWLER DR','SUITE 1005','MIAMI','MIAMI-  
DADE','FLORIDA','AMERICA',20147)
```

```
insert into branch_address values(802,2021,'33612 TEMPLE TERRACE','SUITE  
5002','ORLANDO','LAKE','FLORIDA','AMERICA',10035)
```

	BRANCH_ADDRESSSID	BRANCH_ID	ADDRESS_LINE1	ADDRESS_LINE2	CITY	COUNTY	STATE	COUNTRY	ZIPCODE
1	800	2020	33612 FLETCHER AVENUE	SUITE 2212	TAMPA	HILSBOROUGH	FLORIDA	AMERICA	33612
2	801	2024	20147 FOWLER DR	SUITE 1005	MIAMI	MIAMI-DADE	FLORIDA	AMERICA	20147
3	802	2021	33612 TEMPLE TERRACE	SUITE 5002	ORLANDO	LAKE	FLORIDA	AMERICA	10035

ACCOUNT_DETAILS

```
CREATE TABLE ACCOUNT_DETAILS(  
  ACCOUNT_ID NUMBER(10) PRIMARY KEY,  
  CUSTOMER_ID NUMBER(10),  
  ACCOUNT_NUMBER NUMBER(10),  
  TOTAL_BALANCE FLOAT,  
  ACCOUNT_STATUS CHAR,  
  CREATION_DATE DATE,  
  FOREIGN KEY(CUSTOMER_ID) REFERENCES CUSTOMER(CUSTOMER_ID)  
);
```

```
insert into account_details values(20021,1000,33689767,10000.0,'C',TO_DATE('08-10-2022','mm-dd-yyyy'));
```

```
insert into account_details values(20022,1003,33689768,15000,'S',TO_DATE('08-11-2012','mm-dd-yyyy'));
```

```
insert into account_details values(20023,1004,33689769,22301,'S',TO_DATE('08-08-2022','mm-dd-yyyy'));
```

```
insert into account_details values(20024,2050,33689770,15001,'C',TO_DATE('08-10-1995','mm-dd-yyyy'));
```

```
insert into account_details values(20025,2051,33689771,2002,'C', TO_DATE('08-11-2012','mm-dd-yyyy'));
```

```
insert into account_details values(20026,1050,33689772,17501,'C', TO_DATE('08-10-2002','mm-dd-yyyy'));
```

```
insert into account_details values(20027,1051,33689773,10052,'S',TO_DATE('08-10-2000','mm-dd-yyyy'));
```

```
insert into account_details values(20028,1030,33689774,12345,'S',TO_DATE('08-01-2022','mm-dd-yyyy'));
```

```
insert into account_details values(20029,3050,33689775,10100,'C',TO_DATE('08-10-2022','mm-dd-yyyy'));
```

```
insert into account_details values(20030,3071,33689776,7732,'S',TO_DATE('08-11-2012','mm-dd-yyyy'));
```

	ACCOUNT_ID	CUSTOMER_ID	ACCOUNT_NUMBER	TOTAL_BALANCE	ACCOUNT_STATUS	CREATION_DATE
1	20021	1000	33689767	10000	C	10-AUG-22
2	20022	1003	33689768	15000	S	11-AUG-12
3	20023	1004	33689769	22301	S	08-AUG-22
4	20024	2050	33689770	15001	C	10-AUG-95
5	20025	2051	33689771	2002	C	11-AUG-12
6	20026	1050	33689772	17501	C	10-AUG-02
7	20027	1051	33689773	10052	S	10-AUG-00
8	20028	1030	33689774	12345	S	01-AUG-22
9	20029	3050	33689775	10100	C	10-AUG-22
10	20030	3071	33689776	7732	S	11-AUG-12

LOGIN_DETAILS

```
CREATE TABLE LOGIN_DETAILS(
USER_ID NUMBER(10) NOT NULL,
PASSWORD VARCHAR2(100) NOT NULL,
LAST_LOGIN_DATE_TIME TIMESTAMP,
ACCOUNT_LOCKED VARCHAR2(100),
CUSTOMER_ID NUMBER(10) NOT NULL,
CONSTRAINT FK_ID FOREIGN KEY(CUSTOMER_ID) REFERENCES
CUSTOMER(CUSTOMER_ID)
);
```

```
insert into login_details values(3030123,'Aforapple1',TO_DATE('2020-09-11 8:35:10','YYYY-MM-DD HH:MI:SS'),'NO',1000);
insert into login_details values(3030124,'Bforball2',TO_DATE('2022-01-11 1:23:00','YYYY-MM-DD HH:MI:SS'),'NO',1003);
insert into login_details values(3030125,'Cforcat3',TO_DATE('2021-09-11 12:34:56','YYYY-MM-DD HH:MI:SS'),'NO',1004);
```

```
insert into login_details values(3030126,'Dfordog4',TO_DATE('2022-09-11 10:34:57','YYYY-MM-DD HH:MI:SS'),'NO',2050);
insert into login_details values(3030127,'Eforegg@5',TO_DATE('2022-08-11 3:38:27','YYYY-MM-DD HH:MI:SS'),'NO',2051);
```



```

insert into login_details values(3030128,'Fforfigs6',TO_DATE('2022-07-11 11:59:21','YYYY-MM-DD HH:MI:SS'),'NO',1050);
insert into login_details values(3030129,'Gforgunther7',TO_DATE('2020-12-11 10:45:39','YYYY-MM-DD HH:MI:SS'),'NO',1051);
insert into login_details values(3030130,'Hforhippo@8',TO_DATE('2021-01-11 12:38:19','YYYY-MM-DD HH:MI:SS'),'NO',1030);
insert into login_details values(3030131,'Iforinkbottle9',TO_DATE('2020-09-11 10:08:10','YYYY-MM-DD HH:MI:SS'),'NO',3050);
insert into login_details values(3030132,'Hforhathi10',TO_DATE('2022-05-11 10:20:10','YYYY-MM-DD HH:MI:SS'),'NO',3071);

```

	USER_ID	PASSWORD	LAST_LOGIN_DATE_TIME	ACCOUNT_LOCKED	CUSTOMER_ID
1	3030123	Aforapple1	11-SEP-20 08.35.10.0000000000 AM NO		1000
2	3030124	Bforball12	11-JAN-22 01.23.00.0000000000 AM NO		1003
3	3030125	Cforcat3	11-SEP-21 12.34.56.0000000000 PM NO		1004
4	3030126	Dfordog4	11-SEP-22 10.34.57.0000000000 AM NO		2050
5	3030127	Eforegg@5	11-AUG-22 03.38.27.0000000000 AM NO		2051
6	3030129	Gforgunther7	11-DEC-20 10.45.39.0000000000 AM NO		1051
7	3030130	Hforhippo@8	11-JAN-21 12.38.19.0000000000 PM NO		1030
8	3030131	Iforinkbottle9	11-SEP-20 10.08.10.0000000000 AM NO		3050
9	3030132	Hforhathi10	11-MAY-22 10.20.10.0000000000 AM NO		3071
10	3030128	Fforfigs6	11-JUL-22 11.59.21.0000000000 AM NO		1050

CARD_DETAILS

```

Create table CARD_DETAILS(
CARD_ID NUMBER(10),
CARD_NUMBER NUMBER(10),
NAME_ON_CARD VARCHAR2(100),
CARD_TYPE VARCHAR2(100),
EXPIRY_DATE DATE,
CVV NUMBER(10),
PIN NUMBER(10),
CARD_STATUS VARCHAR2(100),
TRANSACTION_LIMIT FLOAT,
CREDIT_SCORE FLOAT,
ACCOUNT_ID NUMBER(10) NOT NULL,

```

FOREIGN KEY(ACCOUNT_ID) REFERENCES ACCOUNT_DETAILS(ACCOUNT_ID)

);

```

insert into card_details values(9001,100060000,'MOUNICA','DEBIT',TO_DATE('2030-10-01','yyyy-mm-dd'),043,1234,'ACTIVE',5000,730,20021);
insert into card_details values(9002,100060001,'PRASUNA','DEBIT',TO_DATE('2024-10-01','yyyy-mm-dd'),143,4321,'ACTIVE',2500,745,20022);
insert into card_details values(9003,100060002,'SRIKANTH','DEBIT',TO_DATE('2025-10-01','yyyy-mm-dd'),723,8989,'ACTIVE',1500,800,20023);
insert into card_details values(9004,100060003,'CHARLIE','DEBIT',TO_DATE('2027-10-01','yyyy-mm-dd'),432,2020,'ACTIVE',2500,838,20024);
insert into card_details values(9005,100060004,'PHOBE','DEBIT',TO_DATE('2024-10-01','yyyy-mm-dd'),987,9071,'ACTIVE',5000,757,20025);
insert into card_details values(9006,100060005,'HOWARD','DEBIT',TO_DATE('2025-10-01','yyyy-mm-dd'),234,1823,'ACTIVE',3000,677,20026);
insert into card_details values(9007,100060006,'AMY','DEBIT',TO_DATE('2027-10-01','yyyy-mm-dd'),763,1997,'ACTIVE',3500,848,20027);
insert into card_details values(9008,100060007,'RAJESH','DEBIT',TO_DATE('2029-10-01','yyyy-mm-dd'),044,7865,'ACTIVE',5000,770,20028);
insert into card_details values(9009,100060008,'KAYLEY','DEBIT',TO_DATE('2028-10-01','yyyy-mm-dd'),789,6875,'ACTIVE',5000,780,20029);
insert into card_details values(9010,100060009,'LEONARD','DEBIT',TO_DATE('2023-10-01','yyyy-mm-dd'),356,9023,'ACTIVE',1000,802,20030);

```

	CARD_ID	CARD_NUMBER	NAME_ON_CARD	CARD_TYPE	EXPIRY_DATE	CVV	PIN	CARD_STATUS	TRANSACTION_LIMIT	CREDIT_SCORE	ACCOUNT_ID
1	9001	100060000	MOUNICA	DEBIT	01-OCT-30	43	1234	ACTIVE	5000	730	20021
2	9002	100060001	PRASUNA	DEBIT	01-OCT-24	143	4321	ACTIVE	2500	745	20022
3	9003	100060002	SRIKANTH	DEBIT	01-OCT-25	723	8989	ACTIVE	1500	800	20023
4	9004	100060003	CHARLIE	DEBIT	01-OCT-27	432	2020	ACTIVE	2500	838	20024
5	9005	100060004	PHOBE	DEBIT	01-OCT-24	987	9071	ACTIVE	5000	757	20025
6	9006	100060005	HOWARD	DEBIT	01-OCT-25	234	1823	ACTIVE	3000	677	20026
7	9007	100060006	AMY	DEBIT	01-OCT-27	763	1997	ACTIVE	3500	848	20027
8	9008	100060007	RAJESH	DEBIT	01-OCT-29	44	7865	ACTIVE	5000	770	20028
9	9009	100060008	KAYLEY	DEBIT	01-OCT-28	789	6875	ACTIVE	5000	780	20029
10	9010	100060009	LEONARD	DEBIT	01-OCT-23	356	9023	ACTIVE	1000	802	20030

LOAN_DETAILS

```

CREATE TABLE LOAN_DETAILS(
LOAN_ID NUMBER(10) NOT NULL,
ACCOUNT_ID NUMBER(10) NOT NULL,
LOAN_TYPE VARCHAR2(100),
LOAN_AMOUNT FLOAT,
INTEREST_RATE FLOAT,

```

```

TENURE NUMBER(10),
START_DATE DATE,
END_DATE DATE,
FOREIGN KEY(ACCOUNT_ID) REFERENCES ACCOUNT_DETAILS(ACCOUNT_ID)
);

```

```

insert into loan_details values(7050,20021,'HOME',55000,3.5,10,TO_DATE('2022-10-10','yyyy-mm-dd'),TO_DATE('2032-10-09','yyyy-mm-dd'));

```

```

insert into loan_details values(7051,20022,'PERSONAL',15000,5.75,3,TO_DATE('2020-10-10','yyyy-mm-dd'),TO_DATE('2023-10-09','yyyy-mm-dd'));

```

```

insert into loan_details values(7052,20023,'EDUCATIONAL',35000,3.5,10,TO_DATE('2022-10-10','yyyy-mm-dd'),TO_DATE('2032-10-09','yyyy-mm-dd'));

```

```

insert into loan_details values(7053,20024,'HOME',65000,4,15,TO_DATE('2021-10-10','yyyy-mm-dd'),TO_DATE('2036-10-09','yyyy-mm-dd'));

```

```

insert into loan_details values(7054,20025,'PERSONAL',25000,3.5,5,TO_DATE('2020-10-10','yyyy-mm-dd'),TO_DATE('2035-10-09','yyyy-mm-dd'));

```

	LOAN_ID	ACCOUNT_ID	LOAN_TYPE	LOAN_AMOUNT	INTEREST_RATE	TENURE	START_DATE	END_DATE
1	7050	20021	HOME	55000	3.5	10	10-OCT-22	09-OCT-32
2	7051	20022	PERSONAL	15000	5.75	3	10-OCT-20	09-OCT-23
3	7052	20023	EDUCATIONAL	35000	3.5	10	10-OCT-22	09-OCT-32
4	7053	20024	HOME	65000	4	15	10-OCT-21	09-OCT-36
5	7054	20025	PERSONAL	25000	3.5	5	10-OCT-20	09-OCT-35

TRANSACTION_DETAILS

```

CREATE TABLE TRANSACTION_DETAILS(
TRANSACTION_ID NUMBER(10),
TRANSACTION_TYPE VARCHAR2(100),
TRANSACTION_AMOUNT FLOAT,
TRANSACTION_TIME_DATE TIMESTAMP,
ACCOUNT_ID NUMBER(10),
FOREIGN KEY(ACCOUNT_ID) REFERENCES ACCOUNT_DETAILS(ACCOUNT_ID)

```

);

insert into transaction_details values(5000,'CREDIT',500,TO_DATE('2022-01-01','yyyy-mm-dd'),20021);

insert into transaction_details values(5001,'DEBIT',250,TO_DATE('2021-01-01','yyyy-mm-dd'),20022);

insert into transaction_details values(5002,'DEBIT',2000,TO_DATE('2022-05-06','yyyy-mm-dd'),20026);

insert into transaction_details values(5003,'CREDIT',1000,TO_DATE('2022-01-01','yyyy-mm-dd'),20029);

insert into transaction_details values(5004,'DEBIT',23.75,TO_DATE('2020-11-02','yyyy-mm-dd'),20030);

insert into transaction_details values(5005,'CREDIT',225,TO_DATE('2002-01-01','yyyy-mm-dd'),20025);

insert into transaction_details values(5006,'DEBIT',1356,TO_DATE('2021-11-10','yyyy-mm-dd'),20026);

insert into transaction_details values(5007,'CREDIT',2100,TO_DATE('2021-09-09','yyyy-mm-dd'),20029);

	TRANSACTION_ID	TRANSACTION_TYPE	TRANSACTION_AMOUNT	TRANSACTION_TIME_DATE	ACCOUNT_ID
1	5000	CREDIT	500	01-JAN-22 12.00.00.0000000000 AM	20021
2	5001	DEBIT	250	01-JAN-21 12.00.00.0000000000 AM	20022
3	5002	DEBIT	2000	06-MAY-22 12.00.00.0000000000 AM	20026
4	5003	CREDIT	1000	01-JAN-22 12.00.00.0000000000 AM	20029
5	5004	DEBIT	23.75	02-NOV-20 12.00.00.0000000000 AM	20030
6	5005	CREDIT	225	01-JAN-02 12.00.00.0000000000 AM	20025
7	5006	DEBIT	1356	10-NOV-21 12.00.00.0000000000 AM	20026
8	5007	CREDIT	2100	09-SEP-21 12.00.00.0000000000 AM	20029

CONSTRAINTS

The table used here are Customer, Login, Account_Details, Transaction_Details, Card_Details, Loan_Details, Address , Contact_Details, Branch_Details, Branch_Address.

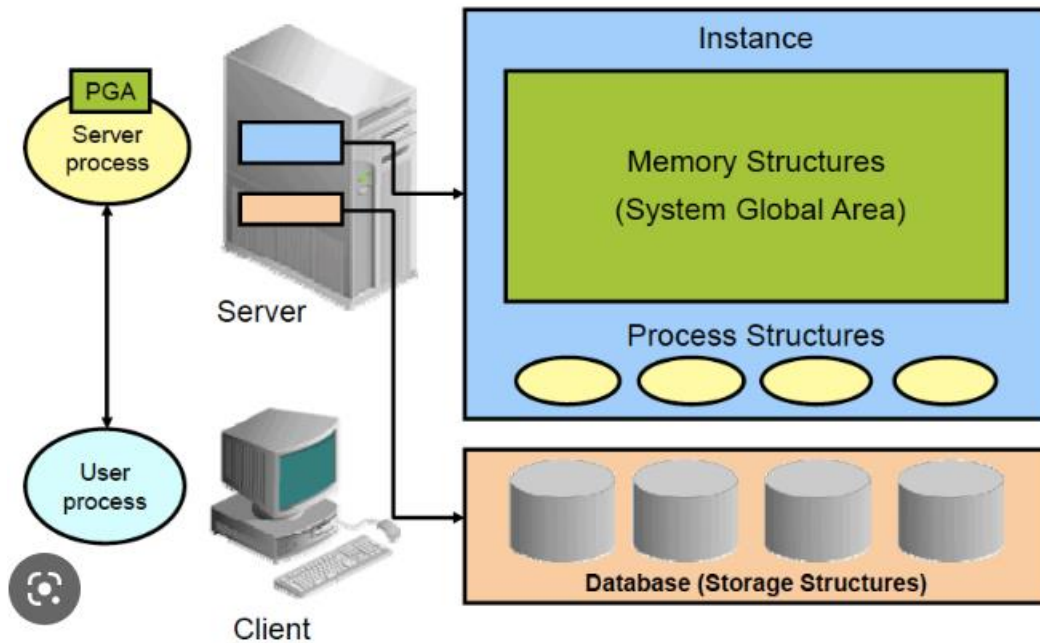
Customer table holds the data of all the customer information, also which is expected to get updated frequently regarding their profile. Reference schema contains master data for employees as quick and easy reference for things. Role Schema has reference data for business roles. Hist Schema maintains historical records of the employees.

Here we used customer_id as the primary key identifier and additionally follows by basic details like Title, First_Name, Middle_Name, Last_Name, Gender, Customer_Begin_Date, Date_of_birth, Nationality, Employment_Status, Occupation, SocialSecurityNumber, RelationshipManager, VerificationStatus, BaseBranchId, IsActive. This table also has 2 foreign keys that references Branchdetails table which is Branch_Id and Address details

Also , we have another table Login which stores the customer login information to avoid brute force attacks by limiting the login attempts, if anything suspicious is found the customer will be locked and would not be able to have login attempt for next 24 hrs. This table has fields like User id, password, Last Login Date and Timestamp, Account Locked?, Customer Id. Here the password is also saved in encrypted format and this table has foreign key from customers table which is customer id.

We also have card details table to store cardid, cardnumber, Name on card, cardtype, expirydate, cvv, pin, cardstatus, Transaction limit, creditscore, Account Id which is a foreign key attribute. Here the pin is also stored in encrypted format.

DATABASE ARCHITECTURE



INDEXING

An index is a schema object that enables quick, direct access to rows by storing entries for each value that appears in the table or cluster's indexed columns.

Without Index:

Created a table (Branch_deatils_withoutindex) with no index. Observed full scan and consistent values on the query

```
Select * from BRANCH_DETAILS_WITHOUTINDEX where BRANCH_ID IN (2022,2021);
```

```

CREATE TABLE BRANCH_DETAILS_WITHOUTINDEX(
  BRANCH_ID NUMBER(10),
  BRANCH_NAME VARCHAR2(100),
  PHONE_NUMBER NUMBER(10),
  MANAGER VARCHAR2(100)
);
SELECT * FROM BRANCH_DETAILS_WITHOUTINDEX WHERE BRANCH_ID IN (2022,2021);

```

Query Result x | Script Output x | Autotrace x | Query Result 1 x | Autotrace 1 x

SQL HotSpot | 1.556 seconds

OPERATION	OBJECT_NAME	OPTIONS	CARDINALITY	COST
SELECT STATEMENT				
TABLE ACCESS	BRANCH_DETAILS_WITHOUTINDEX	FULL		1

Filter Predicates

OR

BRANCH_ID=2021

BRANCH_ID=2022

Other XML

{info}

info type="db version"

V\$STATNAME Name	V\$MYSTAT Value
buffer is not pinned count	16
bytes received via SQL*Net from client	2264
bytes sent via SQL*Net to client	51380
calls to get snapshot scn: kcmgss	19
calls to kcmgcs	6
cluster key scan block gets	3
cluster key scans	3
consistent gets	37
consistent gets examination	18
consistent gets examination (fastpath)	18
consistent gets from cache	37
consistent gets pin	19
consistent gets pin (fastpath)	19
CPU used by this session	3

WITH INDEX:

Created a table with index on Branch_ID on BRANCH_DEATILS_WITHINDEX. Observed range scan and consistent values on the query.

SQL Developer interface showing the execution of a query and its execution plan.

```

CREATE TABLE BRANCH_DETAILS_WITHINDEX (
  BRANCH_ID NUMBER(10),
  BRANCH_NAME VARCHAR2(100),
  PHONE_NUMBER NUMBER(10),
  MANAGER VARCHAR2(100)
);

CREATE INDEX IND_BRANCHID ON BRANCH_DETAILS_WITHINDEX(BRANCH_ID);
SELECT * FROM BRANCH_DETAILS_WITHINDEX WHERE BRANCH_ID IN (2022,2021);

```

Execution Plan:

OPERATION	OBJECT_NAME	OPTIONS	CARDINALITY	COST
SELECT STATEMENT				
INLIST ITERATOR				
TABLE ACCESS	BRANCH_DETAILS_WITHINDEX	BY INDEX ROWID BATCHED		2
INDEX	IND_BRANCHID	RANGE SCAN		1

Access Predicates:

```

OR
  BRANCH_ID=2021
  BRANCH_ID=2022

```

V\$STATNAME Name | V\$MYSTAT Value

buffer is not pinned count	4
buffer is pinned count	2
bytes received via SQL*Net from client	2261
bytes sent via SQL*Net to client	51853
calls to get snapshot scn: kmgss	4
calls to kmgcs	4
consistent gets	3
consistent gets from cache	3
consistent gets pin	3
consistent gets pin (fastpath)	3
cursor authentications	1
execute count	4
index scans kdlixs1	2

DBA SCRIPTS:

We have created a procedure to get the count of customers whose employment status is YES.

SQL Developer interface showing the execution of a PL/SQL procedure.

```

76 CREATE OR REPLACE procedure PROC_CUSTOMERDUP (CUSTOMER_COUNT OUT NUMBER)
77 AS
78 BEGIN
79 select COUNT(*)
80 INTO CUSTOMER_COUNT
81 from CUSTOMER_DUP
82 where EMPLOYMENT_STATUS='YES';
83 END ;
84 EXEC PROC_CUSTOMERDUP;
85

```

Script Output:

```

Task completed in 0.109 seconds

Procedure PROC_CUSTOMERDUP compiled

```


PARTITIONING:

Created a table with partitioning on customer id:

```
CREATE TABLE customer_part (  
  CUSTOMER_ID NUMBER(10) PRIMARY KEY,  
  TITLE VARCHAR2(100),  
  FIRST_NAME VARCHAR2(100) NOT NULL,  
  MIDDLE_NAME VARCHAR2(100),  
  LAST_NAME VARCHAR2(100) NOT NULL,  
  GENDER VARCHAR2(100),  
  CUSTOMER_BEGIN_DATE DATE,  
  DATE_OF_BIRTH DATE,  
  NATIONALITY VARCHAR2(100),  
  EMPLOYMENT_STATUS VARCHAR2(100),  
  OCCUPATION VARCHAR2(100),  
  SSN VARCHAR2(100),  
  RELATIONSHIP_MANAGER VARCHAR2(100),  
  VERIFICATION_STATUS VARCHAR2(100),  
  BASE_BRANCHID NUMBER(10),  
  IS_ACTIVE CHAR,  
  FOREIGN KEY(BASE_BRANCHID) REFERENCES BRANCH_DETAILS(BRANCH_ID))  
PARTITION BY RANGE (customer_id)  
(PARTITION p2000 VALUES LESS THAN (2000),  
PARTITION p3000 VALUES LESS THAN (3000),  
PARTITION p4000 VALUES LESS THAN (4000)  
);  
INSERT INTO CUSTOMER_PART(CUSTOMER_ID,  
TITLE ,
```

FIRST_NAME,
MIDDLE_NAME ,
LAST_NAME,
GENDER ,
CUSTOMER_BEGIN_DATE ,
DATE_OF_BIRTH ,
NATIONALITY ,
EMPLOYMENT_STATUS ,
OCCUPATION ,
SSN,
RELATIONSHIP_MANAGER ,
VARIFICATION_STATUS ,
BASE_BRANCHID ,
IS_ACTIVE) SELECT CUSTOMER_ID,
TITLE ,
FIRST_NAME,
MIDDLE_NAME ,
LAST_NAME,
GENDER ,
CUSTOMER_BEGIN_DATE ,
DATE_OF_BIRTH ,
NATIONALITY ,
EMPLOYMENT_STATUS ,
OCCUPATION ,
SSN,
RELATIONSHIP_MANAGER ,
VARIFICATION_STATUS ,
BASE_BRANCHID ,

IS_ACTIVE FROM CUSTOMER;

SELECT * FROM CUSTOMER_PART;

Partitioned output:

CUSTOMER_ID	TITLE	FIRST_NAME	MIDDLE_NAME	LAST_NAME	GENDER	CUSTOMER_BEGIN_DATE	DATE_OF_BIRTH	NATIONALITY	EMPLOYMENT_STATUS	OCCUPATION	SSN	RELATIONSHIP_MANAGER	VARIFICATION
1	1000 Ms	Mounica	(null)	Pothureddy	Female	10-AUG-22	05-SEP-97	India	NO	STUDENT	1234567	Henry	YES
2	1003 Ms	Prasuna	(null)	Reddy	Female	11-AUG-12	10-NOV-97	India	NO	STUDENT	1234568	Henry	YES
3	1004 Mr	Srikanth	(null)	Gurram	Male	08-AUG-22	18-JAN-96	India	NO	STUDENT	1235567	Rachel	YES
4	1050 MR	Howard	(null)	WOLOWITZ	MALE	10-AUG-02	05-NOV-90	ISREAL	YES	SCIENTIST	128567	RACHEL	YES
5	1051 Ms	AMY	FARRAH	FOWLER	Female	10-AUG-00	05-NOV-97	AMERICA	YES	ENGINEER	1134567	Henry	YES
6	1030 MR	RAJESH	(null)	KOOTHRAPALLI	MALE	01-AUG-22	05-NOV-97	ITALY	YES	REALTOR	2234567	WILLIAM	YES
7	2050 Mr	Charlie	Francis	Xavier	Male	10-AUG-95	02-NOV-86	America	YES	ACTOR	1254567	GRACY	YES
8	2051 Ms	Phobe	(null)	Buffay	Female	10-AUG-01	05-NOV-86	ENGLAND	YES	CONSULTANT	1134567	SHELDON	YES
9	3050 Ms	KAYLEY	(null)	CUCUO	Female	10-AUG-12	05-NOV-90	MEXICO	NO	STUDENT	1236567	SHELDON	YES
10	3071 MR	LEONARD	(null)	HOFFSTADDER	MALE	10-AUG-05	05-NOV-89	GERMANY	YES	ARCHITECT	1244568	WILLIAM	YES

SELECT * FROM CUSTOMER_PART where gender='Male';									
Script Output x Query Result x Query Result 1 x Autotrace x Autotrace 1 x									
SQL HotSpot 1.519 seconds									
OPERATION	OBJECT_NAME	OPTIONS	PARTITION_START	PARTITION_STOP	PARTITIO...	CARDINALITY	COST	LAST_CR_Bk	
SELECT STATEMENT								205	
PARTITION RANGE		ALL	1	3	1		3	205	
TABLE ACCESS	CUSTOMER_PART	FULL	1	3	1		3	205	
Filter Predicates									
VSSTATNAME Name VSSTAT Value									
bytes received via SQL*Net from client							2239		
bytes sent via SQL*Net to client							52692		
calls to get snapshot scn: kcmgss							4		
calls to kcmgcs							31		
consistent gets							75		
consistent gets from cache							75		
consistent gets pin							75		
consistent gets pin (fastpath)							75		
execute count							4		
logical read bytes from cache							614400		
no work - consistent read gets							48		
non-idle wait count							28		

Not partitioned output:

CUSTOMER_ID	TITLE	FIRST_NAME	MIDDLE_NAME	LAST_NAME	GENDER	CUSTOMER_BEGIN_DATE	DATE_OF_BIRTH	NATIONALITY	EMPLOYMENT_STATUS	OCCUPATION	SSN	RELATIONSHIP_MANAGER	VARIIFICATION
1	1000 Ms	Mounica	(null)	Pothureddy	Female	10-AUG-22	05-SEP-97	India	NO	STUDENT	1234567	Henry	YES
2	1003 Ms	Prasuna	(null)	Reddy	Female	11-AUG-12	10-NOV-97	India	NO	STUDENT	1234568	Henry	YES
3	1004 Mr	Srikanth	(null)	Gurram	Male	08-AUG-22	18-JAN-96	India	NO	STUDENT	1235567	Rachel	YES
4	2050 Mr	Charlie	Francis	Xavier	Male	10-AUG-95	02-NOV-86	America	YES	ACTOR	1254567	GRACY	YES
5	2051 Ms	Phobe	(null)	Buffay	Female	10-AUG-01	05-NOV-86	ENGLAND	YES	CONSULTANT	1134567	SHELDON	YES
6	1050 MR	Howard	(null)	WOLOWITZ	MALE	10-AUG-02	05-NOV-90	ISREAL	YES	SCIENTIST	128567	RACHEL	YES
7	1051 Ms	AMY	FARRAH	FOWLER	Female	10-AUG-00	05-NOV-97	AMERICA	YES	ENGINEER	1134567	Henry	YES
8	1030 MR	RAJESH	(null)	KOOTHRAPALLI	MALE	01-AUG-22	05-NOV-97	ITALY	YES	REALTOR	2234567	WILLIAM	YES
9	3050 Ms	KAYLEY	(null)	CUCUO	Female	10-AUG-12	05-NOV-90	MEXICO	NO	STUDENT	1236567	SHELDON	YES
10	3071 MR	LEONARD	(null)	HOFFSTADDER	MALE	10-AUG-05	05-NOV-89	GERMANY	YES	ARCHITECT	1244568	WILLIAM	YES

select * from customer where gender='Male';						
Script Output x Query Result x Query Result 1 x Autotrace x Autotrace 1 x						
SQL HotSpot 1.681 seconds						
OBJECT_NAME	OPTIONS	CARDINALITY	COST	LAST_CR_BUFFER_GETS	LAST_ELAPSED_TIME	
CUSTOMER	FULL		1	2	7	3
				2	7	3
V\$STATNAME Name V\$MYSTAT Value						
bytes received via SQL*Net from client						2233
bytes sent via SQL*Net to client						52433
calls to get snapshot scn: kcmgss						5
calls to kcmgcs						6
consistent gets						7
consistent gets from cache						7
consistent gets pin						7
consistent gets pin (fastpath)						7
enqueue releases						1
enqueue requests						1

SECURITY:

DATA REDACTION is an interesting security feature. We created a policy to full redact the SSN column as it is a PII column. So, after adding the policy the SSN number will be disabled.

```
create table customer_dup as select * from customer;
```

```
BEGIN
```

```
DBMS_REDACT.ADD_POLICY(
```

```
object_schema => 'SQL113',
```

```

object_name => 'CUSTOMER_DUP',
column_name => 'SSN',
policy_name => 'SQL113_CUSTOMERSSN',
function_type => DBMS_REDACT.FULL,
function_parameters => '',
expression => '1=1',
policy_description => 'Redacts SSN.',
column_description => 'SSN can be considered PII. ');

END;

SELECT * FROM CUSTOMER_DUP;

EXEC DBMS_REDACT.DROP_POLICY ('SQL113', 'CUSTOMER_DUP',
'SQL113_CUSTOMERSSN');

```

SQL | All Rows Fetched: 10 in 0.034 seconds

CUSTOMER_ID	TITLE	FIRST_NAME	MIDDLE_NAME	LAST_NAME	GENDER	CUSTOMER_BEGIN_DATE	DATE_OF_BIRTH	NATIONALITY	EMPLOYMENT_STATUS	OCCUPATION	SSN	RELATIONSHIP_MANAGER	VARIFICATION_ST
1	1000 Ms	Mounica	(null)	Pothureddy	Female	10-AUG-22	05-SEP-97	India	NO	STUDENT		Henry	YES
2	1003 Ms	Prasuna	(null)	Reddy	Female	11-AUG-12	10-NOV-97	India	NO	STUDENT		Henry	YES
3	1004 Mr	Srikanth	(null)	Gurram	Male	08-AUG-22	18-JAN-96	India	NO	STUDENT		Rachel	YES
4	2050 Mr	Charlie	Francis	Xavier	Male	10-AUG-95	02-NOV-86	America	YES	ACTOR		GRACY	YES
5	2051 Ms	Phobe	(null)	Buffay	Female	10-AUG-01	05-NOV-86	ENGLAND	YES	CONSULTANT		SHELDON	YES
6	1050 MR	Howard	(null)	WOLOWITZ	MALE	10-AUG-02	05-NOV-90	ISREAL	YES	SCIENTIST		RACHEL	YES
7	1051 Ms	AMY	FARRAH	FOWLER	Female	10-AUG-00	05-NOV-97	AMERICA	YES	ENGINEER		Henry	YES
8	1030 MR	RAJESH	(null)	KOOTHRAPALLI	MALE	01-AUG-22	05-NOV-97	ITALY	YES	REALTOR		WILLIAM	YES
9	3050 Ms	KAYLEY	(null)	CUCUO	Female	10-AUG-12	05-NOV-90	MEXICO	NO	STUDENT		SHELDON	YES
10	3071 MR	LEONARD	(null)	HOFFSTADDER	MALE	10-AUG-05	05-NOV-89	GERMANY	YES	ARCHITECT		WILLIAM	YES

Visualisations Using Tableau

Below is the simple visualization showing the yearly spend on each customer , here to get this data I have applied joins on multiple tables. PFA query below to understand.

```
select c.customer_id,Transaction_time_date,transaction_amount from transaction_details td
```

```
left join account_details ad on td.account_id=ad.account_id left join
```

```
customer c on ad.customer_id=c.customer_id where td.transaction_type='CREDIT';
```

