ISYS224 2018 – ASSIGNMENT ONE

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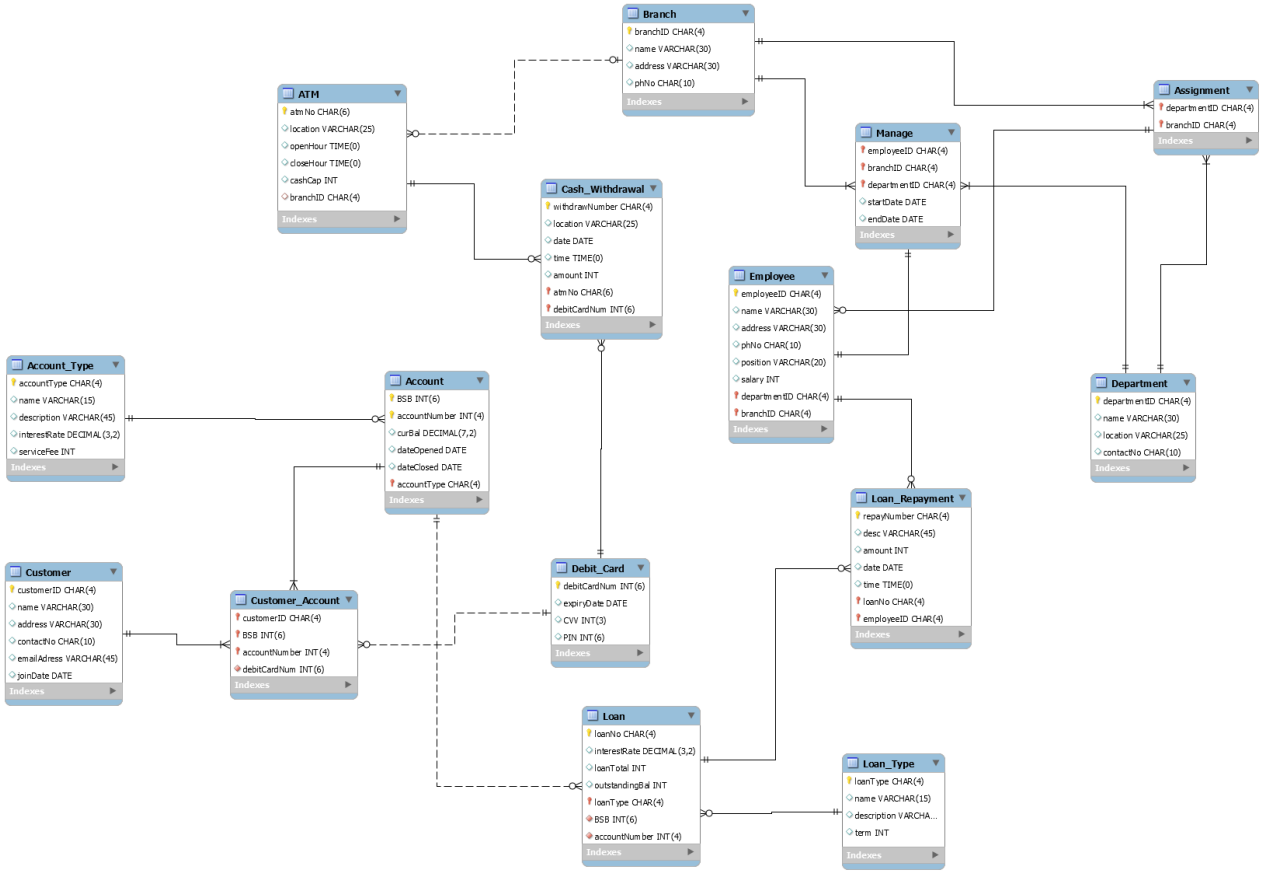
Workshop Number: Practical 1(7) eStudent Class Timetable
Tutor Name: Jandson Hossain
Workshop Day and Time: Thursday 11 – 12 (9WW / E6A 112)

Task 1: Data model



Task 2: Normalisation

Transform table from 1NF to 2NF

AccountNumber	BSB	CustomerID	CustomerName	AccountBalance	BranchID	BranchName	Account Type	Account Name
9047 1234	062 345	C001	Loki	500	Branch1	Burwood	SAV	Savings
9047 1234	062 345	C002	Iron Man	500	Branch1	Burwood	SAV	Savings
9123 2313	062 345	C001	Loki	3000	Branch1	Burwood	CHECK	Checking
9132 3412	024 213	C003	Thor	5400	Branch2	Ashfield	GOAL	Goal Saver
9546 2134	024 213	C003	Thor	2300	Branch2	Ashfield	CHECK	Checking
9546 2134	024 213	C004	Black Widow	2300	Branch2	Ashfield	CHECK	Checking
9021 3241	034 234	C005	Wanda. M	4000	Branch3	Hornsby	IRA	Retirement
9047 1234	021 123	C006	Hulk	800	Branch4	Epping	IRA	Retirement

FD

AccountNumber	BSB	CustomerID	CustomerName	AccountBalance	BranchID	BranchName	Account Type	Account Name
9047 1234	062 345	C001	Loki	500	Branch1	Burwood	SAV	Savings
9047 1234	062 345	C002	Iron Man	500	Branch1	Burwood	SAV	Savings
9123 2313	062 345	C001	Loki	3000	Branch1	Burwood	CHECK	Checking
9132 3412	024 213	C003	Thor	5400	Branch2	Ashfield	GOAL	Goal Saver
9546 2134	024 213	C003	Thor	2300	Branch2	Ashfield	CHECK	Checking
9546 2134	024 213	C004	Black Widow	2300	Branch2	Ashfield	CHECK	Checking
9021 3241	034 234	C005	Wanda. M	4000	Branch3	Hornsby	IRA	Retirement
9047 1234	021 123	C006	Hulk	800	Branch4	Epping	IRA	Retirement

PD1

AccountNumber	BSB	CustomerID	CustomerName	AccountBalance	BranchID	BranchName	Account Type	Account Name
9047 1234	062 345	C001	Loki	500	Branch1	Burwood	SAV	Savings
9047 1234	062 345	C002	Iron Man	500	Branch1	Burwood	SAV	Savings
9123 2313	062 345	C001	Loki	3000	Branch1	Burwood	CHECK	Checking
9132 3412	024 213	C003	Thor	5400	Branch2	Ashfield	GOAL	Goal Saver
9546 2134	024 213	C003	Thor	2300	Branch2	Ashfield	CHECK	Checking
9546 2134	024 213	C004	Black Widow	2300	Branch2	Ashfield	CHECK	Checking
9021 3241	034 234	C005	Wanda. M	4000	Branch3	Hornsby	IRA	Retirement
9047 1234	021 123	C006	Hulk	800	Branch4	Epping	IRA	Retirement

PD2

Underlined = Primary Key
Red = Foreign Key

Account

AccountNumber	CustomerID	AccountBalance	Account Type	Account Name
9047 1234	C001	500	SAV	Savings
9047 1234	C002	500	SAV	Savings
9123 2313	C001	3000	CHECK	Checking
9132 3412	C003	5400	GOAL	Goal Saver
9546 2134	C003	2300	CHECK	Checking
9546 2134	C004	2300	CHECK	Checking
9021 3241	C005	4000	IRA	Retirement
9047 1234	C006	800	IRA	Retirement

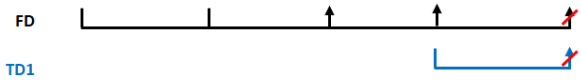
Customer / Bank

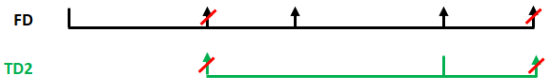
CustomerID	BSB	CustomerName	BranchID	BranchName
C001	062 345	Loki	Branch1	Burwood
C002	062 345	Iron Man	Branch1	Burwood
C003	024 213	Thor	Branch2	Ashfield
C004	024 213	Black Widow	Branch2	Ashfield
C005	034 234	Wanda. M	Branch3	Hornsby
C006	021 123	Hulk	Branch4	Epping

Transform tables from 2NF to 3NF

AccountNumber	CustomerID	AccountBalance	Account Type	Account Name
9047 1234	C001	500	SAV	Savings
9047 1234	C002	500	SAV	Savings
9123 2313	C001	3000	CHECK	Checking
9132 3412	C003	5400	GOAL	Goal Saver
9546 2134	C003	2300	CHECK	Checking
9546 2134	C004	2300	CHECK	Checking
9021 3241	C005	4000	IRA	Retirement
9047 1234	C006	800	IRA	Retirement

CustomerID	BSB	CustomerName	BranchID	BranchName
C001	062 345	Loki	Branch1	Burwood
C002	062 345	Iron Man	Branch1	Burwood
C003	024 213	Thor	Branch2	Ashfield
C004	024 213	Black Widow	Branch2	Ashfield
C005	034 234	Wanda. M	Branch3	Hornsby
C006	021 123	Hulk	Branch4	Epping





Customer Account

AccountNumber	CustomerID	AccountBalance	Account Type
9047 1234	C001	500	SAV
9047 1234	C002	500	SAV
9123 2313	C001	3000	CHECK
9132 3412	C003	5400	GOAL
9546 2134	C003	2300	CHECK
9546 2134	C004	2300	CHECK
9021 3241	C005	4000	IRA
9047 1234	C006	800	IRA

Account Type

Account Type	Account Name
SAV	Savings
GOAL	Goal Saver
CHECK	Checking
IRA	Retirement

Customer

CustomerID	CustomerName	BranchID
C001	Loki	Branch1
C002	Iron Man	Branch1
C003	Thor	Branch2
C004	Black Widow	Branch2
C005	Wanda. M	Branch3
C006	Hulk	Branch4

Bank Branch

BranchID	BranchName	BSB
Branch1	Burwood	062 345
Branch2	Ashfield	024 213
Branch3	Hornsby	034 234
Branch4	Epping	021 123

Task 4: DML

Branch

branchID	name	address	phNo
B001	Gosford	3 Henry Parry Dr, Gosford, NSW	0243412258
B002	Hornsby	15 Crow St, Hornsby, NSW	0247164877
B003	Epping	2 Epping Rd, Epping, NSW	0257894431

Customer

customerID	name	address	contactNo	emailAdress	joinDate
C001	Spock	15 Terrigal Rd, Terrigal, NSW	0491570156	spock@gmail.com	2017-08-02
C002	Kirk	15 Terrigal Rd, Terrigal, NSW	0481528137	kirk@gmail.com	2017-08-02
C003	Bones	70 Forest Dr, Randwick, NSW	0212345678	bones@gmail.com	2015-06-22
C004	Picard	53 Dove Ln, Chirnside, VIC	0287654321	pickard@gmail.com	2018-01-15

Debit Card

debitCardNum	expiryDate	CVV	PIN
1	2020-06-01	110	101010
2	2019-05-01	111	191919
3	2022-07-01	112	202020

Account Type

accountType	name	description	interestRate	serviceFee
CHEQ	Cheque	Cheque account pays no interest	0.00	160
SAVE	Savings	High interest savings account	0.04	200
STUD	Student	Student only account	0.02	70

Account

BSB	accountNumber	curBal	dateOpened	dateClosed	accountType
111222	1	500.00	2017-08-02	NULL	STUD
111222	3	8000.00	2018-01-15	NULL	SAVE
222333	2	10000.00	2015-06-22	NULL	SAVE

ATM

atmNo	location	openHour	closeHour	cashCap	branchID
ATM001	Gosford Branch	08:00:00	18:00:00	15000	B001
ATM002	Hornsby Branch	08:00:00	18:00:00	15000	B002
ATM003	Erina Fair	09:00:00	16:00:00	10000	NULL

Department

departmentID	name	location	contactNo
D001	HR	Gosford	0254321098
D002	Loans	Gosford	0243111555
D003	Loans	Hornsby	0287654321
D004	Marketing	Epping	0290875643
D005	Loans	Epping	0290555777

Assignment

departmentID	branchID
D001	B001
D002	B001
D003	B002
D004	B003
D005	B003

Employee

employeeID	name	address	phNo	position	salary	departmentID	branchID
E001	Worf	1 Enterprise Dr. Randwick	0409000111	Loans Clerk	30000	D002	B001
E002	Data	2 Enterprise Dr. Randwick	0409000222	Loans Clerk	50000	D002	B001
E003	O	3 Enterprise Dr. Randwick	0409000333	Manager	70000	D002	B001
E004	Guinan	4 Enterprise Dr. Randwick	0409000444	Manager	60000	D001	B001
E005	Gowron	5 Enterprise Dr. Randwick	0409000555	Manager	80000	D003	B002
E006	Lore	6 Enterprise Dr. Randwick	0409000666	Manager	60000	D005	B003
E007	Scotty	7 Enterprise Dr. Randwick	0409000777	Manager	120000	D004	B003

Loan Type

loanType	name	description	term
BU05	Business	Business loan for 5 years	5
HM30	Home	Home loan for 30 years	30
PR01	Personal	Personal loan for 1 year	1
PR03	Personal	Personal loan for 3 years	3

Loan

loanNo	interestRate	loanTotal	outstandingBal	loanType	BSB	accountNumber
L001	0.20	400	400	PR01	111222	1
L002	0.15	5000	3000	PR03	222333	2
L003	0.04	1000000	500000	HM30	111222	1
L004	0.08	20000	8000	BU05	111222	3

Cash Withdrawal

withdrawNumber	location	date	time	amount	atmNo	debitCardNum
W001	Gosford	2018-07-05	12:55:00	100	ATM001	1
W002	Hornsby	2018-07-16	16:00:00	350	ATM002	2
W003	Erina Fair	2018-07-22	15:30:00	50	ATM003	1

Loan Repayment

repayNumber	desc	amount	date	time	loanNo	employeeID
R001	Personal loan repayment	500	2018-04-03	14:01:00	L002	E001
R002	Mortgage repayment	10000	2018-04-08	10:34:00	L003	E001
R003	Business loan repayment	3000	2018-04-15	11:55:00	L004	E002

Customer Account

customerID	BSB	accountNumber	debitCardNum
C003	111222	1	1
C004	111222	3	2
C001	222333	2	3
C002	222333	2	3

Manage

employeeID	branchID	departmentID	startDate	endDate
E003	B001	D002	2015-02-07	NULL
E004	B001	D001	2015-02-27	NULL
E005	B002	D003	2016-06-09	NULL
E006	B002	D005	2016-06-13	NULL
E007	B003	D004	2017-08-07	NULL

Task 5: DQL

```
-- Query 1
-- Total joint accounts
SELECT COUNT(*) AS Number_of_Joint_Accounts
FROM (SELECT accountNumber, BSB, COUNT(*)
      FROM Customer_Account
      GROUP BY accountNumber, BSB
      HAVING COUNT(*) > 1
     ) AS a;
```

Number_of_Joint_Accounts
1

```
-- Query 2
-- Accounts with personal loan's linked to them
SELECT L.accountNumber, L.BSB
FROM Loan L, Loan_Type LT
WHERE L.loanType = LT.loanType
AND LT.name = 'Personal';
```

accountNumber	BSB
1	111222
2	222333

```
-- Query 3
-- Branch departments (including department manager)
SELECT M.branchID, D.name AS DepartmentName, E.name AS ManagerName
FROM Manage M, Department D, Employee E
WHERE M.employeeID = E.employeeID
AND M.departmentID = D.departmentID
ORDER BY M.branchID, D.name;
```

branchID	DepartmentName	ManagerName
B001	HR	Guinan
B001	Loans	O
B002	Loans	Lore
B002	Loans	Gowron
B003	Marketing	Scotty

```sql
-- Query 4
-- Managers who make more than the average manager salary
SELECT E.name AS ManagerName
FROM Manage M, Employee E
WHERE M.employeeID = E.employeeID
AND E.salary > (SELECT AVG(salary)
        FROM Manage M, Employee E
                WHERE M.employeeID = E.employeeID)
ORDER BY E.name;
```

ManagerName
Gowron
Scotty

Assumptions:

Task 1 - Model:

- An ATM can exist outside of a branch e.g. A shopping centre (Erina Fair)
- Customers must have an account when signing up
- A single account may have multiple loans
    - A loan will be attached to an account (foreign key) but the account won't be linked
    - If an account is deleted, the loan will still exist (we instead assume that the loan is reattached / associated to another account before deletion)
- Department location is the branch it is located at
    - This means if you want the same department at a different location, need to create new department type
- Attributes like address have been simplified for the exercise, in real life these would be separated into fields (e.g. Postcode, state, suburb, etc.)

Task 4 – DML Scripts:

- Debit Card table contains the PIN, which in a proper database would be encrypted and not able to be decrypted (even by DBA). For testing the system, it will just be stored as INT
- Some fields can have a NULL value (e.g. Branch of ATM, where not located at a branch)