Group 2 - Employee Expense Report

Vinesh Ramakrishnan   Aishwarya Khinvasara
Ruchika Vasudev Balani   Swetha Srinivasan

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Contents

1 Company Background

- TakeCare Healthcare – A large healthcare provider with 10,000+ employees.

- Multi department organization – neurology, cardiology, transportation, logistics, podiatry, dental, paramedical, etc.

- Has branches all over the country, plans to expand to Australia.

- Partnerships with all major insurance providers, universities, and research labs across the country.

- Looking for an integrated, streamlined system of expense report processing for employees.

2 Problem Statement

TakeCare Healthcare is looking for an automated solution which will help them to solve their four biggest challenges:

Employee	• Timely reimbursement of funds for employees. • Visibility of expense report status for employees.
Accounting	• Automated accounting to aid faster month closing.
Auditor	• Ability for auditor to expense reports and enforce organizational expense policies.
Stakeholders	• Visibiliy of expense report across stakeholders.

3   Benefits of Automated System

- Only one expense per Expense Type and Expense Date, Easy for supervisor to Approve or Decline. No need to check multiple entries.

- Employee can access all submitted expenses and check Expense Status and Reimbursement Status easily.

- Any auditor can work on any expense, thus no biasing based on employee, Supervisor, Department or Expense Type.

- Accounting manager can easily check all reimbursements without having to look at all the expenses.
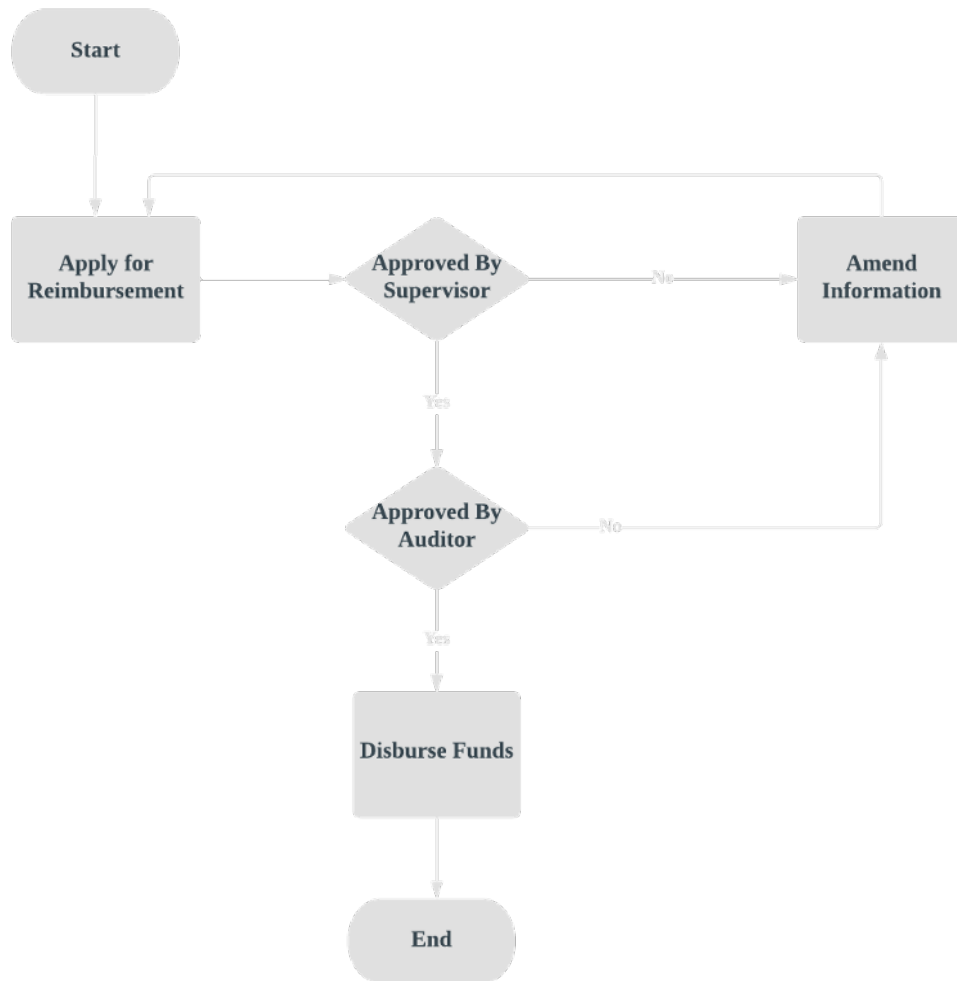
4   Business Flow Chart

Figure 1: Flow Chart

5   Business Rules

1. Employee should submit new expense for each expense type and Expense date.

2. Employee must attach the expense receipts as supporting documents

3. Employee must submit report within 30 days of incurring the expense.

4. Supervisor must be able to review all expenses filed by the employee

5. Supervisor must be able to approve/reject the request within two working days.

6. Auditor must review the expense reports once approved by the supervisor and start reimbursement process

7. Auditor should be able to decline reimbursement if expense do not abide by company policy

8. There will be exactly one reimbursement entry for each approved expense

6   User Requirements

1. Each employee belongs to only one Department and one Department has one or many Employees.

   (a) Employee has unique identifier Employee ID and other attributes are Name (First Name, Middle Name, Last Name) Bank Account, Location and Phone Number.

   (b) Department is uniquely identified by Department Name and other attributes of Department are Department Head and Department Size.

2. Each employee can have one or nosupervisor.

   (a) A supervisor can supervise one or many employees.

3. Employee submits Expense incurred by them.

   (a) Expense is uniquely identified by Expense ID and other attributes are Expense Date, Submit Date, Expense Amount, Expense Description, Supervisor ID, Expense Status, Supervisor comment.

   (b) Employee can submit none or many expenses and one expense will be incurred by exactly one employee.

4. Expense is categorized by Expense Type.

   (a) Expense Type has Expense Type ID as unique Identifier and other attributes are Expense Type name and expense limit.

   (b) One expense can belong to exactly one category and one expense type can have null or multiple expenses.

5. Expense is audited by Auditor.

   (a) Auditor is uniquely identified by Auditor ID and has attribute Auditor name.

   (b) One Auditor can audit one or multiple expenses, but one expense will be audited by exactly one auditor.

6. Auditor will create reimbursement entries.

    (a) Reimbursement entry is uniquely identified by Reimbursement ID and has attributes Reimbursement department, Reimbursement Date, Reimbursement Status, Reimbursement amount and reason for rejection.

    (b) Auditor can create one or multiple reimbursement entries and one reimbursement entry will be created by exactly one auditor.
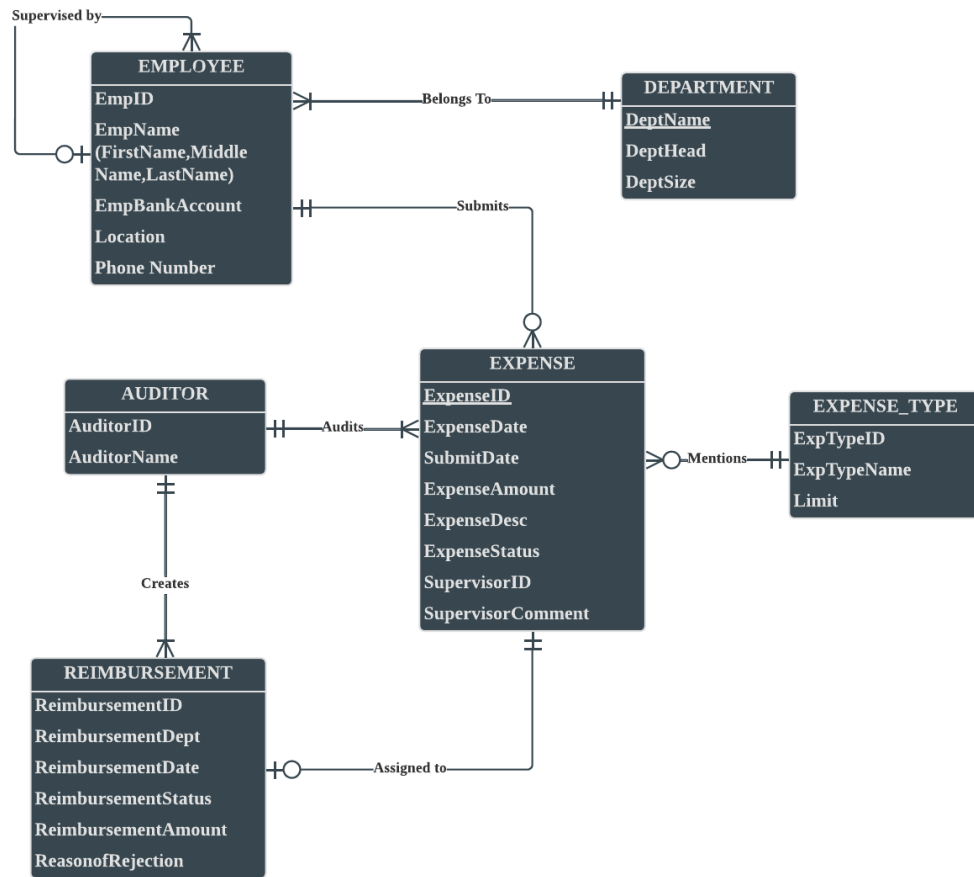
7   Conceptual Data Model

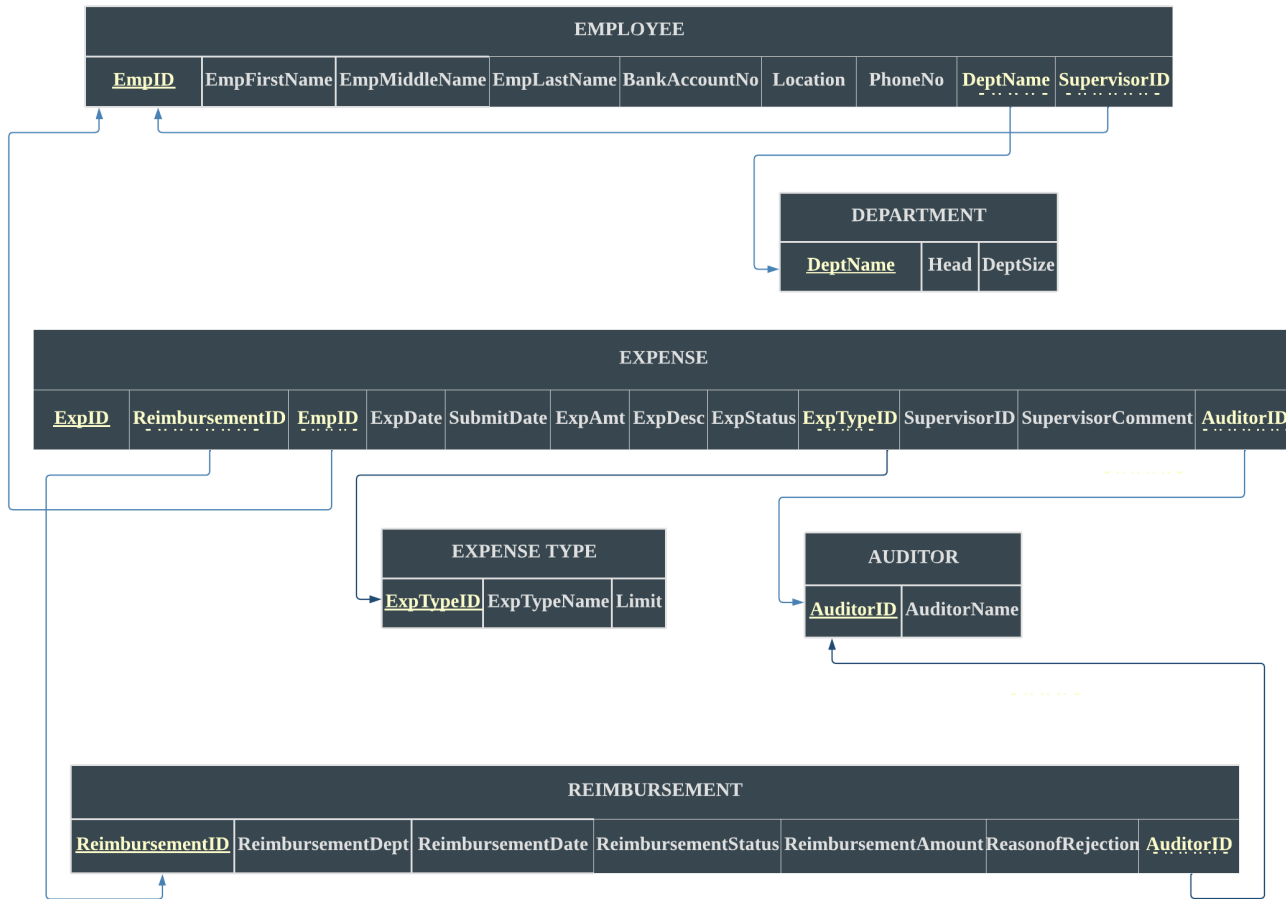

Figure 2: Conceptual Data Model

8 Logical Data Model

Figure 3: Logical Data Model

9 SQL Implementation

9.1 Metadata

Table 1: Department Table

ATTRIBUTE	DATATYPE	SIZE	AUTOINCREMENT	NULL	CONSTRAINT
Department Name	VARCHAR	20	NO	NO	PRIMARY KEY
Department Head	VARCHAR	25	NO	YES	
Department Size	INT		NO	YES	

Table 2: Employee Table

ATTRIBUTE	DATATYPE	SIZE	AUTOINCREMENT	NULL	CONSTRAINT
Employee ID	VARCHAR	25	NO	NO	PRIMARY KEY
Employee First Name	VARCHAR	20	NO	YES	
Employee Middle Name	VARCHAR	20	NO	YES	
Employee Last Name	VARCHAR	20	NO	YES	
Employee Bank Account	VARCHAR	20	NO	YES	
Location	VARCHAR	20	NO	YES	
Phone No	INT		NO	YES	
Department Name	VARCHAR	20	NO	NO	
Supervisor ID	VARCHAR	25	NO	NO	

Table 3: Auditor Table

ATTRIBUTE	DATATYPE	SIZE	AUTOINCREMENT	NULL	CONSTRAINT
Auditor ID	VARCHAR	25	NO	NO	PRIMARY KEY
Auditor Name	VARCHAR	20	NO	YES	

Table 4: Reimbursement Table

ATTRIBUTE	DATATYPE	SIZE	AUTOINCREMENT	NULL	CONSTRAINT
Reimbursement ID	VARCHAR	10	NO	NO	PRIMARY KEY
Reimbursement Dept	VARCHAR	20	NO	YES	
Reimbursement Date	DATE		NO	YES	
Reimbursement Status	VARCHAR	10	NO	YES	
Reimbursement Amount	FLOAT	10,2	NO	YES	
Reason of Rejection	VARCHAR	50	NO	YES	
Auditor ID	VARCHAR	25	NO	NO	FOREIGN KEY

Table 5: Expense Type Table

ATTRIBUTE	DATATYPE	SIZE	AUTOINCREMENT	NULL	CONSTRAINT
Expense Type ID	VARCHAR	10	NO	NO	PRIMARY KEY
Expense Type Name	VARCHAR	25	NO	YES	
Limit	INT		NO	YES	

Table 6: Expense Table

ATTRIBUTE	DATATYPE	SIZE	AUTOINCREMENT	NULL	CONSTRAINT
Expense ID	VARCHAR	10	NO	NO	PRIMARY KEY
Reimbursement ID	VARCHAR	10	NO	YES	FOREIGN KEY
Employee ID	VARCHAR	25	NO	NO	FOREIGN KEY
Expense Date	DATE		NO	YES	
Submit Date	DATE		NO	YES	
Expense Amount	FLOAT	10,2	NO	YES	
Expense Description	VARCHAR	50	NO	YES	
Expense Status	VARCHAR	10	NO	YES	
Expense Type ID	VARCHAR	10	NO	NO	FOREIGN KEY
Supervisor ID	VARCHAR	25	NO	NO	
Supervisor Comment	VARCHAR	50	NO	YES	
Auditor ID	VARCHAR	25	NO	YES	FOREIGN KEY

9.2 Data Definition Language

```
/*create and use a new database*/
/*called EmployeeExpense - Start*/
CREATE DATABASE EmployeeExpense1;
use EmployeeExpense1;
```

```
CREATE TABLE DEPARTMENT(
DeptName VARCHAR(20) PRIMARY KEY,
HEAD VARCHAR(25),
DEPTSIZE INT);
```

```
CREATE TABLE EMPLOYEE(
EMPLID VARCHAR(25) PRIMARY KEY,
EmpFirstName VARCHAR(20),
EmpMiddleName VARCHAR(20),
EmpLastName VARCHAR(20),
BankAccountNo VARCHAR(20),
Location VARCHAR(20),
Phone_No INT,
DeptName VARCHAR(20) NOT NULL,
SupervisorID VARCHAR(25),
FOREIGN KEY (DeptName) REFERENCES DEPARTMENT(DeptName),
FOREIGN KEY (SupervisorID) REFERENCES EMPLOYEE(EMPLID));
```

```
CREATE TABLE AUDITOR(
AuditorID VARCHAR(25) PRIMARY KEY,
AuditorName VARCHAR(20));
```

```
1 CREATE TABLE REIMBURSEMENT(
2 ReimbursementID VARCHAR(10) PRIMARY KEY,
3 ReimbursementDept VARCHAR(20),
4 ReimbursementDate Date,
5 ReimbursementStatus VARCHAR(10),
6 ReimbursementAmount FLOAT(10,2),
7 ReasonofRejection VARCHAR(50),
8 AuditorID VARCHAR(25) NOT NULL,
9 FOREIGN KEY (AuditorID) REFERENCES AUDITOR(AuditorID));

1 CREATE TABLE EXPENSETYPE(
2 ExpTypeID VARCHAR(10) PRIMARY KEY,
3 ExpTypeName VARCHAR(25),
4 Lmt INT);

1 CREATE TABLE Expense(
2 ExpID VARCHAR(10) PRIMARY KEY,
3 ReimbursementID VARCHAR(10),
4 EMPLID VARCHAR(25) NOT NULL,
5 ExpDate Date,
6 SubmitDate Date,
7 ExpAmt FLOAT(10,2),
8 ExpDesc VARCHAR(50),
9 ExpStatus VARCHAR(10),
10 ExpTypeID VARCHAR(10) NOT NULL,
11 SupervisorID VARCHAR(25) NOT NULL,
12 SupervisorComment VARCHAR(50),
13 AuditorID VARCHAR(25),
14 FOREIGN KEY (ReimbursementID)
15 REFERENCES REIMBURSEMENT(ReimbursementID)
16 ON UPDATE CASCADE ON DELETE CASCADE,
17 FOREIGN KEY (AuditorID)
18 REFERENCES AUDITOR(AuditorID),
19 FOREIGN KEY (ExpTypeID)
20 REFERENCES EXPENSETYPE(ExpTypeID));
```
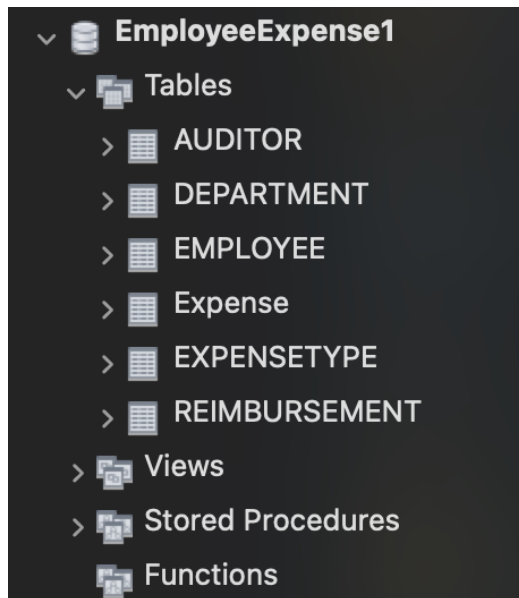
Figure 4: Employee Expense Database

9.3   Data Manipulation Language

Following shows the snippet used to populate data in the remaining tables.

Figure 5: Department Table Values

```
1  SELECT * FROM DEPARTMENT;
```

DeptName	HEAD	DEPTSIZE
ADMIN	Emmerson,Nancy	52
CARDIOLOGY	Channing,Rosanna	118
DENTAL	Elliot,Ken	75
DERMATOLOGY	Parker,Russell	199
FINANCE	Collins,Mike	119
GENERAL	Ball,Nancy	189
GYNAECOLOGY	Hoinck,Susan	196
HR	Brown III,Anne	107
INPATIENT	Ling,Cornelia	164
LOGISTICS	Patterson,John	127
NEUROLOGY	Dobbs,Susan	122
ONCOLOGY	Chae,Kevin	195
OPTOMOLOGY	Ng,Frances	172
OTHER	Martignoni,David	161
OUTPATIENT	Ash,Jude	20
PARAMEDICAL	Summer,Alice	63
PODIATRY	Ann,Mary	196
PROCUREMENT	Lee,Susan	71
RADIOLOGY	Deindorfer,James	197
REHABILITATION	Morgan,Richard	75
TECHNOLOGY	Schofield,Barbara	108
TRANSPORTATION	Monet,Claude	173
UROLOGY	Turner,Ed	39

Figure 6: Department Table Output

AuditorID	AuditorName
KU0046	Channing,Rosanna
KU0079	Ball,Nancy
KU0080	Emmerson,Nancy
KU0106	Chae,Kevin
KU0119	Hoinck,Susan
KU0131	Patterson,John
KU9103	Turner,Ed
KU9104	Parker,Russell
KU9105	Elliot,Ken
KU9106	Ann,Mary
KU9107	Ash,Jude
PU007	Monet,Claude

Figure 7: Auditor Table Output

EMPLID	EmpFirstName	EmpMiddleName	EmpLastName	BankAccountNo	Location	Phone_No	DeptName	SupervisorID
IXHEEE161	CHERI		SMITH	100007337	Luxemburg	888555	GENERAL	KUTZ493
IXHEEE168	JAMES		DEINDORFER	100003619	Berlin	888555	RADIOLOGY	KUTZ485
IXHEEE172	SUSAN		DOBBS	100007069	Greater London	888555	NEUROLOGY	KUTZ486
IXHEEE174	BARBARA		SCHOFIELD	100004255	Tokyo-To	888555	TECHNOLOGY	KUTZ487
IXHEEE176	ANNE		BROWNIII	100004989	Chatswood	888555	HR	KUTZ488
IXHEEE178	FRANCES		NG	100005925	Groningen	888555	OPTOMOLOGY	KUTZ489
KU0008	CALVIN		ROTH	100004088	San Jose	888555	ADMIN	KUTZ494
KU0009	THERESA		MONROE	100004503	San Jose	888555	ONCOLOGY	KUTZ495
KU0010	SONYA		VINCENT	100006375	Inglewood	888555	GYNAECOLOGY	KUTZ496
KU0011	JOHN		BENDETTO	100005979	San Jose	888555	CARDIOLOGY	KUTZ497
KU0021	JESSICA		BENDETTO	100004932	San Jose	888555	TRANSPORTATION	KUTZ498
KU0022	CORNELIA		TURNER	100003940	San Jose	888555	LOGISTICS	KUTZ499
KU0029	CORNELIA		LING	100003758	San Jose	888555	OTHER	MM000000001
KU0032	ALICE		SUMMER	100005421	San Jose	888555	GENERAL	MM000000002
KU0037	RICHARD		MORGAN	100007013	San Jose	888555	ADMIN	MM000000003
KU0042	KENNETH		SCHUMACHER	100007407	San Jose	888555	PROCUREMENT	KUTZ490
KU0046	ROSANNA		CHANNING	100006609	Casper	888555	OUTPATIENT	KUTZ488
KU0056	EDWARD		NG	100004732	San Jose	888555	FINANCE	KUTZ491
KU0057	JENNIFER		LUIS	100003487	San Jose	888555	OTHER	KUTZ492
KU0075	DAVID		MARTIGNONI	100003669	San Jose	888555	CARDIOLOGY	MM000000006
KU0079	NANCY		BALL	100005893	Ontario	888555	TRANSPORTATION	MM000000007
KU0080	NANCY		EMMERSON	100004729	San Jose	888555	LOGISTICS	KUTZ485
KU0106	KEVIN		CHAE	100006778	San Jose	888555	DENTAL	KUTZ486
KU0119	SUSAN		HOINCK	100005031	Arlington	888555	PODIATRY	KUTZ487
KU0131	JOHN		PATTERSON	100004645	Kansas City	888555	PARAMEDICAL	KUTZ490
KU9101	SUSAN		LEE	100006216	San Francisco	888555	ONCOLOGY	MM000000004
KU9102	MIKE		COLLINS	100003763	San Francisco	888555	GYNAECOLOGY	MM000000005
KU9103	ED		TURNER	100003703	San Francisco	888555	REHABILITATION	KUTZ491
KU9104	RUSSELL		PARKER	100005698	San Francisco	888555	DENTAL	KUTZ492
KU9105	KEN		ELLIOT	100004926	San Francisco	888555	PODIATRY	KUTZ493
KU9106	MARY		ANN	100005146	San Francisco	888555	OUTPATIENT	KUTZ494
KU9107	JUDE		ASH	100006416	San Francisco	888555	INPATIENT	KUTZ495
KUTZ485	JO		HARRIS	100009000	Berlin	888555	RADIOLOGY	KUTZ485
KUTZ486	JO		JOHN	100009001	Greater London	888555	NEUROLOGY	KUTZ486
KUTZ487	FOX		SAMANTHA	100009002	Tokyo-To	888555	TECHNOLOGY	KUTZ487

Figure 8: Employee Table Output

Number of Rows returned=55

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ExpTypeID	ExpTypeName	Lmt
AIRFARE	Airfare Expense	1000
AUTO	Auto Rental	500
BRKFAST	Breakfast Expense	30
COURIER	Courier Charge	80
DINNER	Dinner Expense	80
ENTERM	Entertainment meeting	300
ENTERO	Entertainment other	300
GAS	Gas Expense	200
GROUND	Ground Transportation	100
LAUNDRY	Laundry Expense	50
LODGING	Hotel Expense	600
LUNCH	Lunch Expense	50
MEETING	Meeting	200
PERDIEM	Per Diem Charge	100
POSTAGE	Postage Expense	70

Figure 9: Expense Type Table Output

ReimbursementID	ReimbursementDept	ReimbursementDate	ReimbursementStatus	ReimbursementAmount	ReasonofRejection	AuditorID
1868	PODIATRY	2022-04-15	Approved	69.00		KU9104
1950	PODIATRY	2022-04-27	Approved	399.00		KU9103
2450	CARDIOLOGY	2022-04-15	Approved	362.00		KU9106
2566	PROCUREMENT	2022-04-15	Approved	697.00		KU0079
2747	PODIATRY	2022-04-15	Approved	424.00		KU9105
2944	PROCUREMENT	2022-04-15	Approved	399.00		PU007
3459	PODIATRY	2022-04-29	Approved	265.00		KU0131
4632	CARDIOLOGY	2022-04-21	Approved	406.00		KU9104
5563	CARDIOLOGY	2022-04-15	Approved	910.00		KU0046
6226	CARDIOLOGY	2022-04-18	Approved	983.00		KU0119
6999	CARDIOLOGY	2022-04-15	Approved	666.00		KU0131
7546	PODIATRY	2022-04-15	Approved	225.00		KU9106
7591	PROCUREMENT	2022-04-15	Rejected	470.00	No receipt	KU9107
7784	GYNAECOLOGY	2022-04-15	Approved	767.00		PU007
8238	FINANCE	2022-04-15	Approved	305.00		PU007
8380	LOGISTICS	2022-04-15	Approved	785.00		PU007
8577	CARDIOLOGY	2022-04-15	Approved	924.00		KU9105
8605	CARDIOLOGY	2022-04-17	Approved	769.00		KU9103
9542	CARDIOLOGY	2022-04-15	Approved	21.00		PU007
9900	PROCUREMENT	2022-04-18	Rejected	198.00	No receipt	PU007

Figure 10: Reimbursement Table Output

ExpID	ReimbursementID	EMPLID	ExpDate	SubmitDate	ExpAmt	ExpDesc	ExpStatus	ExpTypeID	SupervisorID	SupervisorComment	AuditorID
0000000021	6226	KU0075	2022-04-06	2022-04-10	983.00	Training	APPROVED	DINNER	MM000000006	Approved as per policy	KU0119
0000000022	5563	KU0075	2022-04-07	2022-04-11	910.00	Out of town meeting	APPROVED	PERDIEM	MM000000006	Approved as per policy	KU0046
0000000023	9542	KU0075	2022-04-08	2022-04-12	21.00	Product training	APPROVED	LODGING	MM000000006	Approved as per policy	PU007
0000000024	6999	KU0075	2022-04-09	2022-04-13	666.00	consulting	APPROVED	ENTERM	MM000000006	Approved as per policy	KU0131
0000000025	8605	KU0075	2022-04-10	2022-04-14	769.00	Business trip	APPROVED	COURIER	MM000000006	Approved as per policy	KU9103
0000000026	4632	KU0075	2022-04-11	2022-04-15	406.00	Meeting costs	APPROVED	GAS	MM000000006	Approved as per policy	KU9104
0000000027	8577	KU0075	2022-04-12	2022-04-16	924.00	General Expense Report	APPROVED	BRKFAST	MM000000006	Approved as per policy	KU9105
0000000028	2450	KU0075	2022-04-13	2022-04-17	362.00	Customer Training	APPROVED	GROUND	MM000000006	Approved as per policy	KU9106
0000000051	7591	KU0042	2022-04-14	2022-04-18	470.00	Training for overseas sales	APPROVED	LUNCH	KUTZ490	Approved as per policy	KU9107
0000000052	9900	KU0042	2022-04-15	2022-04-19	198.00	Training for Germany branch	APPROVED	POSTAGE	KUTZ490	Approved as per policy	PU007
0000000053	8238	KU0056	2022-04-16	2022-04-20	305.00	Demo for new product	APPROVED	GROUND	KUTZ491	Approved as per policy	PU007
0000000054	7784	KU0010	2022-04-17	2022-04-21	767.00	Lunch with customer	APPROVED	GROUND	KUTZ496	Approved as per policy	PU007
0000000055	2944	KU0042	2022-04-18	2022-04-21	399.00	Campus Recruitment	APPROVED	GROUND	KUTZ490	Approved as per policy	PU007
0000000056	8380	KU0080	2022-04-19	2022-04-22	785.00	Meeting costs	APPROVED	GROUND	KUTZ485	Approved as per policy	PU007
0000000057	3459	KU0119	2022-04-20	2022-04-25	265.00	Product training	APPROVED	GROUND	KUTZ487	Approved as per policy	KU0131
0000000058	1950	KU0119	2022-04-21	2022-04-23	399.00	Out of town meeting	APPROVED	ENTERM	KUTZ487	Approved as per policy	KU9103
0000000059	1868	KU0119	2022-04-22	2022-04-26	69.00	Dev and Learning Sciences I	APPROVED	COURIER	KUTZ487	Approved as per policy	KU9104
0000000060	2747	KU0119	2022-04-23	2022-04-25	424.00	Training	APPROVED	GAS	KUTZ487	Approved as per policy	KU9105
0000000061	NULL	KU0119	2022-04-23	2022-04-26	225.00	Training	REJECTED	BRKFAST	KUTZ487	Exceeds Exp Limit	NULL
0000000070	2566	KU0042	2022-04-03	2022-04-06	697.00	Presentation in NY	APPROVED	ENTERO	KUTZ490	Approved as per policy	KU0079

Figure 11: Expense Table Output

9.4 Joins

```
1  /*End User Query 1 * - Auditor Query to find out how many expense
2  reports were approved/rejected */
3  Select E.EMPLID,E.ReimbursementID,E.ExpStatus,E.ExpAmt,
4  A.AuditorID,A.AuditorName, r.ReimbursementAmount,
5  r.ReimbursementStatus,r.ReimbursementDept,r.ReimbursementDate
6  FROM Expense E LEFT JOIN Auditor A ON A.auditorid=e.AuditorID
7  LEFT JOIN Reimbursement R ON e.ReimbursementID=r.ReimbursementID;
```

EMPLID	ReimbursementID	ExpStatus	ExpAmt	AuditorID	AuditorName	ReimbursementAmount	ReimbursementStatus	ReimbursementDept	ReimbursementDate
KU0075	6226	APPROVED	983.00	KU0119	Hoinck,Susan	983.00	Approved	CARDIOLOGY	2022-04-18
KU0075	5563	APPROVED	910.00	KU0046	Channing,Rosanna	910.00	Approved	CARDIOLOGY	2022-04-15
KU0075	9542	APPROVED	21.00	PU007	Monet,Claude	21.00	Approved	CARDIOLOGY	2022-04-15
KU0075	6999	APPROVED	666.00	KU0131	Patterson,John	666.00	Approved	CARDIOLOGY	2022-04-15
KU0075	8605	APPROVED	769.00	KU9103	Turner,Ed	769.00	Approved	CARDIOLOGY	2022-04-17
KU0075	4632	APPROVED	406.00	KU9104	Parker,Russell	406.00	Approved	CARDIOLOGY	2022-04-21
KU0075	8577	APPROVED	924.00	KU9105	Elliot,Ken	924.00	Approved	CARDIOLOGY	2022-04-15
KU0075	2450	APPROVED	362.00	KU9106	Ann,Mary	362.00	Approved	CARDIOLOGY	2022-04-15
KU0042	7591	APPROVED	470.00	KU9107	Ash,Jude	470.00	Rejected	PROCUREMENT	2022-04-15
KU0042	9900	APPROVED	198.00	PU007	Monet,Claude	198.00	Rejected	PROCUREMENT	2022-04-18
KU0056	8238	APPROVED	305.00	PU007	Monet,Claude	305.00	Approved	FINANCE	2022-04-15
KU0010	7784	APPROVED	767.00	PU007	Monet,Claude	767.00	Approved	GYNAECOLOGY	2022-04-15
KU0042	2944	APPROVED	399.00	PU007	Monet,Claude	399.00	Approved	PROCUREMENT	2022-04-15
KU0080	8380	APPROVED	785.00	PU007	Monet,Claude	785.00	Approved	LOGISTICS	2022-04-15
KU0119	3459	APPROVED	265.00	KU0131	Patterson,John	265.00	Approved	PODIATRY	2022-04-29
KU0119	1950	APPROVED	399.00	KU9103	Turner,Ed	399.00	Approved	PODIATRY	2022-04-27
KU0119	1868	APPROVED	69.00	KU9104	Parker,Russell	69.00	Approved	PODIATRY	2022-04-15
KU0119	2747	APPROVED	424.00	KU9105	Elliot,Ken	424.00	Approved	PODIATRY	2022-04-15
KU0119	NULL	REJECTED	225.00	NULL	NULL	NULL	NULL	NULL	NULL
KU0042	2566	APPROVED	697.00	KU0079	Ball,Nancy	697.00	Approved	PROCUREMENT	2022-04-15

Figure 12: Query 1 Output

```
1  /*End User Query 2 * - Auditor Query to find
2  high risk expense report for employees */
3  SELECT e1.EmpFirstName ,e1.EmpLastName ,e1.BankAccountNo ,
4  e.expid ,e.reimbursementid ,e.emplid ,e.exptypeid ,
5  et.exptypeName ,e.expamt ,et.lmt ,
6  CASE WHEN lmt -expamt < 0 THEN 'High Risk'
7  ELSE 'No Risk'
8  END as Risk , e.AuditorID
9  FROM expense e
10 NATURAL JOIN expensetype et
11 NATURAL JOIN employee e1;
```

EmpFirstName	EmpLastName	BankAccountNo	expid	reimbursementid	emplid	exptypeid	exptypeName	expamt	lmt	Risk	AuditorID
DAVID	MARTIGNONI	100003669	0000000027	8577	KU0075	BRKFAST	Breakfast Expense	924.00	30	High Risk	KU9105
SUSAN	HOINCK	100005031	0000000061	NULL	KU0119	BRKFAST	Breakfast Expense	225.00	30	High Risk	NULL
DAVID	MARTIGNONI	100003669	0000000025	8605	KU0075	COURIER	Courier Charge	769.00	80	High Risk	KU9103
SUSAN	HOINCK	100005031	0000000059	1868	KU0119	COURIER	Courier Charge	69.00	80	No Risk	KU9104
DAVID	MARTIGNONI	100003669	0000000021	6226	KU0075	DINNER	Dinner Expense	983.00	80	High Risk	KU0119
DAVID	MARTIGNONI	100003669	0000000024	6999	KU0075	ENTERM	Entertainment meeting	666.00	300	High Risk	KU0131
SUSAN	HOINCK	100005031	0000000058	1950	KU0119	ENTERM	Entertainment meeting	399.00	300	High Risk	KU9103
KENNETH	SCHUMACHER	100007407	0000000070	2566	KU0042	ENTERO	Entertainment other	697.00	300	High Risk	KU0079
DAVID	MARTIGNONI	100003669	0000000026	4632	KU0075	GAS	Gas Expense	406.00	200	High Risk	KU9104
SUSAN	HOINCK	100005031	0000000060	2747	KU0119	GAS	Gas Expense	424.00	200	High Risk	KU9105
DAVID	MARTIGNONI	100003669	0000000028	2450	KU0075	GROUND	Ground Transportation	362.00	100	High Risk	KU9106
EDWARD	NG	100004732	0000000053	8238	KU0056	GROUND	Ground Transportation	305.00	100	High Risk	PU007
SONYA	VINCENT	100006375	0000000054	7784	KU0010	GROUND	Ground Transportation	767.00	100	High Risk	PU007
KENNETH	SCHUMACHER	100007407	0000000055	2944	KU0042	GROUND	Ground Transportation	399.00	100	High Risk	PU007
NANCY	EMMERSON	100004729	0000000056	8380	KU0080	GROUND	Ground Transportation	785.00	100	High Risk	PU007
SUSAN	HOINCK	100005031	0000000057	3459	KU0119	GROUND	Ground Transportation	265.00	100	High Risk	KU0131
DAVID	MARTIGNONI	100003669	0000000023	9542	KU0075	LODGING	Hotel Expense	21.00	600	No Risk	PU007
KENNETH	SCHUMACHER	100007407	0000000051	7591	KU0042	LUNCH	Lunch Expense	470.00	50	High Risk	KU9107
DAVID	MARTIGNONI	100003669	0000000022	5563	KU0075	PERDIEM	Per Diem Charge	910.00	100	High Risk	KU0046
KENNETH	SCHUMACHER	100007407	0000000052	9900	KU0042	POSTAGE	Postage Expense	198.00	70	High Risk	PU007

Figure 13: Query 2 Output

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```sql
/*End User Query 3 * - Employee Expenses by Department */
SELECT e1.EmpFirstName,e1.EmpLastName,e1.BankAccountNo,
e.expid,e.reimbursementid,e.emplid,e.exptypeid,
et.exptypeName,e.expamt,et.lmt,
e.AuditorID,d.deptname,d.head,d.deptsize
FROM expense e, expensetype et, employee e1, department d
WHERE e.exptypeID=et.expTypeID
AND e.emplid=e1.emplid
AND e1.deptname=d.deptname
ORDER BY deptname;
```

EmpFirstName	EmpLastName	BankAccountNo	expid	reimbursementid	emplid	exptypeid	exptypeName	expamt	lmt	AuditorID	deptname	head	deptsize
DAVID	MARTIGNONI	100003669	0000000027	8577		KU0075	BRKFAST	Breakfast Expense	924.00	30	KU9105	CARDIOLOGY	Channing,Rosanna	118
DAVID	MARTIGNONI	100003669	0000000025	8605		KU0075	COURIER	Courier Charge	769.00	80	KU9103	CARDIOLOGY	Channing,Rosanna	118
DAVID	MARTIGNONI	100003669	0000000021	6226		KU0075	DINNER	Dinner Expense	983.00	80	KU0119	CARDIOLOGY	Channing,Rosanna	118
DAVID	MARTIGNONI	100003669	0000000024	6999		KU0075	ENTERM	Entertainment meeting	666.00	300	KU0131	CARDIOLOGY	Channing,Rosanna	118
DAVID	MARTIGNONI	100003669	0000000026	4632		KU0075	GAS	Gas Expense	406.00	200	KU9104	CARDIOLOGY	Channing,Rosanna	118
DAVID	MARTIGNONI	100003669	0000000028	2450		KU0075	GROUND	Ground Transportation	362.00	100	KU9106	CARDIOLOGY	Channing,Rosanna	118
DAVID	MARTIGNONI	100003669	0000000023	9542		KU0075	LODGING	Hotel Expense	21.00	600	PU007	CARDIOLOGY	Channing,Rosanna	118
DAVID	MARTIGNONI	100003669	0000000022	5563		KU0075	PERDIEM	Per Diem Charge	910.00	100	KU0046	CARDIOLOGY	Channing,Rosanna	118
EDWARD	NG	100004732	0000000053	8238		KU0056	GROUND	Ground Transportation	305.00	100	PU007	FINANCE	Collins,Mike	119
SONYA	VINCENT	100006375	0000000054	7784		KU0010	GROUND	Ground Transportation	767.00	100	PU007	GYNAECOLOGY	Hoinck,Susan	196
NANCY	EMMERSON	100004729	0000000056	8380		KU0080	GROUND	Ground Transportation	785.00	100	PU007	LOGISTICS	Patterson,John	127
SUSAN	HOINCK	100005031	0000000061	NULL		KU0119	BRKFAST	Breakfast Expense	225.00	30	NULL	PODIATRY	Ann,Mary	196
SUSAN	HOINCK	100005031	0000000059	1868		KU0119	COURIER	Courier Charge	69.00	80	KU9104	PODIATRY	Ann,Mary	196
SUSAN	HOINCK	100005031	0000000058	1950		KU0119	ENTERM	Entertainment meeting	399.00	300	KU9103	PODIATRY	Ann,Mary	196
SUSAN	HOINCK	100005031	0000000060	2747		KU0119	GAS	Gas Expense	424.00	200	KU9105	PODIATRY	Ann,Mary	196
SUSAN	HOINCK	100005031	0000000057	3459		KU0119	GROUND	Ground Transportation	265.00	100	KU0131	PODIATRY	Ann,Mary	196
KENNETH	SCHUMACHER	100007407	0000000070	2566		KU0042	ENTERO	Entertainment other	697.00	300	KU0079	PROCUREMENT	Lee,Susan	71
KENNETH	SCHUMACHER	100007407	0000000055	2944		KU0042	GROUND	Ground Transportation	399.00	100	PU007	PROCUREMENT	Lee,Susan	71
KENNETH	SCHUMACHER	100007407	0000000051	7591		KU0042	LUNCH	Lunch Expense	470.00	50	KU9107	PROCUREMENT	Lee,Susan	71
KENNETH	SCHUMACHER	100007407	0000000052	9900		KU0042	POSTAGE	Postage Expense	198.00	70	PU007	PROCUREMENT	Lee,Susan	71

Figure 14: Query 3 Output

```
1  /*End User Query 4 * - Count of submitted Expenses
2  in each Department */
3  SELECT d.deptname,COUNT(expid) AS exp_count
4  FROM employee e LEFT JOIN department d
5  ON e.deptname=d.deptname
6  LEFT JOIN expense ex ON ex.emplid=e.emplid
7  GROUP BY deptname
8  HAVING exp_count > 0;
```

deptname	exp_count
CARDIOLOGY	8
FINANCE	1
GYNAECOLOGY	1
LOGISTICS	1
PODIATRY	5
PROCUREMENT	4

Figure 15: Query 4 Output

```
1  /*End User Query 5 * - Comprehensive view of
2  all columns in database */
3  SELECT e.expid,r.reimbursementid,e1.emplid,
4  expdate,e.submitdate,e.expamt,
5  e.expdesc,e.expstatus,et.exptypeid,
6  e.supervisorid,e.supervisorcomment,a.auditorid,
7  et.exptypename,et.lmt,e1.empfirstname,e1.emplastname,
8  e1.bankaccountno,e1.location,e1.phone_no,
9  d.deptname,d.head,d.deptsize,a.auditorname,
10 r.reimbursementdept,r.reimbursementstatus,
11 r.reimbursementamount,r.reasonofrejection
12 FROM expense e LEFT JOIN expensetype et
13 ON e.exptypeID=et.expTypeID
14 LEFT JOIN employee e1 ON e.emplid=e1.emplid
15 LEFT JOIN department d ON e1.deptname=d.deptname
16 LEFT JOIN auditor a ON a.auditorid=e.auditorid
17 LEFT JOIN reimbursement r
18 ON e.reimbursementID = r.reimbursementID;
```

1. Number of Rows returned=20

2. Number of Columns returned=27

9.5 Stored Procedures

```
1 /*Stored Procedure to find the status of expense
2 report for an employee*/
3 DELIMITER //
4 CREATE PROCEDURE sp_EmployeeERstatus(IN EMPLID VARCHAR(25))
5 BEGIN
6 SELECT ExpID,ReimbursementID,EMPLID,SubmitDate,
7 ExpAmt,ExpStatus,ExpTypeID,SupervisorID,AuditorID
8 FROM Expense WHERE EMPLID=EMPLID;
9 END//
10 DELIMITER ;
11 /*Call Stored procedure using the below employee ID */
12 call sp_EmployeeERstatus('KU0075');
```

ExpID	ReimbursementID	EMPLID	SubmitDate	ExpAmt	ExpStatus	ExpTypeID	SupervisorID	AuditorID
0000000021	6226	KU0075	2022-04-10	983.00	APPROVED	DINNER	MM000000006	KU0119
0000000022	5563	KU0075	2022-04-11	910.00	APPROVED	PERDIEM	MM000000006	KU0046
0000000023	9542	KU0075	2022-04-12	21.00	APPROVED	LODGING	MM000000006	PU007
0000000024	6999	KU0075	2022-04-13	666.00	APPROVED	ENTERM	MM000000006	KU0131
0000000025	8605	KU0075	2022-04-14	769.00	APPROVED	COURIER	MM000000006	KU9103
0000000026	4632	KU0075	2022-04-15	406.00	APPROVED	GAS	MM000000006	KU9104
0000000027	8577	KU0075	2022-04-16	924.00	APPROVED	BRKFAST	MM000000006	KU9105
0000000028	2450	KU0075	2022-04-17	362.00	APPROVED	GROUND	MM000000006	KU9106
0000000051	7591	KU0075	2022-04-18	470.00	STAGED	LUNCH	KUTZ490	KU9107
0000000052	9900	KU0075	2022-04-19	198.00	STAGED	POSTAGE	KUTZ490	PU007
0000000053	8238	KU0075	2022-04-20	305.00	APPROVED	GROUND	KUTZ491	PU007
0000000054	7784	KU0075	2022-04-21	767.00	APPROVED	GROUND	KUTZ496	PU007
0000000055	2944	KU0075	2022-04-21	399.00	STAGED	GROUND	KUTZ490	PU007
0000000056	8380	KU0075	2022-04-22	785.00	STAGED	GROUND	KUTZ485	PU007
0000000057	3459	KU0075	2022-04-25	265.00	PAID	GROUND	KUTZ487	KU0131
0000000058	1950	KU0075	2022-04-23	399.00	HOLD	ENTERM	KUTZ487	KU9103
0000000059	1868	KU0075	2022-04-26	69.00	PAID	COURIER	KUTZ487	KU9104
0000000060	2747	KU0075	2022-04-25	424.00	PAID	GAS	KUTZ487	KU9105
0000000061	7546	KU0075	2022-04-26	225.00	PAID	BRKFAST	KUTZ487	KU9106
0000000070	2566	KU0075	2022-04-06	697.00	APPROVED	ENTERO	KUTZ490	KU0079

Figure 16: Stored Procedure 1 Output

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```
1  /*Stored Procedure to find Average expense incurred
2  on each expense type*/
3  DELIMITER //
4  CREATE PROCEDURE
5  sp_totalamt_exptype(IN enter_exptypename VARCHAR(50))
6  BEGIN
7  SELECT ExpTypeName,SUM(ExpAmt)
8  FROM expense e NATURAL JOIN expensetype et
9  WHERE et.ExpTypeName=enter_exptypename
10 GROUP BY 1;
11 END //
12 DELIMITER ;
13 /*Call Stored procedure using the below expense type */
14 call sp_totalamt_exptype('Breakfast Expense');
```

ExpTypeName	sum(ExpAmt)
Breakfast Expense	1149.00

Figure 17: Stored Procedure 2 Output

```
1  /*Stored Procedure to find out which employee has
2  charged a more than the expensetype limit and
3  flag them as risk*/
4  DELIMITER //
5  CREATE PROCEDURE sp_ExpenseRisk(IN EMPLID VARCHAR(25))
6  BEGIN
7  SELECT e.expid,e.reimbursementid,e.emplid,
8  e.exptypeid,et.exptypeName,e.expamt,et.lmt,
9  CASE WHEN lmt-expamt < 0 THEN 'High Risk'
10 ELSE 'No Risk'
11 END as Risk
12 FROM expense e, expensetype et
13 WHERE e.exptypeID=et.expTypeID
14 AND e.EMPLID=EMPLID;
15 END//
16 DELIMITER ;
17 /*Call Stored procedure using the below employee ID */
18 call sp_ExpenseRisk('KU0075');
```

expid	reimbursementid	emplid	exptypeid	exptypeName	expamt	lmt	Risk
0000000021	6226	KU0075	DINNER	Dinner Expense	983.00	80	High Risk
0000000022	5563	KU0075	PERDIEM	Per Diem Charge	910.00	100	High Risk
0000000023	9542	KU0075	LODGING	Hotel Expense	21.00	600	No Risk
0000000024	6999	KU0075	ENTERM	Entertainment meeting	666.00	300	High Risk
0000000025	8605	KU0075	COURIER	Courier Charge	769.00	80	High Risk
0000000026	4632	KU0075	GAS	Gas Expense	406.00	200	High Risk
0000000027	8577	KU0075	BRKFAST	Breakfast Expense	924.00	30	High Risk
0000000028	2450	KU0075	GROUND	Ground Transportation	362.00	100	High Risk

Figure 18: Stored Procedure 3 Output

9.6 Views

```
1  /*View for employees to see the status of their expense
2  report with security so that employee can only
3  inquire about their report*/
4  CREATE VIEW v_empl_expense AS
5  SELECT e.ExpID,e.ReimbursementID,e.EMPLID,e.ExpDate,
6  e.SubmitDate,e.ExpAmt,e.ExpTypeID,e.SupervisorID,
7  e.SupervisorComment,e.AuditorID from expense e
8  WHERE e.emplid='KU0075';
9  /*viewing data in the view */
10 select * from v_empl_expense;
```

ExpID	ReimbursementID	EMPLID	ExpDate	SubmitDate	ExpAmt	ExpTypeID	SupervisorID	SupervisorComment	AuditorID
0000000021	6226	KU0075	2022-04-06	2022-04-10	983.00	DINNER	MM000000006	Approved as per policy	KU0119
0000000022	5563	KU0075	2022-04-07	2022-04-11	910.00	PERDIEM	MM000000006	Approved as per policy	KU0046
0000000023	9542	KU0075	2022-04-08	2022-04-12	21.00	LODGING	MM000000006	Approved as per policy	PU007
0000000024	6999	KU0075	2022-04-09	2022-04-13	666.00	ENTERM	MM000000006	Approved as per policy	KU0131
0000000025	8605	KU0075	2022-04-10	2022-04-14	769.00	COURIER	MM000000006	Approved as per policy	KU9103
0000000026	4632	KU0075	2022-04-11	2022-04-15	406.00	GAS	MM000000006	Approved as per policy	KU9104
0000000027	8577	KU0075	2022-04-12	2022-04-16	924.00	BRKFAST	MM000000006	Approved as per policy	KU9105
0000000028	2450	KU0075	2022-04-13	2022-04-17	362.00	GROUND	MM000000006	Approved as per policy	KU9106

Figure 19: View 1 Output

```
1  /*View to see total reimbursement amount disbursed
2  as on particular date*/
3  CREATE VIEW total_reimbursement_AMT AS (
4  SELECT reimbursementdate,SUM(reimbursementamount)
5  AS total_reimbursementAMT
6  FROM reimbursement
7  GROUP BY 1
8  );
9  /*viewing data in the view */
10 SELECT * FROM total_reimbursement_AMT;
11 SELECT * FROM total_reimbursement_AMT
12 WHERE reimbursementdate ='2022-04-15';
```

reimbursementdate	total_reimbursementAMT
2022-04-15	7024.00
2022-04-27	399.00
2022-04-29	265.00
2022-04-21	406.00
2022-04-18	1181.00
2022-04-17	769.00

Figure 20: View 2a Output

reimbursementdate	total_reimbursementAMT
2022-04-15	7024.00

Figure 21: View 2b Output

```
1  /*View for Auditor to see all expenses audited and
2  their associated reimbusement with access to auditors
3  to see their expense report which were audited*/
4  CREATE VIEW v_empl_auditor AS
5  SELECT e.expid,e.ReimbursementID,e.EMPLID,e.ExpDate,
6  e.ExpAmt,r.ReimbursementStatus,r.ReimbursementAmount,
7  r.ReasonofRejection,r.AuditorID
8  FROM expense e, reimbursement r
9  WHERE e.ReimbursementID=r.ReimbursementID
10 AND e.auditorid=r.auditorid
11 AND r.auditorid='PU007';
12 /*viewing data in the view */
13 SELECT * FROM v_empl_auditor;
```

expid	ReimbursementID	EMPLID	ExpDate	ExpAmt	ReimbursementStatus	ReimbursementAmount	ReasonofRejection	AuditorID
0000000023	9542	KU0075	2022-04-08	21.00	Approved	21.00		PU007
0000000052	9900	KU0042	2022-04-15	198.00	Rejected	198.00	No receipt	PU007
0000000053	8238	KU0056	2022-04-16	305.00	Approved	305.00		PU007
0000000054	7784	KU0010	2022-04-17	767.00	Approved	767.00		PU007
0000000055	2944	KU0042	2022-04-18	399.00	Approved	399.00		PU007
0000000056	8380	KU0080	2022-04-19	785.00	Approved	785.00		PU007

Figure 22: View 3 Output