Expensify

An Expense And Procurement Management System

(Project for - MSIS 2603 -Database Management Systems)

Team Expensify:

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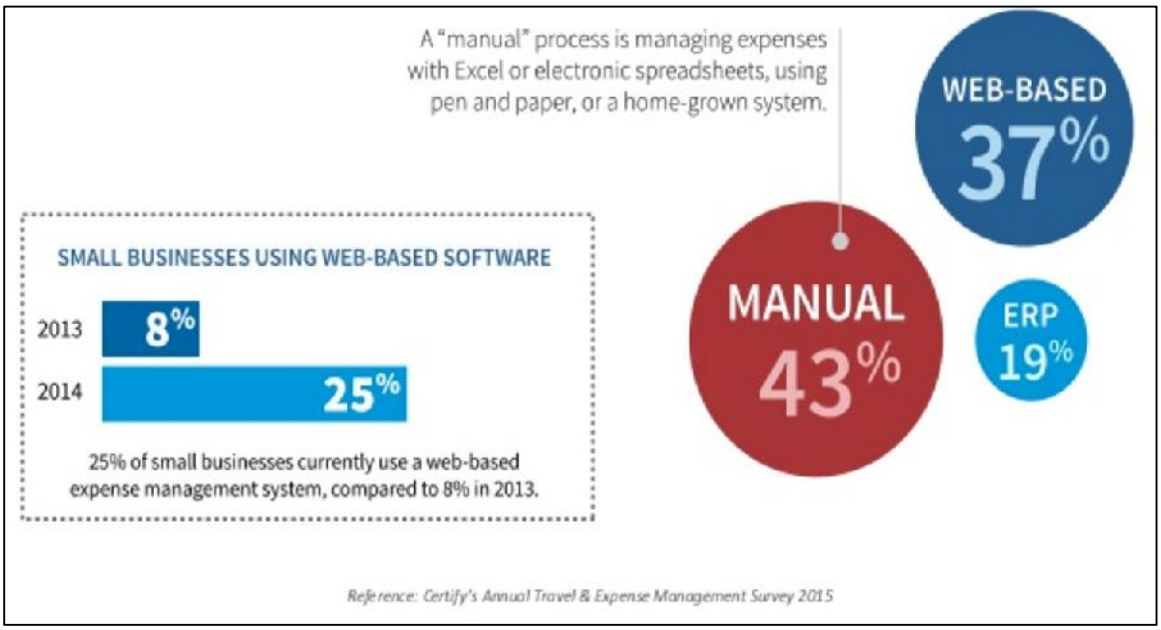
1. Business Need, Application Description and Business Value

Automation of expense and procurement management is becoming extremely crucial and organizations are rapidly adopting automation for this process. Following data shows trends in the industry.



Expense and Procurement Management system (Expensify) automates the expense claims and purchase requests for employees in the company. Expensify mainly caters to small to medium companies where people go through tedious process of manual application for expense claims (reimbursement request) and purchase request.

Automation in reimbursement and procurement requests brings transparency in the requests as well as approvals. This automation would also bring efficiency to the overall expense and procurement management.

2. Users Of Expensify

- Requestors – Requestor is any employee of the organization using Expensify, who wants to make Purchase request or a Reimbursement request

- Managers – Manager is an employee of the organization, who has authority to approve purchase requests based on the purchase limit of the requester.

- Procurement and Payment Associate – Procurement and Payment Associate is an employee of the organization, who creates purchase orders in the system and makes payment for Invoices.

- Suppliers – Suppliers have restricted access to Expensify wherein they can view purchase orders assigned to them and can update the status as the order progresses.

- Analysts – Analyst is a very important user of Expensify, who would slice and dice the data and draw reports to help decision making.

3. Use Cases

Requestor

- Create a purchase request for items like laptop, keyboard, mouse, projector, dock station etc.
- Cancel the request
- Create a reimbursement request for reimbursement related to business travel, food, accommodation, team outings etc.
- View purchase / reimbursement requests submitted in the past

Manager

- View pending and approved Purchase requests
- Search for a request by a Request ID or by approver's name
- Approve or reject requests made by the requestors based on the requestors' expense limit

Procurement and Payment Associate

- View and verify the approved purchase requests
- Create purchase orders associated with a purchase request
- Track open purchase orders
- Make payments for invoices

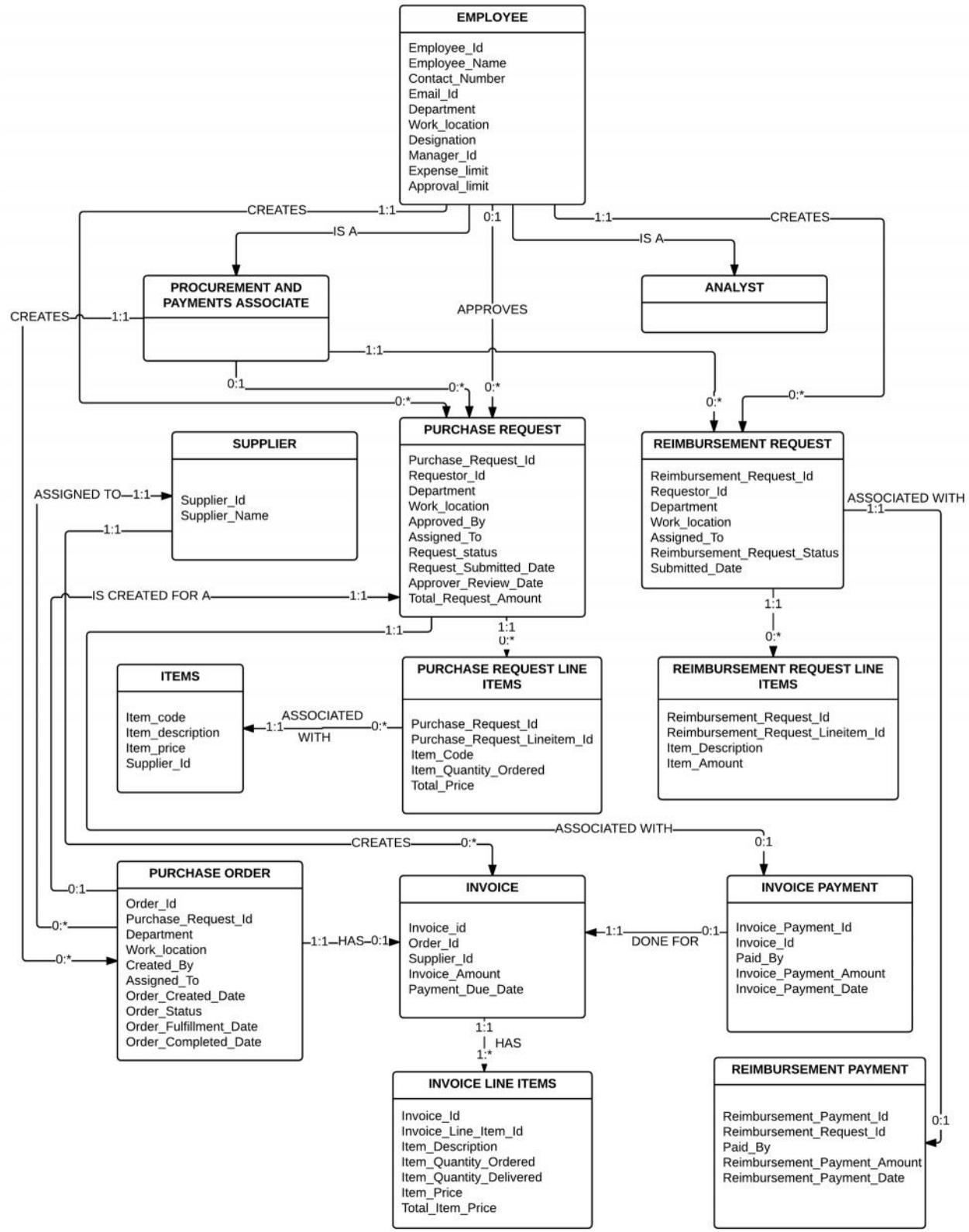
Suppliers

- View and update the order status and order fulfillment date
- View past and pending orders

Analyst

- Draw business metrics reports like – Suppliers by spend, total spend by departments and work locations, overdue payments, delayed deliveries etc.

4. UML Model


EMPLOYEE
Employee_Id
Employee_Name
Contact_Number
Email_Id
Department
Work_location
Designation
Manager_Id
Expense_limit
Approval_limit
CREATES
1:1
0:1
IS A
PROCUREMENT AND PAYMENTS ASSOCIATE
APPROVES
ANALYST
0:*
SUPPLIER
Supplier_Id
Supplier_Name
ASSIGNED TO
PURCHASE REQUEST
Purchase_Request_Id
Requestor_Id
Department
Work_location
Approved_By
Assigned_To
Request_status
Request_Submitted_Date
Approver_Review_Date
Total_Request_Amount
REIMBURSEMENT REQUEST
Reimbursement_Request_Id
Requestor_Id
Department
Work_location
Assigned_To
Reimbursement_Request_Status
Submitted_Date
ASSOCIATED WITH
IS CREATED FOR A
ITEMS
Item_code
Item_description
Item_price
Supplier_Id
ASSOCIATED WITH
PURCHASE REQUEST LINE ITEMS
Purchase_Request_Id
Purchase_Request_Lineitem_Id
Item_Code
Item_Quantity_Ordered
Total_Price
REIMBURSEMENT REQUEST LINE ITEMS
Reimbursement_Request_Id
Reimbursement_Request_Lineitem_Id
Item_Description
Item_Amount
PURCHASE ORDER
Order_Id
Purchase_Request_Id
Department
Work_location
Created_By
Assigned_To
Order_Created_Date
Order_Status
Order_Fulfillment_Date
Order_Completed_Date
HAS
INVOICE
Invoice_id
Order_Id
Supplier_Id
Invoice_Amount
Payment_Due_Date
DONE FOR
INVOICE PAYMENT
Invoice_Payment_Id
Invoice_Id
Paid_By
Invoice_Payment_Amount
Invoice_Payment_Date
INVOICE LINE ITEMS
Invoice_Id
Invoice_Line_Item_Id
Item_Description
Item_Quantity_Ordered
Item_Quantity_Delivered
Item_Price
Total_Item_Price
REIMBURSEMENT PAYMENT
Reimbursement_Payment_Id
Reimbursement_Request_Id
Paid_By
Reimbursement_Payment_Amount
Reimbursement_Payment_Date

5. Physical Schema – Data Dictionary

EMPLOYEE		
COLUMN_NAME	**DATA_TYPE**	**CONSTRAINT(PK,FK,NULLABLE)**
EMPLOYEE_ID	INTEGER	PRIMARY KEY, NOT NULL
EMPLOYEE_NAME	VARCHAR(70)	NOT NULL
EMAIL_ID	VARCHAR(50)	NOT NULL
CONTACT_NO	VARCHAR(15)	NULL
DESIGNATION	VARCHAR(20)	NOT NULL
DEPARTMENT	VARCHAR(20)	NOT NULL
WORK_LOCATION	VARCHAR(20)	NOT NULL
EXPENSE_LIMIT	DECIMAL(10,2)	NOT NULL
APPROVAL_LIMIT	DECIMAL(10,2)	NULL

ROLE		
COLUMN_NAME	**DATA_TYPE**	**CONSTRAINT(PK,FK,NULLABLE)**
ROLE_ID	INTEGER	PRIMARY KEY, NOT NULL
ROLE_NAME	VARCHAR(20)	NOT NULL

USER_ROLE		
COLUMN_NAME	**DATA_TYPE**	**CONSTRAINT(PK,FK,NULLABLE)**
USER_ROLE_KEY_ID	INTEGER	PRIMARY KEY,NOT NULL
EMPLOYEE_ID	INTEGER	FOREIGN KEY (EMPLOYEE -> EMPLOYEE_ID), NOT NULL
ROLE_ID	INTEGER	FOREIGN KEY (ROLE -> ROLE_ID), NOT NULL

MANAGES		
COLUMN_NAME	**DATA_TYPE**	**CONSTRAINT (PK, FK,NULLABLE)**
EMPLOYEE_ID	INTEGER	FOREIGN KEY (EMPLOYEE -> EMPLOYEE_ID), NOT NULL
MANAGER_ID	INTEGER	FOREIGN KEY (EMPLOYEE -> EMPLOYEE_ID), NOT NULL
PRIMARY KEY - EMPLOYEE_ID, APPROVER_ID		

SUPPLIER		
COLUMN_NAME	**DATA_TYPE**	**CONSTRAINT(PK, FK,NULLABLE)**
SUPPLIER_ID	INTEGER	PRIMARY KEY, NOT NULL
SUPPLIER_NAME	VARCHAR(70)	NOT NULL
SUPPLIER_EMAIL ID	VARCHAR (50)	NOT NULL

PURCHASE REQUEST		
COLUMN_NAME	**DATA_TYPE**	**CONSTRAINT (PK, FK, NULLABLE)**
PURCHASE REQUEST_ID	INTEGER	PRIMARY KEY, NOT NULL
REQUESTOR_ID	INTEGER	FOREIGN KEY (EMPLOYEE -> EMPLOYEE_ID), NOT NULL
APPROVED_BY	INTEGER	FOREIGN KEY (EMPLOYEE -> EMPLOYEE_ID), NULL
REQUEST_STATUS	VARCHAR (20)	NOT NULL, DOMAIN VALUES - (OPEN, APPROVED, REJECTED, CLOSED)
ASSIGNED_TO	INTEGER	FOREIGN KEY (EMPLOYEE -> EMPLOYEE_ID), NULL
REQUEST_SUBMITTED_DATE	DATETIME	NOT NULL
TOTAL_REQUEST_AMOUNT	DECIMAL (10,2)	NOT NULL
APPROVER_REVIEW_DATE	DATETIME	NULL
DEPARTMENT	VARCHAR (20)	NOT NULL
WORK_LOCATION	VARCHAR (20)	NOT NULL

REIMBURSEMENT_REQUEST		
COLUMN_NAME	**DATA_TYPE**	**CONSTRAINT (PK,FK,NULLABLE)**
REIMBURSEMENT_REQUEST_ID	INTEGER	PRIMARY KEY, NOT NULL
REQUESTOR_ID	INTEGER	FOREIGN KEY (EMPLOYEE -> EMPLOYEE_ID),NOT NULL
ASSIGNED_TO	INTEGER	FOREIGN KEY (EMPLOYEE -> EMPLOYEE_ID),NOT NULL
SUBMITTED_DATE	DATETIME	NOT NULL
REIMBURSEMENT_REQUEST_STATUS	VARCHAR (20)	NOT NULL, DOMAIN VALUES - (OPEN, APPROVED, REJECTED, CLOSED)
DEPARTMENT	VARCHAR (20)	NOT NULL
WORK_LOCATION	VARCHAR (20)	NOT NULL

ITEMS		
COLUMN_NAME	**DATA_TYPE**	**CONSTRAINT(PK,FK,NULLABLE)**
ITEM_CODE	VARCHAR (20)	PRIMARY KEY, NOT NULL
ITEM_DESCRIPTION	VARCHAR(50)	NOT NULL
ITEM_PRICE	DECIMAL(7,2)	NOT NULL
SUPPLIER_ID	INTEGER	FOREIGN KEY (SUPPLIER-> SUPPLIER_ID),NOT NULL

PURCHASE_REQUEST_LINE_ITEMS		
COLUMN_NAME	**DATA_TYPE**	**CONSTRAINT (PK,FK, NULLABLE)**
PURCHASE_REQUEST_ID	INTEGER	FOREIGN KEY (PURCHASE REQUEST -> PURCHASE_REQUEST_ID), NOT NULL
PURCHASE_REQUEST_LINE_ITEM_ID	INTEGER	NOT NULL
ITEM_CODE	VARCHAR (20)	FOREIGN KEY (ITEMS -> ITEM_CODE), NOT NULL
ITEM_QUANTITY_ORDERED	INTEGER	NOT NULL
TOTAL_PRICE	DECIMAL (10,2)	NOT NULL
PRIMARY KEY(PURCHASE_REQUEST_ID,PURCHASE_REQUEST_LINE_ITEM_D)		

REIMBURSEMENT_REQUEST_LINE_ITEMS		
COLUMN_NAME	**DATA_TYPE**	**CONSTRAINT(PK,FK,NULLABLE)**
REIMBURSEMENT_REQUEST_ID	INTEGER	FOREIGN KEY(REIMBURSEMENT REQUEST -> REIMBURSEMENT_REQUEST_ID), NOT NULL
REIMBURSEMENT_REQUEST_LINE_ITEM_ID	INTEGER	NOT NULL
ITEM_DESCRIPTION	VARCHAR(50)	NOT NULL
ITEM_AMOUNT	DECIMAL(7,2)	NOT NULL
PRIMARY KEY (REIMBURSEMENT_REQUEST_ID,REIMBURSEMENT_REQUEST_LINE_ITEM_D)		

PURCHASE_ORDER		
COLUMN_NAME	**DATA_TYPE**	**CONSTRAINT(PK,FK,NULLABLE)**
ORDER_ID	INTEGER	PRIMARY KEY, NOT NULL
PURCHASE_REQUEST_ID	INTEGER	FOREIGN KEY(PURCHASE_REQUEST -> PURCHASE_REQUEST_ID), NOT NULL
ORDER_CREATED_DATE	DATETIME	NOT NULL
ORDER_STATUS	VARCHAR(20)	NOT NULL, DOMAIN VALUES - (OPEN, WIP, FULFILLED, COMPLETED)
ORDER_FULFILLMENT_DATE	DATETIME	NULL
CREATED_BY	INTEGER	NOT NULL
ASSIGNED_TO	INTEGER	FOREIGN KEY (SUPPLIER -> SUPPLIER_ID), NULL
DEPARTMENT	VARCHAR(20)	NOT NULL
WORK_LOCATION	VARCHAR (20)	NOT NULL
ORDER_COMPLETED_DATE	DATETIME	NULL

INVOICE		
COLUMN_NAME	**DATA_TYPE**	**CONSTRAINT(PK,FK,NULLABLE)**
INVOICE_ID	INTEGER	PRIMARY KEY, NOT NULL
ORDER_ID	INTEGER	FOREIGN KEY(PURCHASE_ORDER -> ORDER_ID), NOT NULL
SUPPLIER_ID	INTEGER	FOREIGN KEY(SUPPLIER -> SUPPLIER_ID), NOT NULL
INVOICE_AMOUNT	DECIMAL(10,2)	NOT NULL
PAYMENT_DUE_DATE	DATETIME	NOT NULL

INVOICE_LINE_ITEMS		
COLUMN_NAME	**DATA_TYPE**	**CONSTRAINT(PK,FK,NULLABLE)**
INVOICE_ID	INTEGER	FOREIGN KEY (INVOICE --> INVOICE_ID), NOT NULL
INVOICE_LINE_ITEM_ID	INTEGER	NOT NULL
ITEM_DESCRIPTION	VARCHAR(50)	NOT NULL
ITEM_QUANTITY_ORDERED	INTEGER	NOT NULL
ITEM_QUANTITY_DELIVERED	INTEGER	NOT NULL
ITEM_PRICE	DECIMAL(7,2)	NOT NULL
TOTAL_ITEM_PRICE	DECIMAL(10,2)	NOT NULL
PRIMARY KEY(INVOICE_ID,INVOICE_LINE_ITEM_ID)		

INVOICE_PAYMENT		
COLUMN_NAME	**DATA_TYPE**	**CONSTRAINT(PK,FK,NULLABLE)**
INVOICE_PAYMENT_ID	INTEGER	PRIMARY KEY,NOT NULL
INVOICE_PAYMENT_AMOUNT	DECIMAL(10,2)	NOT NULL
INVOICE_PAYMENT_DATE	DATETIME	NOT NULL
INVOICE_ID	INTEGER	FOREIGN KEY(INVOICE -> INVOICE_ID), NOT NULL
PAID_BY	INTEGER	FOREIGN KEY (EMPLOYEE -> EMPLOYEE_ID), NULL

REIMBURSEMENT_PAYMENT		
COLUMN_NAME	**DATA_TYPE**	**CONSTRAINT (PK, FK,NULLABLE)**
REIMBURSEMENT_PAYMENT_ID	INTEGER	PRIMARY KEY, NOT NULL
REIMBURSEMENT_PAYMENT_AMOUNT	DECIMAL(7,2)	NOT NULL
REIMBURSEMENT_PAYMENT_DATE	DATETIME	NOT NULL
REIMBURSEMENT_REQUEST_ID	INTEGER	FOREIGN KEY (REIMBURSEMENT REQUEST -> REIMBURSEMENT REQUEST_ID), NOT NULL
PAID_BY	INTEGER	FOREIGN KEY (EMPLOYEE -> EMPLOYEE_ID), NOT NULL

6. SQL Scripts

- Initial state script – Contains creation of tables and population of data
- Final script – Contains all inserts, updates and deletions

  Both scripts submitted along with Report

7. SQL queries

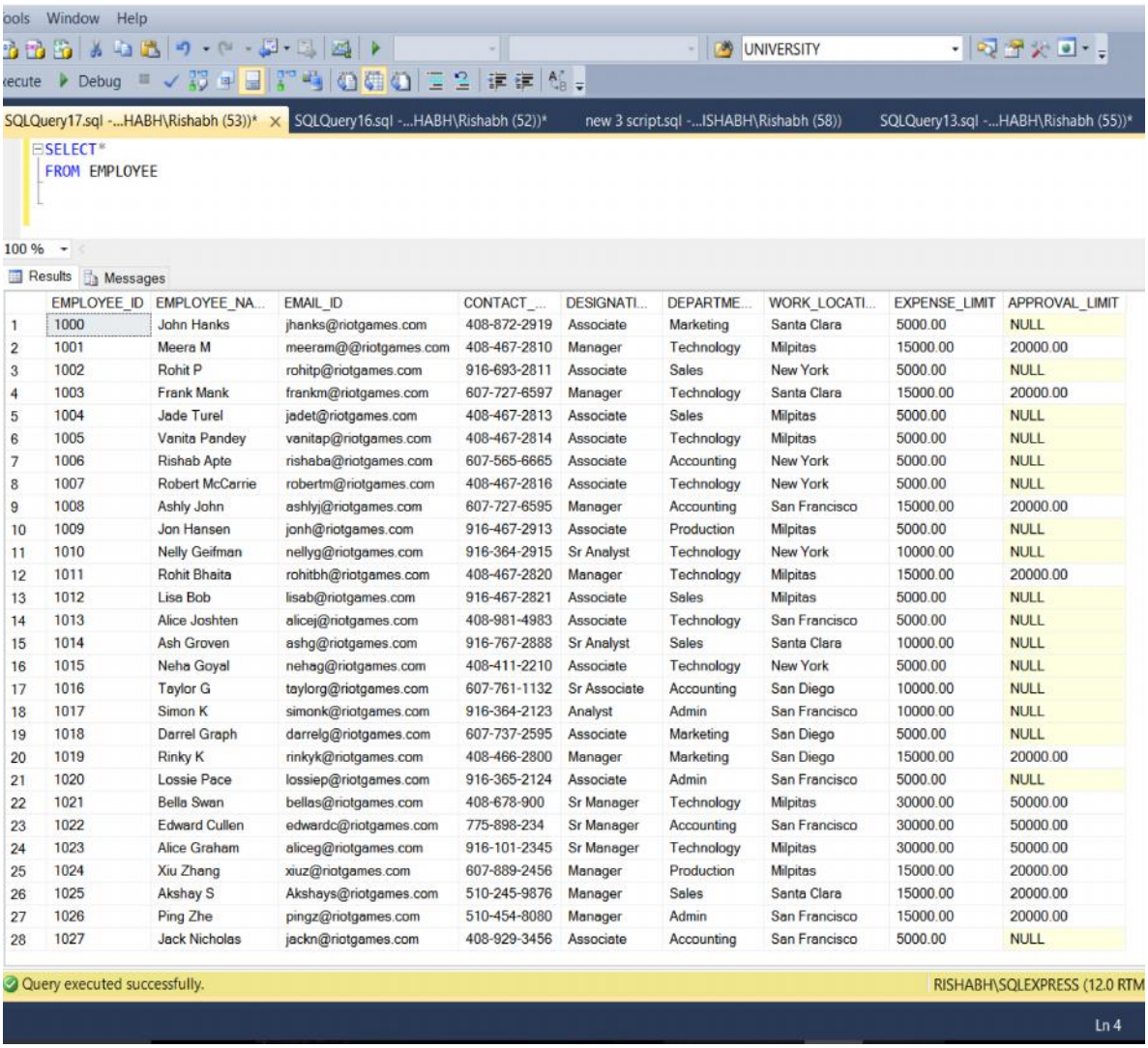
Business Process 1:

When a new employee joins the organization his/her details are inserted in the employee table. Any changes to these details would be updated as and when needed. When the employee leaves the organization this record is deleted.

Insert a new employee

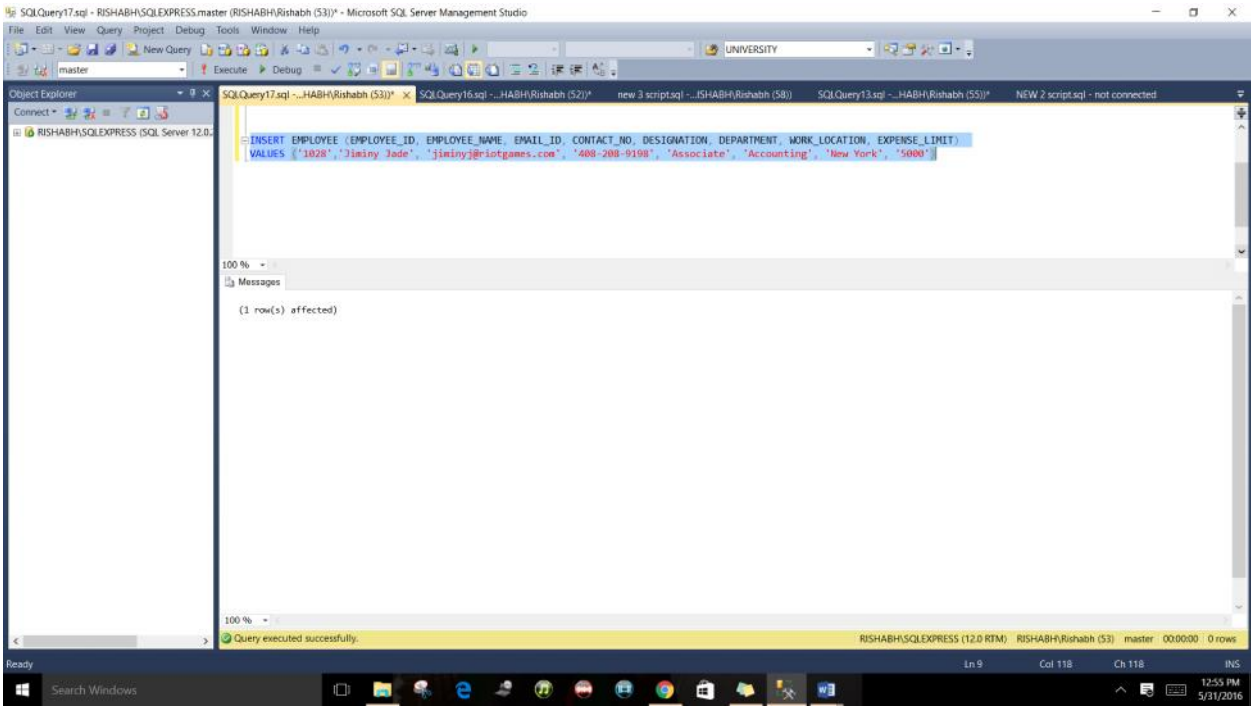
Step 1: Insert employee into Employee table

BEFORE PROCESSING THE INSERT EMPLOYEE QUERY

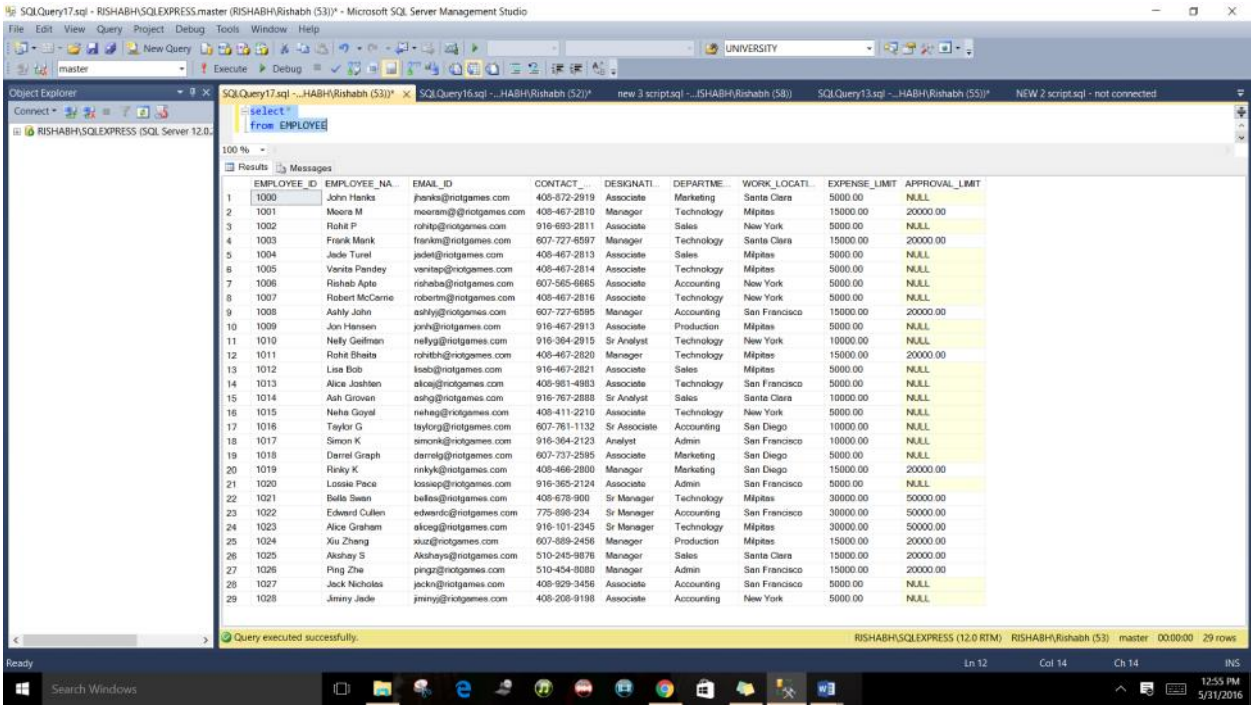


	EMPLOYEE_ID	EMPLOYEE_NA...	EMAIL_ID	CONTACT_...	DESIGNATI...	DEPARTME...	WORK_LOCATI...	EXPENSE_LIMIT	APPROVAL_LIMIT
1	1000	John Hanks	jhanks@riotgames.com	408-872-2919	Associate	Marketing	Santa Clara	5000.00	NULL
2	1001	Meera M	meeram@@riotgames.com	408-467-2810	Manager	Technology	Milpitas	15000.00	20000.00
3	1002	Rohit P	rohitp@riotgames.com	916-693-2811	Associate	Sales	New York	5000.00	NULL
4	1003	Frank Mank	frankm@riotgames.com	607-727-6597	Manager	Technology	Santa Clara	15000.00	20000.00
5	1004	Jade Turel	jadet@riotgames.com	408-467-2813	Associate	Sales	Milpitas	5000.00	NULL
6	1005	Vanita Pandey	vanitap@riotgames.com	408-467-2814	Associate	Technology	Milpitas	5000.00	NULL
7	1006	Rishab Apte	rishaba@riotgames.com	607-565-6665	Associate	Accounting	New York	5000.00	NULL
8	1007	Robert McCarrie	robertm@riotgames.com	408-467-2816	Associate	Technology	New York	5000.00	NULL
9	1008	Ashly John	ashlyj@riotgames.com	607-727-6595	Manager	Accounting	San Francisco	15000.00	20000.00
10	1009	Jon Hansen	jonh@riotgames.com	916-467-2913	Associate	Production	Milpitas	5000.00	NULL
11	1010	Nelly Geifman	nellyg@riotgames.com	916-364-2915	Sr Analyst	Technology	New York	10000.00	NULL
12	1011	Rohit Bhaita	rohitbh@riotgames.com	408-467-2820	Manager	Technology	Milpitas	15000.00	20000.00
13	1012	Lisa Bob	lisab@riotgames.com	916-467-2821	Associate	Sales	Milpitas	5000.00	NULL
14	1013	Alice Joshten	alicej@riotgames.com	408-981-4983	Associate	Technology	San Francisco	5000.00	NULL
15	1014	Ash Groven	ashg@riotgames.com	916-767-2888	Sr Analyst	Sales	Santa Clara	10000.00	NULL
16	1015	Neha Goyal	nehag@riotgames.com	408-411-2210	Associate	Technology	New York	5000.00	NULL
17	1016	Taylor G	taylorg@riotgames.com	607-761-1132	Sr Associate	Accounting	San Diego	10000.00	NULL
18	1017	Simon K	simonk@riotgames.com	916-364-2123	Analyst	Admin	San Francisco	10000.00	NULL
19	1018	Darrel Graph	darrelg@riotgames.com	607-737-2595	Associate	Marketing	San Diego	5000.00	NULL
20	1019	Rinky K	rinkyk@riotgames.com	408-466-2800	Manager	Marketing	San Diego	15000.00	20000.00
21	1020	Lossie Pace	lossiep@riotgames.com	916-365-2124	Associate	Admin	San Francisco	5000.00	NULL
22	1021	Bella Swan	bellas@riotgames.com	408-678-900	Sr Manager	Technology	Milpitas	30000.00	50000.00
23	1022	Edward Cullen	edwardc@riotgames.com	775-898-234	Sr Manager	Accounting	San Francisco	30000.00	50000.00
24	1023	Alice Graham	aliceg@riotgames.com	916-101-2345	Sr Manager	Technology	Milpitas	30000.00	50000.00
25	1024	Xiu Zhang	xiuz@riotgames.com	607-889-2456	Manager	Production	Milpitas	15000.00	20000.00
26	1025	Akshay S	Akshays@riotgames.com	510-245-9876	Manager	Sales	Santa Clara	15000.00	20000.00
27	1026	Ping Zhe	pingz@riotgames.com	510-454-8080	Manager	Admin	San Francisco	15000.00	20000.00
28	1027	Jack Nicholas	jackn@riotgames.com	408-929-3456	Associate	Accounting	San Francisco	5000.00	NULL

QUERY PROCESSING



AFTER PROCESSING THE INSERT EMPLOYEE QUERY



	EMPLOYEE_ID	EMPLOYEE_NA...	EMAIL_ID	CONTACT_...	DESIGNATI...	DEPARTME...	WORK_LOCATI...	EXPENSE_LIMIT	APPROVAL_LIMIT
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2	1001	Meera M	meeram@@riotgames.com	408-467-2810	Manager	Technology	Milpitas	15000.00	20000.00
3	1002	Rohit P	rohitp@riotgames.com	916-693-2811	Associate	Sales	New York	5000.00	NULL
4	1003	Frank Mank	frankm@riotgames.com	607-727-6597	Manager	Technology	Santa Clara	15000.00	20000.00
5	1004	Jade Turel	jadet@riotgames.com	408-467-2813	Associate	Sales	Milpitas	5000.00	NULL
6	1005	Vanita Pandey	vanitap@riotgames.com	408-467-2814	Associate	Technology	Milpitas	5000.00	NULL
7	1006	Rishab Apte	rishaba@riotgames.com	607-565-6665	Associate	Accounting	New York	5000.00	NULL
8	1007	Robert McCarrie	robertm@riotgames.com	408-467-2816	Associate	Technology	New York	5000.00	NULL
9	1008	Ashly John	ashlyj@riotgames.com	607-727-6595	Manager	Accounting	San Francisco	15000.00	20000.00
10	1009	Jon Hansen	jonh@riotgames.com	916-467-2913	Associate	Production	Milpitas	5000.00	NULL
11	1010	Nelly Geifman	nellyg@riotgames.com	916-364-2915	Sr Analyst	Technology	New York	10000.00	NULL
12	1011	Rohit Bhaita	rohitbh@riotgames.com	408-467-2820	Manager	Technology	Milpitas	15000.00	20000.00
13	1012	Lisa Bob	lisab@riotgames.com	916-467-2821	Associate	Sales	Milpitas	5000.00	NULL
14	1013	Alice Jashten	alicej@riotgames.com	408-981-4983	Associate	Technology	San Francisco	5000.00	NULL
15	1014	Ash Grovon	ashg@riotgames.com	916-767-2888	Sr Analyst	Sales	Santa Clara	10000.00	NULL
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17	1016	Taylor G	taylorg@riotgames.com	607-761-1132	Sr Associate	Accounting	San Diego	10000.00	NULL
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19	1018	Darrel Graph	darrelg@riotgames.com	607-737-2595	Associate	Marketing	San Diego	5000.00	NULL
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23	1022	Edward Cullen	edwardc@riotgames.com	775-898-234	Sr Manager	Accounting	San Francisco	30000.00	50000.00
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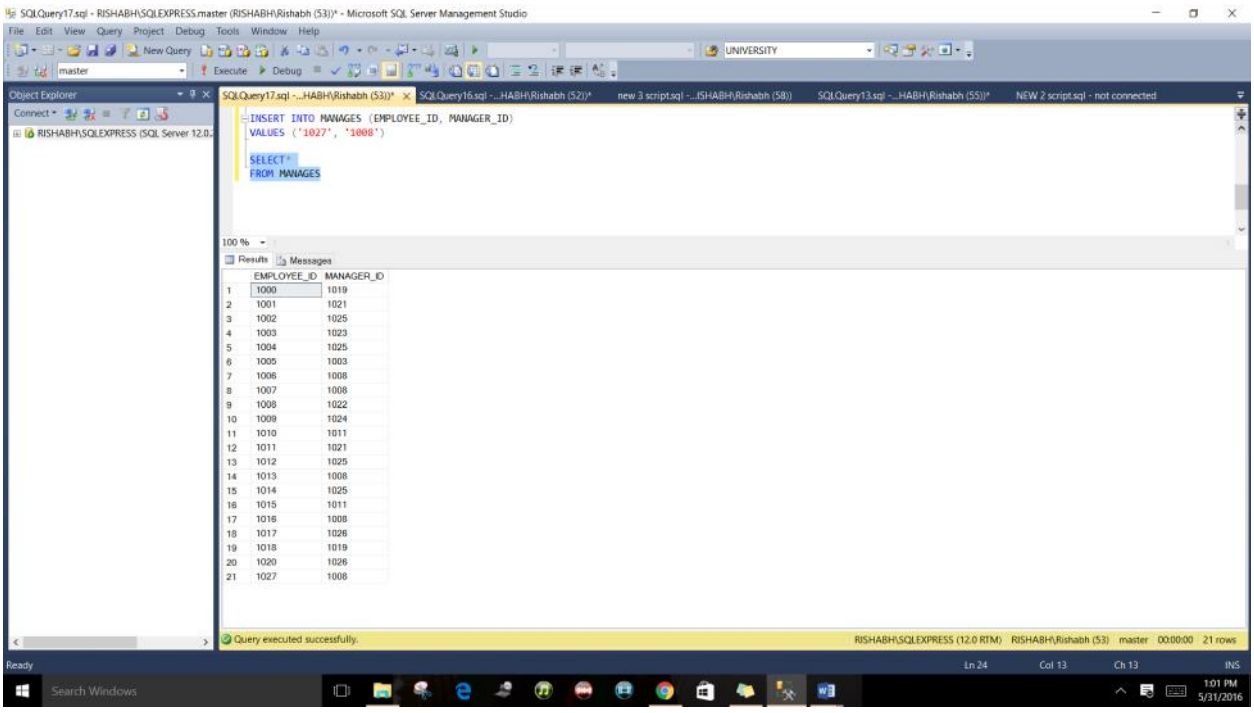
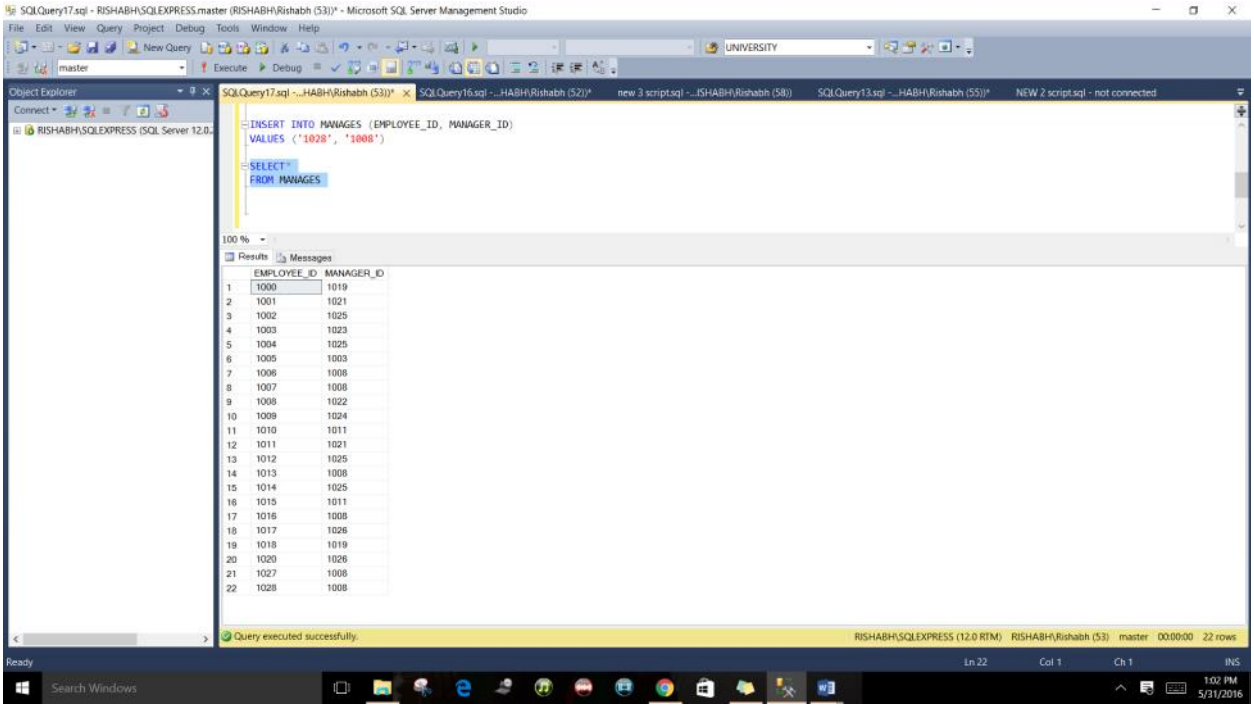
27	1026	Ping Zhe	pingz@riotgames.com	510-454-8080	Manager	Admin	San Francisco	15000.00	20000.00
28	1027	Jack Nicholas	jackn@riotgames.com	408-929-3456	Associate	Accounting	San Francisco	5000.00	NULL
29	1028	Jiminy Jade	jiminyj@riotgames.com	408-208-9198	Associate	Accounting	New York	5000.00	NULL

Step 2: Insert Employee record 1028 in MANAGES

BEFORE PROCESSING THE QUERY

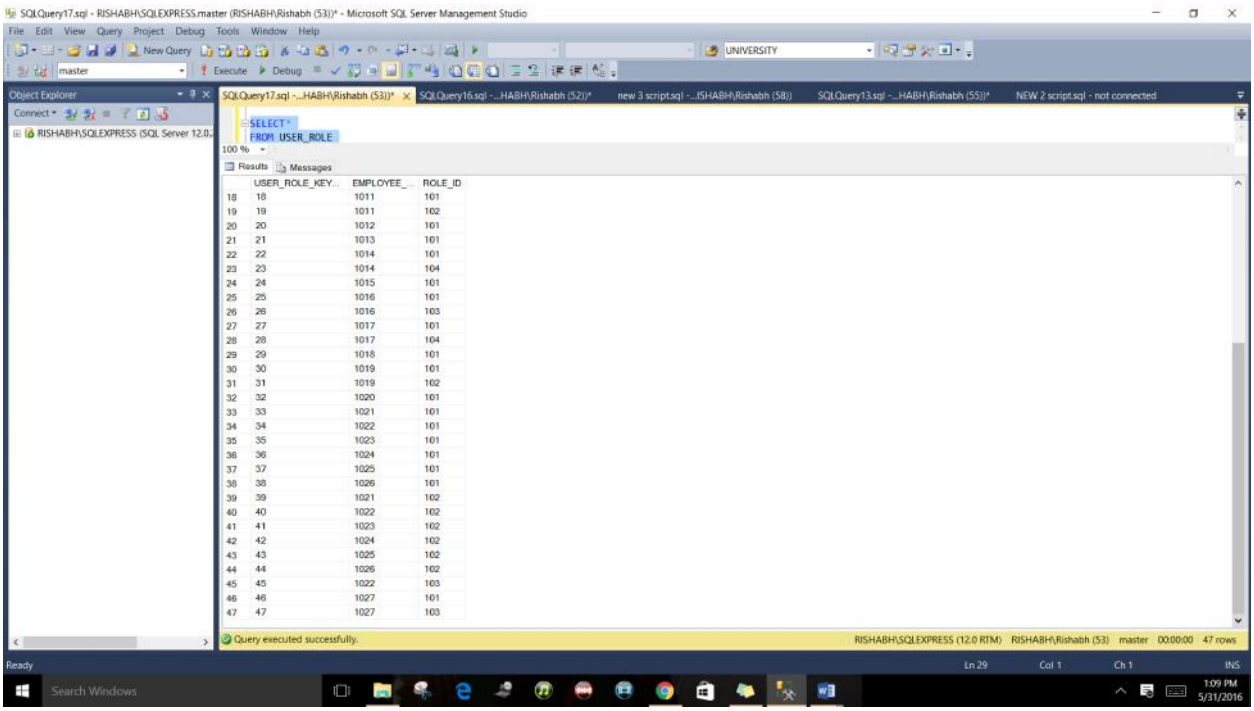


QUERY PROCESSING & AFTER PROCESSING THE QUERY

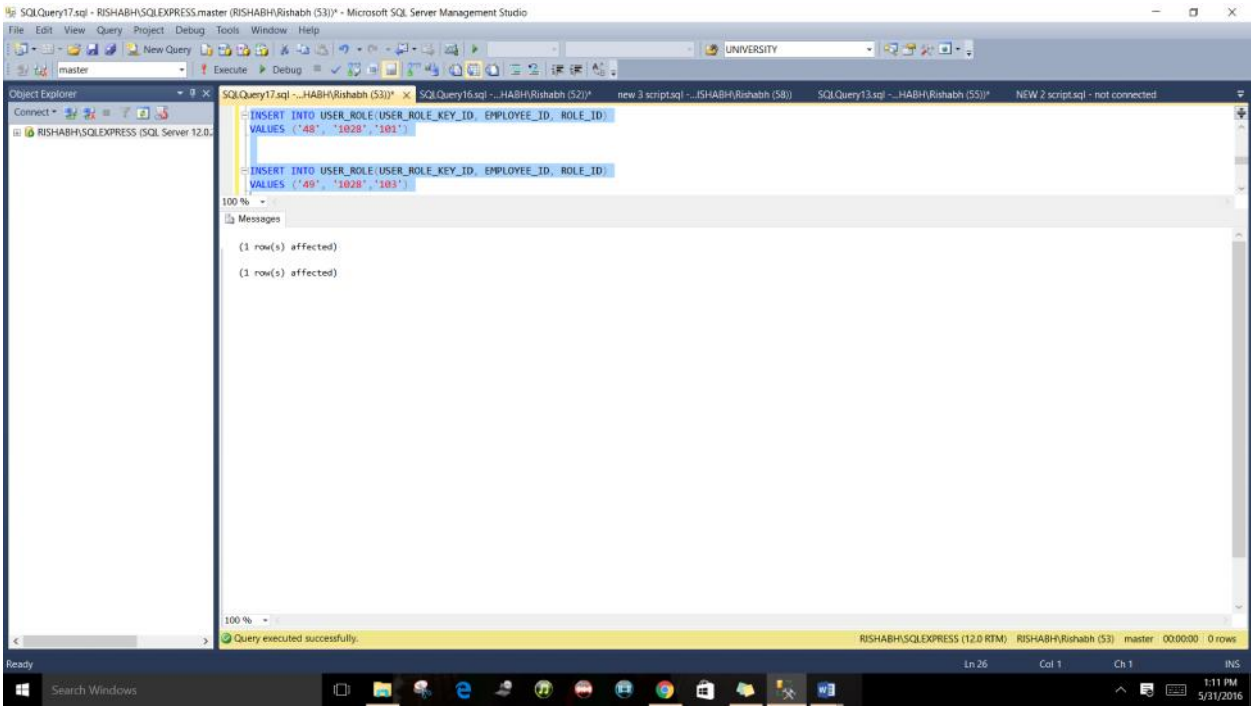


Step 3: Insert Employee roles in USER_ROLE

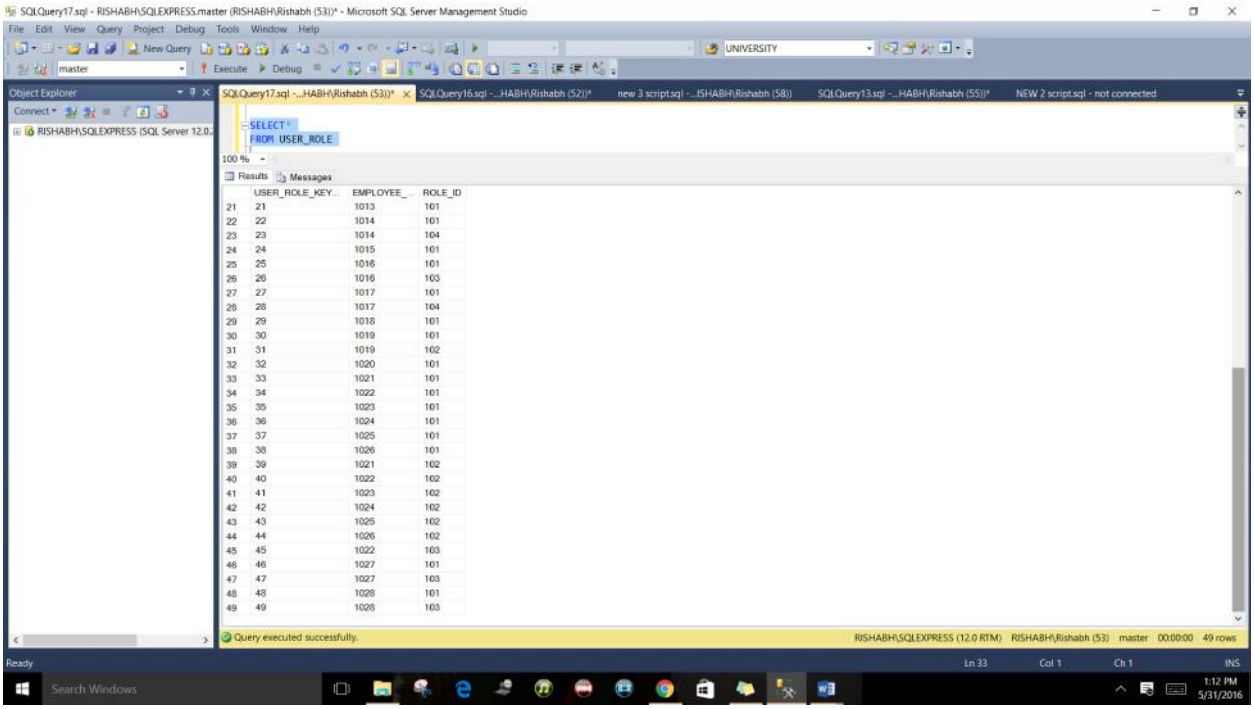
BEFORE PROCESSING THE INSERT QUERY FOR USER_ROLE



QUERY PROCESSING



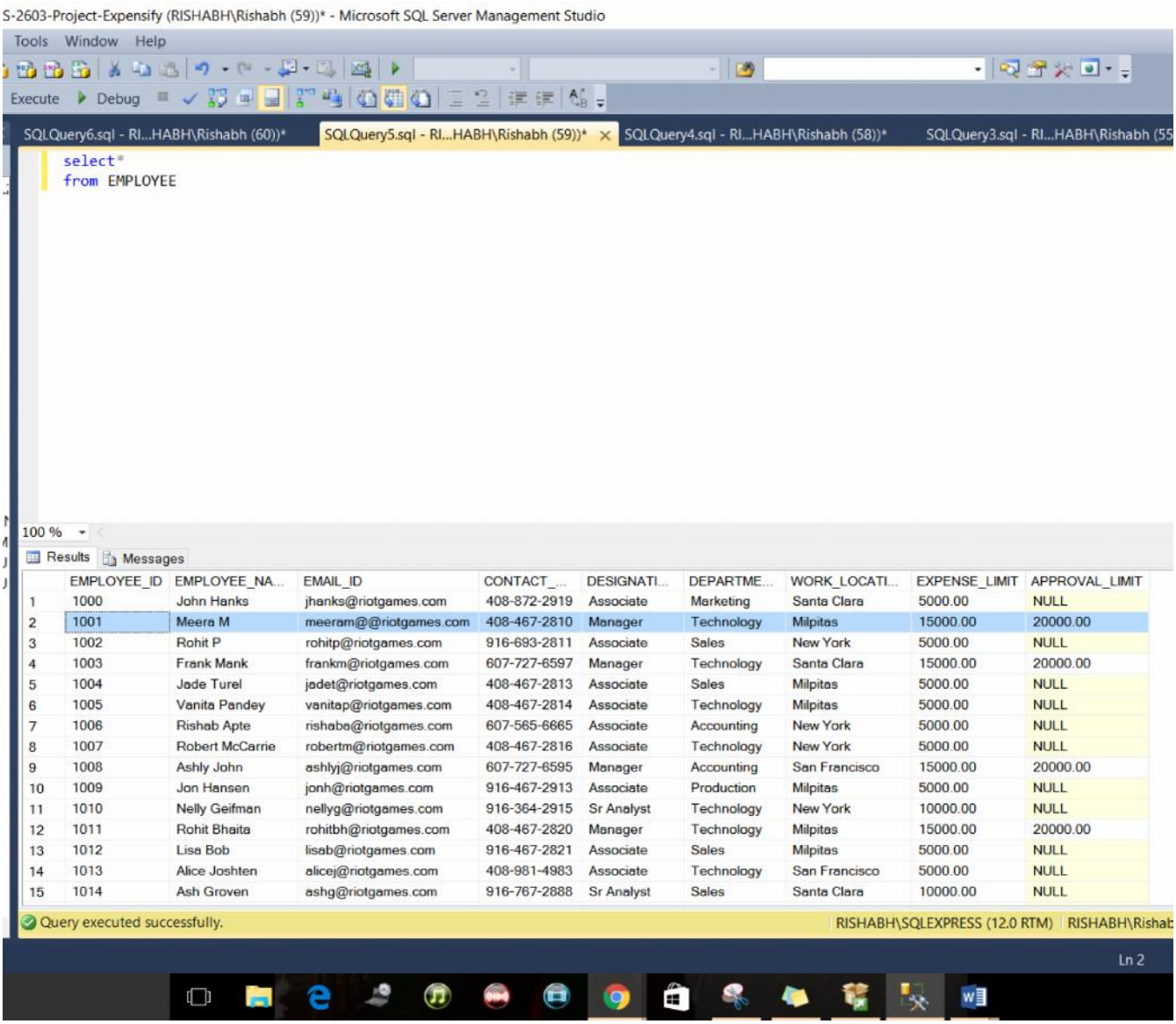
AFTER PROCESSING THE QUERY



Update employee contact number

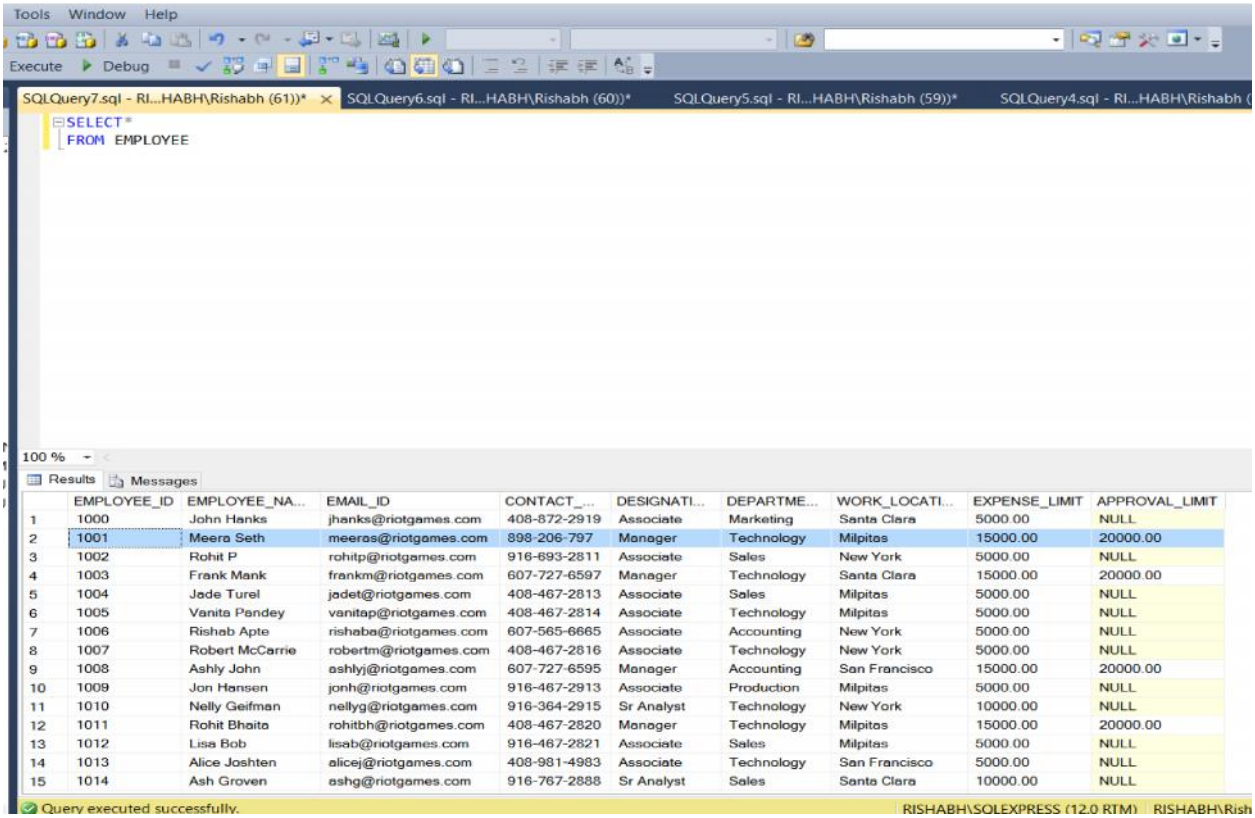
UPDATE EMPLOYEE
SET EMPLOYEE_NAME = 'Meera Seth', CONTACT_NO = '898-206-797',
EMAIL_ID = 'meeras@riotgames.com'
FROM EMPLOYEE E
WHERE E.EMPLOYEE_ID = '1001'

BEFORE EXECUTING THE QUERY



	EMPLOYEE_ID	EMPLOYEE_NA...	EMAIL_ID	CONTACT_...	DESIGNATI...	DEPARTME...	WORK_LOCATI...	EXPENSE_LIMIT	APPROVAL_LIMIT
1	1000	John Hanks	jhanks@riotgames.com	408-872-2919	Associate	Marketing	Santa Clara	5000.00	NULL
2	1001	Meera M	meeram@@riotgames.com	408-467-2810	Manager	Technology	Milpitas	15000.00	20000.00
3	1002	Rohit P	rohitp@riotgames.com	916-693-2811	Associate	Sales	New York	5000.00	NULL
4	1003	Frank Mank	frankm@riotgames.com	607-727-6597	Manager	Technology	Santa Clara	15000.00	20000.00
5	1004	Jade Turel	jadet@riotgames.com	408-467-2813	Associate	Sales	Milpitas	5000.00	NULL
6	1005	Vanita Pandey	vanitap@riotgames.com	408-467-2814	Associate	Technology	Milpitas	5000.00	NULL
7	1006	Rishab Apte	rishaba@riotgames.com	607-565-6665	Associate	Accounting	New York	5000.00	NULL
8	1007	Robert McCarrie	robertm@riotgames.com	408-467-2816	Associate	Technology	New York	5000.00	NULL
9	1008	Ashly John	ashlyj@riotgames.com	607-727-6595	Manager	Accounting	San Francisco	15000.00	20000.00
10	1009	Jon Hansen	jonh@riotgames.com	916-467-2913	Associate	Production	Milpitas	5000.00	NULL
11	1010	Nelly Geifman	nellyg@riotgames.com	916-364-2915	Sr Analyst	Technology	New York	10000.00	NULL
12	1011	Rohit Bhaita	rohitbh@riotgames.com	408-467-2820	Manager	Technology	Milpitas	15000.00	20000.00
13	1012	Lisa Bob	lisab@riotgames.com	916-467-2821	Associate	Sales	Milpitas	5000.00	NULL
14	1013	Alice Joshten	alicej@riotgames.com	408-981-4983	Associate	Technology	San Francisco	5000.00	NULL
15	1014	Ash Groven	ashg@riotgames.com	916-767-2888	Sr Analyst	Sales	Santa Clara	10000.00	NULL

AFTER EXECUTING THE QUERY

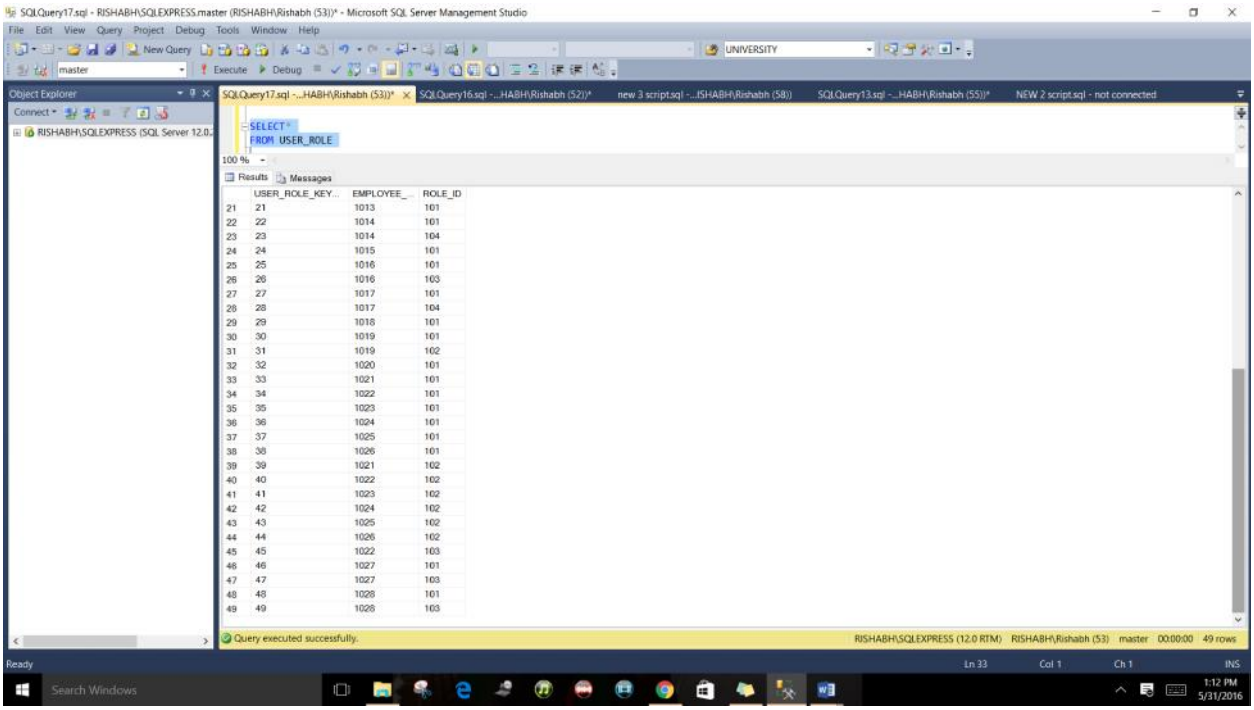


	EMPLOYEE_ID	EMPLOYEE_NA...	EMAIL_ID	CONTACT_...	DESIGNATI...	DEPARTME...	WORK_LOCATI...	EXPENSE_LIMIT	APPROVAL_LIMIT
1	1000	John Hanks	jhanks@riotgames.com	408-872-2919	Associate	Marketing	Santa Clara	5000.00	NULL
2	1001	Meera Seth	meeras@riotgames.com	898-206-797	Manager	Technology	Milpitas	15000.00	20000.00
3	1002	Rohit P	rohitp@riotgames.com	916-693-2811	Associate	Sales	New York	5000.00	NULL
4	1003	Frank Mank	frankm@riotgames.com	607-727-6597	Manager	Technology	Santa Clara	15000.00	20000.00
5	1004	Jade Turel	jadet@riotgames.com	408-467-2813	Associate	Sales	Milpitas	5000.00	NULL
6	1005	Vanita Pandey	vanitap@riotgames.com	408-467-2814	Associate	Technology	Milpitas	5000.00	NULL
7	1006	Rishab Apte	rishaba@riotgames.com	607-565-6665	Associate	Accounting	New York	5000.00	NULL
8	1007	Robert McCarrie	robertm@riotgames.com	408-467-2816	Associate	Technology	New York	5000.00	NULL
9	1008	Ashly John	ashlyj@riotgames.com	607-727-6595	Manager	Accounting	San Francisco	15000.00	20000.00
10	1009	Jon Hansen	jonh@riotgames.com	916-467-2913	Associate	Production	Milpitas	5000.00	NULL
11	1010	Nelly Geifman	nellyg@riotgames.com	916-364-2915	Sr Analyst	Technology	New York	10000.00	NULL
12	1011	Rohit Bhaita	rohitbh@riotgames.com	408-467-2820	Manager	Technology	Milpitas	15000.00	20000.00
13	1012	Lisa Bob	lisab@riotgames.com	916-467-2821	Associate	Sales	Milpitas	5000.00	NULL
14	1013	Alice Joshten	alicej@riotgames.com	408-981-4983	Associate	Technology	San Francisco	5000.00	NULL
15	1014	Ash Groven	ashg@riotgames.com	916-767-2888	Sr Analyst	Sales	Santa Clara	10000.00	NULL

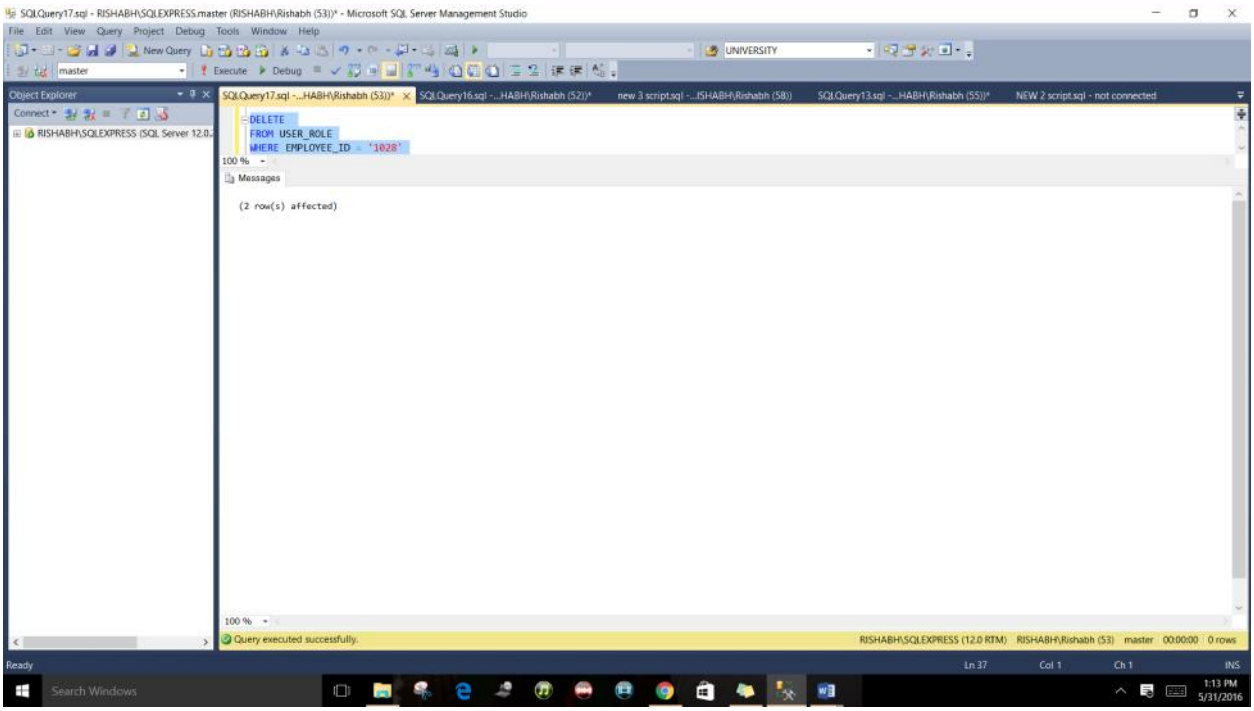
Delete an employee

Step 1: Delete user role from USER_ROLE for EMPLOYEE ID 1028

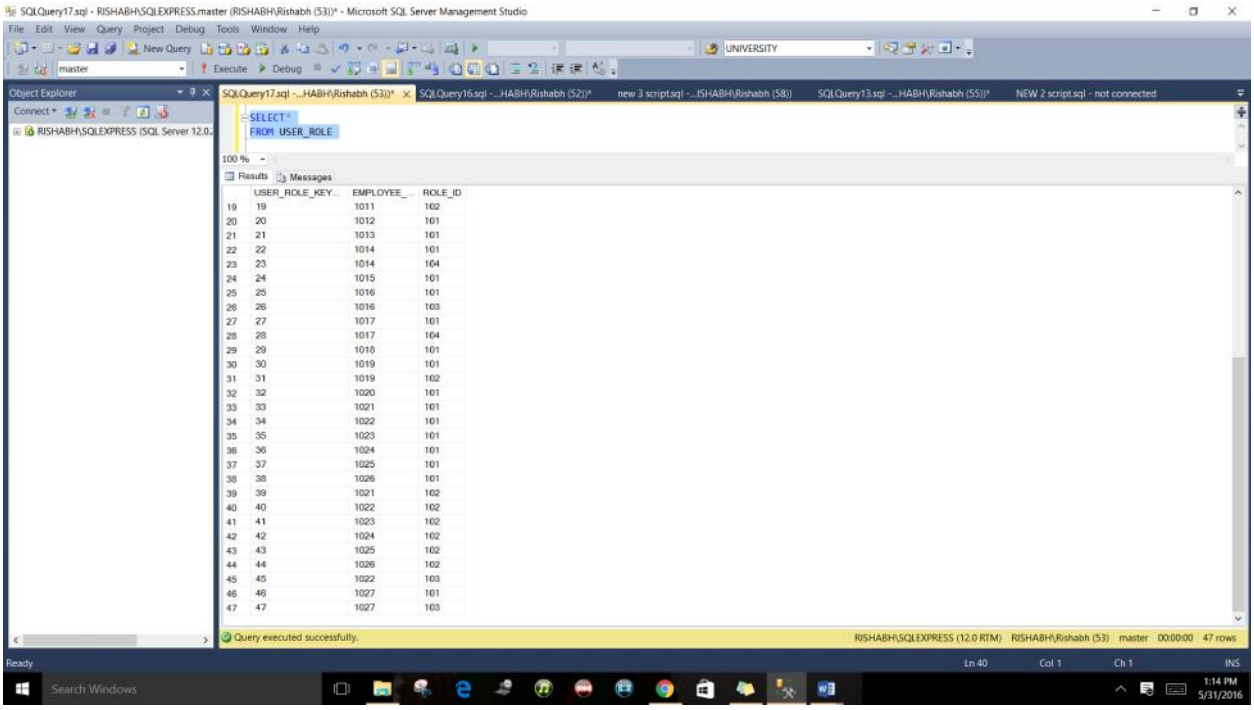
BEFORE PROCESSING THE QUERY



QUERY PROCESSING

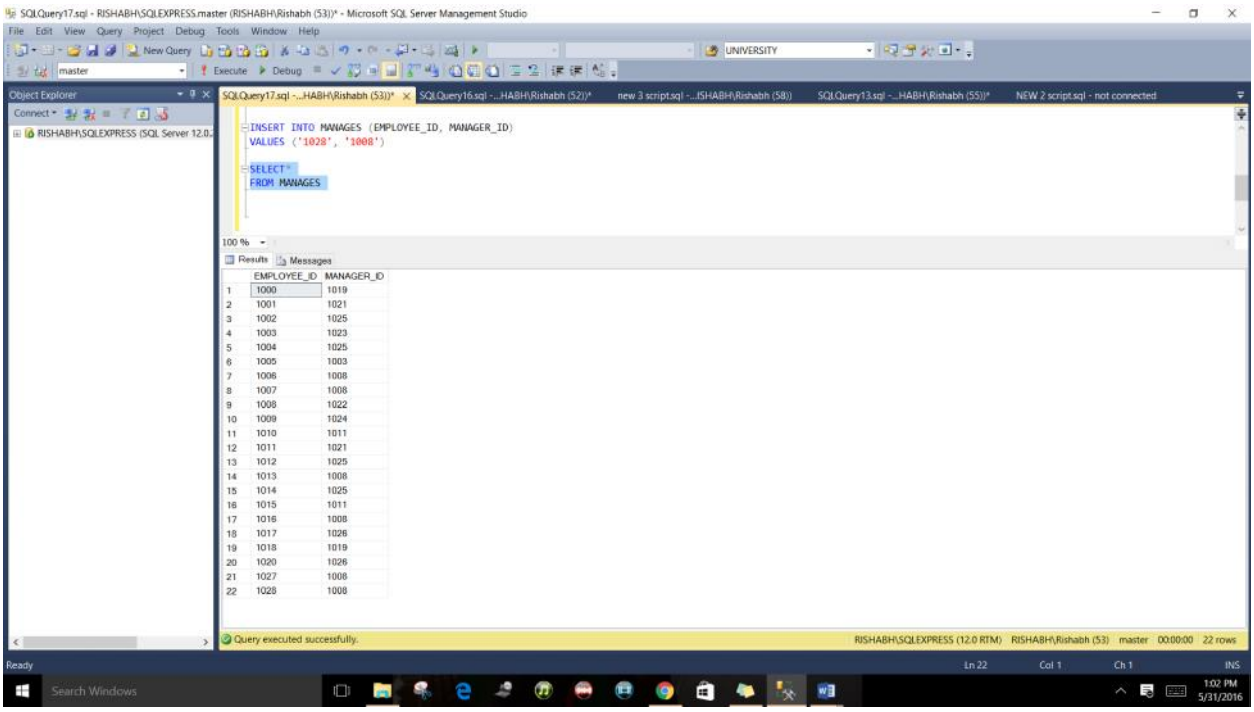


AFTER PROCESSING THE QUERY

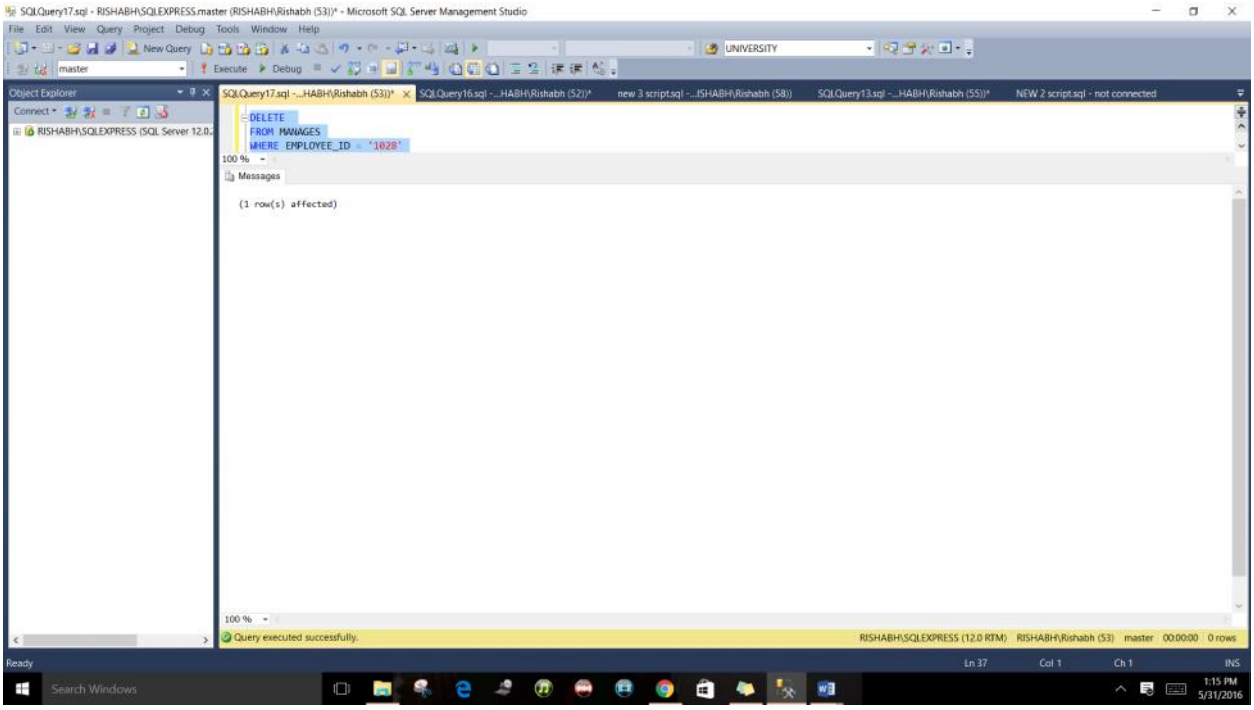


Step 2: Delete from MANAGES table

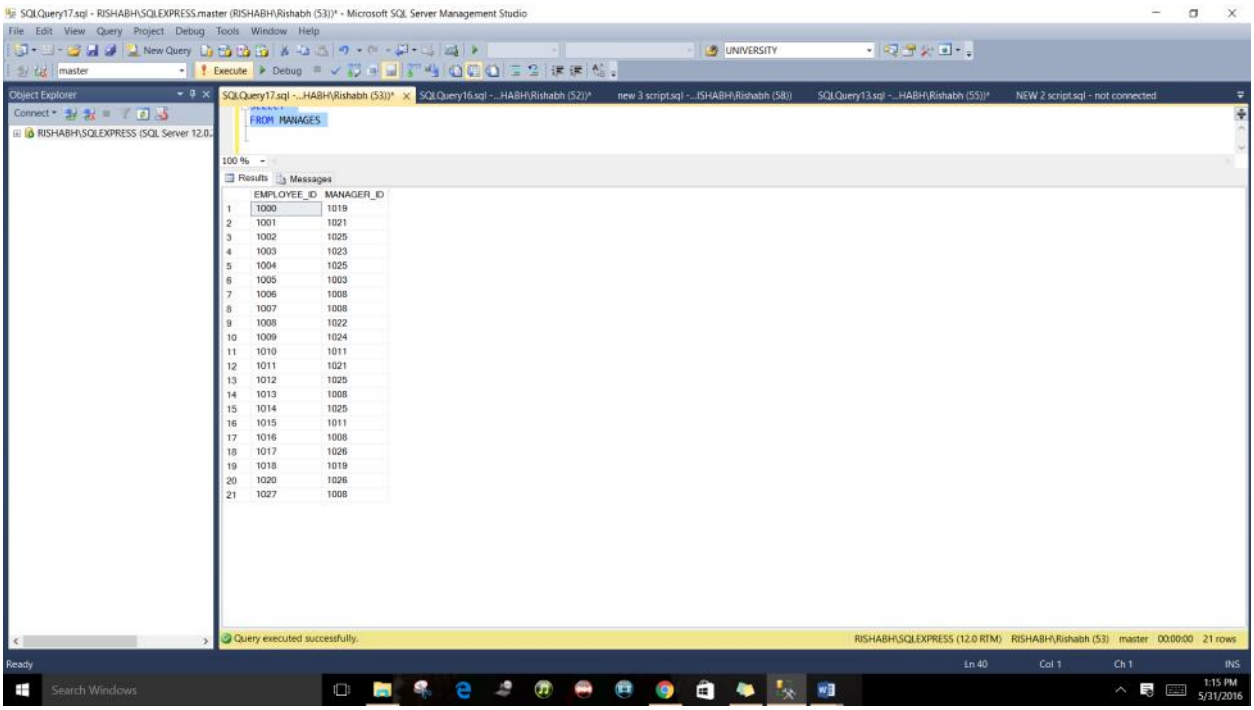
BEFORE PROCESSING THE QUERY



QUERY PROCESSING



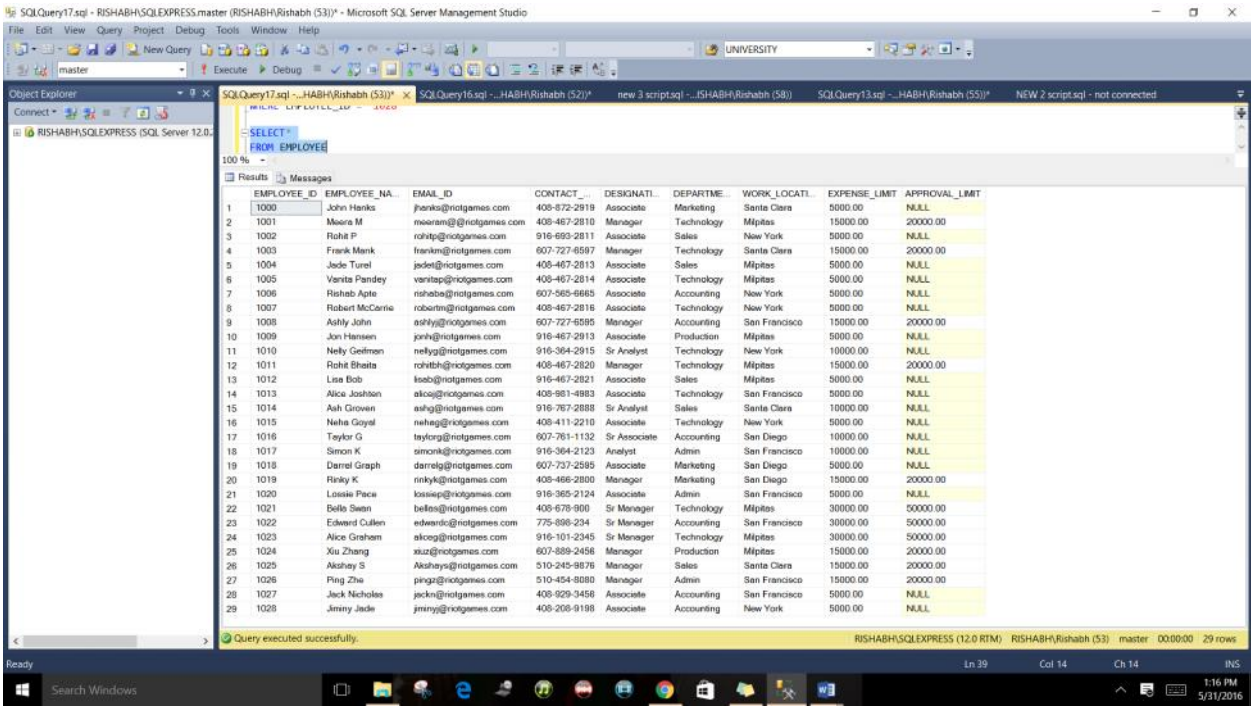
AFTER PROCESSING THE QUERY



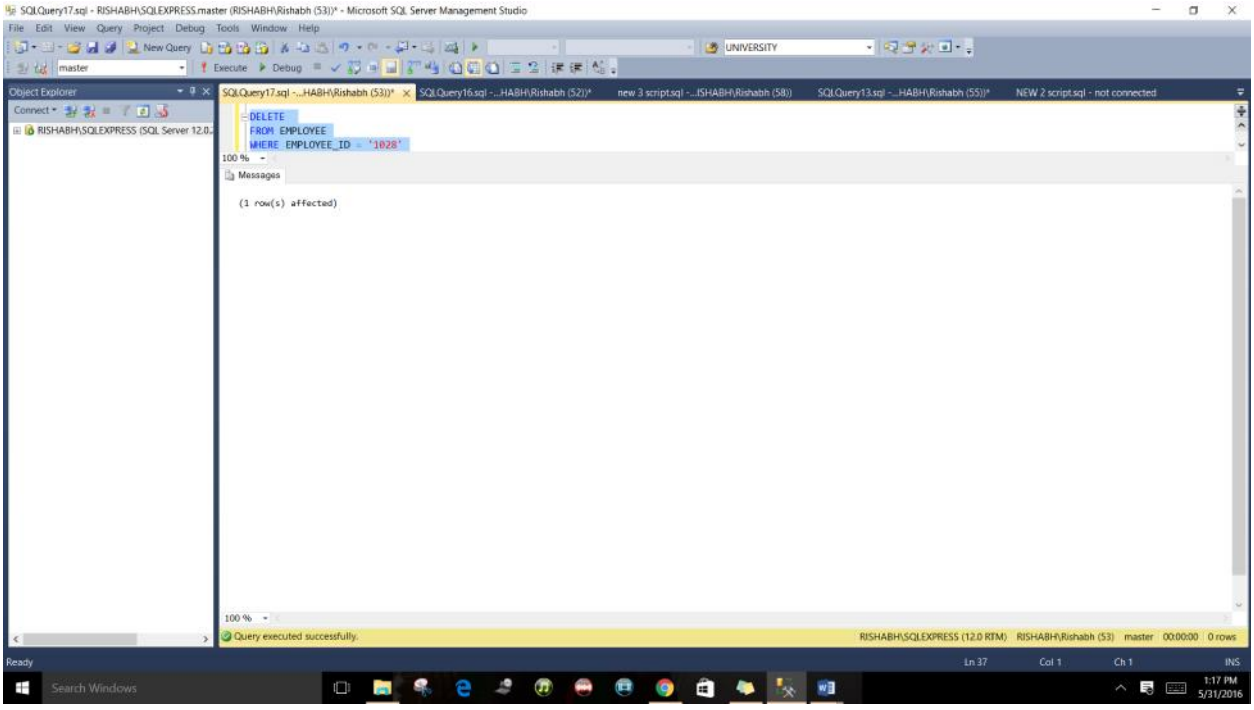
	EMPLOYEE_ID	MANAGER_ID
1	1000	1019
2	1001	1021
3	1002	1025
4	1003	1023
5	1004	1025
6	1005	1003
7	1006	1008
8	1007	1008
9	1008	1022
10	1009	1024
11	1010	1011
12	1011	1021
13	1012	1025
14	1013	1008
15	1014	1025
16	1015	1011
17	1016	1008
18	1017	1026
19	1018	1019
20	1020	1026
21	1027	1008

Step 3: Delete employee record from Employee table

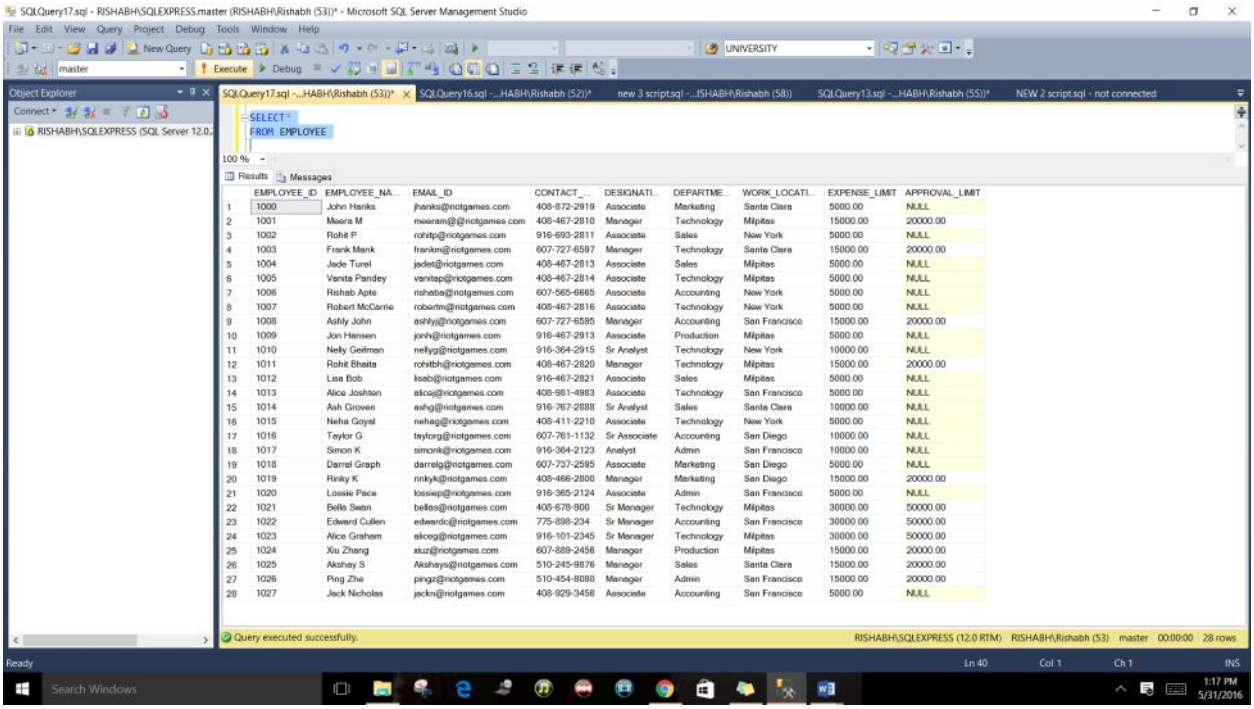
BEFORE PROCESSING THE QUERY



QUERY PROCESSING



AFTER PROCESSING THE QUERY

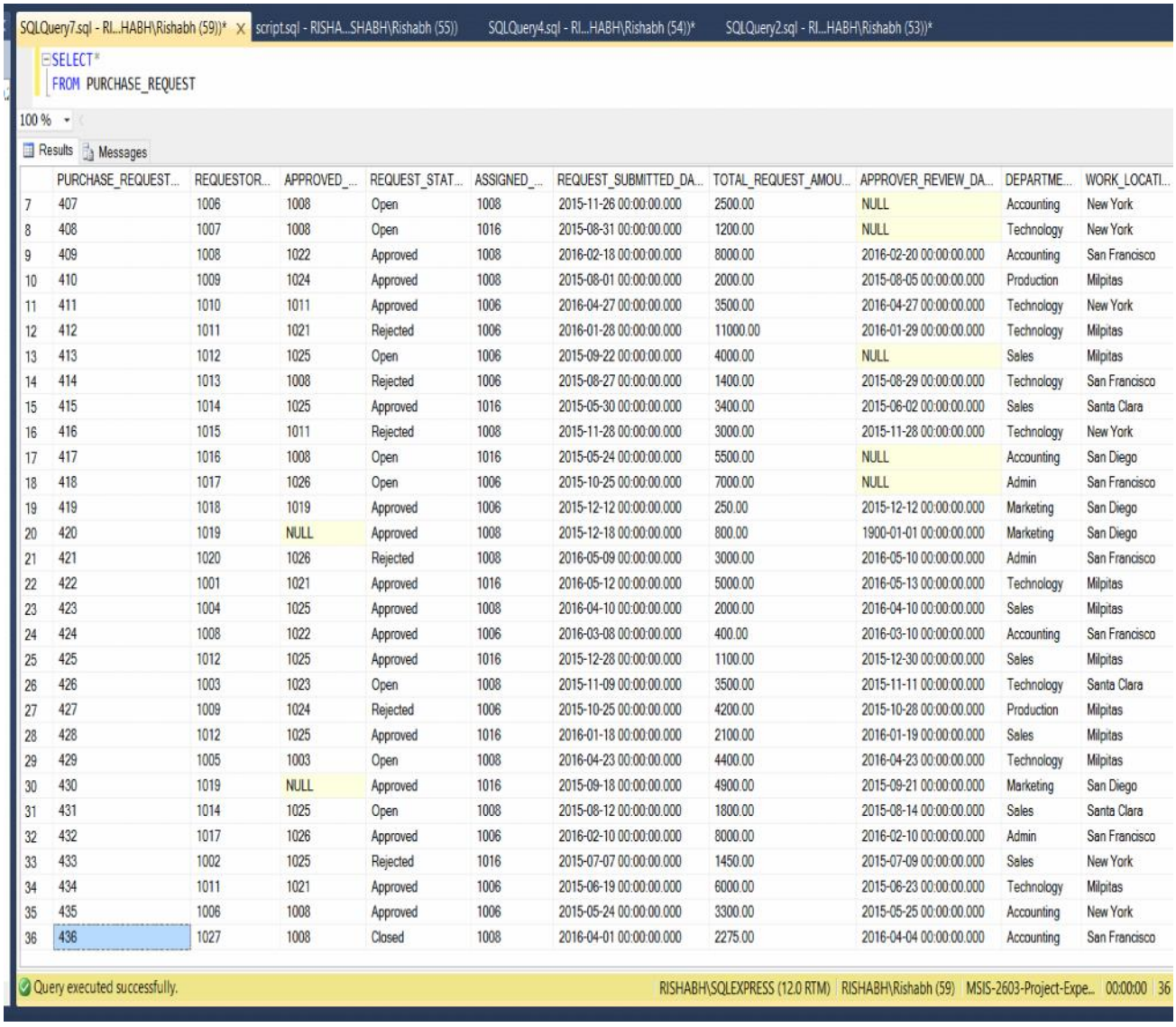


Business Process 2:

When there is a requirement for items like PCs, laptops, routers, etc. an employee submits a purchase request which gets directed to his manager. The manager reviews the request and on approval of the request, an associate from the Procurement and Payment associate team picks it up. He then creates a purchase order and the order gets assigned to a supplier.

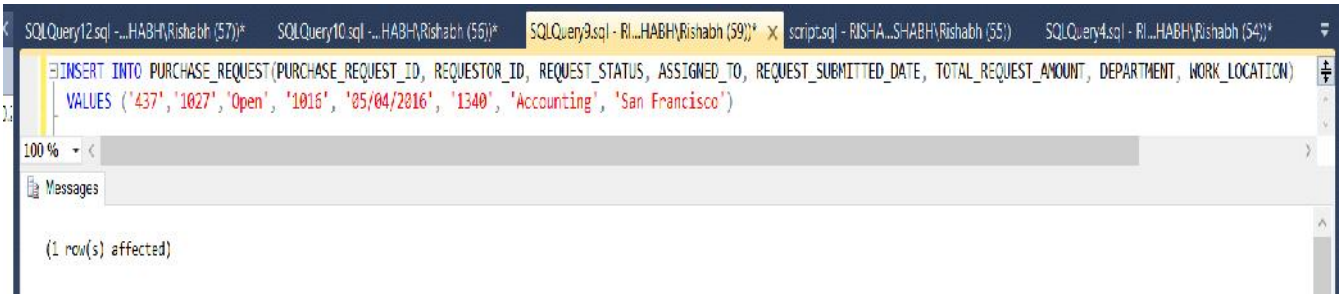
Step 1: **CREATE Purchase Request for EMPLOYEE_ID 1027**

BEFORE EXECUTING THE QUERY

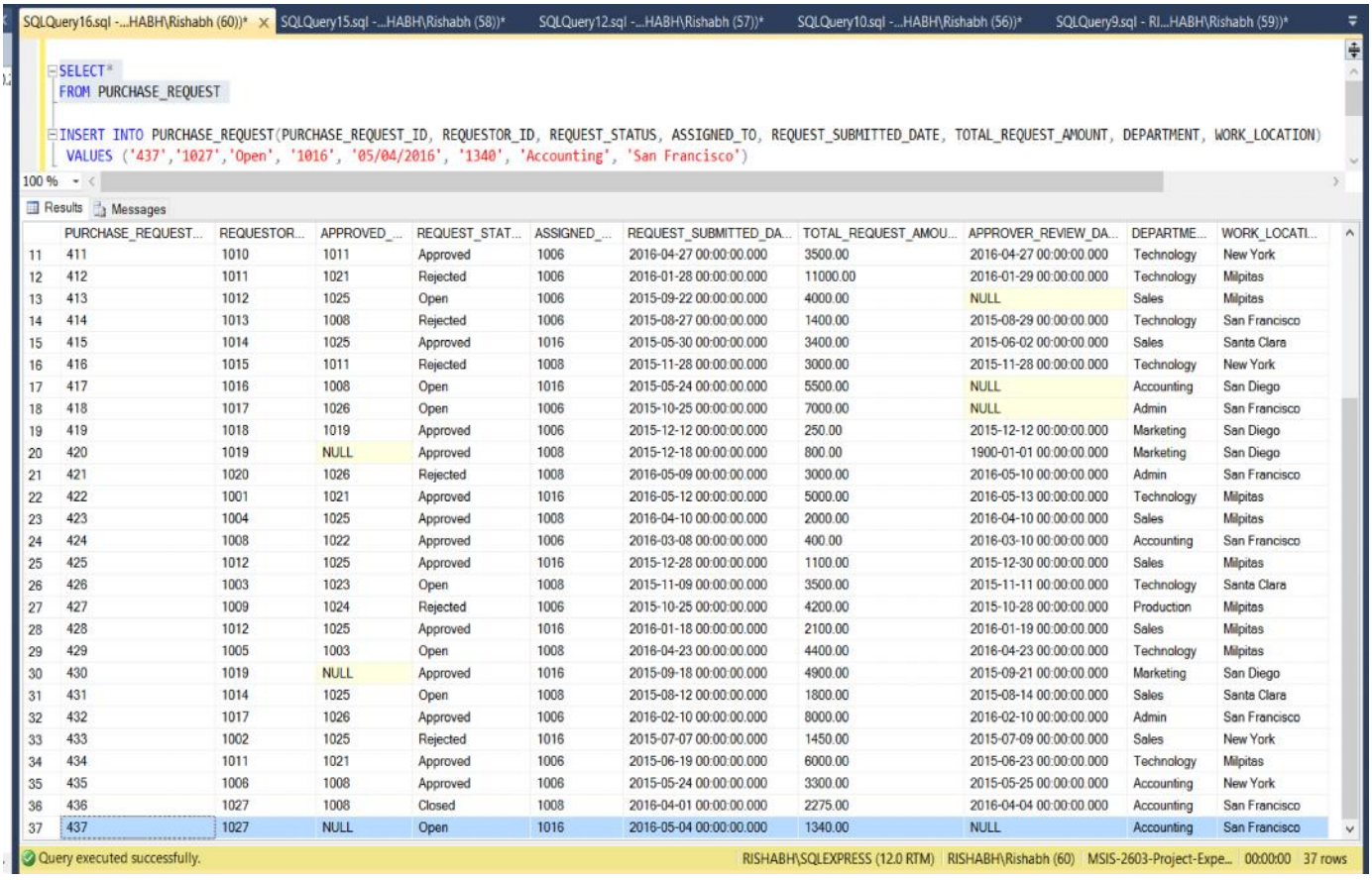


	PURCHASE_REQUEST...	REQUESTOR...	APPROVED_...	REQUEST_STAT...	ASSIGNED_...	REQUEST_SUBMITTED_DA...	TOTAL_REQUEST_AMOU...	APPROVER_REVIEW_DA...	DEPARTME...	WORK_LOCATI...
7	407	1006	1008	Open	1008	2015-11-26 00:00:00.000	2500.00	NULL	Accounting	New York
8	408	1007	1008	Open	1016	2015-08-31 00:00:00.000	1200.00	NULL	Technology	New York
9	409	1008	1022	Approved	1008	2016-02-18 00:00:00.000	8000.00	2016-02-20 00:00:00.000	Accounting	San Francisco
10	410	1009	1024	Approved	1008	2015-08-01 00:00:00.000	2000.00	2015-08-05 00:00:00.000	Production	Milpitas
11	411	1010	1011	Approved	1006	2016-04-27 00:00:00.000	3500.00	2016-04-27 00:00:00.000	Technology	New York
12	412	1011	1021	Rejected	1006	2016-01-28 00:00:00.000	11000.00	2016-01-29 00:00:00.000	Technology	Milpitas
13	413	1012	1025	Open	1006	2015-09-22 00:00:00.000	4000.00	NULL	Sales	Milpitas
14	414	1013	1008	Rejected	1006	2015-08-27 00:00:00.000	1400.00	2015-08-29 00:00:00.000	Technology	San Francisco
15	415	1014	1025	Approved	1016	2015-05-30 00:00:00.000	3400.00	2015-06-02 00:00:00.000	Sales	Santa Clara
16	416	1015	1011	Rejected	1008	2015-11-28 00:00:00.000	3000.00	2015-11-28 00:00:00.000	Technology	New York
17	417	1016	1008	Open	1016	2015-05-24 00:00:00.000	5500.00	NULL	Accounting	San Diego
18	418	1017	1026	Open	1006	2015-10-25 00:00:00.000	7000.00	NULL	Admin	San Francisco
19	419	1018	1019	Approved	1006	2015-12-12 00:00:00.000	250.00	2015-12-12 00:00:00.000	Marketing	San Diego
20	420	1019	NULL	Approved	1008	2015-12-18 00:00:00.000	800.00	1900-01-01 00:00:00.000	Marketing	San Diego
21	421	1020	1026	Rejected	1008	2016-05-09 00:00:00.000	3000.00	2016-05-10 00:00:00.000	Admin	San Francisco
22	422	1001	1021	Approved	1016	2016-05-12 00:00:00.000	5000.00	2016-05-13 00:00:00.000	Technology	Milpitas
23	423	1004	1025	Approved	1008	2016-04-10 00:00:00.000	2000.00	2016-04-10 00:00:00.000	Sales	Milpitas
24	424	1008	1022	Approved	1006	2016-03-08 00:00:00.000	400.00	2016-03-10 00:00:00.000	Accounting	San Francisco
25	425	1012	1025	Approved	1016	2015-12-28 00:00:00.000	1100.00	2015-12-30 00:00:00.000	Sales	Milpitas
26	426	1003	1023	Open	1008	2015-11-09 00:00:00.000	3500.00	2015-11-11 00:00:00.000	Technology	Santa Clara
27	427	1009	1024	Rejected	1006	2015-10-25 00:00:00.000	4200.00	2015-10-28 00:00:00.000	Production	Milpitas
28	428	1012	1025	Approved	1016	2016-01-18 00:00:00.000	2100.00	2016-01-19 00:00:00.000	Sales	Milpitas
29	429	1005	1003	Open	1008	2016-04-23 00:00:00.000	4400.00	2016-04-23 00:00:00.000	Technology	Milpitas
30	430	1019	NULL	Approved	1016	2015-09-18 00:00:00.000	4900.00	2015-09-21 00:00:00.000	Marketing	San Diego
31	431	1014	1025	Open	1008	2015-08-12 00:00:00.000	1800.00	2015-08-14 00:00:00.000	Sales	Santa Clara
32	432	1017	1026	Approved	1006	2016-02-10 00:00:00.000	8000.00	2016-02-10 00:00:00.000	Admin	San Francisco
33	433	1002	1025	Rejected	1016	2015-07-07 00:00:00.000	1450.00	2015-07-09 00:00:00.000	Sales	New York
34	434	1011	1021	Approved	1006	2015-06-19 00:00:00.000	6000.00	2015-06-23 00:00:00.000	Technology	Milpitas
35	435	1006	1008	Approved	1006	2015-05-24 00:00:00.000	3300.00	2015-05-25 00:00:00.000	Accounting	New York
36	436	1027	1008	Closed	1008	2016-04-01 00:00:00.000	2275.00	2016-04-04 00:00:00.000	Accounting	San Francisco

QUERY PROCESSING

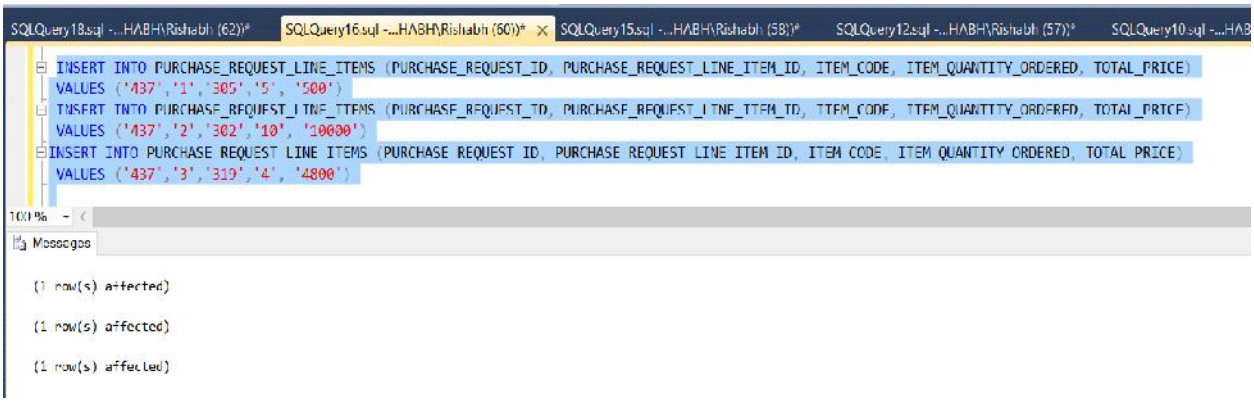


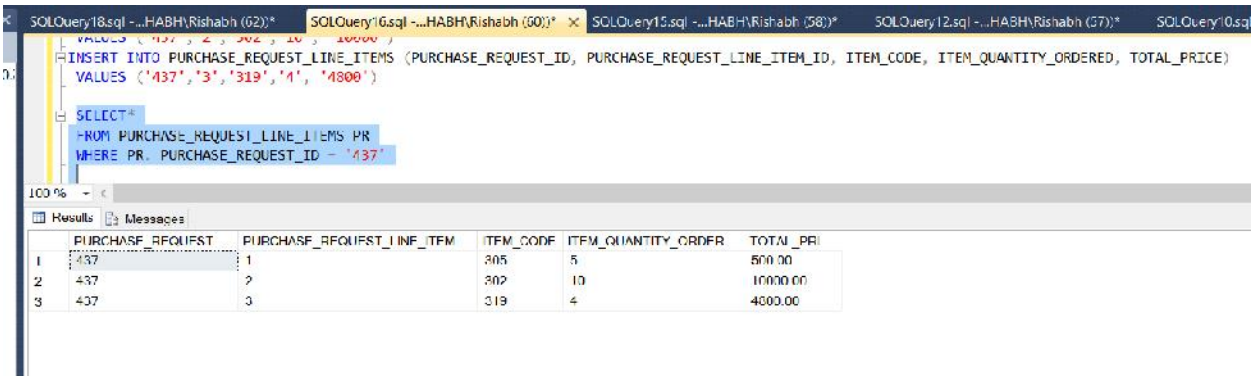
AFTER THE QUERY IS PROCESSED



	PURCHASE_REQUEST...	REQUESTOR...	APPROVED_...	REQUEST_STAT...	ASSIGNED_...	REQUEST_SUBMITTED_DA...	TOTAL_REQUEST_AMOU...	APPROVER_REVIEW_DA...	DEPARTME...	WORK_LOCATI...
11	411	1010	1011	Approved	1006	2016-04-27 00:00:00.000	3500.00	2016-04-27 00:00:00.000	Technology	New York
12	412	1011	1021	Rejected	1006	2016-01-28 00:00:00.000	11000.00	2016-01-29 00:00:00.000	Technology	Milpitas
13	413	1012	1025	Open	1006	2015-09-22 00:00:00.000	4000.00	NULL	Sales	Milpitas
14	414	1013	1008	Rejected	1006	2015-08-27 00:00:00.000	1400.00	2015-08-29 00:00:00.000	Technology	San Francisco
15	415	1014	1025	Approved	1016	2015-05-30 00:00:00.000	3400.00	2015-06-02 00:00:00.000	Sales	Santa Clara
16	416	1015	1011	Rejected	1008	2015-11-28 00:00:00.000	3000.00	2015-11-28 00:00:00.000	Technology	New York
17	417	1016	1008	Open	1016	2015-05-24 00:00:00.000	5500.00	NULL	Accounting	San Diego
18	418	1017	1026	Open	1006	2015-10-25 00:00:00.000	7000.00	NULL	Admin	San Francisco
19	419	1018	1019	Approved	1006	2015-12-12 00:00:00.000	250.00	2015-12-12 00:00:00.000	Marketing	San Diego
20	420	1019	NULL	Approved	1008	2015-12-18 00:00:00.000	800.00	1900-01-01 00:00:00.000	Marketing	San Diego
21	421	1020	1026	Rejected	1008	2016-05-09 00:00:00.000	3000.00	2016-05-10 00:00:00.000	Admin	San Francisco
22	422	1001	1021	Approved	1016	2016-05-12 00:00:00.000	5000.00	2016-05-13 00:00:00.000	Technology	Milpitas
23	423	1004	1025	Approved	1008	2016-04-10 00:00:00.000	2000.00	2016-04-10 00:00:00.000	Sales	Milpitas
24	424	1008	1022	Approved	1006	2016-03-08 00:00:00.000	400.00	2016-03-10 00:00:00.000	Accounting	San Francisco
25	425	1012	1025	Approved	1016	2015-12-28 00:00:00.000	1100.00	2015-12-30 00:00:00.000	Sales	Milpitas
26	426	1003	1023	Open	1008	2015-11-09 00:00:00.000	3500.00	2015-11-11 00:00:00.000	Technology	Santa Clara
27	427	1009	1024	Rejected	1006	2015-10-25 00:00:00.000	4200.00	2015-10-28 00:00:00.000	Production	Milpitas
28	428	1012	1025	Approved	1016	2016-01-18 00:00:00.000	2100.00	2016-01-19 00:00:00.000	Sales	Milpitas
29	429	1005	1003	Open	1008	2016-04-23 00:00:00.000	4400.00	2016-04-23 00:00:00.000	Technology	Milpitas
30	430	1019	NULL	Approved	1016	2015-09-18 00:00:00.000	4900.00	2015-09-21 00:00:00.000	Marketing	San Diego
31	431	1014	1025	Open	1008	2015-08-12 00:00:00.000	1800.00	2015-08-14 00:00:00.000	Sales	Santa Clara
32	432	1017	1026	Approved	1006	2016-02-10 00:00:00.000	8000.00	2016-02-10 00:00:00.000	Admin	San Francisco
33	433	1002	1025	Rejected	1016	2015-07-07 00:00:00.000	1450.00	2015-07-09 00:00:00.000	Sales	New York
34	434	1011	1021	Approved	1006	2015-06-19 00:00:00.000	6000.00	2015-06-23 00:00:00.000	Technology	Milpitas
35	435	1008	1008	Approved	1006	2015-05-24 00:00:00.000	3300.00	2015-05-25 00:00:00.000	Accounting	New York
36	436	1027	1008	Closed	1008	2016-04-01 00:00:00.000	2275.00	2016-04-04 00:00:00.000	Accounting	San Francisco
37	437	1027	NULL	Open	1016	2016-05-04 00:00:00.000	1340.00	NULL	Accounting	San Francisco

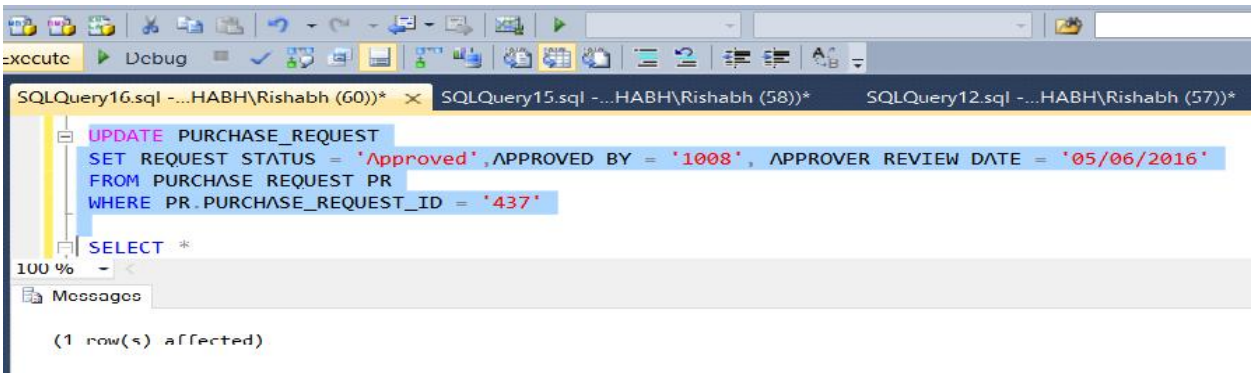
Step 2: Add PURCHASE_REQUEST_LINE_ITEMS for PURCHASE_REQUEST_ID 437



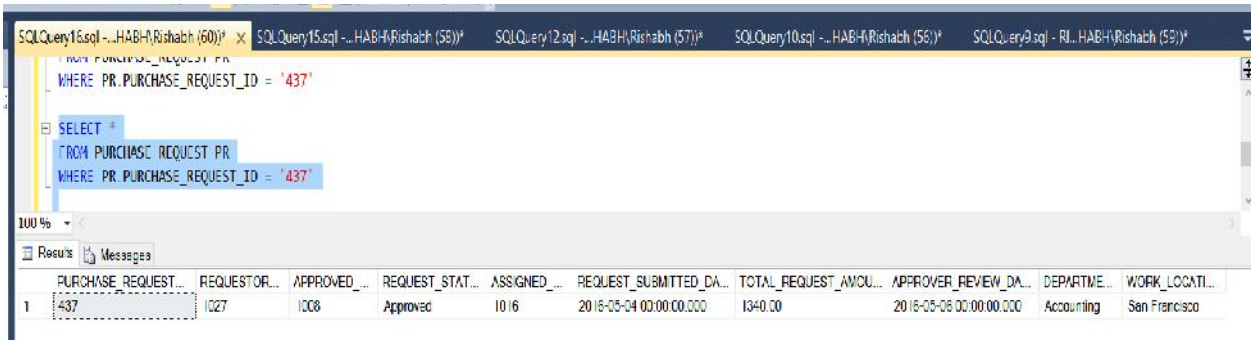


Step 3: Purchase request status changes to 'APPROVED' for PURCHASE_REQUEST_ID 437

QUERY PROCESSING

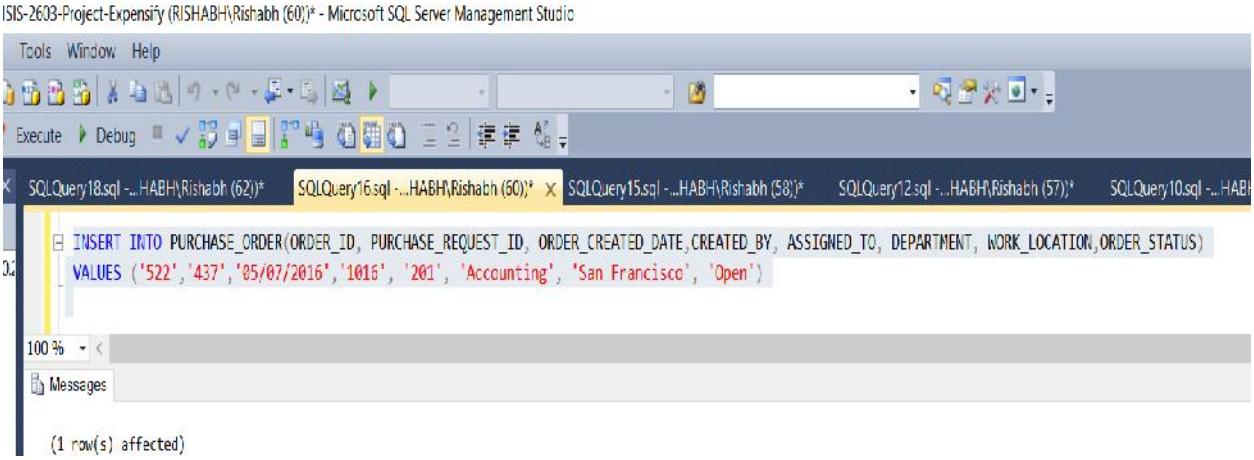


AFTER THE QUERY IS PROCESSED

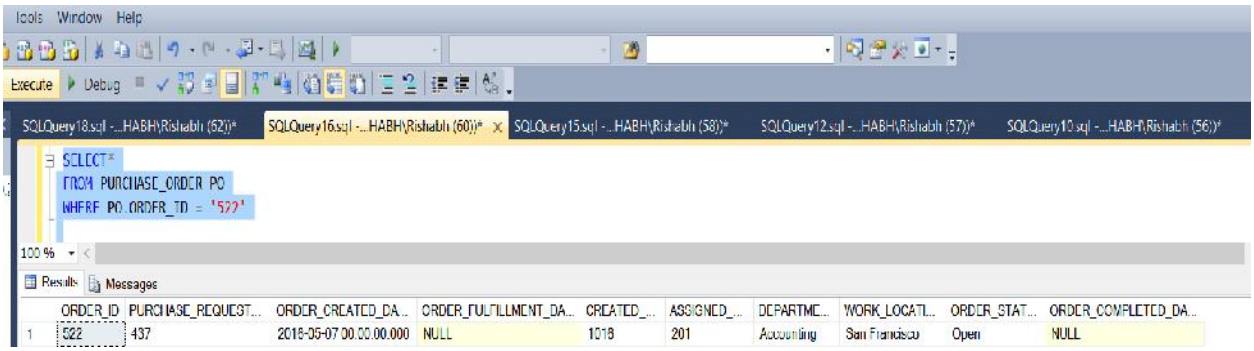


Step 4: An associate from purchase and procurement team creates a purchase order

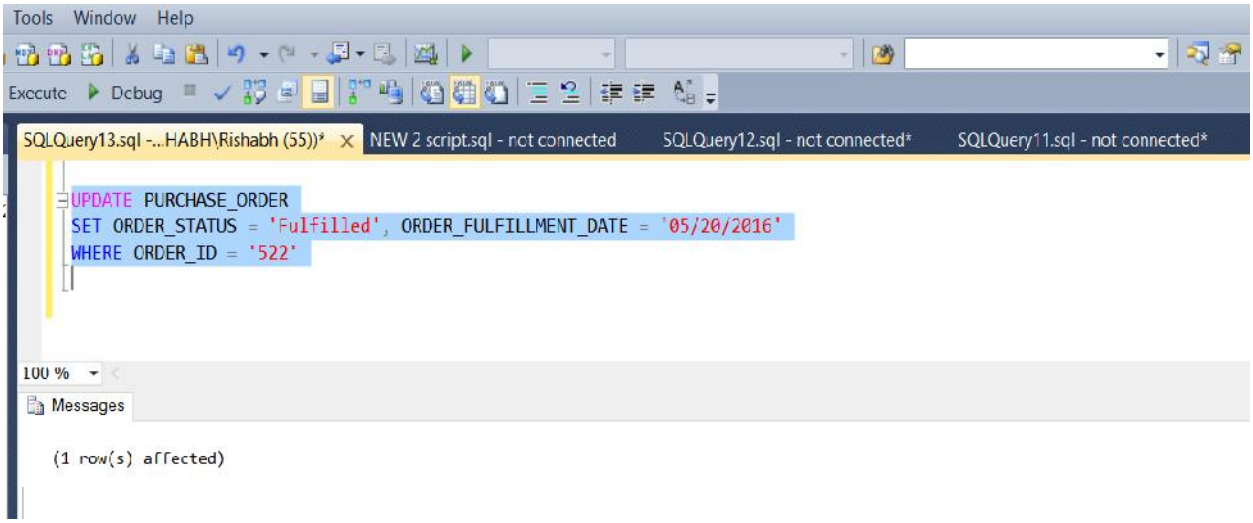
CREATE PURCHASE ORDER



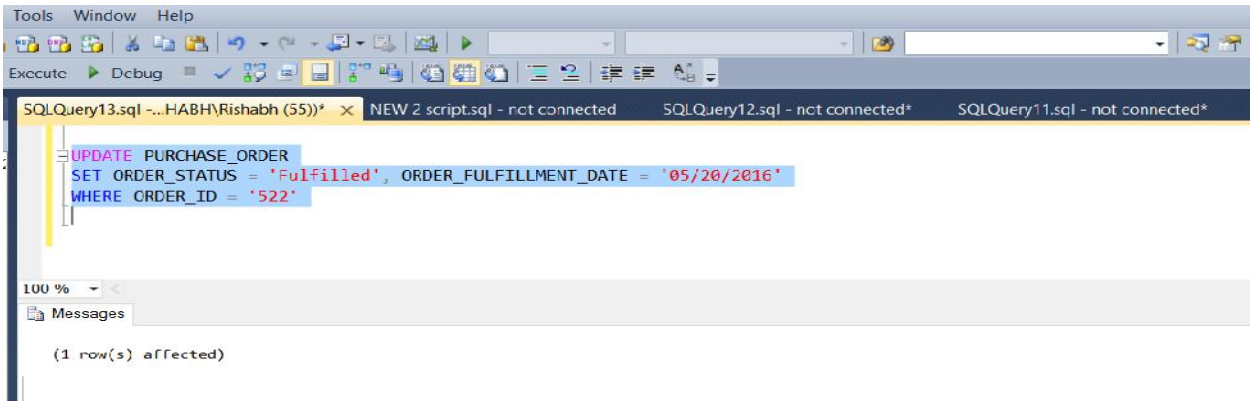
AFTER QUERY IS PROCESSED



Step 5: Supplier updates the status periodically once he starts working on the order. Once the supplier fulfills the order, he updates the order status as well as sends an invoice to the purchase and procurement team



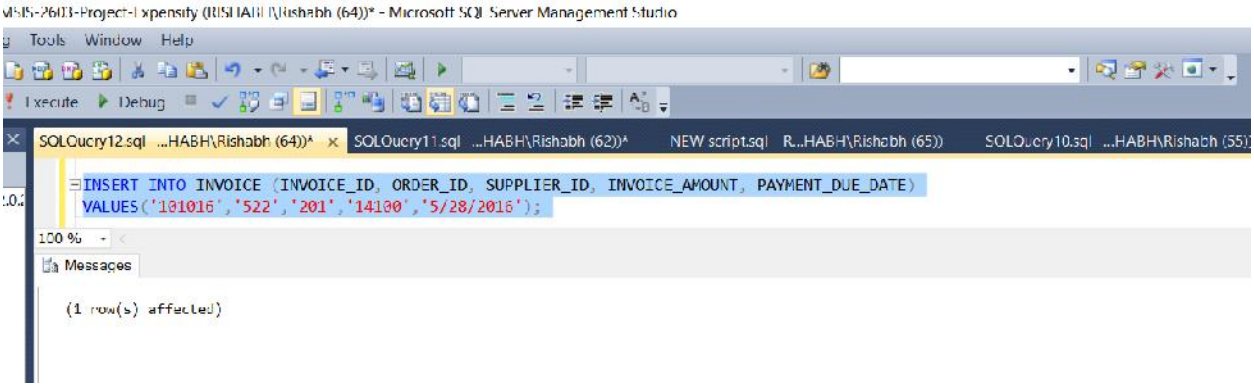
AFTER PROCESSING THE QUERY

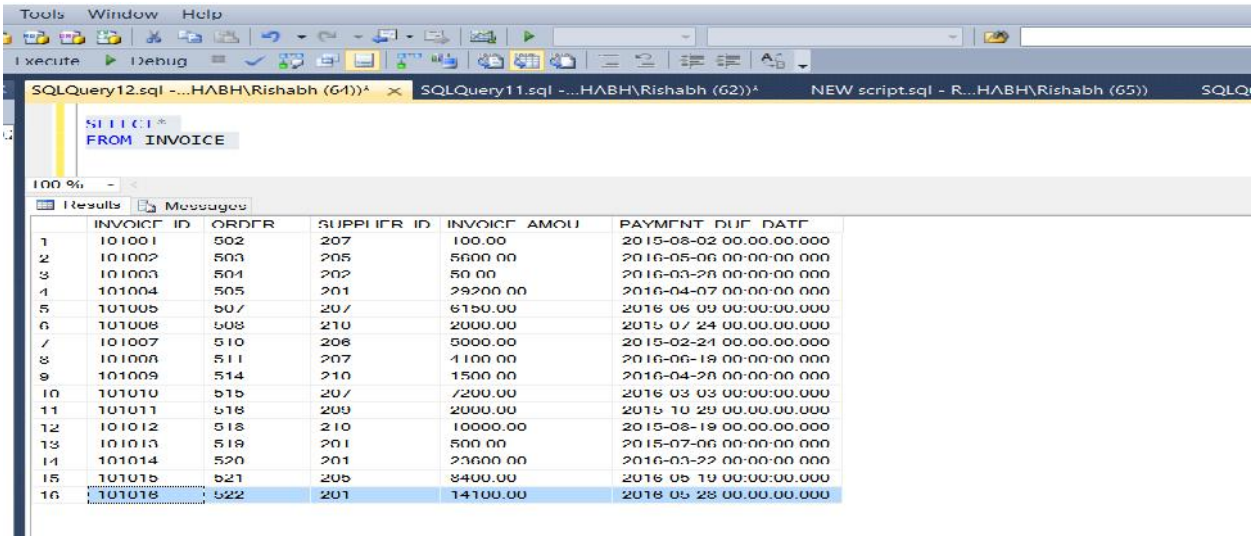


Step 6: On delivery of the order, purchase and procurement associate verifies purchase order details with invoice details and creates an invoice record in system.

INVOICE CREATION

```
INSERT INTO INVOICE (INVOICE_ID, ORDER_ID, SUPPLIER_ID, INVOICE_AMOUNT, PAYMENT_DUE_DATE)
VALUES('101016','522','201','14100','5/28/2016');
```



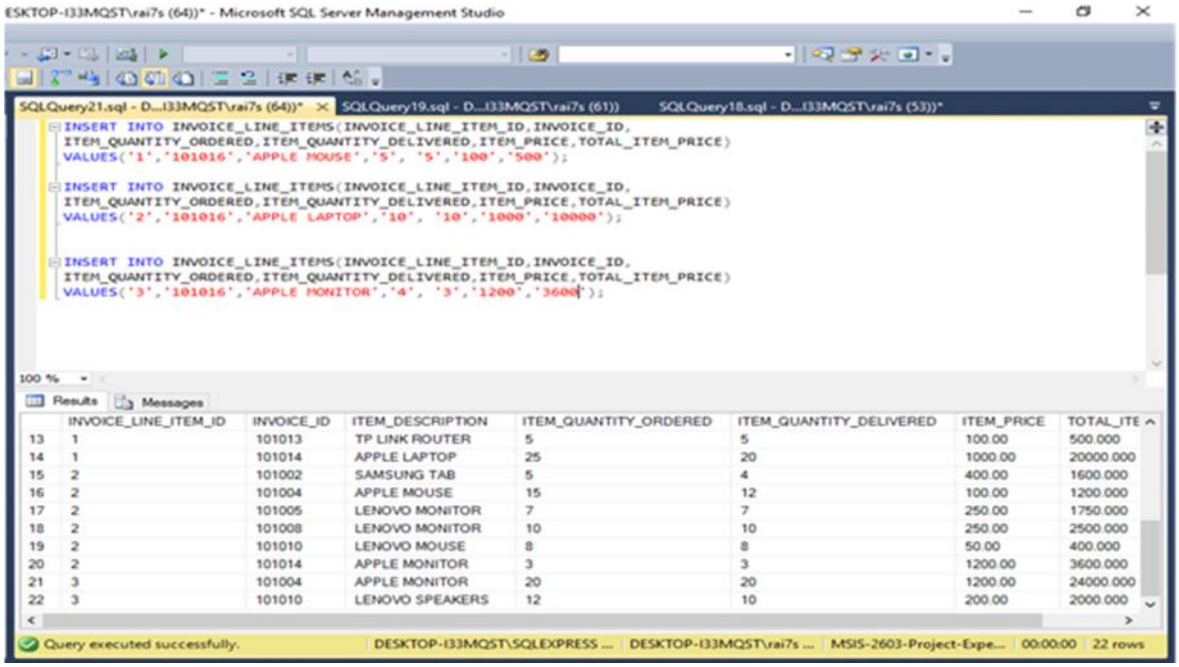


	INVOICE_ID	ORDER	SUPPLIER_ID	INVOICE_AMOU	PAYMENT_DUE_DATE
1	101001	502	207	100.00	2015-08-02 00.00.00.000
2	101002	503	205	5600.00	2016-05-06 00.00.00.000
3	101003	504	202	50.00	2016-03-28 00.00.00.000
4	101004	505	201	29200.00	2016-04-07 00.00.00.000
5	101005	507	207	6150.00	2016 06 09 00.00.00.000
6	101006	508	210	2000.00	2015 07 24 00.00.00.000
7	101007	510	206	5000.00	2015-02-21 00.00.00.000
8	101008	511	207	4100.00	2016-06-19 00.00.00.000
9	101009	514	210	1500.00	2016-04-28 00.00.00.000
10	101010	515	207	7200.00	2016 03 03 00.00.00.000
11	101011	518	209	2000.00	2015 10 29 00.00.00.000
12	101012	518	210	10000.00	2015-08-19 00.00.00.000
13	101013	519	201	500.00	2015-07-06 00.00.00.000
14	101014	520	201	23600.00	2016-03-22 00.00.00.000
15	101015	521	205	8400.00	2016 05 19 00.00.00.000
16	101016	522	201	14100.00	2016 05 28 00.00.00.000

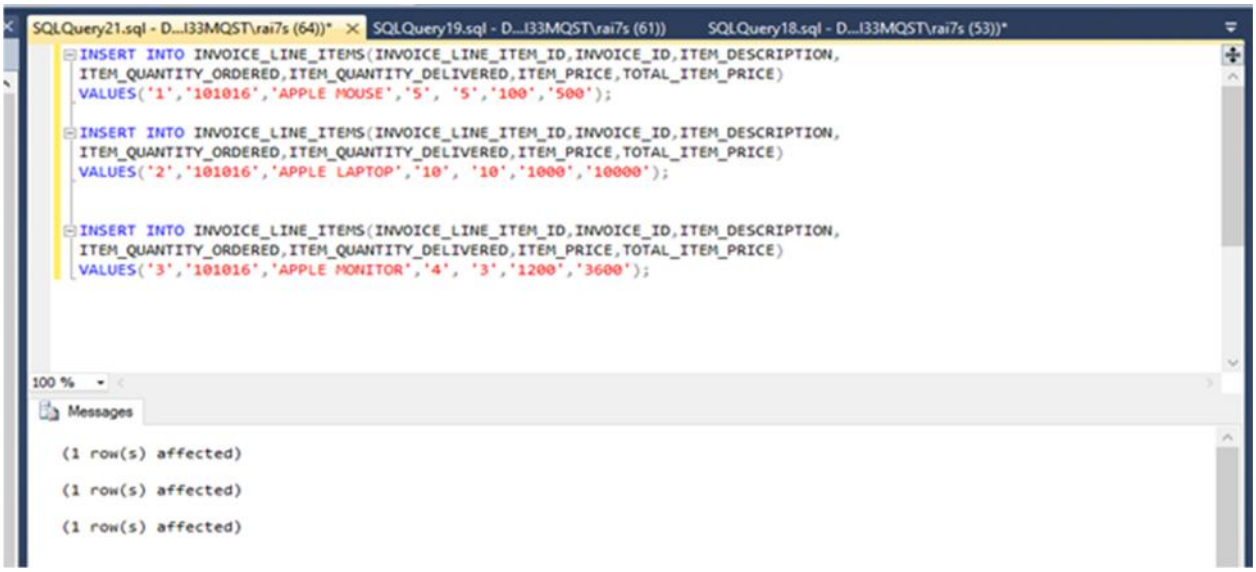
INSERT INVOICE LINE ITEMS

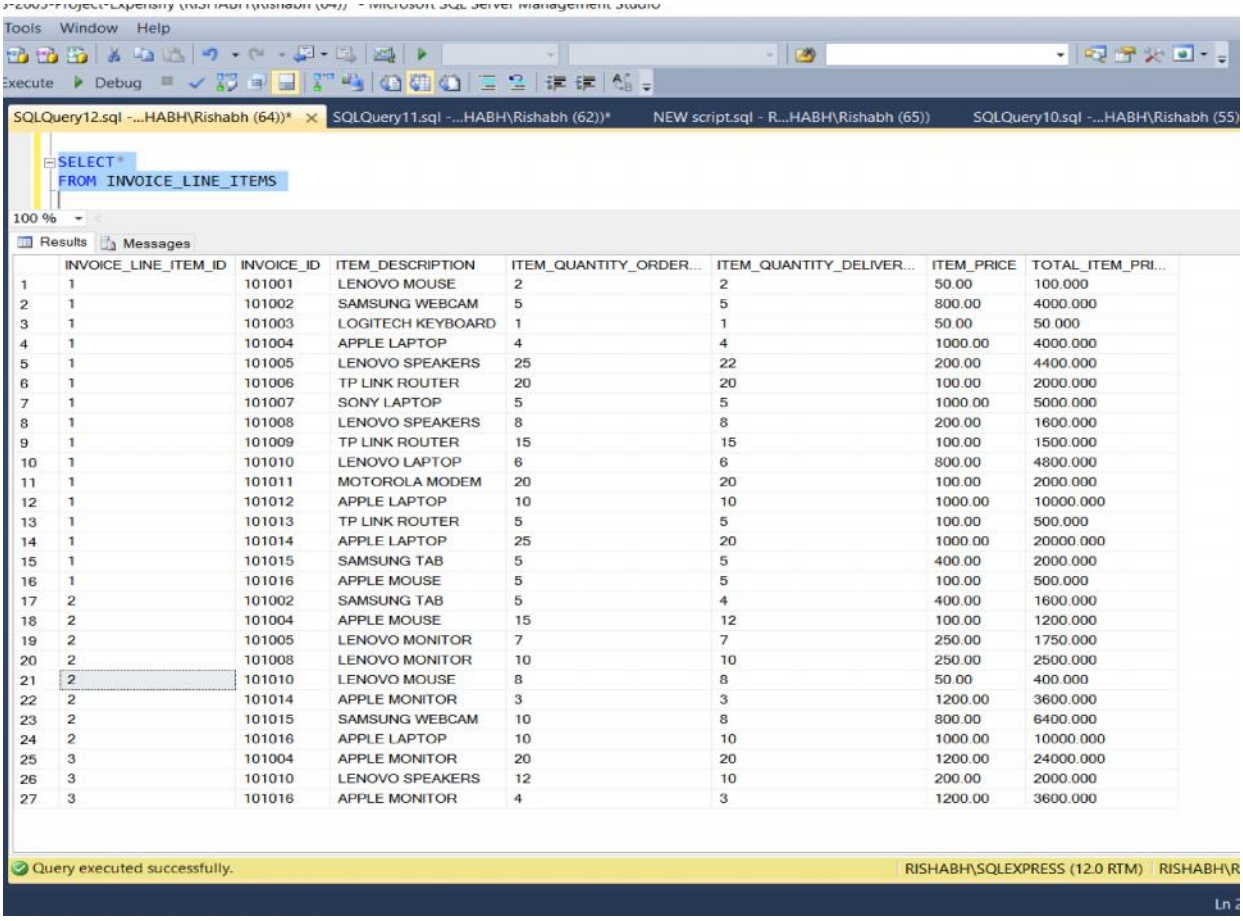
```
INSERT INTO INVOICE_LINE_ITEMS(INVOICE_LINE_ITEM_ID,INVOICE_ID,ITEM_DESCRIPTION,
ITEM_QUANTITY_ORDERED,ITEM_QUANTITY_DELIVERED,ITEM_PRICE,TOTAL_ITEM_PRICE)
VALUES('1','101016','APPLE MOUSE','5', '5','100','500');

INSERT INTO INVOICE_LINE_ITEMS(INVOICE_LINE_ITEM_ID,INVOICE_ID,ITEM_DESCRIPTION,
ITEM_QUANTITY_ORDERED,ITEM_QUANTITY_DELIVERED,ITEM_PRICE,TOTAL_ITEM_PRICE)
VALUES('2','101016','APPLE LAPTOP','10', '10','1000','10000');


INSERT INTO INVOICE_LINE_ITEMS(INVOICE_LINE_ITEM_ID,INVOICE_ID,ITEM_DESCRIPTION,
ITEM_QUANTITY_ORDERED,ITEM_QUANTITY_DELIVERED,ITEM_PRICE,TOTAL_ITEM_PRICE)
VALUES('3','101016','APPLE MONITOR','4', '3','1200','3600');
```

BEFORE PROCESSING THE QUERY



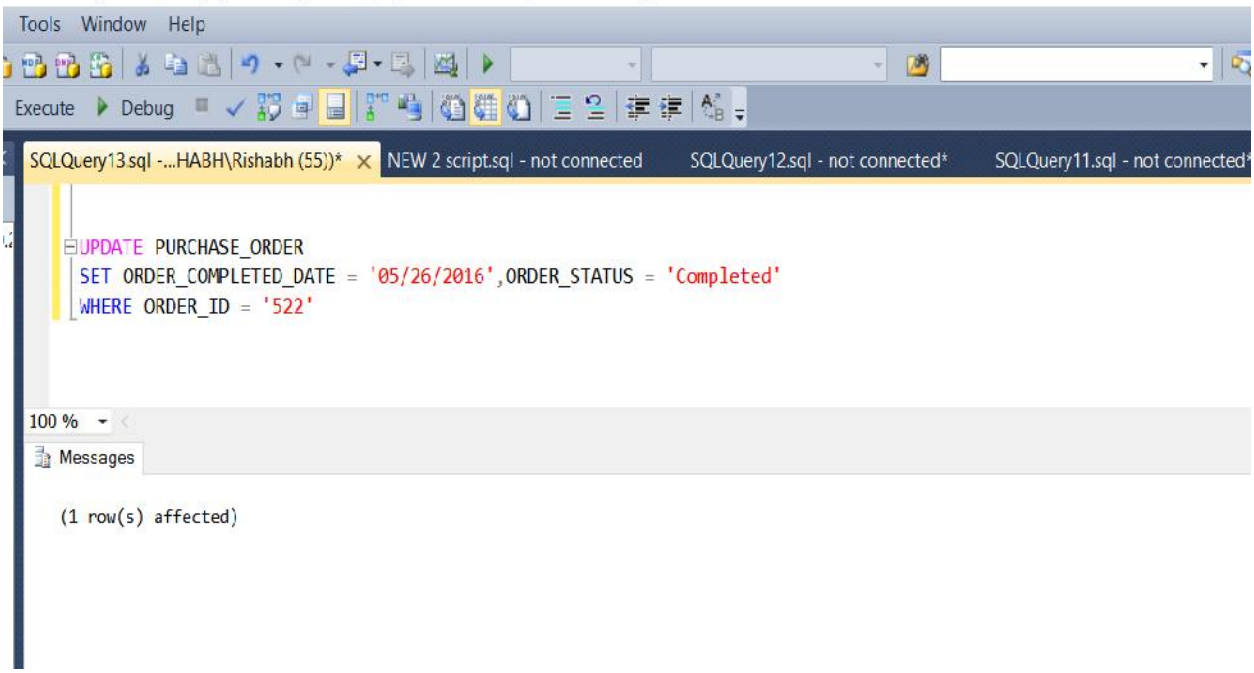
QUERY PROCESSING

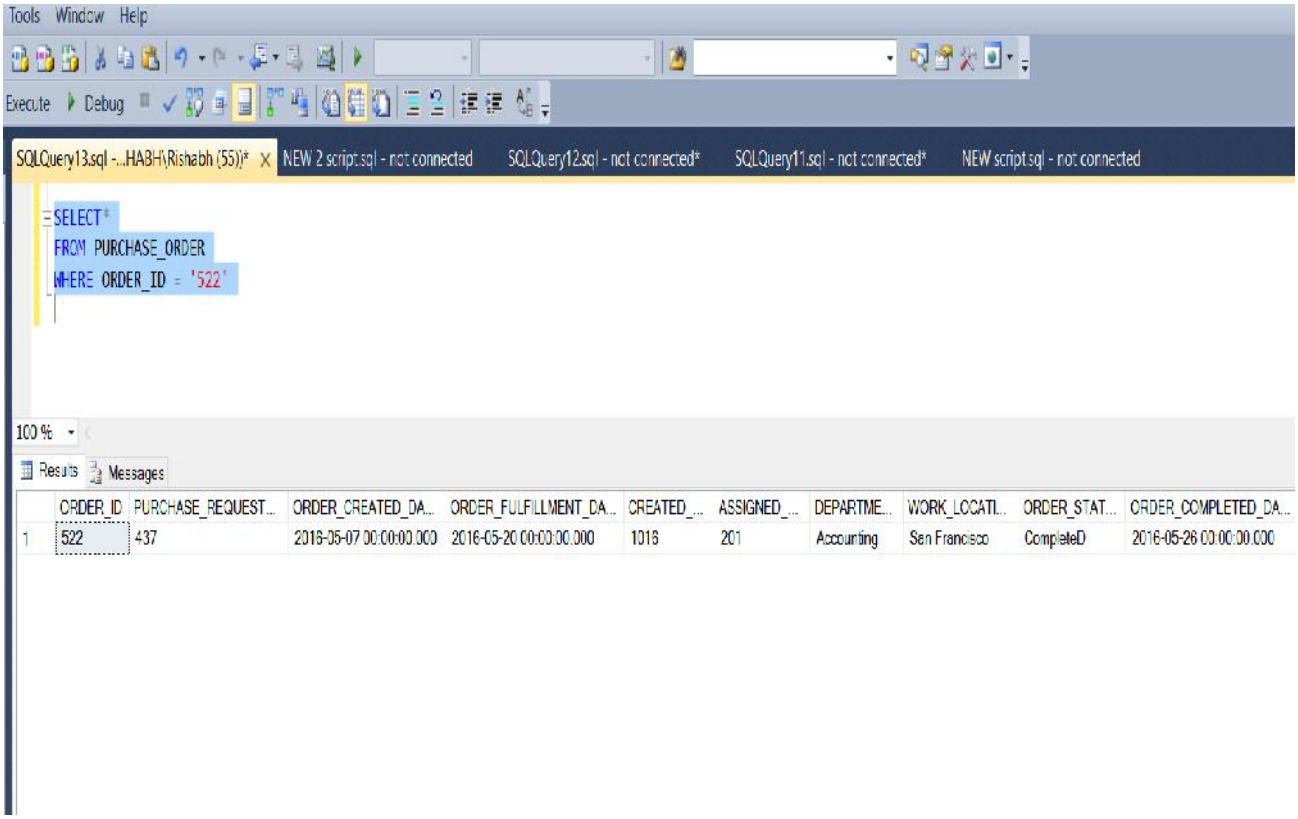




	INVOICE_LINE_ITEM_ID	INVOICE_ID	ITEM_DESCRIPTION	ITEM_QUANTITY_ORDER...	ITEM_QUANTITY_DELIVER...	ITEM_PRICE	TOTAL_ITEM_PRI...
1	1	101001	LENOVO MOUSE	2	2	50.00	100.000
2	1	101002	SAMSUNG WEBCAM	5	5	800.00	4000.000
3	1	101003	LOGITECH KEYBOARD	1	1	50.00	50.000
4	1	101004	APPLE LAPTOP	4	4	1000.00	4000.000
5	1	101005	LENOVO SPEAKERS	25	22	200.00	4400.000
6	1	101006	TP LINK ROUTER	20	20	100.00	2000.000
7	1	101007	SONY LAPTOP	5	5	1000.00	5000.000
8	1	101008	LENOVO SPEAKERS	8	8	200.00	1600.000
9	1	101009	TP LINK ROUTER	15	15	100.00	1500.000
10	1	101010	LENOVO LAPTOP	6	6	800.00	4800.000
11	1	101011	MOTOROLA MODEM	20	20	100.00	2000.000
12	1	101012	APPLE LAPTOP	10	10	1000.00	10000.000
13	1	101013	TP LINK ROUTER	5	5	100.00	500.000
14	1	101014	APPLE LAPTOP	25	20	1000.00	20000.000
15	1	101015	SAMSUNG TAB	5	5	400.00	2000.000
16	1	101016	APPLE MOUSE	5	5	100.00	500.000
17	2	101002	SAMSUNG TAB	5	4	400.00	1600.000
18	2	101004	APPLE MOUSE	15	12	100.00	1200.000
19	2	101005	LENOVO MONITOR	7	7	250.00	1750.000
20	2	101008	LENOVO MONITOR	10	10	250.00	2500.000
21	2	101010	LENOVO MOUSE	8	8	50.00	400.000
22	2	101014	APPLE MONITOR	3	3	1200.00	3600.000
23	2	101015	SAMSUNG WEBCAM	10	8	800.00	6400.000
24	2	101016	APPLE LAPTOP	10	10	1000.00	10000.000
25	3	101004	APPLE MONITOR	20	20	1200.00	24000.000
26	3	101010	LENOVO SPEAKERS	12	10	200.00	2000.000
27	3	101016	APPLE MONITOR	4	3	1200.00	3600.000

Step 7: After creating invoice, the Procurement and Payment associate marks the Purchase Order as completed and updates the Order completed date.

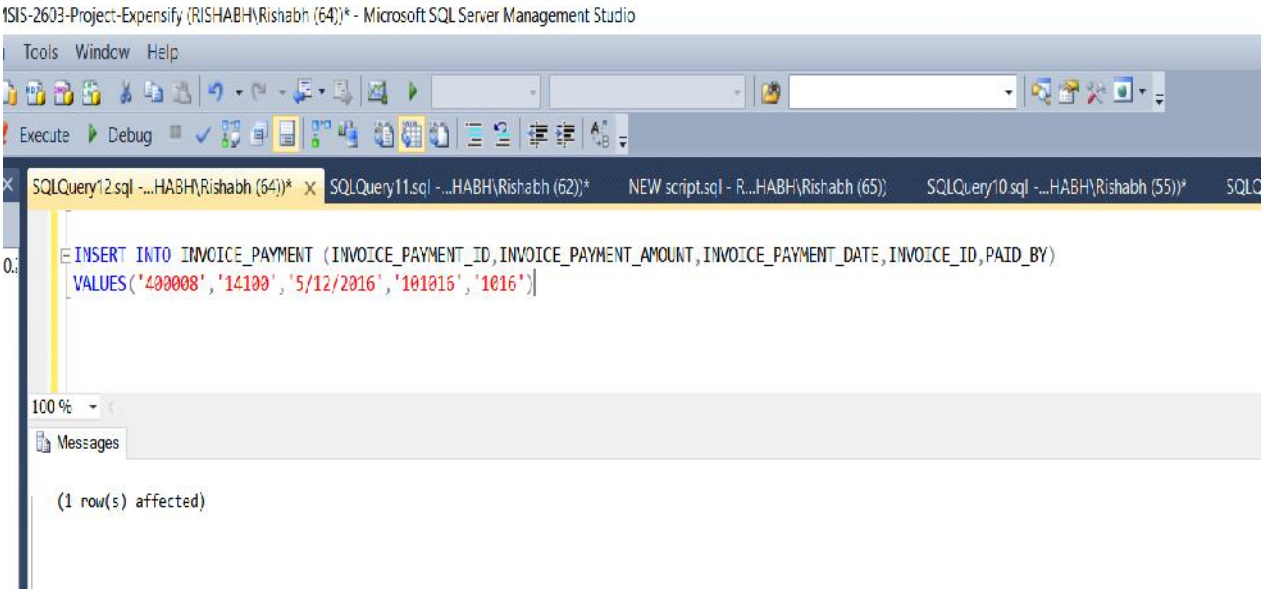


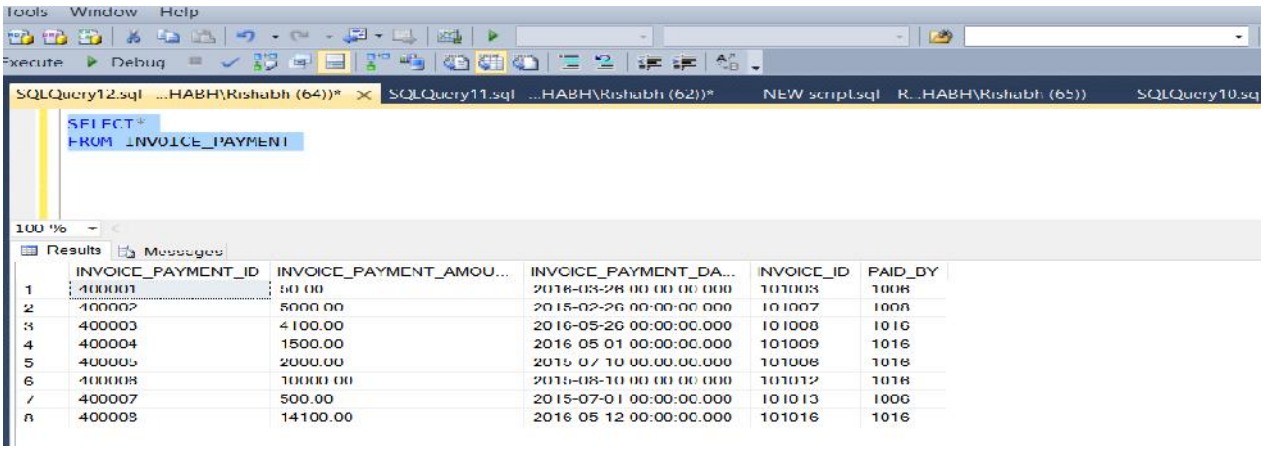


Step 8: On successful completion of the purchase order, Purchase and Procurement associate pays the supplier

Invoice payment

```
INSERT INTO INVOICE_PAYMENT
(INVOICE_PAYMENT_ID,INVOICE_PAYMENT_AMOUNT,INVOICE_PAYMENT_DATE,INVOICE_ID,PAID_BY)
VALUES('400008','14100','5/12/2016','101016','1016')
```



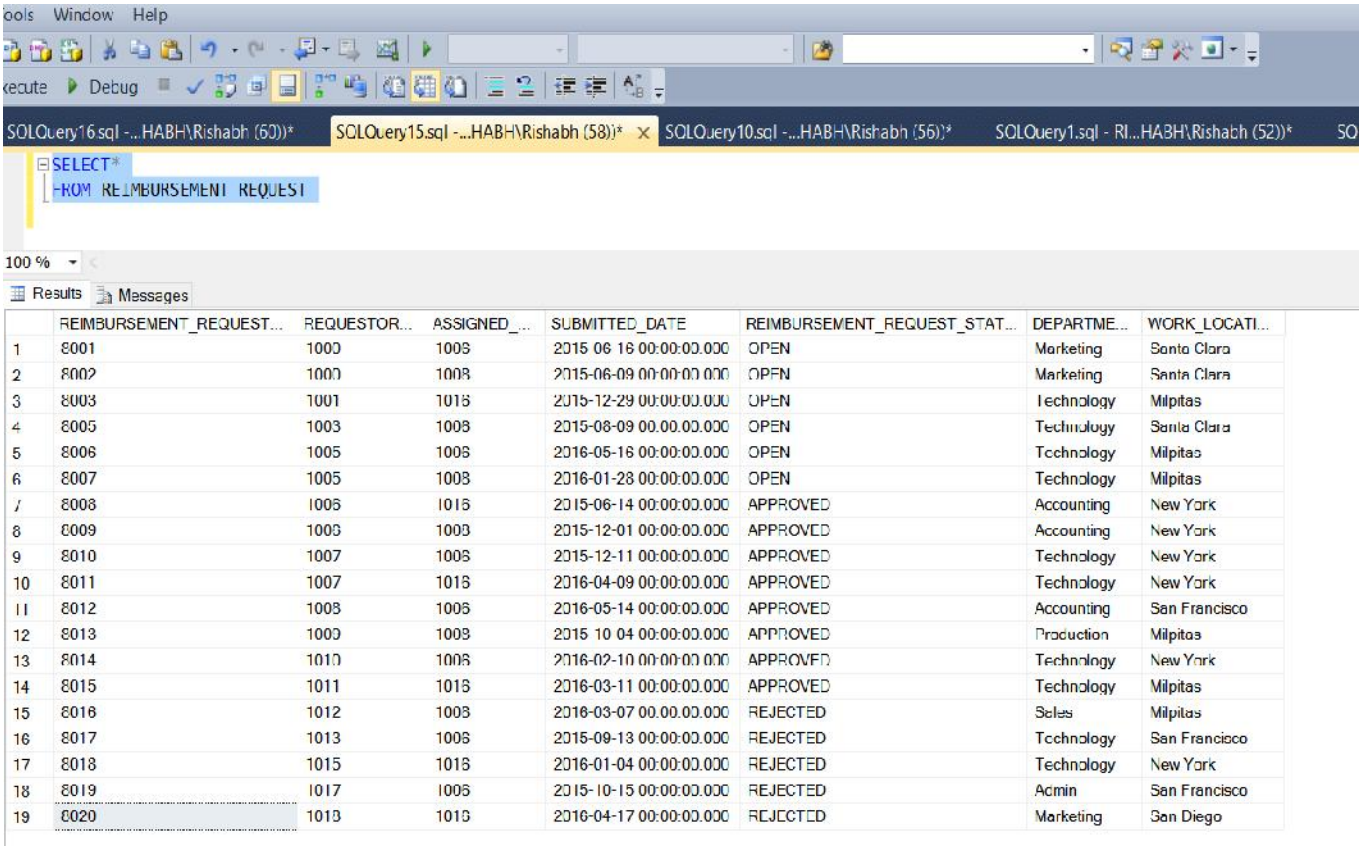


Business Process 3:

Employees create reimbursement requests for any official expenses like travel, food, accommodation etc. which is assigned to procurement and payment associate for review. For approved requests, the procurement and payment associate pays the employee.

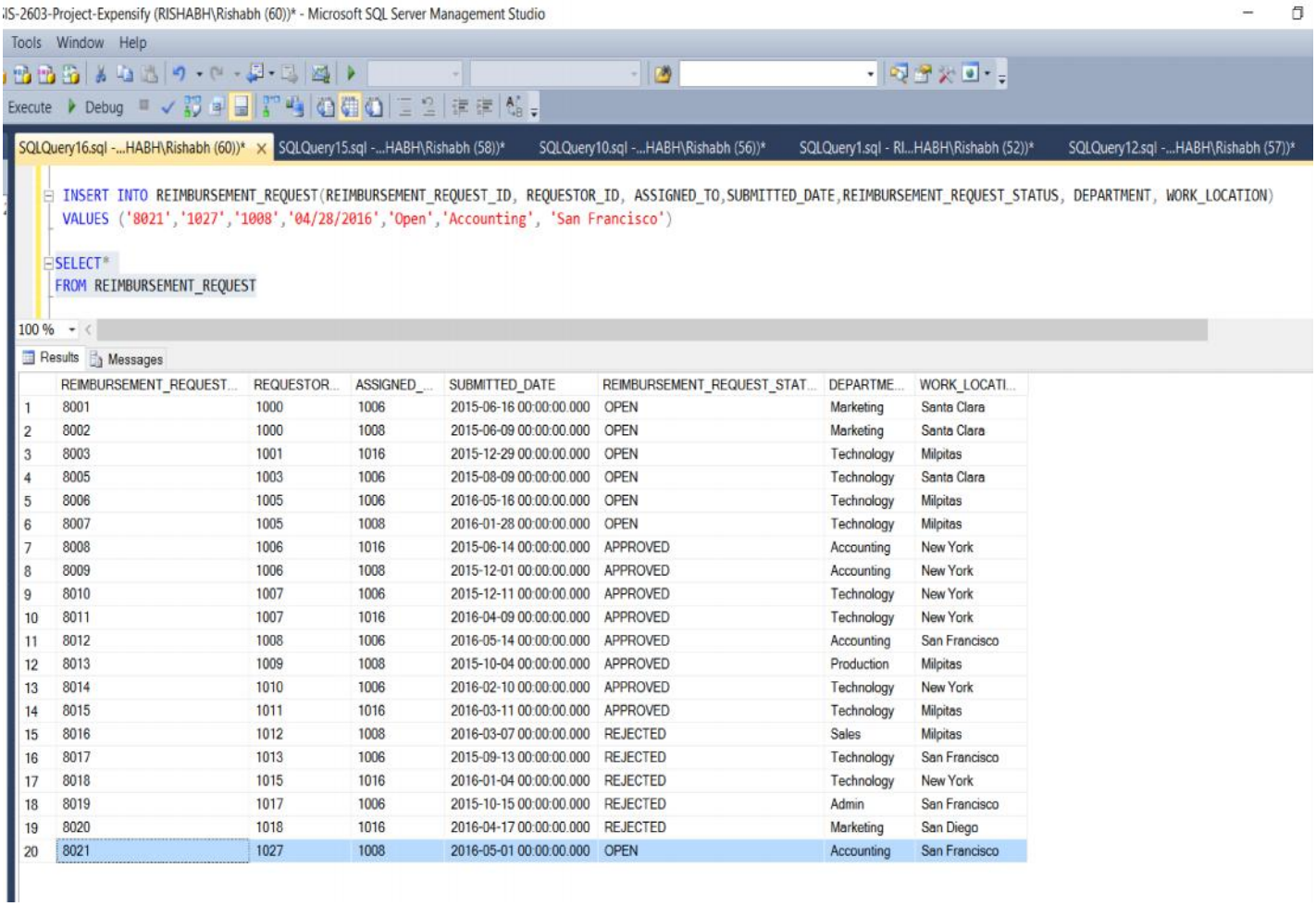
Step 1: Reimbursement request creation

BEFORE PROCESSING THE QUERY



	REIMBURSEMENT_REQUEST...	REQUESTOR...	ASSIGNED_...	SUBMITTED_DATE	REIMBURSEMENT_REQUEST_STAT...	DEPARTME...	WORK_LOCATI...
1	8001	1000	1008	2015 06 16 00:00:00.000	OPEN	Marketing	Santa Clara
2	8002	1000	1008	2015-06-09 00:00:00.000	OPEN	Marketing	Santa Clara
3	8003	1001	1018	2015-12-29 00:00:00.000	OPEN	Technology	Milpitas
4	8005	1003	1008	2015-08-09 00.00.00.000	OPEN	Technology	Santa Clara
5	8006	1005	1008	2016-05-16 00:00:00.000	OPEN	Technology	Milpitas
6	8007	1005	1008	2016-01-28 00:00:00.000	OPEN	Technology	Milpitas
7	8008	1006	1018	2015-06-14 00:00:00.000	APPROVED	Accounting	New York
8	8009	1006	1008	2015-12-01 00:00:00.000	APPROVED	Accounting	New York
9	8010	1007	1008	2015-12-11 00:00:00.000	APPROVED	Technology	New York
10	8011	1007	1018	2016-04-09 00:00:00.000	APPROVED	Technology	New York
11	8012	1008	1006	2016-05-14 00:00:00.000	APPROVED	Accounting	San Francisco
12	8013	1000	1008	2015 10 04 00:00:00.000	APPROVED	Production	Milpitas
13	8014	1010	1006	2016-02-10 00:00:00.000	APPROVED	Technology	New York
14	8015	1011	1018	2016-03-11 00:00:00.000	APPROVED	Technology	Milpitas
15	8016	1012	1008	2016-03-07 00.00.00.000	REJECTED	Sales	Milpitas
16	8017	1013	1006	2015-09-13 00:00:00.000	REJECTED	Technology	San Francisco
17	8018	1015	1018	2016-01-04 00:00:00.000	REJECTED	Technology	New York
18	8019	1017	1006	2015-10-15 00:00:00.000	REJECTED	Admin	San Francisco
19	8020	1018	1018	2016-04-17 00:00:00.000	REJECTED	Marketing	San Diego

AFTER PROCESSING THE QUERY:



	REIMBURSEMENT_REQUEST...	REQUESTOR...	ASSIGNED_...	SUBMITTED_DATE	REIMBURSEMENT_REQUEST_STAT...	DEPARTME...	WORK_LOCATI...
1	8001	1000	1006	2015-06-16 00:00:00.000	OPEN	Marketing	Santa Clara
2	8002	1000	1008	2015-06-09 00:00:00.000	OPEN	Marketing	Santa Clara
3	8003	1001	1016	2015-12-29 00:00:00.000	OPEN	Technology	Milpitas
4	8005	1003	1006	2015-08-09 00:00:00.000	OPEN	Technology	Santa Clara
5	8006	1005	1006	2016-05-16 00:00:00.000	OPEN	Technology	Milpitas
6	8007	1005	1008	2016-01-28 00:00:00.000	OPEN	Technology	Milpitas
7	8008	1006	1016	2015-06-14 00:00:00.000	APPROVED	Accounting	New York
8	8009	1006	1008	2015-12-01 00:00:00.000	APPROVED	Accounting	New York
9	8010	1007	1006	2015-12-11 00:00:00.000	APPROVED	Technology	New York
10	8011	1007	1016	2016-04-09 00:00:00.000	APPROVED	Technology	New York
11	8012	1008	1006	2016-05-14 00:00:00.000	APPROVED	Accounting	San Francisco
12	8013	1009	1008	2015-10-04 00:00:00.000	APPROVED	Production	Milpitas
13	8014	1010	1006	2016-02-10 00:00:00.000	APPROVED	Technology	New York
14	8015	1011	1016	2016-03-11 00:00:00.000	APPROVED	Technology	Milpitas
15	8016	1012	1008	2016-03-07 00:00:00.000	REJECTED	Sales	Milpitas
16	8017	1013	1006	2015-09-13 00:00:00.000	REJECTED	Technology	San Francisco
17	8018	1015	1016	2016-01-04 00:00:00.000	REJECTED	Technology	New York
18	8019	1017	1006	2015-10-15 00:00:00.000	REJECTED	Admin	San Francisco
19	8020	1018	1016	2016-04-17 00:00:00.000	REJECTED	Marketing	San Diego
20	8021	1027	1008	2016-05-01 00:00:00.000	OPEN	Accounting	San Francisco

Insert Reimbursement Request Line Items

BEFORE EXECUTING THE QUERY

SQLQuery1.sql - not connected

```
/****** Script for SelectTopNRows command from SSMS  ******/
SELECT TOP 1000 [REIMBURSEMENT_REQUEST_ID]
      ,[REIMBURSEMENT_REQUEST_LINE_ITEM_ID]
      ,[ITEM_DESCRIPTION]
      ,[ITEM_AMOUNT]
```

100 %

Results | Messages

	REIMBURSEMENT_REQUEST_ID	REIMBURSEMENT_REQUEST_LINE_ITEM_ID	ITEM_DESCRIPTION	ITEM_AMOUNT
3	8002	1	TEAM OUTING	1000.00
4	8003	1	ACCOMODATION	200.00
5	8003	2	GAS	50.00
6	8005	1	CAR RENTAL	200.00
7	8006	1	CAR INSURANCE	300.00
8	8007	1	HEALTH INSURANCE	500.00
9	8007	2	HOUSE RENTAL	1000.00
10	8007	3	AIR TICKET	200.00
11	8008	1	AIR TICKET	1000.00
12	8009	1	GAS	500.00
13	8010	1	PHONE BILL	100.00
14	8011	1	TEAM LUNCH	300.00
15	8012	1	TEAM OUTING	1000.00
16	8013	1	TEAM DINNER	300.00
17	8014	1	INTERNET	70.00
18	8015	1	BRUNCH	150.00
19	8016	1	MISC	150.00
20	8017	1	MISC	500.00
21	8018	1	CAR REPAIR	800.00
22	8019	1	LAPTOP REPAIR	200.00
23	8020	1	GIFTS	500.00

QUERY PROCESSING

```
INSERT INTO REIMBURSEMENT_REQUEST_LINE_ITEMS (REIMBURSEMENT_REQUEST_ID, REIMBURSEMENT_REQUEST_LINE_ITEM_ID, ITEM_DESCRIPTION, ITEM_AMOUNT)
VALUES ('8021', '1', 'AIR TICKET','400')

INSERT INTO REIMBURSEMENT_REQUEST_LINE_ITEMS (REIMBURSEMENT_REQUEST_ID, REIMBURSEMENT_REQUEST_LINE_ITEM_ID, ITEM_DESCRIPTION, ITEM_AMOUNT)
VALUES ('8021', '2', 'CAR RENTAL','940')
```

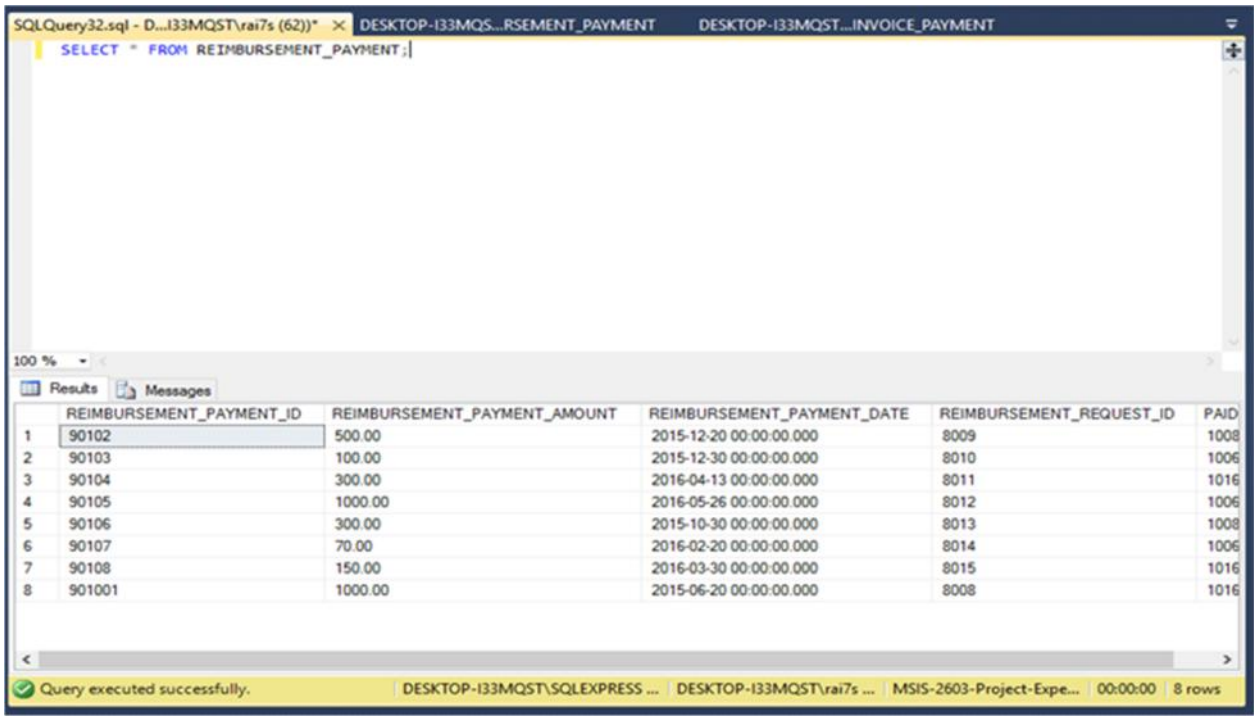
100 %

Messages

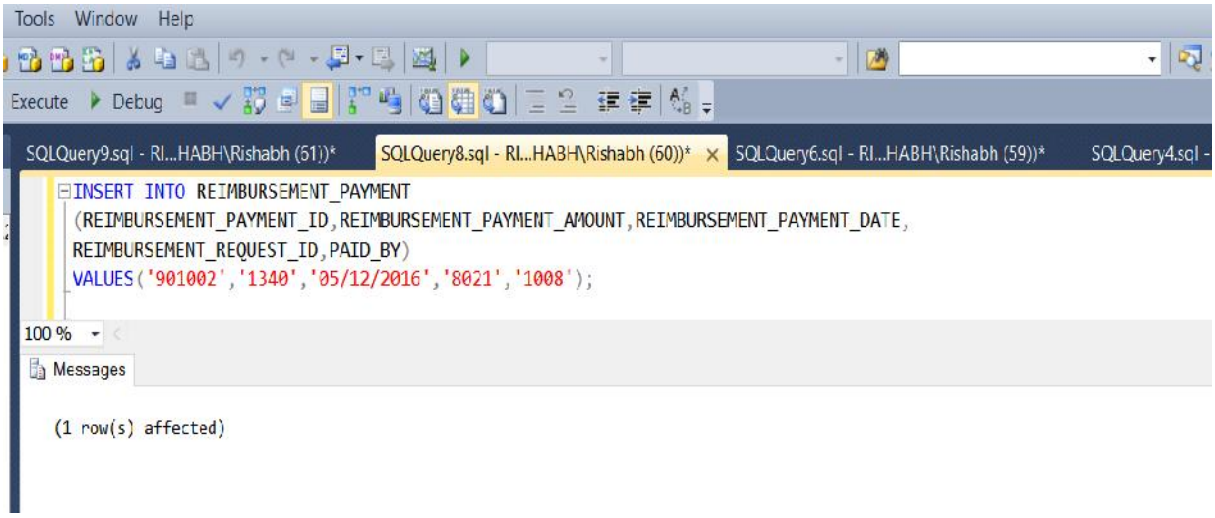
```
(1 row(s) affected)

(1 row(s) affected)
```

Step 2: Reimbursement payment

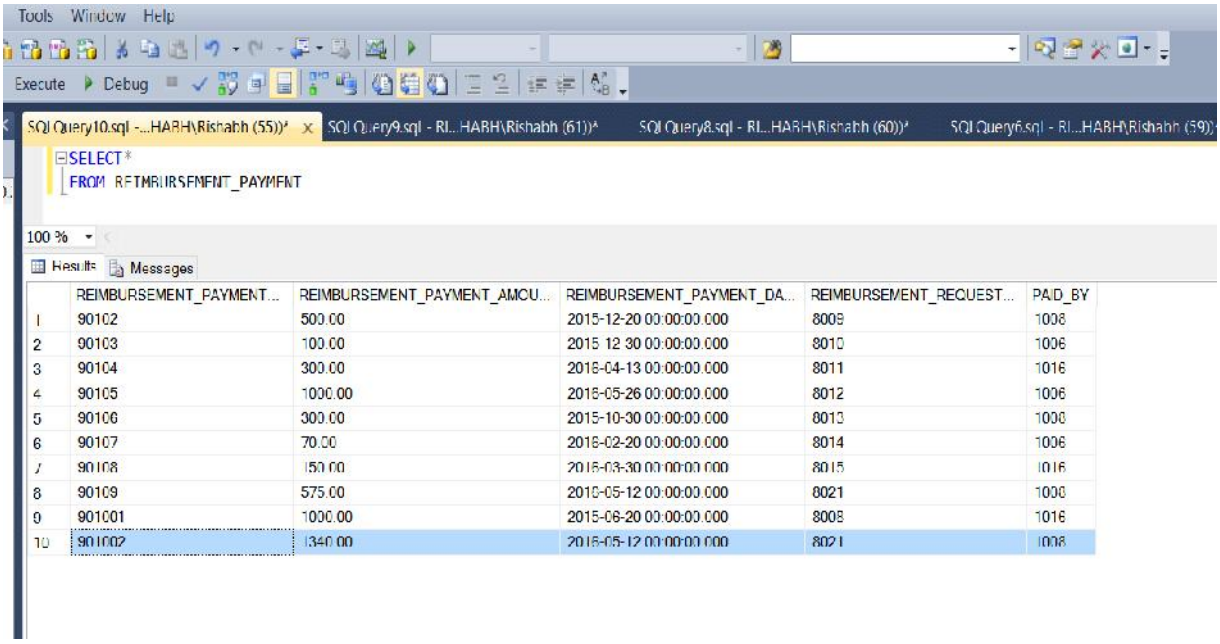
```
INSERT INTO REIMBURSEMENT_PAYMENT
(REIMBURSEMENT_PAYMENT_ID,REIMBURSEMENT_PAYMENT_AMOUNT,
REIMBURSEMENT_PAYMENT_DATE,
REIMBURSEMENT_REQUEST_ID,PAID_BY)
VALUES('901002','1340','2016-05-20','8021','1016');
```



QUERY PROCESSING FOR REIMBURSEMENT PAYMENT



AFTER QUERY PROCESSING FOR REIUMBURSEMENT PAYMENT

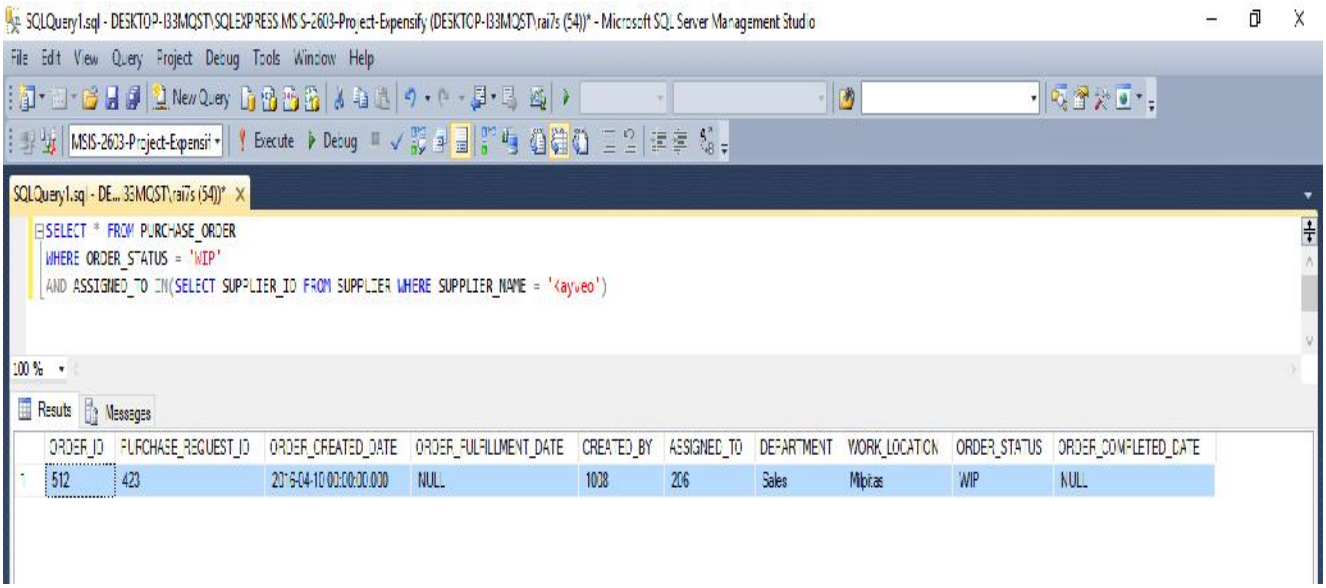


	REIMBURSEMENT_PAYMENT...	REIMBURSEMENT_PAYMENT_AMOU...	REIMBURSEMENT_PAYMENT_DA...	REIMBURSEMENT_REQUEST...	PAID_BY
1	90102	500.00	2015-12-20 00:00:00.000	8009	1006
2	90103	100.00	2015-12-30 00:00:00.000	8010	1006
3	90104	300.00	2016-04-13 00:00:00.000	8011	1016
4	90105	1000.00	2016-05-26 00:00:00.000	8012	1006
5	90106	300.00	2015-10-30 00:00:00.000	8013	1000
6	90107	70.00	2016-02-20 00:00:00.000	8014	1006
7	90108	150.00	2016-03-30 00:00:00.000	8015	1016
8	90109	575.00	2016-05-12 00:00:00.000	8021	1000
9	901001	1000.00	2015-06-20 00:00:00.000	8008	1016
10	901002	1340.00	2016-05-12 00:00:00.000	8021	1008

Additional Queries

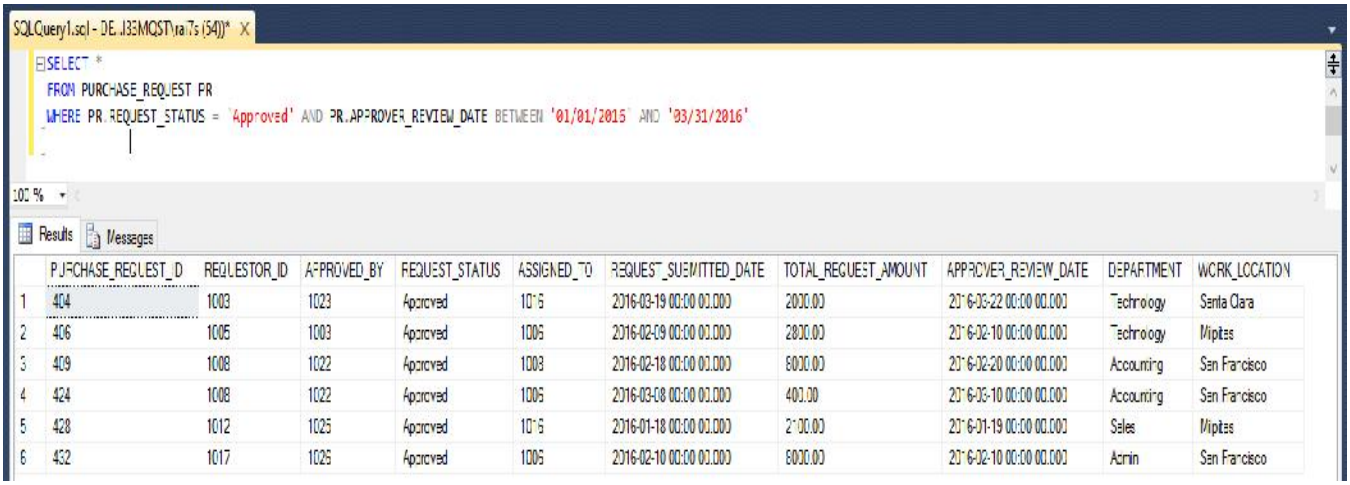
1. Find all WIP purchase orders assigned a particular supplier

```
SELECT * FROM PURCHASE_ORDER
WHERE ORDER_STATUS = 'WIP'
AND ASSIGNED_TO IN (
SELECT SUPPLIER_ID FROM SUPPLIER WHERE SUPPLIER_NAME = 'Kayveo')
```



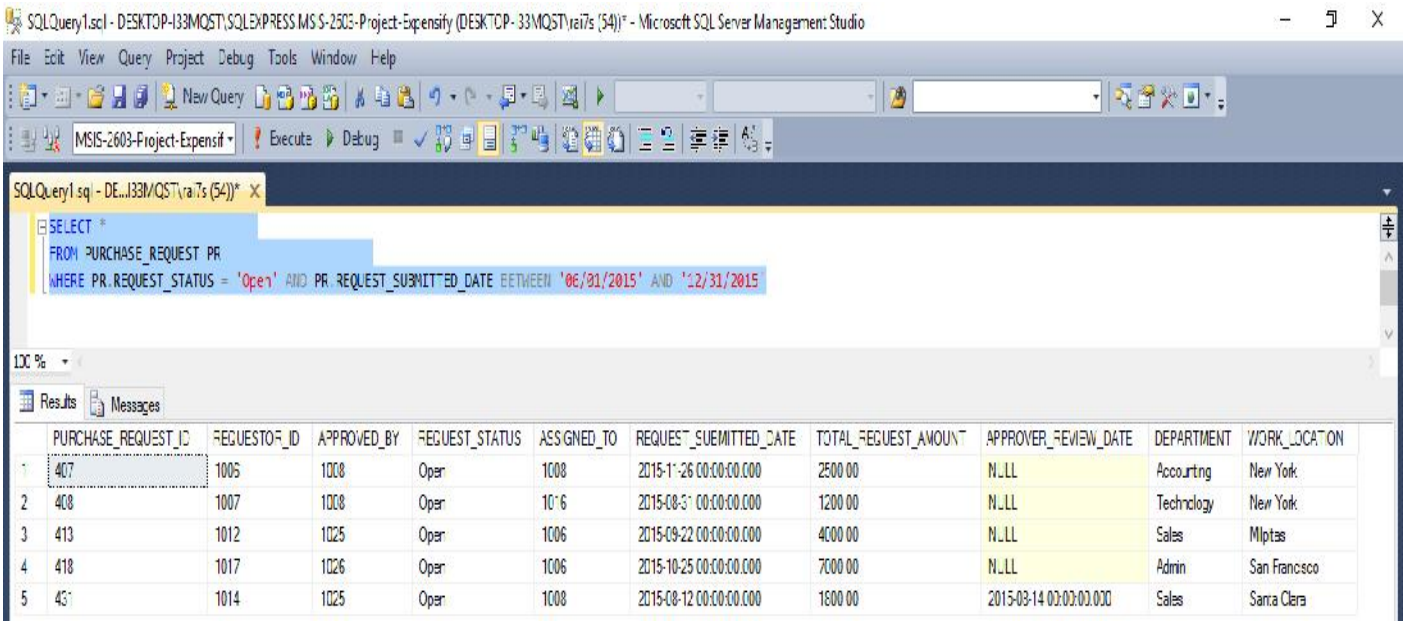
2. View all requests that have been approved for first quarter of 2016

```
SELECT *
FROM PURCHASE_REQUEST PR
WHERE PR.REQUEST_STATUS = 'Approved' AND
PR.APPROVER_REVIEW_DATE BETWEEN '01/01/2016' AND '03/31/2016'
```



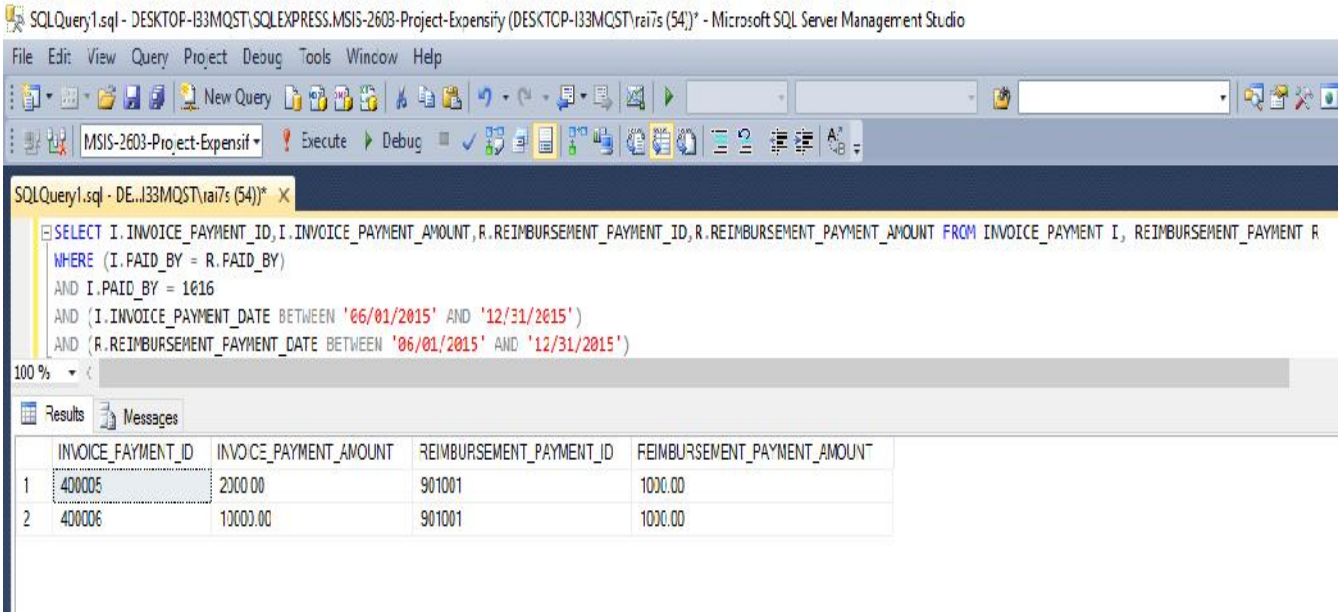
3. View all requests from 2015 that are still pending approval

```
SELECT *
FROM PURCHASE_REQUEST PR
WHERE PR.REQUEST_STATUS = 'Open' AND
PR.REQUEST_SUBMITTED_DATE BETWEEN '06/01/2015' AND '12/31/2015'
```

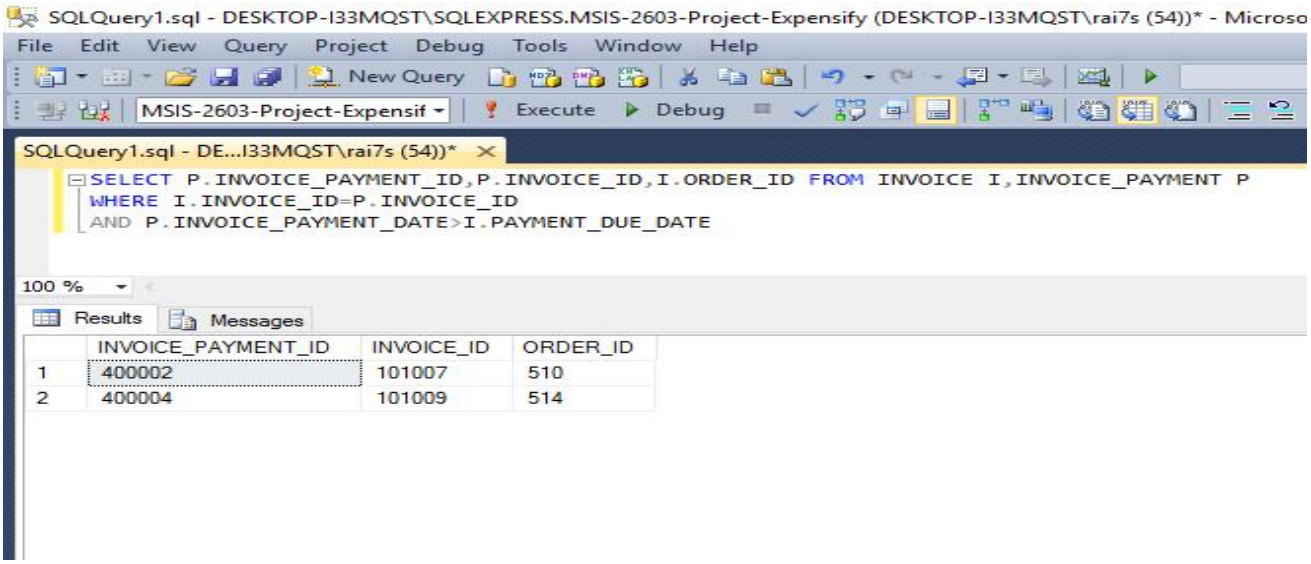


4. Find all payments made by a payment associate in last quarter of 2015

```
SELECT I.INVOICE_PAYMENT_ID,I.INVOICE_PAYMENT_AMOUNT,R.REIMBURSEMENT_PAYMENT_ID,
R.REIMBURSEMENT_PAYMENT_AMOUNT FROM INVOICE_PAYMENT I, REIMBURSEMENT_PAYMENT R
WHERE (I.PAID_BY = R.PAID_BY)
AND I.PAID_BY = 1016
AND (I.INVOICE_PAYMENT_DATE BETWEEN '06/01/2015' AND '12/31/2015')
AND (R.REIMBURSEMENT_PAYMENT_DATE BETWEEN '06/01/2015' AND '12/31/2015')
```



5. Find all overdue payments



8. Business Metrics Queries

1. Find Suppliers by Total Spend

```
/*Group suppliers by spend*/
SELECT SUPPLIER.SUPPLIER_NAME,SUM(INVOICE_PAYMENT.INVOICE_PAYMENT_AMOUNT ) AS AMOUNT_SPENT
FROM SUPPLIER,INVOICE,INVOICE_PAYMENT
WHERE INVOICE_PAYMENT.INVOICE_ID = INVOICE.INVOICE_ID AND SUPPLIER.SUPPLIER_ID = INVOICE.SUPPLIER_ID
GROUP BY SUPPLIER.SUPPLIER_NAME
```

100 %

Results | Messages

	SUPPLIER_NAME	AMOUNT_SPENT
1	InnoZ	4100.00
2	Kayveo	5000.00
3	Novatech	50.00
4	Skipstorm	500.00
5	Skyble	13500.00

2. Find the total spend with a drill down of Reimbursement payments and Procurement/Supplier payments by each department and work location

```
SELECT O.DEPARTMENT,O.WORK_LOCATION,SUM(IP.INVOICE_PAYMENT_AMOUNT) AS 'SUPPLIER PAYMENT',
SUM(RP.REIMBURSEMENT_PAYMENT_AMOUNT) AS'REIMBURSEMENT PAYMENT',
SUM(IP.INVOICE_PAYMENT_AMOUNT + RP.REIMBURSEMENT_PAYMENT_AMOUNT) AS TOTAL_SPEND
FROM PURCHASE_ORDER O,INVOICE_PAYMENT IP,INVOICE I,REIMBURSEMENT_REQUEST R,REIMBURSEMENT_PAYMENT RP
WHERE IP.INVOICE_ID = I.INVOICE_ID AND I.ORDER_ID = O.ORDER_ID
AND RP.REIMBURSEMENT_REQUEST_ID = R.REIMBURSEMENT_REQUEST_ID
GROUP BY O.DEPARTMENT,O.WORK_LOCATION
ORDER BY O.WORK_LOCATION
```

100 %

Results | Messages

	DEPARTMENT	WORK_LOCATION	SUPPLIER PAYMENT	REIMBURSEMENT PAYMENT	TOTAL_SPEND
1	Sales	Milpitas	13500.00	3995.00	17495.00
2	Technology	Milpitas	127350.00	11985.00	139335.00
3	Accounting	New York	4500.00	3995.00	8495.00
4	Marketing	San Diego	45000.00	3995.00	48995.00
5	Sales	Santa Clara	18000.00	3995.00	21995.00

3. List Suppliers who have delayed their deliveries along with the duration for delay in days

```
SELECT A.SUPPLIER,S.SUPPLIER_NAME,A.PURCHASE_ODER_ID, (A.DELAY_IN_DAYS - 20) AS 'DELAY_IN_DAYS' ,A.ORDER_STATUS
FROM
(SELECT PO.ORDER_ID AS 'PURCHASE_ODER_ID',PO.ASSIGNED_TO AS 'SUPPLIER',
DATEDIFF(DAY,PO.ORDER_CREATED_DATE,PO.ORDER_FULFILLMENT_DATE)
AS 'DELAY_IN_DAYS', PO.ORDER_STATUS FROM PURCHASE_ORDER PO  WHERE PO.ORDER_STATUS = 'COMPLETED' AND EXISTS
(SELECT * FROM PURCHASE_ORDER P WHERE DATEDIFF(DAY,P.ORDER_CREATED_DATE,P.ORDER_FULFILLMENT_DATE)>20 AND
PO.ORDER_ID = P.ORDER_ID)) A,SUPPLIER S
WHERE S.SUPPLIER_ID = A.SUPPLIER
```

Results | Messages

	SUPPLIER	SUPPLIER_NAME	PURCHASE_ODER_ID	DELAY_IN_DAYS	ORDER_STATUS
1	210	Skyble	508	2	COMPLETED
2	206	Kayveo	510	8	COMPLETED
3	210	Skyble	514	68	COMPLETED
4	210	Skyble	518	6	COMPLETED

4. Find the Suppliers for which the quantity delivered was short of quantity ordered

```
/*Find the suppliers for which the quantity delivered was short of quantity ordered.*/

SELECT SUPPLIER.SUPPLIER_NAME + '-' + INVOICE_LINE_ITEMS.ITEM_DESCRIPTION AS 'SUPPLIER-ITEM',
INVOICE_LINE_ITEMS.ITEM_QUANTITY_ORDERED,INVOICE_LINE_ITEMS.ITEM_QUANTITY_DELIVERED
FROM PURCHASE_ORDER,INVOICE, INVOICE_LINE_ITEMS, SUPPLIER
WHERE PURCHASE_ORDER.ORDER_ID = INVOICE.ORDER_ID AND
INVOICE.INVOICE_ID = INVOICE_LINE_ITEMS.INVOICE_ID AND
INVOICE_LINE_ITEMS.ITEM_QUANTITY_DELIVERED < INVOICE_LINE_ITEMS.ITEM_QUANTITY_ORDERED AND
PURCHASE_ORDER.ASSIGNED_TO = SUPPLIER.SUPPLIER_ID
```

100 %

Results | Messages

	SUPPLIER-ITEM	ITEM_QUANTITY_ORDERED	ITEM_QUANTITY_DELIVERED
1	InnoZ-LENOVO SPEAKERS	25	22
2	Skipstorm-APPLE LAPTOP	25	20
3	Nlounge-SAMSUNG TAB	5	4
4	Skipstorm-APPLE MOUSE	15	12
5	Nlounge-SAMSUNG WEBCAM	10	8
6	InnoZ-LENOVO SPEAKERS	12	10

5. Find the items purchased from different suppliers along with their quantity and the price the supplier charged for every item

```
/* price analysis*/
SELECT S.SUPPLIER_NAME,IL.ITEM_DESCRIPTION,IL.ITEM_PRICE,IL.ITEM_QUANTITY_ORDERED
FROM INVOICE I,INVOICE_LINE_ITEMS IL,SUPPLIER S
WHERE I.INVOICE_ID = IL.INVOICE_ID AND S.SUPPLIER_ID = I.SUPPLIER_ID
ORDER BY S.SUPPLIER_NAME
```

100 %

Results | Messages

	SUPPLIER_NAME	ITEM_DESCRIPTION	ITEM_PRICE	ITEM_QUANTITY_ORDERED
1	InnoZ	LENOVO MOUSE	50.00	2
2	InnoZ	LENOVO SPEAKERS	200.00	25
3	InnoZ	LENOVO MONITOR	250.00	7
4	InnoZ	LENOVO SPEAKERS	200.00	8
5	InnoZ	LENOVO MONITOR	250.00	10
6	InnoZ	LENOVO LAPTOP	800.00	6
7	InnoZ	LENOVO MOUSE	50.00	8
8	InnoZ	LENOVO SPEAKERS	200.00	12
9	Kayveo	SONY LAPTOP	1000.00	5
10	Nlounge	SAMSUNG WEBCAM	800.00	5
11	Nlounge	SAMSUNG TAB	400.00	5
12	Nlounge	SAMSUNG TAB	400.00	5
13	Nlounge	SAMSUNG WEBCAM	800.00	10
14	Novatech	LOGITECH KEYBOARD	50.00	1
15	Oodoo	MOTOROLA MODEM	100.00	20
16	Skipstorm	APPLE LAPTOP	1000.00	4
17	Skipstorm	APPLE MOUSE	100.00	15
18	Skipstorm	APPLE MONITOR	1200.00	20
19	Skipstorm	TP LINK ROUTER	100.00	5
20	Skipstorm	APPLE LAPTOP	1000.00	25
21	Skipstorm	APPLE MONITOR	1200.00	3
22	Skyble	TP LINK ROUTER	100.00	20
23	Skyble	TP LINK ROUTER	100.00	15
24	Skyble	APPLE LAPTOP	1000.00	10

6. Find the status of purchase orders in every department since January 2015

```
/* Status of purchase orders in every department*/

SELECT O.DEPARTMENT,O.ORDER_STATUS,COUNT(O.ORDER_STATUS) AS 'Number of Orders'
FROM PURCHASE_ORDER O
WHERE O.ORDER_CREATED_DATE BETWEEN '01/01/2015' AND '05/30/2016'
GROUP BY O.DEPARTMENT,O.ORDER_STATUS
ORDER BY O.DEPARTMENT
```

100 %

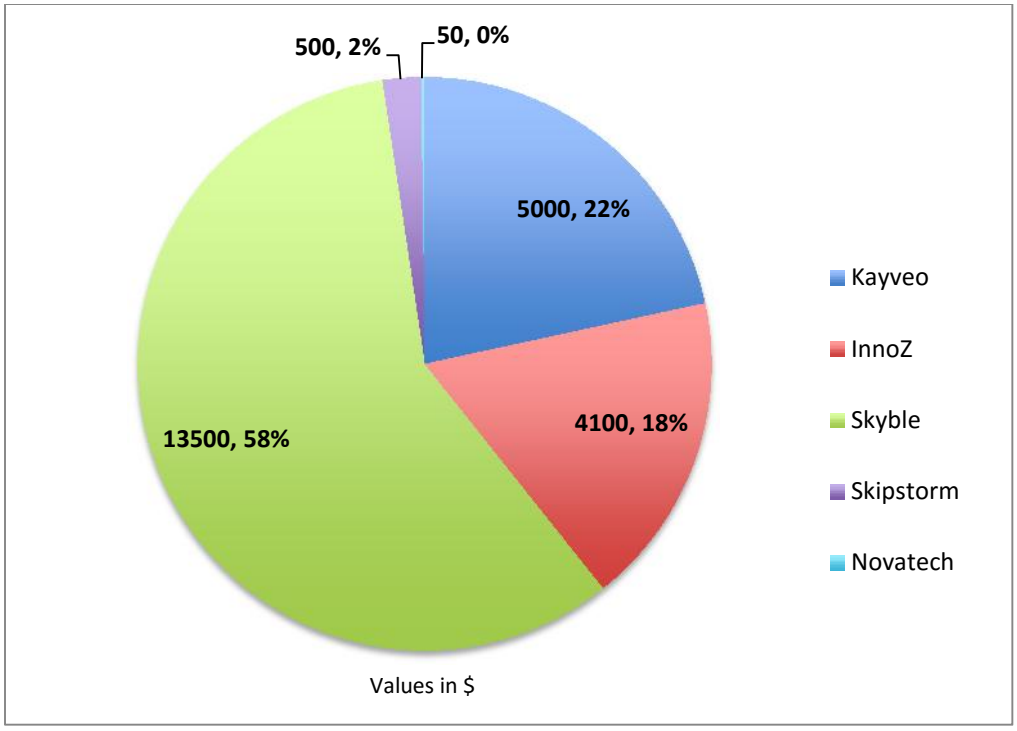
Results | Messages

	DEPARTMENT	ORDER_STATUS	Number of Orders
1	Accounting	COMPLETED	2
2	Accounting	FULFILLED	1
3	Accounting	OPEN	1
4	Admin	FULFILLED	1
5	Admin	OPEN	1
6	Marketing	COMPLETED	2
7	Marketing	OPEN	1
8	Production	WIP	1
9	Sales	COMPLETED	2
10	Sales	FULFILLED	2
11	Sales	WIP	1
12	Technology	COMPLETED	3
13	Technology	FULFILLED	2
14	Technology	WIP	1

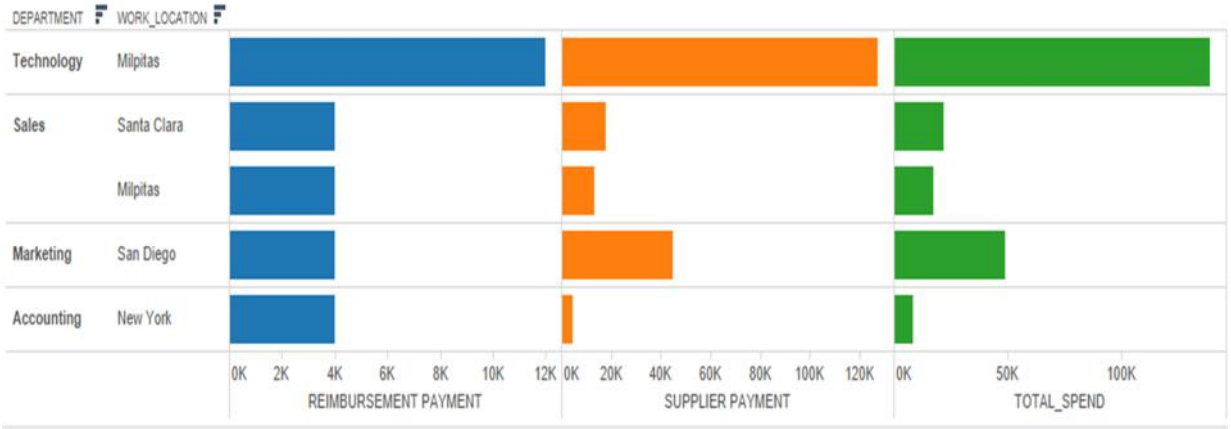
9. Business Metrics Reports

In today's world, with different systems in place a lot of data is being generated and it's very important to draw quantitative and qualitative insights from that data in the form of *Business Metrics Reports*, to help business take informed decisions.

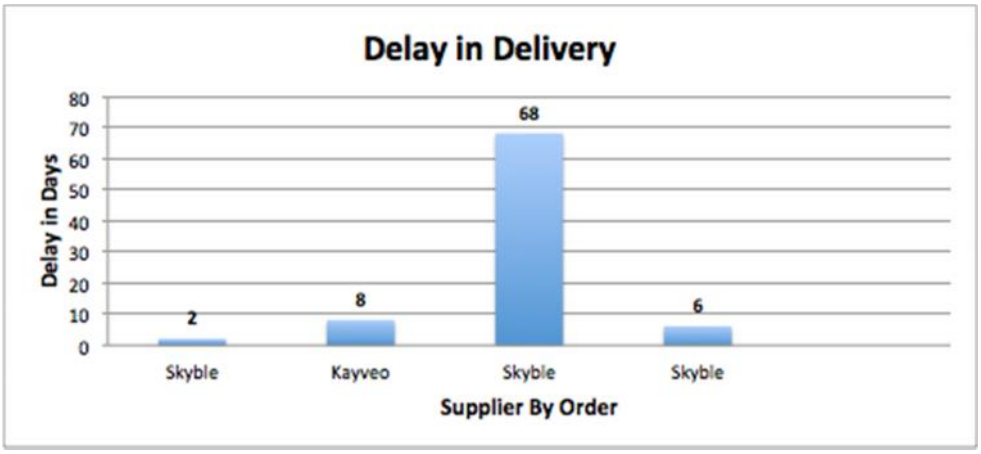
Analyze the Percentage Spend by Supplier: This Report is crucial as it gives a holistic view about an organization's spending in $ value and its percentage of the total spend by supplier. Based on $ value purchase with a supplier, the company can initiate some negotiation discussions. From the report below we see that the company has spent 58% of its total spend with supplier Skyble, so it can definitely negotiate the payment terms for future purchases.



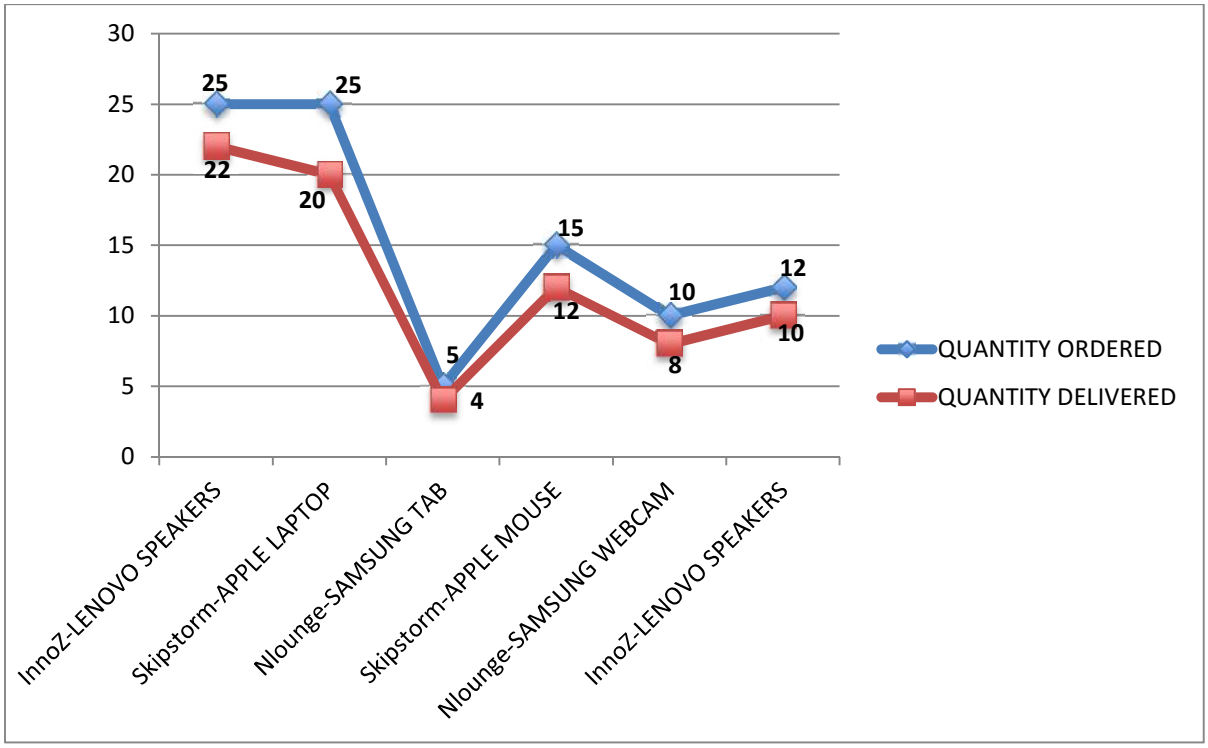
2. Analyze the Spends by Department and Work Location – This Report helps analyze the total spend with two *dimensions* – Department and work location *and it also drills down* to two subcategories of the total spend - reimbursement payments and procurement payments. This report tells us which department and which work location is spending the most and it also helps do comparative analysis. For example - Based on the following data, we see that the Milpitas location has the highest overall spend and hence management would want to have a closer look at the spending and see any opportunities to cut down costs.



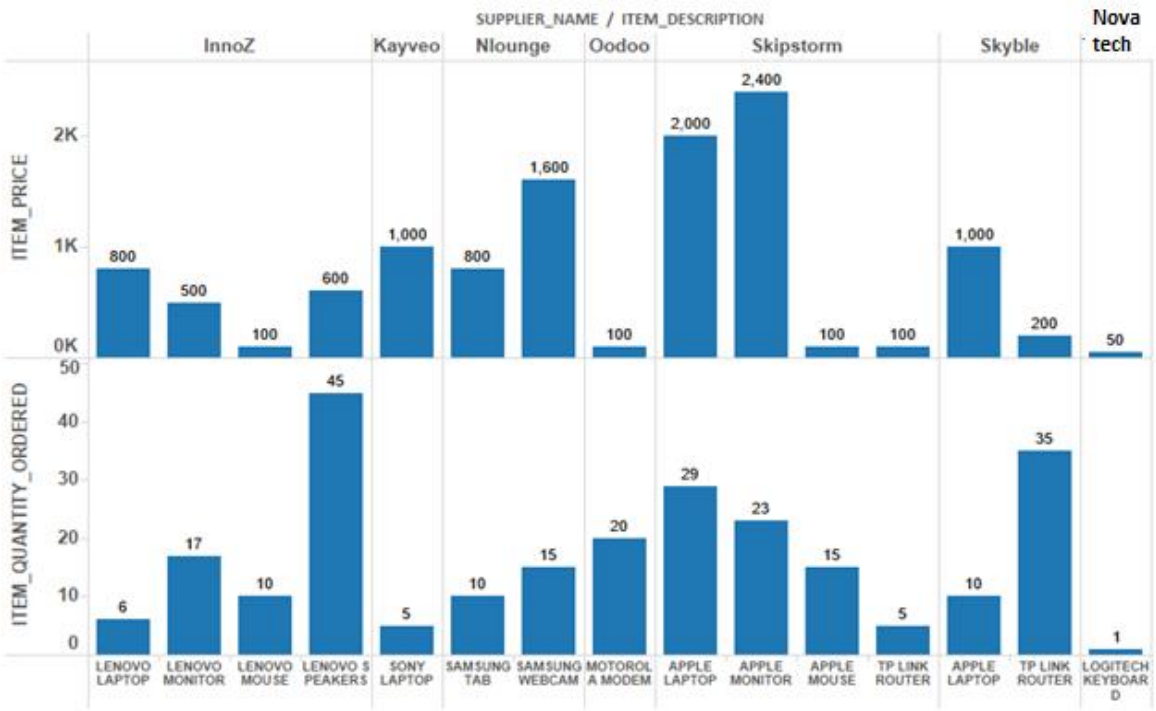
3. Suppliers with delays in delivery – This report shows the suppliers who have not delivered on time and also depicts the delay in days. From the report below we can infer that the supplier Skyble has not delivered on time for three orders, so probably, the company would not want to do business with this supplier in future.



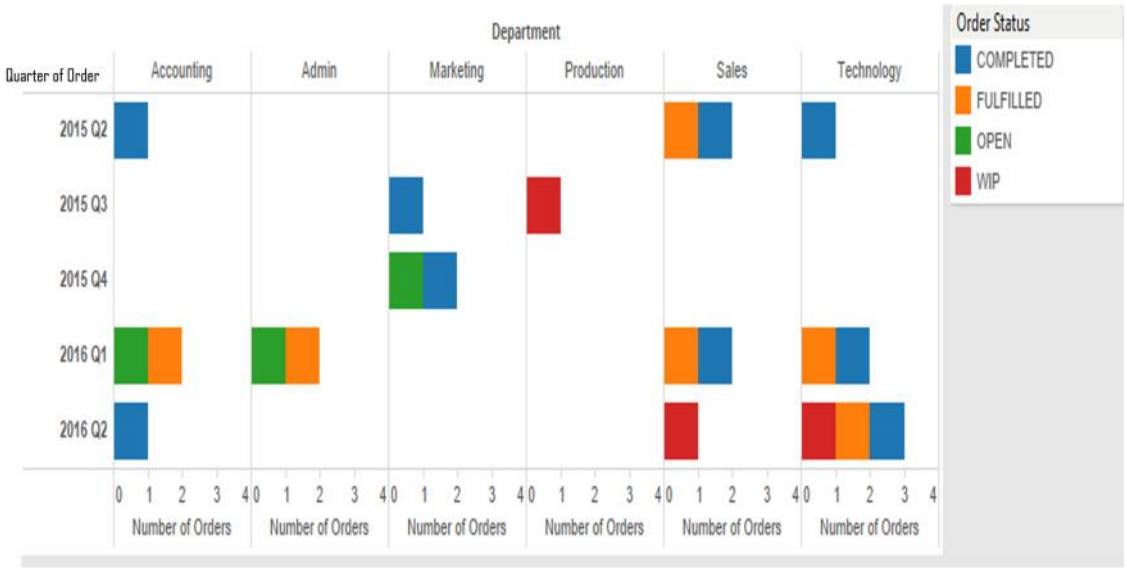
4. Delivery short on Quantity ordered – This report gives information of suppliers along with the Item names for which the quantity delivered was short of quantity ordered. This representation would help the procurement team to follow up with suppliers on delivery and also see the trend if a particular supplier is repeating this pattern of inefficiency over a period of time.



5. Items ordered and Item prices comparative analysis by supplier – This report helps analyze items ordered from different suppliers and their associated prices which gives an insight on the price variations for similar items. For example, apple laptops ordered are most expensive in laptop category, so the company could consider other options in the same category which are cost beneficial.



6. Purchase Order Status Analysis – This report allows analysis of purchase orders by their status. The procurement associate can keep track of orders created over time (view of last 6 quarters here) For example – Order created in Q3 -2015 is still in progress, so procurement team should prioritize this order and close it by following up with the associated supplier.



10. Project Summary

This project has helped us design and implement the back-end interactions of a procurement and expense management system, which has enabled us to understand the end-to-end activities of the system. As a team, we came together with varied perspectives and ideas for the project at hand and each one's skills and techniques were put into good use during the course of the project. High cohesiveness within the team helped us plan the project tasks ahead of time and also helped us adhere to the milestones.

Challenges faced and solutions:

Restricting the scope:

Given the domain as procurement and expense management, we had challenges in restricting the scope of the application. After brainstorming, we incorporated a few scope restrictions on the user types, user roles, approval structure, mapping between purchase requests and purchase orders and the number of suppliers fulfilling an order. Working through our restrictions we made sure that we still

incorporate all the important functionalities of an expense and procurement management system.

UML design:

During the UML design, identifying all the entities, attributes and making sure all dependencies were listed out was quite a challenge. Several reviews with professor followed by discussions and updates, helped immensely to gain better insights into the entire process and also gave a clear picture of the next steps to be taken.

Consolidation of individual work:

As a team, we did a good job of splitting the tasks among ourselves and it ensured that we could move forward in the right pace. But, each of our individual efforts in writing queries necessitated revisiting the UML or the physical schema. Group collaboration tools like Google docs, Google sheets and also the automated features of exporting the script from SQL Server came handy and saved a lot of manual work. Also, we planned to execute our individual tasks coherently so as to reduce any kind of rework. Peer reviews on each other's work and keeping everyone on the team updated on any changes proved to be constructive.

Data population:

Populating the data for all tables created was yet another challenge as the entire process flow had to be thought through and every record added, had to be relevant to the business processes. Moreover, all of the reference integrity constraints had to be preserved. There were instances where we had to go back to create necessary data to generate meaningful results for all queries formed and also to map the business metrics queries to the reports generated. This activity involved lot of manual work and forming subgroups within the team helped focus on different aspects of data creation.

Business Metrics:

To create a visual representation for the queries using reports, our team utilized the report generating functionalities of the visualization tool Tableau.

Initially, it was a challenge to learn how to use the tool, but later we enjoyed creating the reports and also realized the value of data visualization.

Improvements identified on retrospection:

We believe that, probably, doing a bottom-up approach of deciding on the variety and volume of data based on the queries and then creating data would prevent lot of rework. We are happy with every other effort that has been put into the project.

Suggestions:

The project work could also include following tasks:

- Performance tuning of queries to make them more efficient
- Form a buddy team comprising of representatives from every team to address issues at regular intervals and help each other to make sure all the teams stick to the timeline
- Include peer review points to make sure no single student is overloaded with all the work, not every team can be like Expensify :)