Bike Directs Assembly

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12/2/2014

Introduction:

The Bike Directs Assembly Company is a manufacturing company which produce Road and Hybrid Bikes by assembling the required parts. The Company's customers are 10 largest bike retail stores in the City. The Company does not sale any bikes to retail customers directly.

How the Company operates?

As mentioned above the Company produces two type of bike (Road and Hybrid). The Company has defined a project line for each type of bike (Road Project and Hybrid project) and has assigned certain employees to work on each project line. The Company obtains related parts from different suppliers and each supplier is specialized in a certain part. Meaning for each part there is only one supplier. In the factory four employees work on a Hybrid project line and six employees work on Road project line. The Road project line requires more employees due to sophistication. When all parts are put together and the production cycle is complete, Bikes will be sold to 10 regular customers whom the Company has a contract with. The customers are retail bike stores across multiple states.

Entities, Relationships, and Attributes:

Based on the operations mentioned above, we have defined the following entities, Relationships and Attributes:

- BIKE ASSEMBLY (Bike ID, Bike Name, *Project ID,* Bike Price)

- PROJECT (Project ID, Project Cost, *Part ID*)

- SUPPLIER (Supplier ID, Supplier Name, Supplier Address, State, City, Zip)

- PARTS (Part ID, Part Name, Part Cost)

- EMPLOYEES (Employee ID, Employee Name, Employee Address, *Project ID,* State, City, Zip)

- CUSTOMERS (Customer ID, Customer Name, Customer Address, *Order-by Bike ID*, Quantity, Sale, State, City, Zip)

Bike Assembly table contains information related final product where bikes produced link to a project by Project ID attribute. Project table contains information related to production which in this case are Road and Hybrid and is linked to Supplier table by Part ID attribute. Supplier table also contains parts. Since each supplier provides one part. The main parts required to make such bikes are:

1. Hybrid Frame
2. Hybrid Wheels
3. Road Frame
4. Road Wheels
5. Hybrid Seat
6. Road Seat
7. Sport Gear Shift
8. Basket
9. Head Lamp
10. Bell

Customer table contains customer information and links to Bike Assembly table by Bike ID attribute. Finally there is an Employee table which contains the employee information links to project table by Project ID attribute.

E-R model and Relationships:

Further, we have developed an E-R model in the way that one Bike Assembly must have one or many employees. One Bike Assembly must have one or many suppliers. One Bike Assembly may have zero or many customers. One Bike Assembly must

have at least one project. One supplier may have zero or many bike parts and One

project may have zero or many employees. Below is the E-R model diagram:
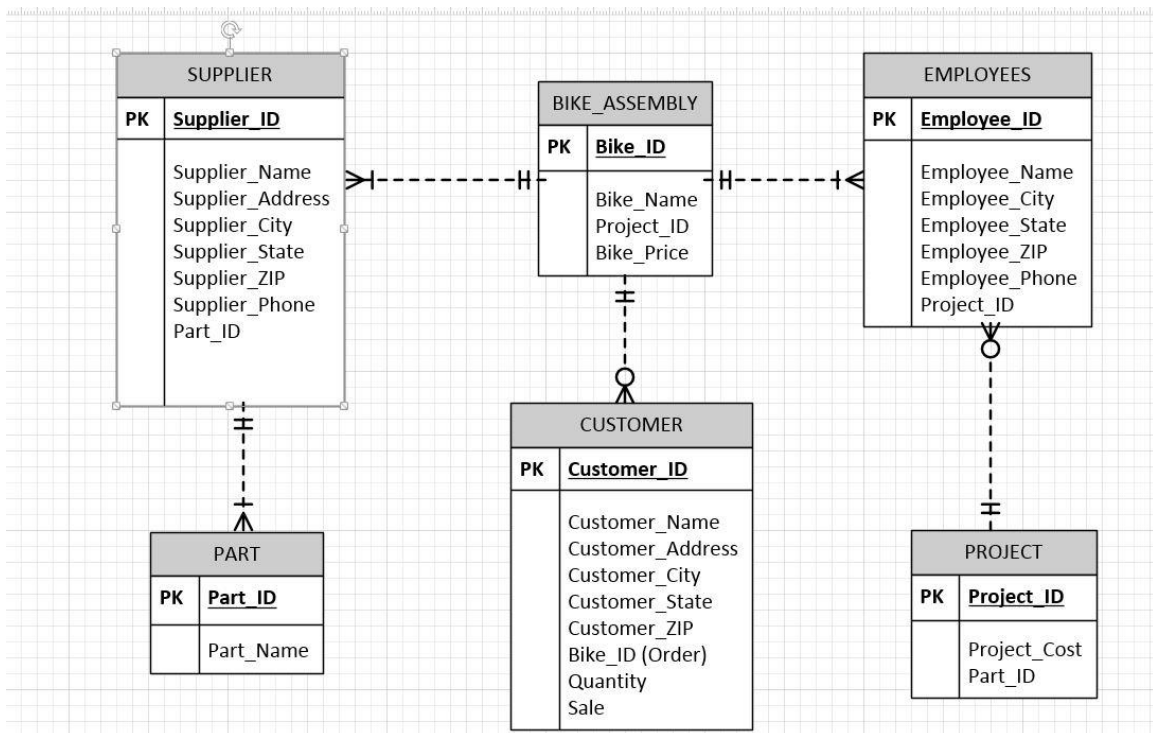
Normalization and BCNF:

To normalize this database, we had to find out what we needed it to do. This

database has five tables that help list different aspects of this bike business. We ran

into problems in the supplier table. Originally, supplier and supplies were one table

but had to be split to avoid design problems. This database is normalized to the

BCNF form.

Implementation in Microsoft Access:

We have used the following data types for our fields in Microsoft Access:

- AutoNumber for (Bike ID, Customer ID, Employee ID, Project ID, and Supplier ID)

- Currency (Bike Price, Sale, Project Cost)

- Short Text (All other attributes)

For the type of attributes that require a sequential order we have used AutoNumber as the data type. For the type of attributes that require a Dollar amount input, we have used currency as data type and for all other attributes which do not require a specific data type we have used Short Text.

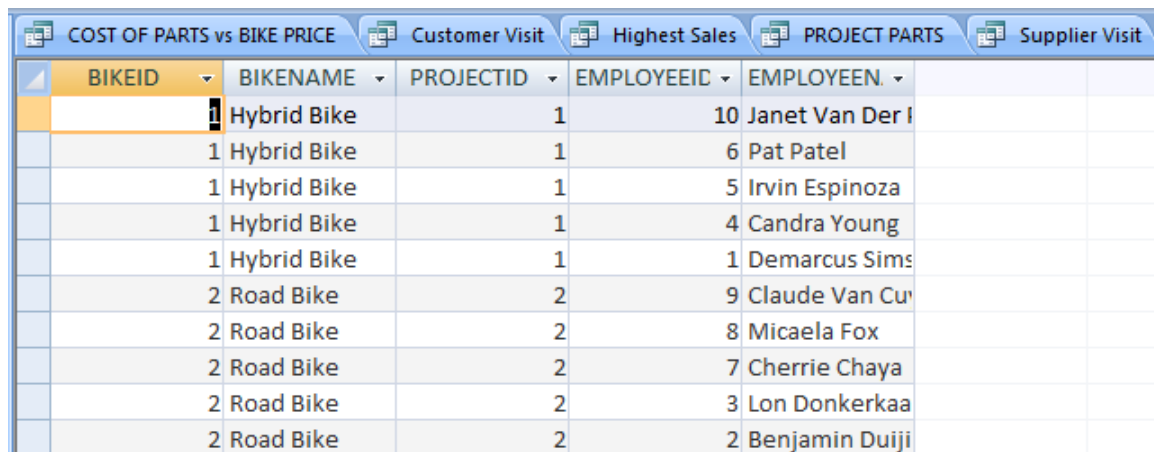In addition, we have defined the following relationships among our tables in Access:
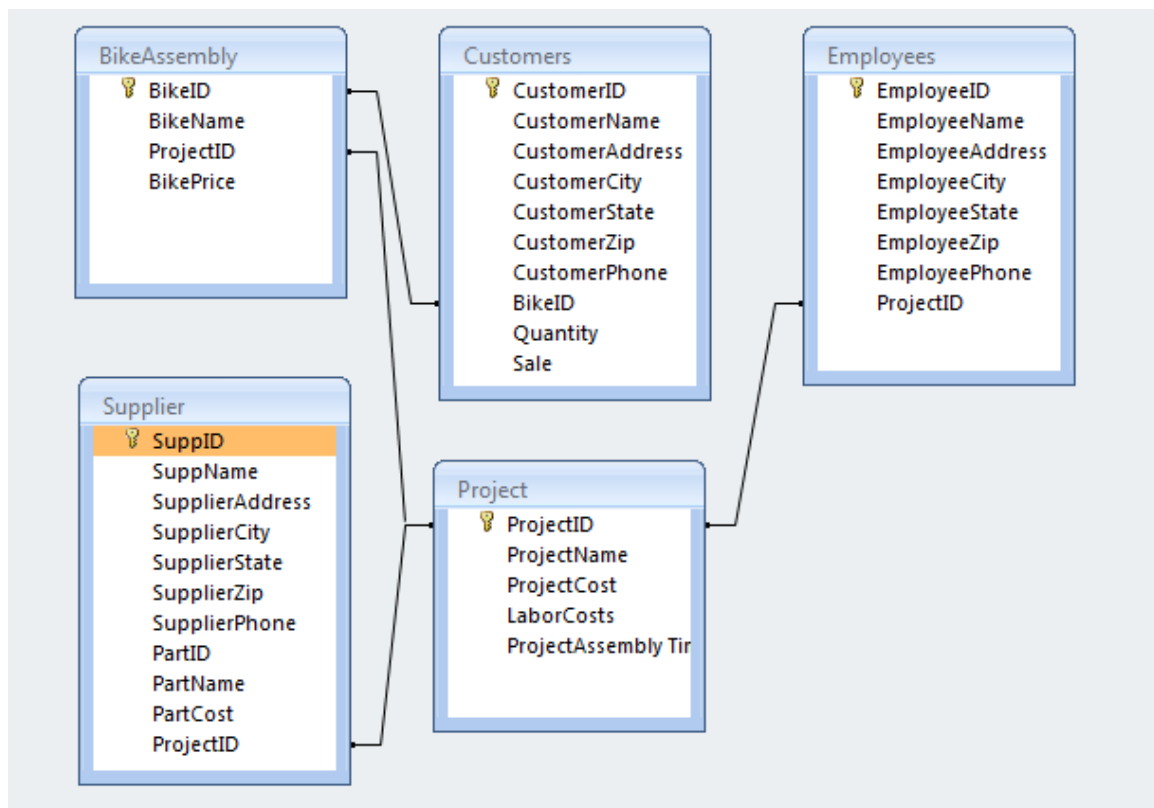
Queries:

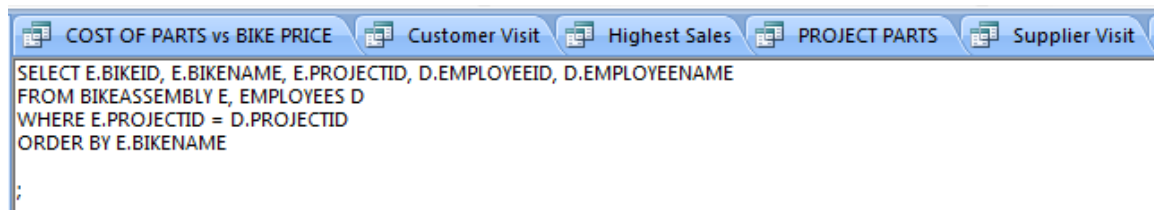**We have built the following queries within our data base:**

- Query: Which employees are working on what Bikes

- Average, Max and Min sales by Bike.

- Which are our strongest customers?

- If employees live close enough (ZIP) to go on trips to suppliers?

- If employees live close enough (ZIP) to go on trips to customers?

Example Tables and SQL Queries:

| | COST OF PARTS vs BIKE PRICE | Customer Visit | Highest Sales | PROJECT PARTS | Supplier Visit |

BIKEID	BIKENAME	PROJECTID	EMPLOYEEID	EMPLOYEEN.
1	Hybrid Bike	1	10	Janet Van Der F
1	Hybrid Bike	1	6	Pat Patel
1	Hybrid Bike	1	5	Irvin Espinoza
1	Hybrid Bike	1	4	Candra Young
1	Hybrid Bike	1	1	Demarcus Sims
2	Road Bike	2	9	Claude Van Cu
2	Road Bike	2	8	Micaela Fox
2	Road Bike	2	7	Cherrie Chaya
2	Road Bike	2	3	Lon Donkerkaa
2	Road Bike	2	2	Benjamin Duiji

Query Table 1

| COST OF PARTS vs BIKE PRICE | Customer Visit | Highest Sales | PROJECT PARTS | Supplier Visit |

```
SELECT E.BIKEID, E.BIKENAME, E.PROJECTID, D.EMPLOYEEID, D.EMPLOYEENAME
FROM BIKEASSEMBLY E, EMPLOYEES D
WHERE E.PROJECTID = D.PROJECTID
ORDER BY E.BIKENAME
;
```

Query Figure 1

Query Table 1 & Query Figure 1 shows the list of employees working on their

corresponding projects and the associated Bike name. Query Table 2 & Query Figure

2 shows the cost of each part that makes up a particular price allowing with the

Bikes base price. This information can help management understand the ratios

associated with part cost compared to the overall bike price.

BIKEID	BIKENAME	BIKEPRICE	PROJECTID	SUPPNAME	PARTID	PARTNAME	PARTCOST
1	Hybrid Bike	800	1	Hollis Bicycles	609	Head Lamp	$10.00
1	Hybrid Bike	800	1	Marketta	607	Sport Gear Shif	$30.00
1	Hybrid Bike	800	1	DPM Sports	605	Hybrid Seat	$50.00
1	Hybrid Bike	800	1	Cycles Lamber	603	Hybrid Wheels	$50.00
1	Hybrid Bike	800	1	Action Bicycle	601	Hybrid Frame	$300.00
2	Road Bike	500	2	Michael Oschn	610	Bell	$5.00
2	Road Bike	500	2	Curtis Importer	608	Basket	$10.00
2	Road Bike	500	2	eWheels Distri	606	Road Wheels	$50.00
2	Road Bike	500	2	Cyclone Bicycle	604	Road Seat	$20.00
2	Road Bike	500	2	Bicycle Techno	602	Road Frame	$200.00

Query Table 2

```
SELECT E.BIKEID, E.BIKENAME, E.BIKEPRICE, E.PROJECTID, D.SUPPNAME, D.PARTID, D.PARTNAME, D.PARTCOST
FROM BIKEASSEMBLY E, SUPPLIER D
WHERE E.PROJECTID = D.PROJECTID
ORDER BY E.PROJECTID
;
```

Query Figure 2

Query Table 3 & Query Figure 3 shows how to generate a list of average, maximum

and minimum sales of the hybrid bike.

Highest Sale	Lowest Sale	Average Sale
18400	2400	11680

Query Table 3

```
SELECT MAX(SALE) as [Highest Sale], MIN(SALE) as [Lowest Sale], AVG(SALE) as [Average Sales]
FROM CUSTOMERS
WHERE BIKEID = 1
;
```

Query Figure 3

In order to compile testimonials from our best customers management can examine

which employees live close enough to customers and even suppliers in order to

obtain accurate feedback our company. Query Table 1 & Query Figure 4 show how

to obtain that information based upon our best customers.

	COST OF PARTS vs BIKE PRICE		Customer Visit		Highest Sales		PROJECT PARTS		Supplier Visit	

CUSTOMERII ▼	CUSTOMERN ▼	CUSTOMERS ▼	SALE ▼	EMPLOYEEIC ▼	EMPLOYEEN ▼
7	Cathern Kierny	New Jersey	16000	1	Demarcus Sims
7	Cathern Kierny	New Jersey	16000	4	Candra Young
7	Cathern Kierny	New Jersey	16000	6	Pat Patel
7	Cathern Kierny	New Jersey	16000	9	Claude Van Cu
1	Svetlana Huert	New Jersey	11200	1	Demarcus Sims
1	Svetlana Huert	New Jersey	11200	4	Candra Young
1	Svetlana Huert	New Jersey	11200	6	Pat Patel
1	Svetlana Huert	New Jersey	11200	9	Claude Van Cu
5	Leisha Cooper	New York	28000	2	Benjamin Duiji
5	Leisha Cooper	New York	28000	7	Cherrie Chaya
2	Travis Verrips	Pennsylvania	18400	3	Lon Donkerkaa
2	Travis Verrips	Pennsylvania	18400	5	Irvin Espinoza
2	Travis Verrips	Pennsylvania	18400	10	Janet Van Der I

Query Table 4

	COST OF PARTS vs BIKE PRICE		Customer Visit		Highest Sales		PROJECT PARTS		Supplier Visit	

```
SELECT D.CUSTOMERID, D.CUSTOMERNAME, D.CUSTOMERSTATE, D.SALE, E.EMPLOYEEID,E.EMPLOYEENAME
FROM CUSTOMERS D, EMPLOYEES E
WHERE D.CUSTOMERSTATE = E.EMPLOYEESTATE AND SALE > 10000
ORDER BY D.CUSTOMERSTATE
;
```

Query Figure 4

Utilizing our developed Microsoft Access Database and building appropriate SQL queries we can produce actionable reports surrounding our business and its operations.