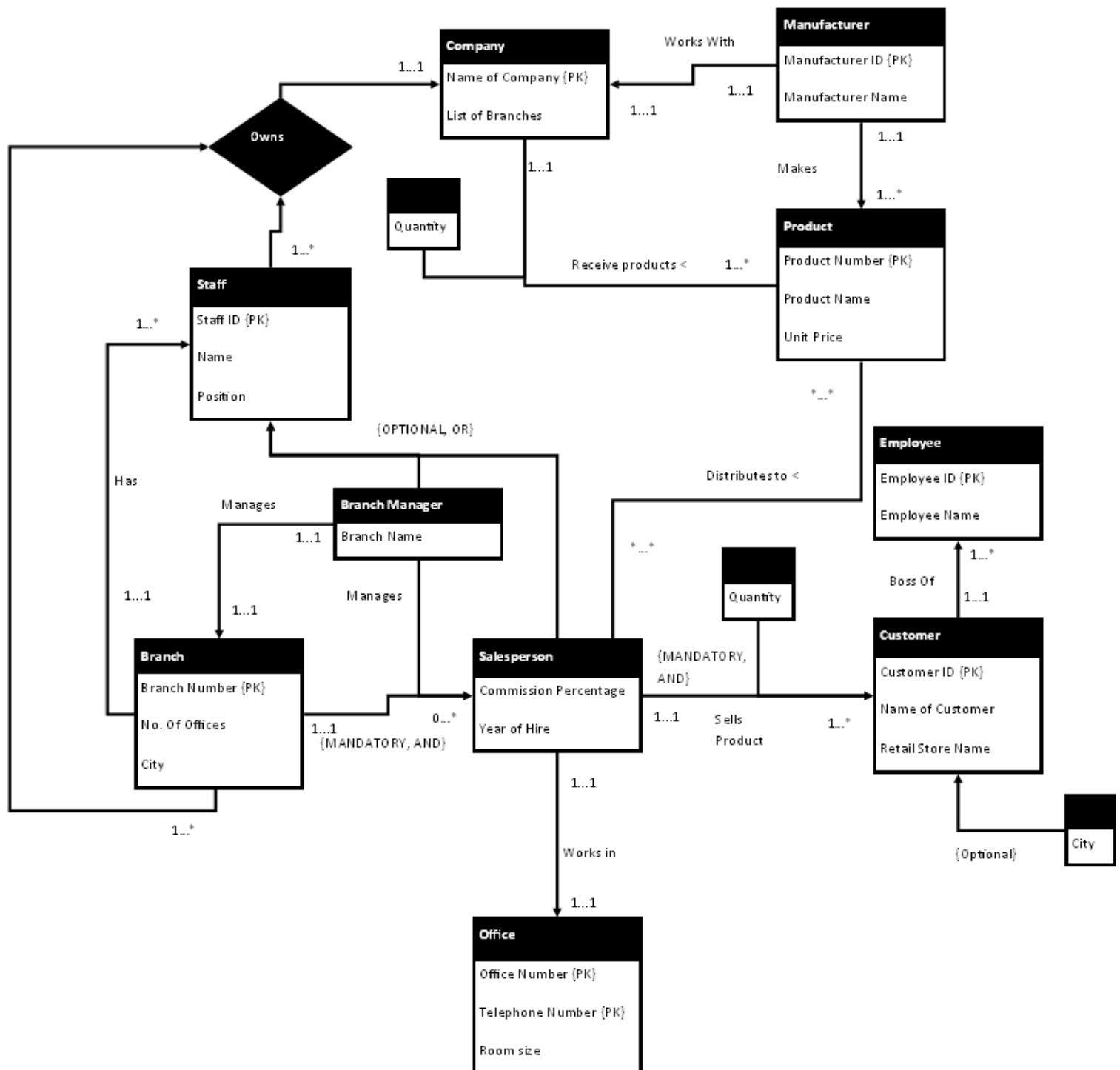


ECM2419 – Database Theory and Design

1) Entity Relationship Diagram



Report on Entity-Relationship Diagram:

Analysis:

Predicted Users of the Database:

The only people which will access the database would be the personal within the company itself so any one under the company of the C&E Household Hardware Co. This is used to track the products and the branch of each of the personnel within the company. The select staff members will only need to be able to add or remove certain aspects products which will be sold. There will also be the need to remove or add any new offices in certain cities. There will be functionality with the idea of attribute of the quantity going towards the customer in question. They will also need to track which customers are getting what and the employees they have. It would need high security for certain part of the database as it will hold information about the users and the products they are selling from certain manufacturers.

Report of Entities and Relationships, along with the Attributes they will hold

Staff:

I decided to add this to the Hardware company as it would be better use to have all the staff members within one database and the company higher ups to see all the staff which is employed within the company. This is split into optional or as you can choose either the branch manager or the salesperson. Each of the ones it splits into actually have their own attributes which is explained later on. This is to specialise and allow each collection of data of the individuals.

Attributes:

- Staff ID– The ID of the Staff (Primary Key)
- Name – This is the name of the Staff member
- Position – Distinguishes between what role they have in the company

Salesperson:

The Salesperson will need to contain information of when it joined the company and the commission pay. There is a separate entity called staff which will be used to specialise it to make it easier for a user to understand and get a better database design and will allow someone to access all the staff in one area. This has the relations of the branch and the customer also having the product in their area of the database as it would be distributed from the salesperson to the customer in the end. So the relations are the selling to the customer and the salesperson being in a certain branch as that is needed as each salespersons are in certain branches and in certain cities for the Hardware company.

Attributes within Salesperson:

- Staff ID(Staff -> Salesperson) – The ID of the Staff (Primary Key)
- Name(Staff -> Salesperson) – This is the name of the Staff member
- Position(Staff -> Salesperson) – Distinguishes between what role they have in the company
- Commission pay – This is the pay of the salesperson
- Year of Hire – This is the year of hire of the salesperson

Branch Manager:

The Branch manager has two relations to the database which is to manage both the salesperson and the branch itself and therefore it would be slightly recursive as the branch needs the branch manager and the branch manager needs the branch. This also takes information from the staff table for the staff ID and the other information. This seemed easier as mentioned to allow someone to access information on all the staff.

Attributes:

- Staff ID(Staff -> Branch Manager) – The ID of the Staff (Primary Key)
- Name(Staff -> Branch Manager) – This is the name of the Staff member
- Position(Staff -> Branch Manager) – Distinguishes between what role they have in the company
- Branch name – The name of the branch they are in

Branch:

The Branch has many relations to it. As the branch needs to be the many basis of each area these hardware products are getting distributed by. They have the relation to where the company owns it as there will be many branches within the company. There will be the relation to the Branch manager as it has been mentioned and each branch will have many salespersons so that was added and it would need to manage all these people so the two branch and branch manager is related to the salesperson and it would need to be mandatory and both of them need to be there to interact with the salesperson to work. The branch manager also Has the staff so that one branch will have multiple staff which is how it will relate to everything there.

Attributes:

- Branch Number – This is the ID of the Branch (Primary Key)
- No. Of Offices – This will be the number of offices within this branch
- City – The city the branch is located in

Office:

The office is just one salesperson for each office. Being a one-to-one relationship there isn't much to explain about the office as its just the place where the salesperson is and much isn't related to it as it isn't that important to the idea of what needs to be done in the database

Attributes:

- Office Number – This is the office number (Primary Key)
- Telephone Number – The number to contact the salesperson office (Also a Primary Key)
- Room size – This is the room size

Customer:

The Customer is related to the Employee and the salesperson. The salesperson as the quantity of the selling of the products to the customer. This is mandatory and required for the database to work all together. That relation would be a 1 salesperson to many customers in the area. The employee would also be a one-to-many relationship as one customer could have many employees working for them. There is the optional city attribute as well which is because the city has been mentioned before and may not be needed anymore as the customer is the retail store.

Attributes:

- Customer ID – The unique ID of the customer
- Name of Customer – This is just the name of the Customer
- Retail store name – This is the store which they are selling the hardware

Employee:

The employee only relationship is the customer which is the boss and the relationship was explained in the customer section. So, it will follow the same method as that explanation.

Attributes:

- Employee ID – The identification of the Employee (Primary Key)
- Employee Name – The name of the Employee

Company:

The company has three relationships which are the manufacturer, what it owns and the products it receives. What it owns is a one to many relationship as it always the one company and the products are the same just with quantity affecting it. Manufacturer is a one to one as they work together.

Attributes:

- Name of Company – This is the identity of the company so it is unique (PK)
- List of Branches – These are the list of branches under the company

Manufacturer:

It has two relationships which are just straight forward which is the one-to-one relationship mentioned above. And what it manufactures which is its products. Which would be a one-to-many relationship

Attributes:

- Manufacturer ID – The unique code of this manufacturing firm (Primary Key)
- Manufacturer Name – The name of them

Product:

The product relationship to the company has been explained being a one-to-many relationship with quantity. The other relationship is the distribution to the salesperson for the customer this is many to many relationship as you can have many products for many salespersons.

Attributes:

- Product ID – The unique ID of the product (Primary Key)
- Product Name – This is just the product name
- Unit Price – This is the price of the product each unit-wise

2) Normalised Table Definitions

Original Table

Salesperson Number	Product Number	Salesperson Name	Commission Percentage	Year of Hire	Department Number	Manager Name	Product Name	Unit Price	Quantity
37	6722	Baker	10	2005	73	Scott	Pliers	11.50	688
	4013						Saw	26.25	170
	9440						Hammer	17.50	473
86	6386	Adams	15	2001	59	Lopez	Wrench	12.95	1745
	9440						Hammer	17.50	2529
	1765						Drill	32.99	1962
	4013						Saw	26.25	3071
14	1765	Johnson	10	2008	73	Scott	Drill	32.99	809
	6722						Pliers	11.50	734
61	6386	Davies	20	2001	73	Scott	Wrench	12.95	3729
	1765						Drill	32.99	3110
	6722						Pliers	11.50	2738

1st Normalization

Salesperson Number	Product Number	Salesperson Name	Commission Percentage	Year of Hire	Department Number	Manager Name	Product Name	Unit Price	Quantity
37	6722	Baker	10	2005	73	Scott	Pliers	11.50	688
37	4013	Baker	10	2005	73	Scott	Saw	26.25	170
37	9440	Baker	10	2005	73	Scott	Hammer	17.50	473
15	6386	Adams	15	2001	59	Lopez	Wrench	12.95	1745
15	9440	Adams	15	2001	59	Lopez	Hammer	17.50	2529
15	1765	Adams	15	2001	59	Lopez	Drill	32.99	1962
15	4013	Adams	15	2001	59	Lopez	Saw	26.25	3071
10	1765	Johnson	10	2008	73	Scott	Drill	32.99	809
10	6722	Johnson	10	2008	73	Scott	Pliers	11.50	734
20	6386	Davies	20	2001	73	Scott	Wrench	12.95	3729
20	1765	Davies	20	2001	73	Scott	Drill	32.99	3110
20	6722	Davies	20	2001	73	Scott	Pliers	11.50	2738

This is the first normalization of the table I was given originally above. I did a step by step method to get to the 3rd normalization. So, with the first step which is the table I produced above is to make each row have information instead of having merged information in certain columns this allows you to know what information is in each row. The idea of this is to remove repeating group in the table. The outcome is the table above in this situation. The repeating groups in the unnormalized table would be the products and product numbers so I took the ones which didn't have repeating groups and expanded them to allow all the information to be seen and then get ready for the next step which is the 2nd Normalization table. Before that I can to presume the information in the table which is quite easy and this is just expanding the table out.

2nd Normalization

Sales(Salesperson ID, Product Number, Salesperson Name, Commission Percentage, Year of Hire, Department Number, Manager Name, Product Name, Unit Price, Quantity)

This is the 1st normalization of the table which I made written out in a way which allows you to identify partial dependencies. The reason you need to identify these partial dependencies is because it allows you to separate information which is repeating in the table and doesn't clutter the current table we have.

FD1: Salesperson Number -> Salesperson Name, Commission Percentage, Year of Hire, Department Number, Manager Name, Product Name, ... (Primary key)

FD2: Salesperson Number -> Salesperson Name, Commission Percentage, Year of Hire, Department Number, Manager Name (Partial dependency)

I identified the partial dependency in the table and made these two to show the primary key we will be using which I decided is to be the Salesperson Number. The partial dependency is the Salesperson

Number as well which has all the information on the Salesperson only. I decided that it would be the Salesperson Name, Commission Percentage, Year of Hire, Department Number and the Manager number. The final product I came to is the following:

Sales(Salesperson Number, Product Number, Product Name, Unit Price, Quantity)

Salesperson(Salesperson Number, Salesperson Name, Commission Percentage, Year of Hire, Department Number, Manager Name)

Separating the Sales which contains mainly the product information and the Salesperson Number. The Salesperson section contains all the information retaining the Salesperson which was getting repeated when I made the 1st Normalization.

3rd Normalization

This is the final part of the Normalization which is the final product which was desired. The final product I decided to do is the following:

Sales(Salesperson Number, Product Number)

Salesperson(Salesperson Number, Salesperson Name, Commission Percentage, Year of Hire, Department Number, Manager Name)

Product(Product Number, Product Name, Unit Price, Quantity)

The idea of the 3rd Normalization is to remove transitive dependencies. I decided on the following to be the transitive tendency which allowed me to create the Normalization above:

Transitive dependencies: Salesperson Number -> Product Number -> Product Name, Unit Price, Quantity

I would have the Product separated into its own section and have all information on the product there as well. The main section which was the Sales part is used to have only the Salesperson Number and the Product Number. All information comes to that section in the end and allows to create a more fluid database in the end.