

COSC344 Assignment 2

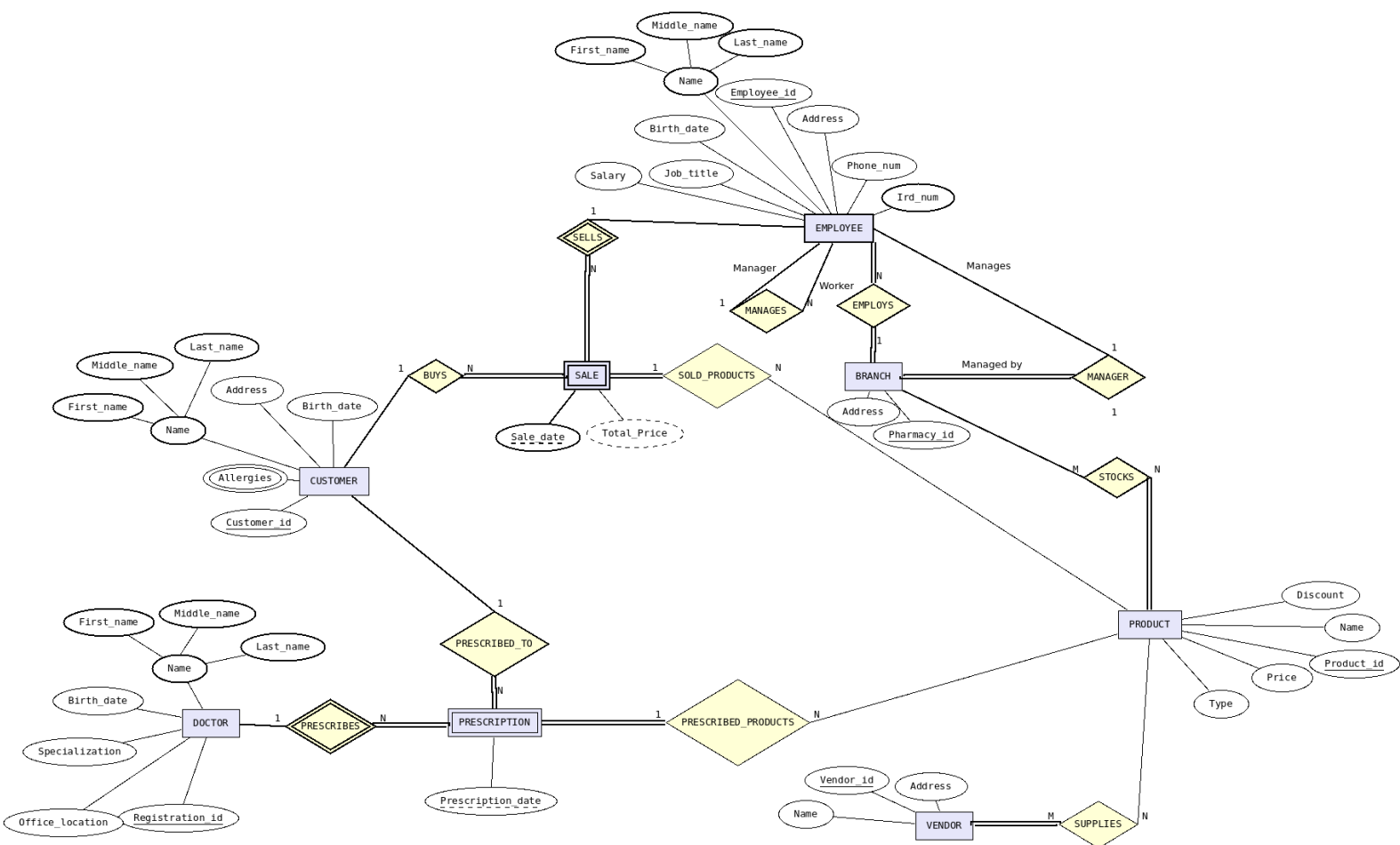
TEAM: 10

Leader: Benjamin McCarthy

Members:

- Benjamin McCarthy
- Dominic Stuffkens
- Leon Hook
- Usman Shah
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1) Revised ER Diagram

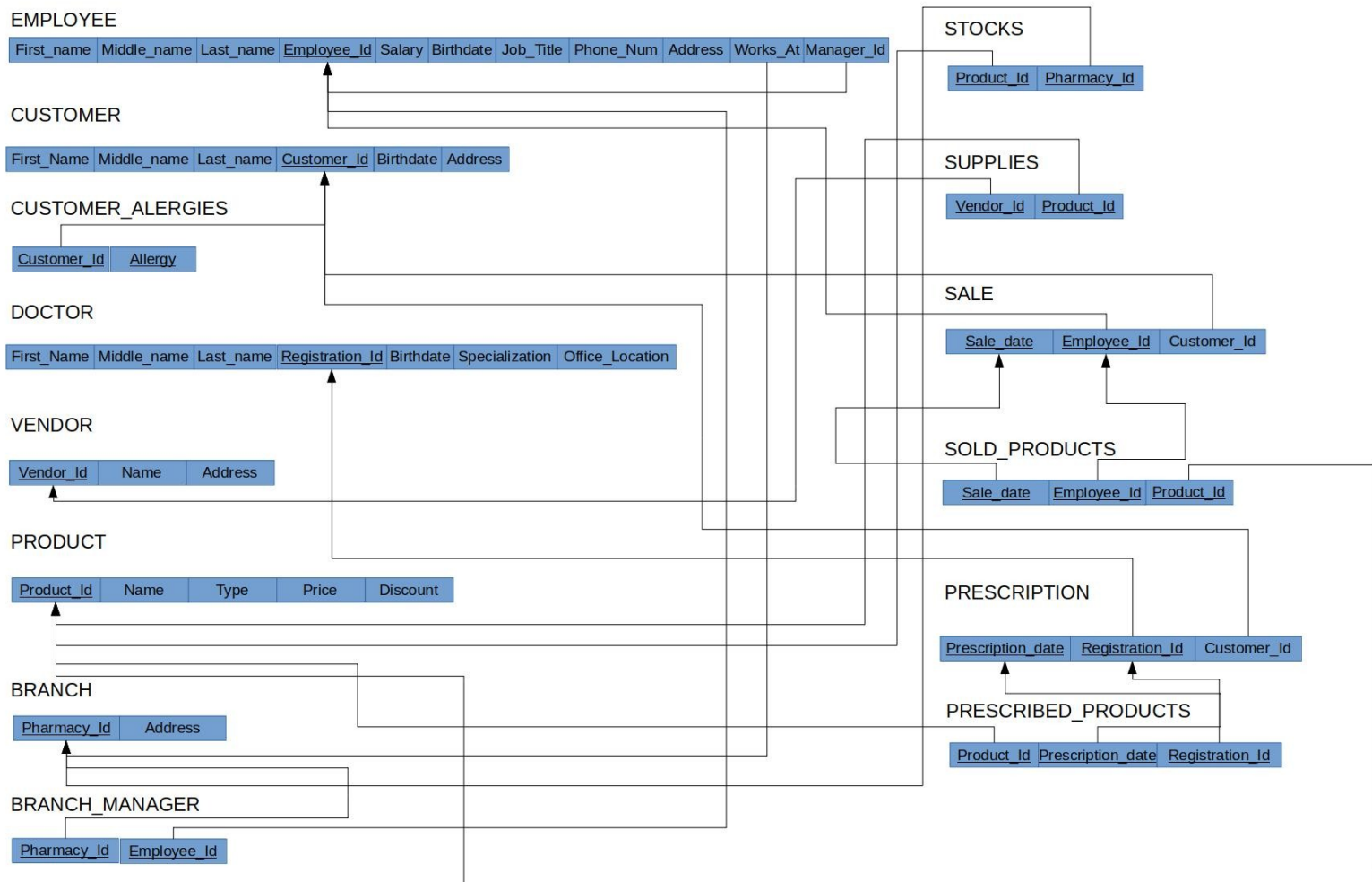


We revised our diagram by:

- Adding the relationships 'Prescribed_Products' and 'Sold_Products' to eliminate the multi-variable attributes from PRESCRIPTION and SALE.
- Changing the names of the Date attributes in SALE and PRESCRIPTION to more easily distinguish between them.

- Making PRESCRIBES and SELLS the identifying relationships for the weak entities PRESCRIPTION and SALE.
- Making Total_Price a derived attribute in SALE.
- Removing the un-needed attributes in PRODUCT, VENDOR, SALE and PRESCRIPTION.

2) Relational Schema



3) Normalization

• PRESCRIPTION

<u>Prescription_Date</u>	<u>Registration_Id</u>	Customer_Id
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Step1 : 1NF

PRESCRIPTION is already in 1NF. There are no composite or multi-valued attributes, and no nested relations.

Step2 : 2NF

PRESCRIPTION is already in 2NF. The only non prime attribute(Customer_Id) is fully functionally dependent on Prescription_date and Registration_Id.

Step3 : 3NF

PRESCRIPTION is already in 3NF. The only non prime attribute is not transitively dependent on the primary key.

Step4 : BCNF

PRESCRIPTION is already in BCNF.

- **PRESCRIBED_PRODUCTS**

<u>Prescription_Date</u>	<u>Registration_Id</u>	<u>Product_Id</u>
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Step1 : 1NF

PRESCRIBED_PRODUCTS is already in 1NF. There are no composite or multi-valued attributes, and no nested relations.

Step2 : 2NF

PRESCRIBED_PRODUCTS is already on 2NF. There are no non_primary attributes that could be functionally dependent since every attribute is part of the primary key.

Step3 : 3NF

PRESCRIBED_PRODUCTS is already in 3NF. There are no transitive dependencies on the primary key.

Step4 : BCNF

PRESCRIBED_PRODUCTS is already in BCNF.

- **STOCKS**

<u>Pharmacy_Id</u>	<u>Product_Id</u>
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Step1 : 1NF

STOCKS is already in 1NF. There are no composite or multi-valued attributes, and no nested relations.

Step2 : 2NF

STOCKS is already in 2NF. There are no non_primary attributes that could be functionally dependent since every attribute is part of the primary key.

Step3 : 3NF

STOCKS is already in 3NF. There are no transitive dependencies on the primary key.

Step4 : BCNF

STOCKS is already in BCNF.

- **EMPLOYEE**

First _Name	Middle _Name	Last _Name	<u>Employee _Id</u>	Salary	Birth _Date	Job _Title	Phone _Number	Works _At	Manager _Id
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Step1 : 1NF

EMPLOYEE is already in 1NF. There are no composite or multi-valued attributes.

Step2 : 2NF

EMPLOYEE is already in 2NF. There are no non-prime attributes that are partially dependent on the primary key, since the primary key is composed of only one attribute.

Step3 : 3NF

EMPLOYEE is not in 3NF, since salary depends on Job_Title and they are both non_prime attributes. To convert it we created a new relation EMPLOYEE_JOB and then added Job_Title and Salary which are the determinants of the non_prime attributes. Both of them became the primary key of the new relation.

EMPLOYEE (First_Name, Middle_Name, Last_Name, Employee_Id., Birth_Date, Phone_Num, Works_At, Manager_Id, Job_Title)

EMPLOYEE_JOBS (Job_Title, Salary)

Step4 : BCNF

EMPLOYEE_JOBS is already in BCNF.

EMPLOYEE is already in BCNF.

- **DOCTOR**

First _Name	Middle _Name	Last _Name	<u>Registration</u> _Id	Birth _Date	Specialization	Office _Location
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Step1 : 1NF

DOCTOR is already in 1NF. There are no composite or multi-valued attributes.

Step2 : 2NF

DOCTOR is already in 2NF. There are no partial functional dependencies as primary keys consists of only one attribute.

Step3 : 3NF

DOCTOR is already in 3NF. There are no transitive dependencies on the primary key.

Step4 : BCNF

DOCTOR is already in BCNF.

- **PRODUCT**

<u>Product_Id</u>	Name	Type	Price	Discount
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Step1 : 1NF

PRODUCT is already in 1NF. There are no composite or multi-valued attributes, and no nested relations.

Step2 : 2NF

PRODUCT is already in 2NF. There are no partial dependencies on the primary key.

Step3 : 3NF

PRODUCT is already in 3NF. There are no transitive dependencies on the primary key.

Step4 : BCNF

PRODUCT is already in BCNF.

- **SALE**

<u>Sale_Date</u>	<u>Employee_Id</u>	Customer_Id
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Step1 : 1NF

SALE is already in 1NF. There are no composite or multi-valued attributes, and no nested relations.

Step2 : 2NF

SALE is already in 2NF. There are no partial dependencies on the primary key.

Step3 : 3NF

SALE is already in 3NF. There are no transitive dependencies on the primary key.

Step4 : BCNF

SALE is already in BCNF.

- **SUPPLIES**

<u>Vendor_Id</u>	<u>Product_Id</u>
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Step1 : 1NF

SUPPLIES is already in 1NF. There are no composite or multi-valued attributes, and no nested relations.

Step2 : 2NF

SUPPLIES is already in 2NF. There are no partial dependencies on the primary key.

Step3 : 3NF

SUPPLIES is already in 3NF. There are no transitive dependencies on the primary key.

Step4 : BCNF

SUPPLIES is already in BCNF.

- **SOLD_PRODUCTS**

<u>Employeee_Id</u>	<u>Product_Id</u>	<u>Date</u>
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Step1 : 1NF

SOLD_PRODUCTS is already in 1NF. There are no composite or multi-valued attributes, and no nested relations.

Step2 : 2NF

SOLD_PRODUCTS is already in 2NF. There are no partial dependencies on the primary key.

Step3 : 3NF

SOLD_PRODUCTS is already in 3NF. There are no transitive dependencies on the primary key.

Step4 : BCNF

SOLD_PRODUCTS is already in BCNF.

- **CUSTOMER**

First _Name	Middle _Name	Last _Name	<u>Customer _Id</u>	Birth _Date	Address	Allergies
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Step1 : 1NF

CUSTOMER is not in 1NF,. Allergies is a multi_valued attribute. To eliminate that we'll divide it into the following two relations.

CUSTOMER (First_Name, Middle_Name, Last_Name, Customer_Id, Birth_Date, Address)

CUSTOMER_ALLERGIES (Customer_Id, Allergy)

Step2 : 2NF

Both are already in 2NF. There are no partial functional dependencies in CUSTOMER as the primary key consists of only one attribute, and both attributes in CUSTOMER_ALLERGIES make up the primary key.

Step3 : 3NF

Both are already in 3NF. There are no transitive dependencies on the primary key.

Step4 : BCNF

Both are already in BCNF.

- **VENDOR**

<u>Vendor_Id</u>	Name	Address
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Step1 : 1NF

VENDOR is already in 1NF. There are no composite or multi-valued attributes.

Step2 : 2NF

VENDOR is already in 2NF. There are no partial functional dependencies as primary keys consist of only one attribute.

Step3 : 3NF

VENDOR is already in 3NF. There are no transitive dependencies on the primary key.

Step4 : BCNF

VENDOR is already in BCNF.

- **BRANCH**

<u>Pharmacy_Id</u>	Address
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Step1 : 1NF

BRANCH is already in 1NF. There are no composite or multi-valued attributes.

Step2 : 2NF

BRANCH is already in 2NF. There are no partial functional dependencies as primary keys consist of only one attribute.

Step3 : 3NF

BRANCH is already in 3NF. There are no transitive dependencies on the primary key.

Step4 : BCNF

BRANCH is already in BCNF.

- **BRANCH_MANAGER**

<u>Pharmacy_Id</u>	<u>Employee_Id</u>
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Step1 : 1NF

BRANCH_MANAGER is already in 1NF. There are no composite or multi-valued attributes.

Step2 : 2NF

BRANCH_MANAGER is already in 2NF. There are no partial functional dependencies as the primary key is composed of both attributes.

Step3 : 3NF

BRANCH_MANAGER is already in 3NF. There are no transitive dependencies on the primary key.

Step4 : BCNF

BRANCH_MANAGER is already in BCNF

4) Teamwork Description

- After getting feedback for Assignment 1, we had a meeting in which we revised the ERD diagram together in the lab and made the required changes.
- We all met in the lab and went through the 7 step process outlined in lecture 4 as a group to convert all the Entities and Relationships into a Relational Schema.
- Benjamin assigned the new relations to each individual to normalize. Leon took care of CUSTOMER, VENDOR and BRANCH. DOMINIC did EMPLOYEE, DOCTOR and PRODUCT. Benjamin did PRESCRIPTION, PRESCRIBED_PRODUCTS and STOCKS, and Usman did SALE, SUPPLIES and SOLD_PRODUCTS.
- We came accross a slight bit of confusion with one part of the ERD conversion, so we sent Haibo a message and fixed up the parts he reffered us to.
- We also ran into a problem where BRANCH referred to EMPLOYEE through a foreign key (to define a branch manager) and EMPLOYEE referred to BRANCH to define which branch

the employee works at. This proved to be a problem when inserting data, so we created a WORKS_AT relation to solve the issue.

- We combined our normalizations, and used LibreOffice to model it.
- Dom and Leon couldn't make it into the lab so they wrote SQL to define their specific relations, and sent them to Benjamin over messenger. Benjamin and Usman wrote SQL to define their relations and we combined/cleaned up all the code into one Load.sql file.
- We added some constraints to enforce integrity, then combined all our work into this report.