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# CPT103 COURSEWORK REPORT

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## MUST READ

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Your report and database design must be your own work. You should not copy any code from others or let anyone develop this database.

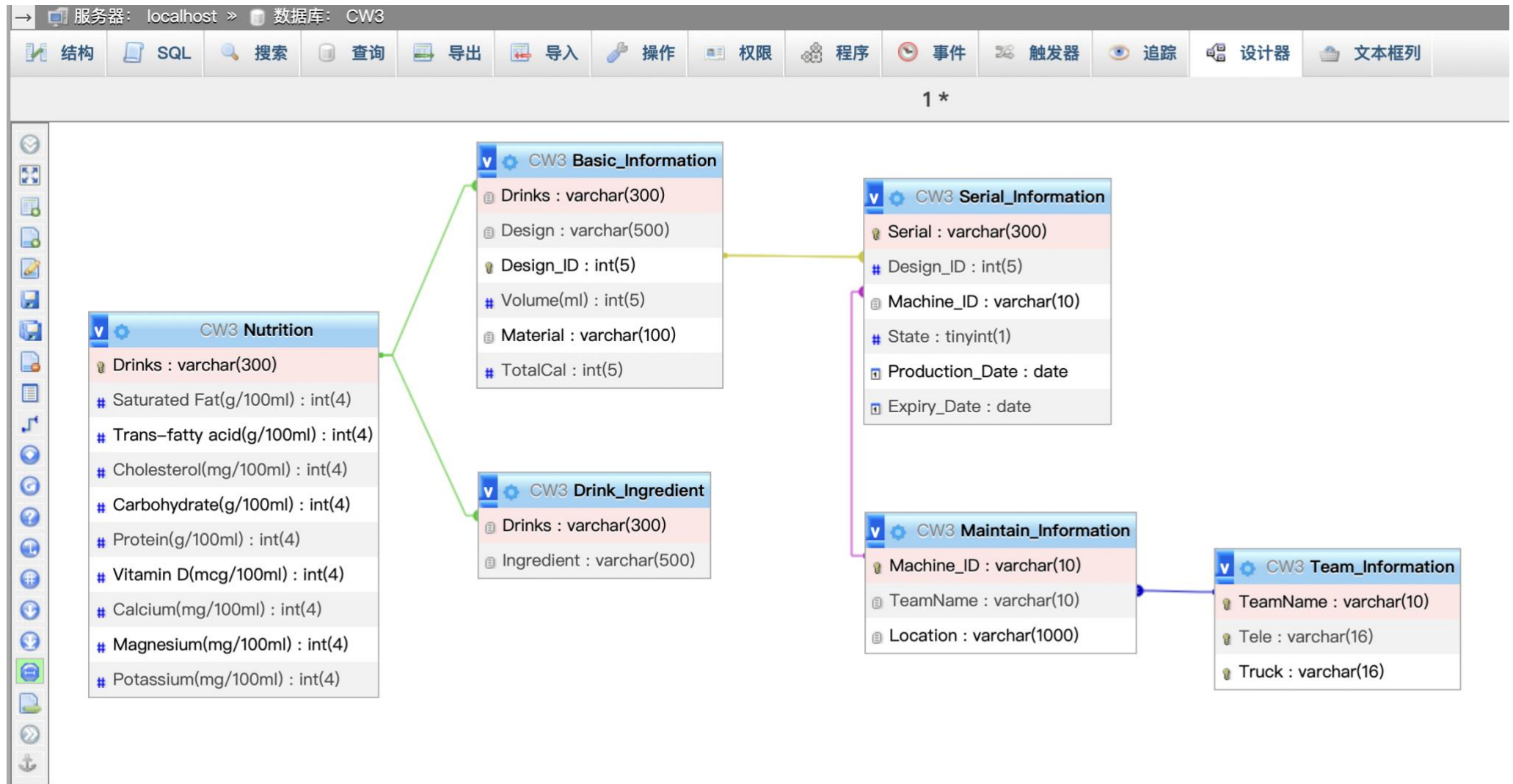
***Plagiarism and collusion lead to a zero mark for this coursework.***

All tables must be in 3NF and the ER diagram should not contain any M:N or 1:1 relationships. ***Please strictly follow the structure of this template. Using your own template is not allowed.*** Remember to double-check grammar and wording errors so that the report could be understood correctly. ***Any language other than English will be ignored when marking the report.***

Team information:

ID	Name	Email
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Your ER Diagram for **Task 1** here. Make sure this ER diagram fits **one single page** and is **clear to read**. Do not split the diagram into several pages.



## DATABASE DESIGN DETAILS (TASK 1)

### TABLES

In this section, you are required to explain all of the tables in your ER diagram. An example is given below. Please make sure you follow the template and everything is clearly explained.

Table name: Nutrition

Table design explanation: The 'Nutrition' table focus on the nutrition of all kinds of drinks, all nutrition will be included in the table with default 0. The primary key is 'Drinks', which is used to list and store the name of all the drinks that the company produce this is to make sure all drinks unique and would have homologous nutrition.

Attributes:

Column Definition	Domain	Explanation
Drinks Varchar (300) Primary Key	All valid names for drinks are acceptable. For example, 'Pressed Coconut Milk', 'Ocean Dew Beer'	It is the name of that type of drink in general, but not what printed on the package.
Saturated Fat(g/100ml) int (4) default 0	All possible 'Saturated Fat' number are acceptable from 0-9999.	The Saturated Fat content in that drink every 100ml
Trans-fatty acid(g/100ml) int (4) default 0	All possible 'Trans-fatty acid' number are acceptable from 0-9999.	The Trans-fatty acid content in that drink every 100ml
Cholesterol(mg/100ml) int (4) default 0	All possible 'Cholesterol' number are acceptable from 0-9999.	The Cholesterol content in that drink every 100ml
Carbohydrate(g/100ml) int (4) default 0	All possible 'Carbohydrate' number are acceptable from 0-9999.	The Carbohydrate content in that drink every 100ml
Protein(g/100ml) int (4) default 0	All possible 'Protein' number are acceptable from 0-9999.	The Protein content in that drink every 100ml
Vitamin D(mcg/100ml) int (4) default 0	All possible 'Vitamin D' number are acceptable from 0-9999.	The Vitamin D content in that drink every 100ml

Calcium(mg/100ml) int (4) default 0	All possible 'Calcium' number are acceptable from 0-9999.	The Calcium content in that drink every 100ml
Magnesium(mg/100ml) int (4) default 0	All possible 'Magnesium' number are acceptable from 0-9999.	The Magnesium content in that drink every 100ml
Potassium(mg/100ml) int (4) default 0	All possible 'Potassium' number are acceptable from 0-9999.	The Potassium content in that drink every 100ml

Foreign keys and reasons: No foreign key

Table name: Basic\_Information

Table design explanation: The 'Basic\_Information' table about the basic information about that kind of drink. The primary key of the table is 'Design\_ID' as it is unique for all types of drink.

Attributes:

Column Definition	Domain	Explanation
Drinks Varchar (300) Foreign Key	All valid names for drinks are acceptable. For example, 'Pressed Coconut Milk', 'Ocean Dew Beer'	It is the name of that type of drink in general, but not what printed on the package.
Design Varchar (500)	All valid name for drink design name printed on the packaging are acceptable. For example, 'Ocean Dew Beer can', 'Ocean Dew Beer glass bottle'	The name printed on the packaging.
Design_ID Int (5) Primary key	Start from 1 and increase one by one to the number of all types of drinks	This drink id depends on 'Drinks', 'Design' and 'Volume', if one of the factors above was different, it should be added.
Volume Int (4)	All possible volume number are acceptable from 0-1500.	The volume of that type of packaging. From common sense, it won't be larger than 1500.
Material Varchar (100)	All the possible names for material used to produce the container are acceptable. For example, "plastic", "aluminum" or "glass".	The main material used to produce the packaging.
TotalCal Int (4)	All possible calorie number are acceptable from 0-9999.	The calories of the whole drink. In regard with the volume and drink itself. According to common sense, it won't be larger than 9999.

Foreign keys and reasons: The column Drinks references Nutrition.Drinks, this is to make sure all types of packaging have the corresponding drinks. It corresponds with 1:M relationship in the ER diagram.

Table name: Serial\_Information

Table design explanation: The “Serial\_Information” table store the information about the drink with specific serial including the packaging information, date and state of sale. The primary key is ‘Serial’ as it is unique for all the bottle of drink.

Attributes:

Column Definition	Domain	Explanation
Serial Varchar (15) Primary key	SZ2022112600001	The serial must be 15 figures long and consist with 3 parts as the format of XXYYYYMMDDZZZZZ. XX refers to the factory site for short, YYYYMMDD refers to the date of that specific drink being produced. And the final 5 figures refer to number of the product number on that day.
Design_ID Int (5) Foreign key	Start from 1 and increase one by one to the number of all types of drinks	This drink id depends on ‘Drinks’, ‘Design’ and ‘Volume’, if one of the factors above was different, it should be added.
Machine_ID Varchar (10) Foreign key	The id of vending machine	In which vending machine the serial was placed in for sale.
State Boolean	Yes/No	Weather the serial had been sold.
Production_Date Date	Date	Date that the serial had been produced
Expiry_Date Date	Date	The date on which the drink expires

Foreign keys and reasons: The column Design\_ID references Basic\_Information.Design\_ID, this is to make sure all serials have their own design. It corresponds with 1:M relationship in the ER diagram.

The column Machine\_ID references Maintain\_Information.Machine\_ID, this is to make sure all serials have their corresponding vending machine. It corresponds with 1:M relationship in the ER diagram.

Table name: Drink\_Ingredient

Table design explanation: The ‘Drink\_Ingredient’ table store the ingredient of the drink. The primary key here is (Drinks, Ingredient)

Attributes:

Column Definition	Domain	Explanation
Drinks Varchar (300) Foreign key	All valid names for drinks are acceptable. For example, ‘Pressed	It is the name of that type of drink in general, but not what printed on the package.

Primary key	Coconut Milk', 'Ocean Dew Beer'	
Ingredient Varchar (500) Primary key	All valid name for ingredients is acceptable. For example, 'water', only one ingredient is allowed into the grid	One ingredient of the drink

Foreign keys and reasons: The column Drinks references Nutrition.Drinks, this is to make sure all types of packaging have the corresponding drinks. It corresponds with 1:M relationship in the ER diagram.

Table name: Team\_Information

Table design explanation: This 'Team\_Information' table is used to store all information about that team. The primary key is 'TeamName' which is unique for all the teams. And other attributes are all unique.

Attributes:

Column Definition	Domain	Explanation
TeamName Varchar (10) Primary Key	XXXteam	The XXX refers to the region, and "team" must be contained in the name
Tele Varchar (16) Unique	+XX XXXXXXXXX	The previous part is for the area code and the later part is the telephone number, and all of them do not have specific length to avoid region difference
Truck Varchar (16) Unique	Truck number of that car	The license plate number of the car owned by the team

Foreign keys and reasons: No foreign key

Table name: Maintain\_Information

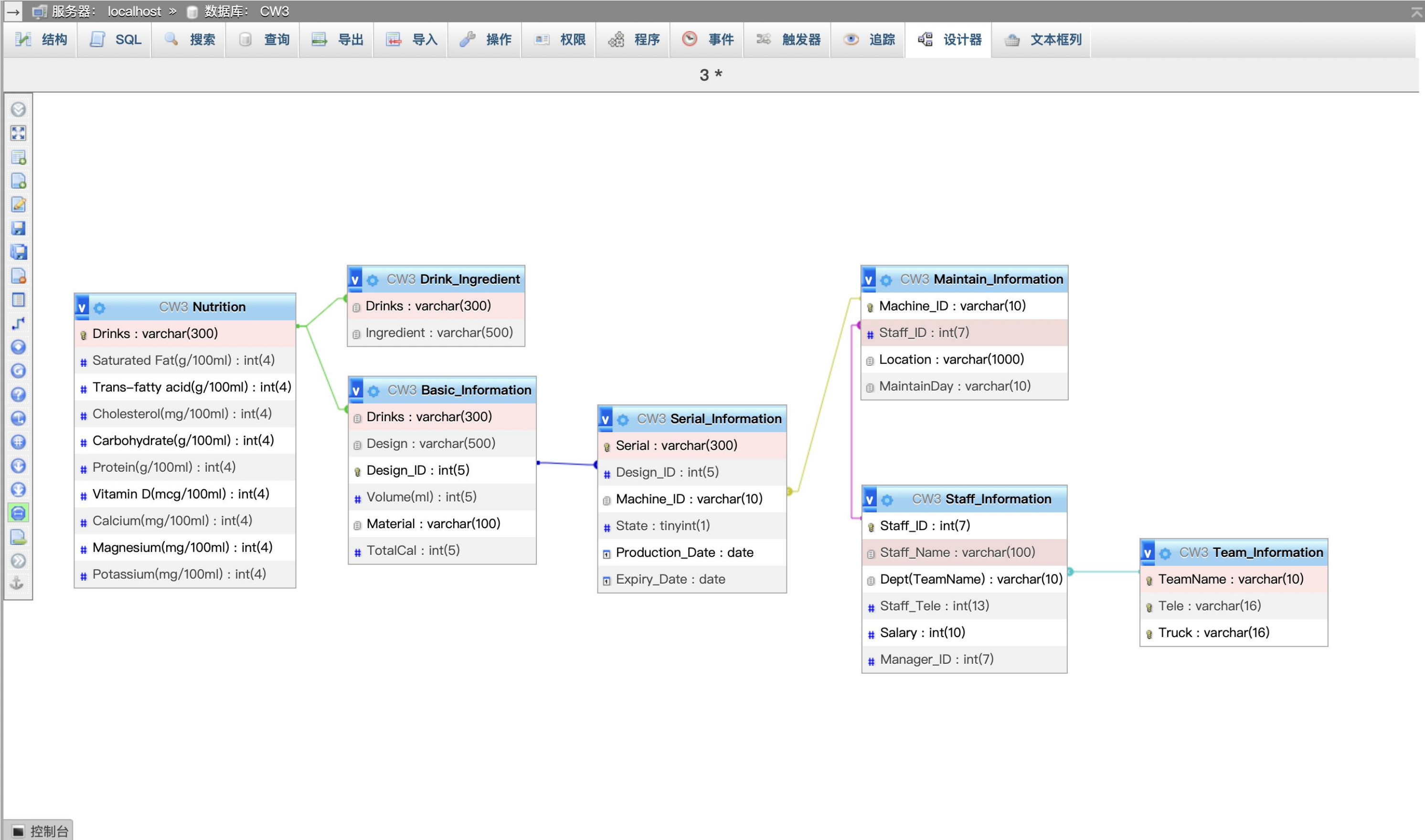
Table design explanation: This 'Maintain\_Information' table store information about the machine and its corresponding repair team name. The primary key is 'Machine\_ID' it is to make sure all the machine has corresponding repair team.

Attributes:

Column Definition	Domain	Explanation
Machine_ID Varchar (10) Primary Key	The id of vending machine such as '5F056'	The id of vending machine
TeamName Varchar (10) Foreign key	XXX Team	The XXX refers to the region

Loc Varchar (1000)	AAA BBB CCC DDD	'AAA' refers to the country, 'BBB' refers to the province, 'CCC' refers to the city, 'DDD' refers to specific location
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Foreign keys and reasons: The column TeamName refer to Team\_Information.TeamName, this is to make sure the team's name is really exist. This corresponds with 1:M relationship in ER diagram.





## DATABASE EXTENSION DETAILS (TASK 2)

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In this section, each team member needs to describe the new requirement in details and list a few related use cases. The new requirement and use cases should have a similar complexity level like requirement 2 and should have practical value. **Remember to write down your name and ID.** Each person has **a page limit of 5**. Please do not change the font size or line spacing or paragraph spacing.

## REQUIREMENT 1 (NAME: RUOYU XU, ID: 2142804)

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Table name: Maintain\_Information (Updated from Maintain\_Information for task 1)

Table design explanation: This 'Maintain\_Information' table store information about the machine and its corresponding repair team name. The primary key is 'Machine\_ID' it is to make sure all the machine has corresponding repair team.

Attributes

Column Definition	Domain	Explanation
Machine_ID Varchar (10) Primary Key	The id of vending machine such as '5F056'	The id of vending machine
Staff_ID Int (7)	The id of the staff, consisting of 7 integers For example,"1847928"	The id of the staff, unique for each employee
Loc Varchar (1000)	AAA BBB CCC DDD	'AAA' refers to the country, 'BBB' refers to the province, 'CCC' refers to the city, 'DDD' refers to specific location
MaintainDay Varchar (10)	The day of maintain, for example "Monday"	One vending machine is repaired once a week on a specific day

Foreign keys and reasons: The column Staff\_ID refer to Staff\_Information.Staff\_ID, this is to make sure the maintain man's name is existing. This corresponds with 1:M relationship in ER diagram.

Table name: Staff\_Information

Table design explanation: This "Staff\_Information" table stores information about the staff. The primary key is Staff\_ID, which is unique for all the employees.

Attributes:

Column Definition	Domain	Explanation
Staff_ID int (7) Primary key	The id of the staff, consisting of 7 integers For example,"1847928"	The id of the staff, unique for each employee
Staff_Name varchar (1000)	All name of the employee is acceptable	The name of staffs. It is supposed that the name of the staff will be no longer than 1000 characters
Dept(TeamName) Varchar (10)	Name of departments such as "marketing"	The department or repair team name of the staff
Staff_Tele int (13)	Telephone consists of 13 numbers	It is supposed that telephone number will be within 13 figures. The private telephone number of the staff
Salary int (10)	The salary per month	The salary per month of the employee
Manager_ID int (7)	The id of the manager of staff, consisting of 7 integers	The id of the manager of the staff, which is unique for all departments

Foreign keys and reasons: The column Dept(TeamName) refer to Team\_Information. TeamName, this is to make sure all teams are real. This corresponds with 1:M relationship in ER diagram.

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#### DESCRIPTION OF REQUIREMENT (150 WORDS MINIMUM)

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The information on the maintenance of vending machines should be updated so that each vending machine is now assigned to a specific team member on the basis of the one machine assigned to a team, with only one team member responsible for a vending machine. But one team member takes care of more than one vending machine. Each vending machine has two fixed maintenance and restocking dates during the week. For example, a machine with ID "OD7100" located at "Lukewarm Shopping Mall North Gate" is planned to be replenished and maintained on Monday and Friday.

In addition, the database should have the ability to manage employee information. Moreover, for maintenance teams, the name of repair staff teams should be classified as a department. The database needs to be able to include staff's basic information such as his or her employee ID, name, department, and salary. Also, the hierarchical relationship between employees should also be included.

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#### USE CASES (5 NEEDED)

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Use case 1: List all the machines the employee whose ID" 1847928" maintain and the name of the employee

SQL query for use case 1: `SELECT DISTINCT Machine_ID FROM Maintain_Information  
WHERE Staff_ID = 1847928;`

Use case 2: List all days when team staffs work

SQL query for use case 2: `SELECT DISTINCT MaintainDay, Staff_Name  
FROM Staff_Information, Maintain_Information  
WHERE Maintain_Information.Staff_ID = Staff_Information.Staff_ID;`

Use case 3: Retrieve the private telephone number of the staff who maintain the machine in the location of "XJTLU.MA.101"

SQL query for use case 3: `SELECT Location, Staff_Information.Staff_ID, Staff_Tele  
FROM Maintain_Information, Staff_Information  
WHERE (Location = 'XJTLU.MA.101')  
AND (Maintain_Information.Staff_ID = Staff_Information.Staff_ID);`

Use case 4: Find out all the ID of the staffs of maintaining teams

SQL query for use case 4: SELECT `Staff\_ID` FROM `Staff\_Information`

WHERE `Dept(TeamName)` IN

(SELECT DISTINCT `Dept(TeamName)` FROM `Staff\_Information`

WHERE `Dept(TeamName)` LIKE '%team%');

Use case 5: Count the machine number that each staff maintains

SQL query for use case 5: SELECT Staff\_ID,

COUNT (DISTINCT Machine\_ID) AS Repair\_Num

FROM Maintain\_Information

GROUP BY Staff\_ID;