

Use Case Orientation

Consider a maintenance shop that fixes a spectrum of devices. Devices could be categorized as appliances or sensors. Each appliance should have a set of specifications. Each appliance could have a set of sensors. Each sensor should have a set of specifications.

Structured DB Schema

Please consider the following schema to represent the use case.

Dataset Representation; Specs and Device tables

Specs			Device				
ID	Name	Value	ID	Name	Type	ParentDeviceID	SpecID
1	Weight	10	1	Heater	Appliance	(null)	1
2	Area	2	2	Security	Appliance	(null)	2
3	Max-Current	80	3	Current	Sensor	1	3
4	Max-Temperature	90	4	Current	Sensor	1	1
5	Angle	160	5	Temperature	Sensor	1	4
			5	Temperature	Sensor	1	1
			6	Motion	Sensor	2	5

Specs table contains the specifications data. Its ID is just an auto increment column to identify the record. Its Name column identify the name of the specification. Its Value column identify the value specifies for the corresponding mentioned name.

Device table contains the devices data. Its ID is just an auto increment column to identify the record. Its Name column along with the Type column identifies whether the device either appliance or sensor and mentioning its name. Its ParentDeviceID identifies which sensors are contained in which devices. This is being represented via a self-relationship. Its SpecID identifies the specification of each device.

Worth mentioning that this schema should be used as is. You should not attempt to change anything , e.g., don't think about creating a bridge (many-to-many) table between Specs and Device tables.

Questions: Write SQL queries to satisfy the following:

1. Retrieve the name of each Machine and the names of the sensors related to this machine.

The following depicts the expected result set:

Expected result set for the 1st question.

MachineName	SensorName
Heater	Current
Heater	Temperature
Security	Motion

- Retrieve all device names and all the specs names and values defined to each device

Expected result set for the 2nd question.

DeviceName	SpecName	SpecValue
Heater	Weight	10
Security	Area	2
Current	Max-Current	80
Current	Weight	10
Temperature	Max-Temperature	90
Temperature	Weight	10
Motion	Angle	160

- Retrieve the sensor name with only one specification and retrieve the machine name of this sensor.

Expected result set for the 3rd question.

SensorName	MachineName
Motion	Security

- Retrieve the intersection between the two tables based on the ID column from Specs table and the SpecID from Devices table.

Expected result set for the 4th question.

IntersectedSpecsID
1
2
3
4
5

- Retrieve all Specifications names and the number of sensors related to each specification

Expected result set for the 5th question.

SpecName	NumOfSensors
Angle	1
Max-Current	1
Max-Temperature	1
Weight	2

Instructions

You will find a list of instructions to be followed on the team. But here are some:

- Do not change the schema; tables' and columns' names. Copy them from the file without any trail spaces to your IDE.
- Do not make even slight changes, such as adding spaces between the columns name's words, e.g., do not change "ParentDeviceID" to "Parent Device ID". Just stick to the copy and paste from the document.
- Expected output column's names must be the same as shown in this document. Example: if there is no spaces then do not change even with tail spaces, e.g., "NumOfSensors" column in the 5th question must not be changed to "Num Of Sensors".
- For submission:
 - Do not make multiple submissions.
 - Do not submit multiple answers for the same question.
 - Do not submit until you are sure that this is the correct format and the final answer.
 - Do not put semicolon or special characters in any answer.
 - Submit records from your imagination NOT the provided records in this document and not from your colleagues.
 - When submitting records to the form do not use quotes, or spaces special characters even with character datatypes. Example for Specs table:
 - 1,S,30
 - 2,U,57
- Make sure many times that the query you are submitting corresponds to the relevant question. Make sure that the query you write has an equivalent result to the expected result set.
- After submission there will not be any chance to change/alter/switch your answers.
- Questions are weighted differently and will be corrected as a whole, i.e., you will get the complete mark of the weighted question in case you solved as it should be, or you will get nothing in case your answer doesn't match the correct answer.
- You will not be able to know the grade of the exam because it is a part of the final exam.