ECU178 Computer Science: 220CT Data and Information Retrieval Coursework

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Task 1 Database Design

This task in Database Design consists of four activities. The first three involve normalising the given data to third normal form, and the fourth is to produce and Entity Relationship diagram of the normalised relations. For each activity I will give a detailed step by step explanation of how I came to this conclusion.

Activity 1: First Normal Form

To put this data into First Normal Form (1NF), I need to:

1. Identify any repeating redundant data and remove it from the current Entity
2. Place the data into a new Entity
3. Create a relationship with a primary key from one Entity as a foreign key in the other.

Step 1: Identify Redundancy

On inspecting the data, I can see that there are multiple instances of repeating data.
Orders' ID: *CON-2237, CON-2356* and *CON-1234* all have repeating data entries for fields: *Equipment, Qty,* and *Unit Price* .

Step 2: Create New Entity

Removing the *Equipment, Qty,* and *Unit Price* fields and placing them in a new entity, leaves me with two entities as shown below.

ItemOrder entity

Equipment	Qty	Unit Price
Butterfly Valve	2	£5.00
3/4" Locknut	6	£1.50
Sch 40 Blk Pipe	4	£20.00
Thin Stranded Copper Wire	6	£6.00
Sch 40 Blk Pipe	3	£20.00
4x8x3/4 Cos Plywood	2	£10.00
3/4" EMT	2	£50.00
Duplex Ivy Rec	1	£100.00
Sch 40 Blk Pipe	1	£20.00
3/4" Locknut	2	£1.50

Order entity

Order ID	Supplier ID	Client Name	Client Address	Date	Total Price
CON-2237	168	Coventry Building Services Ltd	Units 2-4, Binley Industrial Estate, CV3 2WL	14-Dec-14	£99.00
CON-3664	527	Allied Construction Ltd	34,Lythalls La Industrial Estate, CV6 6RG	16-Jan-15	£36.00
CON-2356	169	Rioh Builds Ltd	Unit 12,Stoneleigh Park, CV8 2UV	12-Feb-15	£280.00
CON-1234	032	Grand Design Ltd	32-34, Bilton Industrial Estate, CV3 5YB	16-Apr-15	£23.00

Step 3: Relationships and Keys

To complete the First Normal Form, a relationship needs to be created between the entities.
I created the relationship by repeating the *Order ID* in the *ItemOrder* entity as seen below.
The *Order* entity remains the same, and I have made *Order ID* the primary key as it can be used to uniquely identify each record.
In the *ItemOrder* entity, no one attribute can be used to uniquely identify a single record. For this reason, I have created a concatenated key using the attributes *Equipment* and *Order ID* as a foreign key. The concatenated key can now be used to uniquely identify each record.

ItemOrder entity

Order ID	Equipment	Qty	Unit Price
CON-2237	Butterfly Valve	2	£5.00
CON-2237	3/4" Locknut	6	£1.50
CON-2237	Sch 40 Blk Pipe	4	£20.00
CON-3664	Thin Stranded Copper Wire	6	£6.00
CON-2356	Sch 40 Blk Pipe	3	£20.00
CON-2356	4x8x3/4 Cos Plywood	2	£10.00
CON-2356	3/4" EMT	2	£50.00
CON-2356	Duplex Ivy Rec	1	£100.00
CON-1234	Sch 40 Blk Pipe	1	£20.00
CON-1234	3/4" Locknut	2	£1.50

Task 1 Database Design continued on next page...

Activity 2: Second Normal Form

To put this data into the Second Normal Form(2NF) I need to ensure that the attributes are completely dependant on the primary key, i.e., that no attribute is only dependant on one part of the primary key. This can be done in two steps:

1. Test each attribute for complete dependency on the primary key.
2. Remove any partially dependent attributes to a new entity and assign a primary key.

For this particular set of data, the *Order* entity does not have a concatenated key and therefore is already in the second normal form.

Step 1: Testing each attribute.

Primary Key	Attribute	Functionally Dependant?
Order ID, Equipment	Qty	Yes, dependant on both
Order ID, Equipment	Unit Price	No, dependant on Equipment only

Step 2: Entity, Relationship and Key

From my testing, I found that the attribute *Unit Price* is not functionally dependant as it is only dependent on *Equipment*, but not *Order ID*.
I moved *Unit Price* into a new entity called *Item* and then I created an relationship between the *Item* and *ItemOrder* entities by repeating the *Equipment* attribute in the *Item* entity. *Equipment* also bceomes the primary key.

Item entity

Unit Price
50.00
1.50
10.00
5.00
100.00
20.00
6.00

Item entity(with relationship)

Equipment	Unit Price
3/4" EMT	50.00
3/4" Locknut	1.50
4x8x3/4 Cos Plywood	10.00
Butterfly Valve	5.00
Duplex Ivy Rec	100.00
Sch 40 Blk Pipe	20.00
Thin Stranded Copper Wire	6.00

All three entities in Second Normal Form

Order	(Order ID	**Item**	(Equipment	**ItemOrder**	(*Order ID
	Suppler ID		Unit Price)		*Equipment
	Client Name				Qty)
	Client Address				
	Date				
	Total Price)				