**Seneca College**

**Database Design for Oakville Yards**

**DBS 201 Group Assignment**

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**DBS 201 – Section A**

**Professor Lydia Li**

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**Student Assignment Submission Form**

I/we declare that the attached assignment is my/our own work in accordance with the Seneca Academic Policy. No part of this assignment has been copied manually or electronically from any other source (including web sites) **or distributed to other students**

Name(s) Signature

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**User View 1 – Invoice Statements**

An invoice is the same as a receipt and it is issued to customer once all services are completed. The invoice itemizes many details including the services provided, work duration, and total charges. Based on the sample invoices provided, the following field names are generated (not in order):

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| InvoiceNo | InvoiceDate | TeamNo | EquipDesc | CustNo |
| CustFName | CustLName | CustAddr | CustCity | CustPCode |
| SerCode | SerDesc | HourlyRate | Duration |  |

**Surrogate Primary Key: EquipNo**

EquipNo is a surrogate primary key that is added to identify the equipment used.

**Rationale**

1. Total Charge, Subtotal, GST, PST and Total Due are calculated fields so they are NOT included in the normalized forms.
2. Postal Code uniquely identifies a city; hence, a POSTALCODE entity is created in 3NF with CustPCode being the primary key. CustPCode is then a foreign key in the CUSTOMER entity.

**Normalization**

UNF:INVOICE [**InvoiceNo(PK)**, InvoiceDate, TeamNo, CustNo, CustFName, CustLName, CustAddr, CustCity, CustPCode, (EquipNo, EquipDesc), (SerCode, SerDesc, HourlyRate, Duration)]

1NF: INVOICE [**InvoiceNo(PK)**, InvoiceDate, TeamNo, CustNo, CustFName, CustLName, CustAddr, CustCity, CustPCode]

EQUIPUSED [***InvoiceNo(PK)(FK)***, **EquipNo(PK)**, EquipDesc]

SERVICEUSED [***InvoiceNo(PK)(FK)***, **SerCode(PK)**, SerDesc, HourlyRate, Duration]

2NF: INVOICE [**InvoiceNo(PK)**, InvoiceDate, TeamNo, CustNo, CustFName, CustLName, CustAddr, CustCity, CustPCode]

EQUIPUSED [***InvoiceNo(PK)(FK), EquipNo(PK)(FK)***]

EQUIPMENT [**EquipNo(PK)**, EquipDesc]

SERVICE [**SerCode(PK)**, SerDesc, HourlyRate]

SERVICEUSED [***InvoiceNo(PK)(FK), SerCode(PK)(FK)***, Duration]

3NF: INVOICE [**InvoiceNo(PK)**, InvoiceDate, TeamNo*, CustNo(FK)*]

EQUIPUSED [***InvoiceNo(PK)(FK), EquipNo(PK)(FK)***]

EQUIPMENT [**EquipNo(PK)**, EquipDesc]

SERVICE [**SerCode(PK)**, SerDesc, HourlyRate]

SERVICEUSED [***InvoiceNo(PK)(FK), SerCode(PK)(FK)***, Duration]

CUSTOMER [**CustNo(PK)**, CustFName, CustLName, CustAddr, *CustPCode(FK)*]

POSTALCODE [**CustPCode(PK)**, CustCity]

**User View 2 – Team Employee Reports**

The team employee reports are used by the Operations Manager to schedule which teams will be sent to which customers on any given work day. Team members work together when visiting a customer site. Based on the team employee reports provided, the following field names are generated (not in order):

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| TeamNo | TeamDesc | EmpID | EmpFName | EmpLName |
| PosDesc | EmpOHIP | EmpHPhone | EmpStartDate | SkillDesc |

**Surrogate Primary Key: SkillID**

SkillID is a surrogate primary key that is added to identify an employee’s skill and its description.

**Normalization**

UNF:TEAM [**TeamNo(PK)**, TeamDesc, (EmpID, EmpFName, EmpLName, PosDesc, EmpOHIP, EmpHPhone, EmpStartDate (SkillID, SkillDesc))]

1NF: TEAM [**TeamNo(PK)**, TeamDesc]

TEAMMEMBER [***TeamNo(PK)(FK)*,** **EmpID(PK)**, EmpFName, EmpLName, PosDesc, EmpOHIP, EmpHPhone, EmpStartDate]

TEAMEMPSKILL [***TeamNo(PK)(FK)*, *EmpID(PK)(FK)*, SkillID(PK)**, SkillDesc]

2NF: TEAM [**TeamNo(PK)**, TeamDesc]

TEAMMEMBER [***TeamNo(PK)(FK)*,** ***EmpID(PK)(FK)***]

TEAMEMPSKILL [***TeamNo(PK)(FK)*, *EmpID(PK)(FK)*, *SkillID(PK)(FK)***]

EMPLOYEE [**EmpID(PK)**, EmpFName, EmpLName, PosDesc, EmpOHIP, EmpHPhone, EmpStartDate]

SKILL [**SkillID(PK)**, SkillDesc]

3NF: TEAM [**TeamNo(PK)**, TeamDesc]

TEAMMEMBER [***TeamNo(PK)(FK)*,** ***EmpID(PK)(FK)***]

TEAMEMPSKILL [***TeamNo(PK)(FK)*, *EmpID(PK)(FK)*, *SkillID(PK)(FK)***]

EMPLOYEE [**EmpID(PK)**, EmpFName, EmpLName, PosDesc, EmpOHIP, EmpHPhone, EmpStartDate]

SKILL [**SkillID(PK)**, SkillDesc]

**User View 3 – 3-Day Product Sales Report**

The product sales report is required by the Purchasing Manager to evaluate and analyze the demands of each product. Based on the 3-day product sales report provided, the following field names are generated (not in order):

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| ClassCode | ProdID | ProdDesc | Charge | Qty | CustNo |
| InvoiceNo | InvoiceDate | RepNo | RepFName | RepLName |  |

**Normalization**

UNF:PRODUCT [**ProdID(PK)**, ClassCode, ProdDesc, Charge (Qty, InvoiceNo, InvoiceDate, RepNo, RepFName, RepLName, CustNo]

1NF: PRODUCT [**ProdID(PK)**, ClassCode, ProdDesc, Charge]

PRODSALE [***ProdID(PK)(FK)***, **InvoiceNo(PK)**, InvoiceDate, Qty, RepNo, RepFName, RepLName, CustNo]

2NF: PRODUCT [**ProdID(PK)**, ClassCode, ProdDesc, Charge]

PRODSALE [***ProdID(PK)(FK)***, ***InvoiceNo(PK)(FK)***, Qty]

INVOICE [**InvoiceNo(PK)**, InvoiceDate, RepNo, RepFName, RepLName, CustNo]

3NF: PRODUCT [**ProdID(PK)**, ClassCode, ProdDesc, Charge]

PRODSALE [***ProdID(PK)(FK)***, ***InvoiceNo(PK)(FK)***, Qty]

INVOICE [**InvoiceNo(PK)**, InvoiceDate, CustNo, *RepNo(FK)*]

SALESREP [**RepNo(PK)**, RepFName, RepLName]

**User View 4 – Product Report (Need Clarification – May be in correct)**

The product report is a listing and pricing schedule that the Sales Staff used to determine the markup price to be charged for each product. Based on the product report provided, the following field names are generated (not in order):

|  |  |  |  |
| --- | --- | --- | --- |
| ClassCode | ClassDesc | ProdID | ProdDesc |
| Cost | MarkupPercent |  |  |

**Rationale**

1. The Charge field is not included in the normalized forms because it is a calculated field.

**Normalization**

UNF:PRODUCT [**ProdID(PK)**, ProdDesc, ClassCode, ClassDesc, Cost, MarkupPercent]

1NF: PRODUCT [**ProdID(PK)**, ProdDesc, ClassCode, ClassDesc, Cost, MarkupPercent]

2NF: PRODUCT [**ProdID(PK)**, ProdDesc, ClassCode, ClassDesc, Cost, MarkupPercent]

3NF: PRODUCT [**ProdID(PK)**, ProdDesc, Cost, *ClassCode(FK)*]

CLASSIFICATION [**ClassCode(PK)**, ClassDesc, MarkupPercent]

**User View 5 – Inventory Report**

The inventory report provides information on product inventory and its supplier. In Oakville Yards, all products are stored and displayed in one of the aisles in the main office’s showroom. Based on the inventory report provided, the following field names are generated (not in order):

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| ProdID | ProdDesc | Inventory | AisleNo | SuppName |

**Normalization**

UNF:INVENTORY [**ProdID(PK)**, ProdDesc, Inventory, AisleNo, SuppName]

1NF: INVENTORY [**ProdID(PK)**, ProdDesc, Inventory, AisleNo, SuppName]

2NF: INVENTORY [**ProdID(PK)**, ProdDesc, Inventory, AisleNo, SuppName]

3NF: INVENTORY [**ProdID(PK)**, ProdDesc, Inventory, AisleNo, SuppName]

**Merging Relations**

**3NF from all User Views**

1A:INVOICE [**InvoiceNo(PK)**, InvoiceDate, TeamNo*, CustNo(FK)*]

1B:EQUIPUSED [***InvoiceNo(PK)(FK), EquipNo(PK)(FK)***]

1C: EQUIPMENT [**EquipNo(PK)**, EquipDesc]

1D: SERVICE [**SerCode(PK)**, SerDesc, HourlyRate]

1E: SERVICEUSED [***InvoiceNo(PK)(FK), SerCode(PK)(FK)***, Duration]

1F: CUSTOMER [**CustNo(PK)**, CustFName, CustLName, CustAddr, *CustPCode(FK)*]

1G: POSTALCODE [**CustPCode(PK)**, CustCity]

2A: TEAM [**TeamNo(PK)**, TeamDesc]

2B:TEAMMEMBER [***TeamNo(PK)(FK)*,** ***EmpID(PK)(FK)***]

2C: TEAMEMPSKILL [***TeamNo(PK)(FK)*, *EmpID(PK)(FK)*, *SkillID(PK)(FK)***]

2D: EMPLOYEE [**EmpID(PK)**, EmpFName, EmpLName, PosDesc, EmpOHIP, EmpHPhone, EmpStartDate]

2E: SKILL [**SkillID(PK)**, SkillDesc]

3A: PRODUCT [**ProdID(PK)**, ClassCode, ProdDesc, Charge]

3B:PRODSALE [***ProdID(PK)(FK)***, ***InvoiceNo(PK)(FK)***, Qty]

3C: INVOICE [**InvoiceNo(PK)**, InvoiceDate, CustNo, *RepNo(FK)*]

3D: SALESREP [**RepNo(PK)**, RepFName, RepLName]

4A: PRODUCT [**ProdID(PK)**, ProdDesc, Cost, *ClassCode(FK)*]

4B:CLASSIFICATION [**ClassCode(PK)**, ClassDesc, MarkupPercent]

5: INVENTORY [**ProdID(PK)**, ProdDesc, Inventory, AisleNo, SuppName]

**Examining Tables with Composite Key as Primary Key**

1B:EQUIPUSED [***InvoiceNo(PK)(FK), EquipNo(PK)(FK)***]

1E: SERVICEUSED [***InvoiceNo(PK)(FK), SerCode(PK)(FK)***, Duration]

2B:TEAMMEMBER [***TeamNo(PK)(FK)*,** ***EmpID(PK)(FK)***]

2C: TEAMEMPSKILL [***TeamNo(PK)(FK)*, *EmpID(PK)(FK)*, *SkillID(PK)(FK)***]

3B:PRODSALE [***ProdID(PK)(FK)***, ***InvoiceNo(PK)(FK)***, Qty]

***Rationale***

1B: INVOICE and EQUIPMENT are in a many-to-many relationship; thus, EQUIPUSED is required as a bridging table.

1E: INVOICE AND SERVICE are in a many-to-many relationship; moreover, both keys are required to uniquely determine the work duration of each service. Therefore, SERVICEUSED is required as a bridging table.

2B: Each team can have one or more employee while each employee can only be assigned to one team, and that makes a one-to-many relationship. Since the two entities are already in a one-to-many relationship, a bridging table is no longer required; therefore, it is decided that the composite key in TEAMMEMBER be separated. The 2B TEAMMEMBER table will become: TEAMMEMBER [**EmpID(PK)**, TeamNo].

2C: Because EmpID can identify the skills, and EMPLOYEE table is already related to the TEAM table, so it is decided that TeamNo be separated from the composite key. TEAMEMPSKILL table will be renamed and should now look like: EMPSKILL [***EmpID(PK)(FK), SkillID(PK)(FK)***, TeamNo]

3B: Both ProdID and InvoiceNo are required to uniquely determine the quantity sold for each order, so there is no change to the PRODSALE table.

**Merging Tables with Identical Primary Key**

Table 1A and 3C become:

1A, 3C:INVOICE [**InvoiceNo(PK)**, InvoiceDate, TeamNo, *CustNo(FK), RepNo(FK)*]

Table 2B and 2D become:

2B, 2D:EMPLOYEE [**EmpID(PK)**, EmpFName, EmpLName, PosDesc, EmpOHIP, EmpHPhone, EmpStartDate, TeamNo]

Table 3A, 4A, and 5 become:

3A, 4A, 5:PRODUCT [**ProdID(PK)**, ProdDesc, Cost, Inventory, AisleNo, SuppName, *ClassCode(FK)*]

***Rationale***

3A: The Charge attribute has been removed after the merge because User View 4 has determined that Charge is a calculated field.

**Final Form**

INVOICE [**InvoiceNo(PK)**, InvoiceDate, *TeamNo(FK)*, *CustNo(FK), RepNo(FK)*]

EQUIPUSED [***InvoiceNo(PK)(FK), EquipNo(PK)(FK)***]

EQUIPMENT [**EquipNo(PK)**, EquipDesc]

SERVICEUSED [***InvoiceNo(PK)(FK), SerCode(PK)(FK)***, Duration]

SERVICE [**SerCode(PK)**, SerDesc, HourlyRate]

CUSTOMER [**CustNo(PK)**, CustFName, CustLName, CustAddr, *CustPCode(FK)*]

POSTALCODE [**CustPCode(PK)**, CustCity]

SALESREP [**RepNo(PK)**, RepFName, RepLName]

TEAM [**TeamNo(PK)**, TeamDesc]

EMPLOYEE [**EmpID(PK)**, EmpFName, EmpLName, PosDesc, EmpOHIP, EmpHPhone, EmpStartDate, *TeamNo(FK)*]

EMPSKILL [***EmpID(PK)(FK)*, *SkillID(PK)(FK)***, *TeamNo(FK)*]

SKILL [**SkillID(PK)**, SkillDesc]

PRODUCT [**ProdID(PK)**, ProdDesc, Cost, Inventory, AisleNo, SuppName, *ClassCode(FK)*]

PRODSALE [***ProdID(PK)(FK)***, ***InvoiceNo(PK)(FK)***, Qty]

CLASSIFICATION [**ClassCode(PK)**, ClassDesc, MarkupPercent]

**Entity Relationship Diagram**

