**Employee Normalization**

A set of project information as shown below needs to be normalized to 3NF. Be sure to look for opportunities to optimize the design to improve overall relational structure (e.g. minimize the number of tables). Note: This is one table, split up for display purposes only.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Project ID | Project Name | Employee ID | Employee Name | Manager ID | Manager Name |
| 55B23 | HR\_Update | 403 | John Black | 304 | Sue West |
| 55B23 | HR\_Update | 393 | Jackson Quinta | 706 | Bill Halloway |
| 55B23 | HR\_Update | 466 | Gwen Day | 233 | Sam Ha |
| 83W61 | FoodSafe | 403 | John Black | 304 | Sue West |
| 40R77 | Plan-Net | 329 | Cathy Zou | 227 | Melinda River |
| 40R77 | Plan-Net | 706 | Bill Halloway | 687 | Al Brown |
| 52H68 | Dublin4 | 472 | Maria Chow | 220 | Vince Gossi |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Department ID | Dept Name | Start Date | Hours Billed | Dept Location | Billing Rate | Total |
| RD | Research | March 3, 2018 | 30.5 | Victoria | $100 | $3050.00 |
| RD | Research | March 3, 2018 | 22.5 | Victoria | $75 | $1687.50 |
| ACC | Accounting | March 3, 2018 | 40.0 | Nanaimo | $60 | $2400.00 |
| RD | Research | March 1, 2018 | 12.5 | Victoria | $100 | $1250.00 |
| BP | Benefits | March 3, 2018 | 31.0 | Vancouver | $100 | $3100.00 |
| MK | Marketing | March 3, 2018 | 27.5 | Victoria | $80 | $2200.00 |
| RD | Research | March 6, 2018 | 30.5 | Victoria | $100 | $3050.00 |

Here are some **relevant** and **not-so-relevant** business rules you **may** need:

An employee belongs to just one department.

An employee has just one manager. Managers are also employees.

Each department has one location.

Each project has one start date.

Some employees do not have an assigned project.

An employee has the same billing rate regardless of which project he or she works on.

Projects do not belong to any department, only employees belong to departments.

Use the following table to show the UNF, 1NF, 2NF, 3NF and entity name. ***(10 marks)***

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **UNF** | **1NF** | **2NF** | **3NF** | **Entity** |
| ProjectID \* | ProjectID\* | ProjectID\* | ProjectID\* | Project |
| ProjectName | ProjectName | ProjectName | ProjectName |  |
| StartDate | StartDate | StartDate | StartDate |  |
| EmployeeID \* ) |  |  |  |  |
| Emp\_FirstName ) | ProjectID\* | ProjectID\* | ProjectID\* | Bill |
| Emp\_LastName ) | EmployeeID\* | EmployeeID\* | EmployeeID\* |  |
| ManagerID ) | Emp\_FirstName | HoursBilled | HoursBilled |  |
| Mgr\_FirstName ) | Emp\_LastName |  |  |  |
| Mgr\_LastName ) | ManagerID | EmployeeID\* | EmployeeID\* | Employee |
| DepartmentID ) | Mgr\_FirstName | Emp\_FirstName | Emp\_FirstName |  |
| DepartmentName ) | Mgr\_LastName | Emp\_LastName | Emp\_LastName |  |
| HoursBilled ) | DepartmentID | ManagerID | BillingRate |  |
| DeptLocation ) | DepartmentName | Mgr\_FirstName | ManagerID (FK) |  |
| BillingRate ) | HoursBilled | Mgr\_LastName | DepartmentID (FK) |  |
|  | DeptLocation | DepartmentID |  |  |
|  | BillingRate | DepartmentName | ManagerID\* | Manager |
|  |  | DeptLocation | Mgr\_FirstName |  |
|  |  | BillingRate | Mgr\_LastName |  |
|  |  |  |  |  |
|  |  |  | DepartmentID\* | Department |
|  |  |  | DeptName |  |
|  |  |  | DeptLocation |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
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**Dog Grooming Normalization**

A local dog grooming service business has heard that you are taking a database course and has asked you to help them organize their service receipts. They have just two stores for now and have hired a few attendants to perform the grooming services. Currently they just record everything in a single Excel spreadsheet as shown below. Customers bring in their dogs for a grooming service and pay based on the size of the dog and the type of grooming (standard doggie wash or the deluxe ‘ultra-wash’ grooming treatment which includes a nail clip). The attendants groom each dog for about thirty minutes. You think you can show them a better approach to managing this information. Because the lines of each grooming service stretches over a number of columns, we have split the display into a left half (the top part below) and a right half (the bottom part).





Mr. John Smith had brought in his three dogs: Spot, Balto, and Peeto for grooming on February 17th, but then he had to bring his pooch Spot for a wash just 3 days later at the other store by Mandy. Spot likes to jump into puddles.

The groom service ledger shows at most three dogs per customer service. If there are more than three dogs for a customer, they just create a new till receipt for those extra dogs.

Here are some **relevant** and **not-so-relevant** assumptions you **may** need:

* A customer’s dogs will each have different names. (Yes, Spot, Spott, and Spaut are different names.)
* Customers may use either store.
* Customers keep the same address (they don’t move to a new location).
* Each attendant has a unique ID number (e.g. Mary West’s id number is 6).
* Attendants may work at either store.
* Attendants may work with dogs of any size (big, medium, or small).
* Attendants may provide any type of grooming service (standard wash or ultra wash).
* Grooming service costs are the same for both stores (e.g. standard wash for a big dog is $30 at either store).
* Customers may bring in any number of their dogs for a grooming appointment but there are only at most two attendants who can provide grooming services at the same time. A customer’s third dog will have to wait for a grooming attendant to be available if both attendants are busy. Regardless of possible wait time, all the customer’s dogs will be processed under one date and time for the grooming service.
* Each grooming service requires only one attendant.
* Each grooming service requires the same amount of time (30 minutes) regardless of dog size.
* Customers cannot book a grooming service for the same dog twice at the same time.
* Dogs stay the same size.
* The service type name includes the size of the dog (e.g. “Standard wash – small” or “Ultra wash – big”).
* Both stores can handle at most two grooming services at the same time.

Because the store owners are so nice and give you a free dog grooming service for your beloved Scooby (a wee white Terrier), you want to ensure that you normalize the database properly.

Use the following table to show the UNF, 1NF, 2NF, 3NF and entity name. ***(10 marks)***

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **UNF** | **1NF** | **2NF** | **3NF** | **Entity** |
| ReceiptNo \* | ReceiptNo \* | ReceiptNo \* | ReceiptNo\* | Receipt |
| CustomerID | CustomerID | CustomerID | ServiceDate |  |
| Cust\_FirstName | Cust\_FirstName | Cust\_FirstName | CustomerID (FK) |  |
| Cust\_LastName | Cust\_LastName | Cust\_LastName | StoreID (FK) |  |
| Cust\_Address | Cust\_Address | Cust\_Address |  |  |
| Cust\_Postal | Cust\_Postal | Cust\_Postal | CustomerID\* | Customer |
| ServiceDate | ServiceDate | ServiceDate | Cust\_FirstName |  |
| StoreID | StoreID | StoreID | Cust\_LastName |  |
| StoreAddress | StoreAddress | StoreAddress | Cust\_Address |  |
| DogName \* ) |  |  | Cust\_Postal |  |
| DogBreed ) | ReceiptNo\* | ReceiptNo\* |  |  |
| AttendantID ) | DogName \* | DogName \* | StoreID\* | Store |
| Att\_FirstName ) | DogBreed | DogBreed | StoreAddress |  |
| Att\_LastName ) | AttendantID | AttendantID |  |  |
| Treatment ) | Att\_FirstName | Att\_FirstName | ReceiptNo\* | Groom\_Service |
| TreatmentCost ) | Att\_LastName | Att\_LastName | DogName\* |  |
|  | Treatment | Treatment | DogBreed |  |
|  | TreatmentCost | TreatmentCost | AttendantID (FK) |  |
|  |  |  | Treatment (FK) |  |
|  |  |  |  |  |
|  |  |  | AttendantID\* | Attendant |
|  |  |  | Att\_FirstName |  |
|  |  |  | Att\_LastName |  |
|  |  |  |  |  |
|  |  |  | Treatment\* | Treatment |
|  |  |  | TreatmentCost |  |
|  |  |  |  |  |
|  |  |  |  |  |