**Normalization Homework**

1. Consider the Grade Report Relation
   1. Draw a relational schema and diagram the functional dependencies in the relation
   2. What normal form is this relation in?
   3. Decompose the relation into a set of #NF relations (Show all steps)

**Grade Report Relation**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| CWID | Student\_Name | Campus\_address | Major | Course\_id | Course\_Title | Instructor name | Instructor Location | Grade |
| 168300458 | Williams | 208 RiverSide | MIS | MIS 320 | Systems Dev | Givens | A 367 | A |
| 168300458 | Williams | 208 RiverSide | MIS | MIS 330 | Database MGT | Raja | AL 367 | B |
| 543921073 | Baker | 102 Riverside | ACCT | ACCT 102 | Intro to ACCT | Ingrham | AL 360 | C |
| 543921073 | Baker | 102 Riverside | ACCT | Acct 200 | Adv ACCT | Duggan | AL 205 | B |
| 543921073 | Baker | 102 Riverside | ACCT | MIS 330 | Database MGT | Raja | A L 367 | A |

**B)** It is in first normal form.

**C)** Student(CWID, Student Name, Campus Address, Major)  
Instructor(Instructor Name, Instructor Location)  
Course(Course ID, CWID, Course Title, Instructor Name, Grade)

1. The public Safety office at UA maintains a list of parking tickets issued to vehicles parked illegally on the campus. The table below shows a portion of this list for fall 2008.
   1. Convert this table into a relation in first normal form by entering appropriate data in it.
   2. Draw a dependency diagram showing all functional dependencies, based on the data provided
   3. Give an example of one or more anomalies that can result in using the relation
   4. Develop a set of relations in 3NF.
   5. Include a new column with the heading “violation” in the appropriate table to explain the reason for each ticket. Values in the column are: expired parking meter (Ticket code 1), no parking permit (ticket code 2) and handicap violation (ticket code 3)

**Parking Ticket at UA**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parking Ticket Table | | | | | | | | | | | | | | |
| CWID | L\_Name | F\_Name | Phone# | | St\_Lic | | Lic\_No | Ticket# | | | Date | Code | | Fine | |
| 38249 | Brown | Thomas | 111-7804 | Fl | | BRY 123 | | | 15634 | 10/17/08 | | | 2 | 25 |
|  |  |  |  |  | |  | | | 16017 | 11/13/08 | | | 1 | 15 |
| 82453 | Green | Sally | 391-1689 | AL | | TRE 141 | | | 14897 | 10/05/08 | | | 3 | 100 |
|  |  |  |  |  | |  | | | 16293 | 11/18/08 | | | 1 | 15 |
|  |  |  |  |  | |  | | | 17892 | 12/13/08 | | | 2 | 25 |

**A)**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parking Ticket Table | | | | | | | | | | | | | | |
| CWID | L\_Name | F\_Name | Phone# | | St\_Lic | | Lic\_No | Ticket# | | | Date | Code | | Fine | |
| 38249 | Brown | Thomas | 111-7804 | Fl | | BRY 123 | | | 15634 | 10/17/08 | | | 2 | 25 |
| 38249 | Brown | Thomas | 111-7804 | Fl | | BRY 123 | | | 16017 | 11/13/08 | | | 1 | 15 |
| 82453 | Green | Sally | 391-1689 | AL | | TRE 141 | | | 14897 | 10/05/08 | | | 3 | 100 |
| 82453 | Green | Sally | 391-1689 | AL | | TRE 141 | | | 16293 | 11/18/08 | | | 1 | 15 |
| 82453 | Green | Sally | 391-1689 | AL | | TRE 141 | | | 17892 | 12/13/08 | | | 2 | 25 |

**C)** In the original table, if the first or third rows were deleted, then the remaining information in the table could be incorrectly associated to the wrong person.

**D)** Student(CWID, L\_Name, F\_Name, Phone)  
 License (State License, License #, CWID)  
 Ticket(Ticket #, CWID, Date, Code)  
 Ticket Code(Code, Fine)

**E)**

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Parking Ticket Table | | | | | | | | | | | |
| CWID | | L\_Name | F\_Name | Phone# | St\_Lic | Lic\_No | Ticket# | Date | Code | Violation | Fine |
| 38249 | | Brown | Thomas | 111-7804 | Fl | BRY 123 | 15634 | 10/17/08 | 2 | No Parking Permit | 25 |
| 38249 | | Brown | Thomas | 111-7804 | Fl | BRY 123 | 16017 | 11/13/08 | 1 | Expired Parking Meeting | 15 |
| 82453 | | Green | Sally | 391-1689 | AL | TRE 141 | 14897 | 10/05/08 | 3 | Handicap Violation | 100 |
| 82453 | | Green | Sally | 391-1689 | AL | TRE 141 | 16293 | 11/18/08 | 1 | Expired Violation | 15 |
| 82453 | | Green | Sally | 391-1689 | AL | TRE 141 | 17892 | 12/13/08 | 2 | No Parking Permit | 25 |

1. The following table shows a potion of the shipment table for a large manufacturing company. Each shipment (identified by Shipment #) uniquely identifies the shipment Origin, Destination and Distance. The shipment Origin and Destination pair also uniquely identifies Distance.
   1. Develop a diagram that shows the functional dependencies in the SHIPMENT relation
   2. In what normal form is SHIPMENT? Why?
   3. Convert SHIPMENT to third normal form.

**SHIPMENT**

|  |  |  |  |
| --- | --- | --- | --- |
| Shipment # | Origin | Destination | Distance |
| 409 | Seattle | Denver | 1537 |
| 618 | Chicago | Dallas | 1058 |
| 723 | Boston | Atlanta | 1214 |
| 824 | Denver | Los Angeles | 975 |
| 629 | Seattle | Denver | 1537 |

**A)**

**B)** It is in first normal form. The table can be broken down into multiple tables with the shipment numbers and distance between the origin and destination.

**C)**  Shipment(Shipment #, Origin, Destination)