**DASC 5333 Database Systems for Data Science  
CSCI 4333 Design of Database Systems   
Fall 2024  
Template for Q1 of Homework #7**

Relation schema with entries for normalization analysis. Fill in the rows “Normalization Analysis.”

|  |  |
| --- | --- |
| **1** | Account(Account, Password, Created) |
| Candidate Keys | [1] Account |
| Foreign Keys |  |
| Nullable Attributes |  |
| Non-nullable Attributes | Account, Password, Created |
| Notes |  |
| Normalization Analysis | [FD]:  [Highest NF]: |
| **2** | Person(PersonId, LName, FName, DoB, Address, City, State, ZipCode) |
| Candidate Keys | [1] PersonId |
| Foreign Keys |  |
| Nullable Attributes | Dob, City |
| Non-nullable Attributes | PersonId, LName, FName, Address, State, ZipCode |
| Notes |  |
| Normalization Analysis | [FD]:  [Highest NF]: |
| **3** | Customer(CustomerId, PersonId, Phone, EMail, Account) |
| Candidate Keys | [1] CustomerId. [2] PersonId |
| Foreign Keys | [1] PersonId references Person(PersonId), [2] Account references Account(Account) |
| Nullable Attributes | Phone, EMail |
| Non-nullable Attributes | CustomerId, PersonId, Account |
| Notes | [1] A surrogate key, CustomerId, is created as the primary key. |
| Normalization Analysis | [FD]:  [Highest NF]: |
| **4** | RelationshipKind(RK\_Id, RelationshipKind, Description) |
| Candidate Keys | [1] RK\_Id, [2] RelationshipKind |
| Foreign Keys |  |
| Nullable Attributes | Description |
| Non-nullable Attributes | RK\_Id, RelationshipKind |
| Notes | [1] A surrogate key, RK\_Id, is created as the primary key. |
| Normalization Analysis | [FD]:  [Highest NF]: |
| **5** | Relationship(RId, CustomerId\_1, CustomerId\_2, RK\_Id, Note) |
| Candidate Keys | [1] RId, [2] CustomerId\_1, CustomerId\_2 |
| Foreign Keys | [1] CustomerId\_1 references Customer(CustomerId), [2] CustomerId\_2 references Customer(CustomerId), [3] RK\_Id references RelationshipKind(RK\_Id) |
| Nullable Attributes | Note |
| Non-nullable Attributes | Rid, CustomerId\_1, CustomerId\_2, RK\_Id |
| Notes | [1] A surrogate key, RId, is created as the primary key. |
| Normalization Analysis | [FD]:  [Highest NF]: |
| **6** | Employee(EmployeeId, PersonId, Phone, AltPhone, Email, Account) |
| Candidate Keys | [1] EmployeeId, [2] PersonId |
| Foreign Keys | [1] PersonId references Person(PersonId), [2] Account references Account(Account) |
| Nullable Attributes | AltPhone |
| Non-nullable Attributes | EmployeeId, PersonId, Phone, Email, Account |
| Notes | [1] It is acceptable that the Employee table is designed to store information of objects from the three classes of Employee, Nurse, and Technician. If so, the next two relations, Nurse and Technician, should be merged into the Employee relation. The fields EmployeeType, CertLevel and Registered should be added. |
| Normalization Analysis | [FD]:  [Highest NF]: |
| **7** | Nurse(NurseId, EmployeeId, Registered) |
| Candidate Keys | [1] NurseId, [2] EmployeeId |
| Foreign Keys | [1] EmployeeId references Employee(EmployeeId) |
| Nullable Attributes |  |
| Non-nullable Attributes | NurseId, EmployeeId, Registered |
| Notes | [1] A surrogate key, NurseId, is created as the primary key. |
| Normalization Analysis | [FD]:  [Highest NF]: |
| **8** | Technician(TechnicanId, EmployeeId, CertLevel) |
| Candidate Keys | [1] TechnicanId, [2] EmployeeId |
| Foreign Keys | [1] EmployeeId references Employee(EmployeeId) |
| Nullable Attributes | CertLevel |
| Non-nullable Attributes | TechnicanId, EmployeeId |
| Notes | [1] A surrogate key, TechnicianId, is created as the primary key. |
| Normalization Analysis | [FD]:  [Highest NF]: |
| **9** | Center(CenterId, CenterName) |
| Candidate Keys | [1] CenterId, [2] CenterName |
| Foreign Keys |  |
| Nullable Attributes |  |
| Non-nullable Attributes | CenterId, CenterName |
| Notes |  |
| Normalization Analysis | [FD]:  [Highest NF]: |
| **10** | Visit(VisitId, VisitTime, CustomerId, CenterId, NurseId) |
| Candidate Keys | [1] VisitId, [2] VisitTime, CustomerId, CenterId |
| Foreign Keys | [1] CustomerId references Customer(CustomerId), [2] CenterId references Center(CenterId), [3] NurseId references Nurse(NurseId). |
| Nullable Attributes |  |
| Non-nullable Attributes | VisitId, VisitTime, CustomerId, CenterId, NurseId |
| Notes | [1] It is possible that the classes Visit and VisitReport are implemented by a single relation, Visit, since they have a one to one relationship. |
| Normalization Analysis | [FD]:  [Highest NF]: |
| **11** | VisitReport(VR\_Id, Time, Summary, VisitId, TechnicianId) |
| Candidate Keys | [1] VR\_Id, [2] VisitId |
| Foreign Keys | [1] VisitId references Visit(VisitId), [2] TechnicianId references Technician(TechnicianId) |
| Nullable Attributes | Summary |
| Non-nullable Attributes | VR\_Id, Time, Summary, VisitId, TechnicianId |
| Notes | [1] A surrogate key, VR\_Id, is created as the primary key. |
| Normalization Analysis | [FD]:  [Highest NF]: |
| **12** | TestItem(ItemId, ItemName, Unit, LowerRange, UpperRange, Description) |
| Candidate Keys | [1] ItemId, [2] ItemName |
| Foreign Keys |  |
| Nullable Attributes | LowerRange, UpperRange, Description |
| Non-nullable Attributes | ItemId, ItemName, Unit |
| Notes |  |
| Normalization Analysis | [FD]:  [Highest NF]: |
| **13** | TestGroup(TGId, TGName, Description) |
| Candidate Keys | [1] TGId, [2] TGName |
| Foreign Keys |  |
| Nullable Attributes |  |
| Non-nullable Attributes | TGId, TGName, Description |
| Notes |  |
| Normalization Analysis | [FD]:  [Highest NF]: |
| **14** | TestGroupItems(TGI\_Id, TGId, ItemId) |
| Candidate Keys | [1] TGI\_Id, [2] TGId, ItemId |
| Foreign Keys | [1] TGId references TestGroup(TGId), [2] ItemId references TestItem(ItemId) |
| Nullable Attributes |  |
| Non-nullable Attributes | TGI\_Id, TGId, ItemId |
| Notes | [1] A surrogate key, TGI\_Id, is created as the primary key. |
| Normalization Analysis | [FD]:  [Highest NF]: |
| **15** | VisitGroup(VG\_Id, VisitId, TGId) |
| Candidate Keys | [1] VG\_Id, [2] VisitId, TGId |
| Foreign Keys | [1] VisitId references Visit(VisitId), [2] TGId references TestGroup(TGId) |
| Nullable Attributes |  |
| Non-nullable Attributes | VG\_Id, VisitId, TGId |
| Notes | [1] A surrogate key, VG\_Id, is created as the primary key. |
| Normalization Analysis | [FD]:  [Highest NF]: |
| **16** | VisitItem(VI\_Id, VisitId, ItemId) |
| Candidate Keys | [1] VI\_Id, [2] VisitId, ItemId |
| Foreign Keys | [1] VisitId references Visit(VisitId) [2] ItemId references TestItem(ItemId) |
| Nullable Attributes |  |
| Non-nullable Attributes | VI\_Id, VisitId, ItemId |
| Notes | [1] A surrogate key, VI\_Id, is created as the primary key. |
| Normalization Analysis | [FD]:  [Highest NF]: |
| **17** | TGResult(TGR\_Id, Summary, VR\_Id, TGId) |
| Candidate Keys | [1] TGR\_Id, [2] VR\_Id, TGId |
| Foreign Keys | [1] VR\_Id references VisitReport(VR\_Id), [2] TGId references TestGroup(TGId) |
| Nullable Attributes | Summary |
| Non-nullable Attributes | TGR\_Id, VR\_Id, TGId |
| Notes | [1] A surrogate key, TGR\_Id, is created as the primary key. |
| Normalization Analysis | [FD]:  [Highest NF]: |
| **18** | TIResult(TIR\_Id, Value, VR\_Id, TGR\_Id, ItemId) |
| Candidate Keys | [1] TIR\_Id, [2] (likely) VR\_Id, ItemId |
| Foreign Keys | [1] VR\_Id references VisitReport(VR\_Id), [2] ItemId references TestItem(ItemId), [3] TGR\_Id references TGResut(TGR\_Id) |
| Nullable Attributes | TGR\_Id |
| Non-nullable Attributes | TIR\_Id, Value, VR\_Id, TGR\_Id, ItemId |
| Notes | [1] A surrogate key, TIR\_Id, is created as the primary key. |
| Normalization Analysis | [FD]:  [Highest NF]: |