**DASC 5333 Database Systems for Data Science  
CSCI 4333 Design of Database Systems   
Spring 2025  
Template for Q1 of Homework #7**

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

|  |  |
| --- | --- |
| 1 | TaxCategory(TC\_Id, Name, TaxRate) |
| Candidate Keys | [1] TC\_Id, [2] Name |
| Foreign Keys |  |
| Nullable Attributes |  |
| Non-nullable Attributes | TC\_Id, Name, TaxRate |
| Notes | [1] A surrogate key, TC\_Id, is created as the primary key. |
| Normalization Analysis | [FD]:  [Highest NF]: |
| 2 | Item(ItemId, Item, CurrentPrice, CurrentPriceSince, Description, Comment, IsActive, TC\_Id) |
| Candidate Keys | [1] ItemId, [2] Item |
| Foreign Keys | [1] TC\_Id references TaxCategory(TC\_Id) |
| Nullable Attributes | Description, Comment |
| Non-nullable Attributes | ItemId, Item, CurrentPrice, CurrentPriceSince, IsActive, TC\_Id |
| Notes |  |
| Normalization Analysis | [FD]:  [Highest NF]: |
| 3 | MenuCategory(MC\_Id, CategoryName, Description) |
| Candidate Keys | [1] MC\_Id, [2] CategoryName |
| Foreign Keys |  |
| Nullable Attributes | Description |
| Non-nullable Attributes | MC\_Id, CategoryName |
| Notes | [1] A surrogate key, MC\_Id, is created as the primary key. |
| Normalization Analysis | [FD]:  [Highest NF]: |
| 4 | ItemCategory(IC\_Id, ItemId, MC\_Id) |
| Candidate Keys | [1] IC\_Id, [2] ItemId, MC\_Id |
| Foreign Keys | [1] ItemId references Item(ItemId), [2] MC\_Id references MenuCategory(MC\_Id) |
| Nullable Attributes |  |
| Non-nullable Attributes | IC\_Id, ItemId, MC\_Id |
| Notes | [1] A surrogate key, IC\_Id, is created as the primary key. |
| Normalization Analysis | [FD]:  [Highest NF]: |
| 5 | ItemHistory(IH\_Id, ChangeTime, Price, Comment, IsActive, ItemId) |
| Candidate Keys | [1] IH\_Id |
| Foreign Keys | [1] ItemId references Item(ItemId) |
| Nullable Attributes | Price, Comment, IsActive |
| Non-nullable Attributes | IH\_Id, ChangeTime, ItemId |
| Notes | [1] A surrogate key, IH\_Id, is created as the primary key. |
| Normalization Analysis | [FD]:  [Highest NF]: |
| 6 | Waiter(WaiterId, FName, LName) |
| Candidate Keys | [1] WaiterId |
| Foreign Keys |  |
| Nullable Attributes |  |
| Non-nullable Attributes | WaiterId, FName, LName |
| Notes |  |
| Normalization Analysis | [FD]:  [Highest NF]: |
| 7 | Customer(CId, FName, LName, Phone, Address, City, State, ZipCode) |
| Candidate Keys | [1] CId |
| Foreign Keys |  |
| Nullable Attributes | FName, LName, |
| Non-nullable Attributes | CId, Phone, Address, City, State, ZipCode |
| Notes | [1] A surrogate key, CId, is created as the primary key. |
| Normalization Analysis | [FD]:  [Highest NF]: |
| 8 | Table(TableId, TableNum, Description) |
| Candidate Keys | [1] TableId, [2] TableNum |
| Foreign Keys |  |
| Nullable Attributes | Description |
| Non-nullable Attributes | TableId, TableNum |
| Notes |  |
| Normalization Analysis | [FD]:  [Highest NF]: |
| 9 | Order(OrderId, OrderTime, Comment) |
| Candidate Keys | [1] OrderId |
| Foreign Keys |  |
| Nullable Attributes | Comment |
| Non-nullable Attributes | OrderId, OrderTime |
| Notes | [1] In this design, the superclass ‘Order’ and the three subclasses are modeled by a relation each. It is possible to use other designs, such as one relation for all four classes. |
| Normalization Analysis | [FD]:  [Highest NF]: |
| 10 | TakeOutOrder(TO\_Id, PickupTime, OrderId) |
| Candidate Keys | [1] TO\_Id, [2] OrderId |
| Foreign Keys | [1] OrderId references Order(OrderId) |
| Nullable Attributes | PickupTime |
| Non-nullable Attributes | To\_Id, OrderId |
| Notes | [1] A surrogate key, TO\_Id, is created as the primary key. [2] Other reasonable designs acceptable. |
| Normalization Analysis | [FD]:  [Highest NF]: |
| 11 | DeliveryOrder(DeliveryId, PromisedTime, OrderId, CId) |
| Candidate Keys | [1] DeliveryId, [2] OrderId |
| Foreign Keys | [1] OrderId references Order(OrderId), [2] CId references Customer(CId) |
| Nullable Attributes | PromisedTime |
| Non-nullable Attributes | DeliveryId, OrderId, CId |
| Notes | [1] A surrogate key, DeliveryId, is created as the primary key. |
| Normalization Analysis | [FD]:  [Highest NF]: |
| 12 | InhouseOrder(IO\_Id, NumGuests, OrderId, WaiterId) |
| Candidate Keys | [1] IO\_Id, [2] OrderId |
| Foreign Keys | [1] OrderId references Order(OrderId), [2] WaiterId references Waiter(WaiterId) |
| Nullable Attributes |  |
| Non-nullable Attributes | IO\_Id, NumGuests, OrderId, WaiterId |
| Notes | [1] A surrogate key, IO\_Id, is created as the primary key. |
| Normalization Analysis | [FD]:  [Highest NF]: |
| 13 | OrderTable(OT\_Id, IO\_Id, TableId) |
| Candidate Keys | [1] OT\_Id, [2] IO\_Id, TableId |
| Foreign Keys | [1] IO\_Id references InhouseOrder(IO\_Id), [2] TableId references Table(TableId) |
| Nullable Attributes |  |
| Non-nullable Attributes | OT\_Id, IO\_Id, TableId |
| Notes | [1] A surrogate key, OT\_Id, is created as the primary key. |
| Normalization Analysis | [FD]:  [Highest NF]: |
| 14 | OrderItem(OItemId, ItemId, Quantity, OrderId, Comment) |
| Candidate Keys | [1] OItemId, [2] OrderId, ItemId (possibly) |
| Foreign Keys | [1] OrderId references Order(OrderId), [2] ItemId references Item(ItemId) |
| Nullable Attributes | Comment |
| Non-nullable Attributes | OItemId, ItemId, Quantity, OrderId |
| Notes | [1] A surrogate key, OItemId, is created as the primary key. |
| Normalization Analysis | [FD]:  [Highest NF]: |
| 15 | Bill(Bill\_Id, Total, OrderId) |
| Candidate Keys | [1] Bill\_Id |
| Foreign Keys | [1] OrderId references Order(OrderId), |
| Nullable Attributes |  |
| Non-nullable Attributes | Bill\_Id, Total, OrderId |
| Notes | [1] A surrogate key, Bill\_Id, is created as the primary key. |
| Normalization Analysis | [FD]:  [Highest NF]: |
| 16 | ItemsForBill(IFB\_Id, Bill\_Id, OT\_Id) |
| Candidate Keys | [1] IFB\_Id, [2] Bill\_Id, OT\_Id |
| Foreign Keys | [1] Bill\_Id references Bill(Bill\_Id), [2] OT\_Id references OrderItem(OT\_Id) |
| Nullable Attributes |  |
| Non-nullable Attributes | IFB\_Id, Bill\_Id, OT\_Id |
| Notes | [1] A surrogate key, IFB\_Id, is created as the primary key. |
| Normalization Analysis | [FD]:  [Highest NF]: |