DASC 5333 Database Systems for Data Science
CSCI 4333 Design of Database Systems
Fall 2024
Suggested Solution for Homework #3

This is a sample design. Other reasonable designs are acceptable.
The relation schema:

1	Account(Account, Password, Created)
Candidate Keys	[1] Account
Foreign Keys	
Nullable Attributes	
Non-nullable Attributes	Account, Password, Created
Notes	
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	
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.
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.
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.
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.
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.
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.
9	Center(CenterId, CenterName)
Candidate Keys	[1] CenterId, [2] CenterName
Foreign Keys	
Nullable Attributes	
Non-nullable Attributes	CenterId, CenterName
Notes	
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.
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.
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	

13	TestGroup(TGId, TGName, Description)
Candidate Keys	[1] TGId, [2] TGName
Foreign Keys	
Nullable Attributes	
Non-nullable Attributes	TGId, TGName, Description
Notes	
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.
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.
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.
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.
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.