

Database Systems Spring 2026 Suggested Solution for Homework #3

This is a sample design. Other reasonable designs are acceptable.

The relation schema:

1	Account(<u>Username</u> , Password)
Candidate Keys	[1] Username
Foreign Keys	
Nullable Attributes	
Non-nullable Attributes	Username, Password
Notes	
2	TWMember(<u>TWMemberId</u> , LName, FName, ScreenName, StartTime, EMail, ReferrerTWMemberId, Username)
Candidate Keys	[1] TWMemberId, [2] ScreenName
Foreign Keys	[1] ReferrerTWMemberId references TWMember(TWMemberId), [2] Username references Account(Username)
Nullable Attributes	TWRefererMemberId, EMail
Non-nullable Attributes	TWMemberId, LName, FName, ScreenName, StartTime
Notes	
3	Team(<u>TeamId</u> , TName, Description, Since)
Candidate Keys	[1] TeamId
Foreign Keys	
Nullable Attributes	Description
Non-nullable Attributes	TeamId, TName, Since
Notes	
4	TeamMember(<u>TMId</u> , TWMemberId, TeamId, JointTime)
Candidate Keys	[1] TMId, [2] TWMemberId, TeamId, JointTime
Foreign Keys	[1] TWMemberId references TWMember(TWMemberId), [2] TeamId references Team(TeamId)
Nullable Attributes	
Non-nullable Attributes	TMId, TWMemberId, TeamId, JointTime
Notes	[1] TMId is created as a surrogate primary key.
5	TeamAdmin(<u>AdminId</u> , TMId, TeamId)
Candidate Keys	[1] AdminId, [2] TWMemberId, TeamId
Foreign Keys	[1] TMId references TeamMember(TMId), [2] TeamId references Team(TeamId)
Nullable Attributes	
Non-nullable Attributes	AdminId, TMId, TeamId
Notes	[1] AdminId is created as a surrogate primary key.
6	RoleLevel(<u>RLNum</u> , Definition)
Candidate Keys	[1] RLNum
Foreign Keys	
Nullable Attributes	

Non-nullable Attributes	RLNum, Definition
Notes	
7	Role(RoleId, RLNum)
Candidate Keys	[1] RoleId
Foreign Keys	[1] RLNum references RoleLevel(RLNum)
Nullable Attributes	
Non-nullable Attributes	RoleId, RLNum
Notes	[1] RoleId is created as a surrogate primary key. [2] We used three relations to implement the three classes Role, UserDefinedRole and StandardRole. It is possible to use only one relation.
8	TeamSpecificRole(TSRId, TSRName, Description, CTime, RoleId, AdminId)
Candidate Keys	[1] TSRId, [2] RoleId
Foreign Keys	[1] RoleId references Role(RoleId), [2] AdminId references TeamAdmin(AdminId)
Nullable Attributes	Description
Non-nullable Attributes	TSRId, TSRName, CTime, RoleId, AdminId
Notes	[1] TSRId is created as a surrogate primary key.
9	StandardRole(SRId, SRName, RoleId)
Candidate Keys	[1] SRId, [2] SRName, [3] RoleId
Foreign Keys	[1] RoleId references Role(RoleId)
Nullable Attributes	
Non-nullable Attributes	SRId, SRName, RoleId
Notes	[1] SRId is created as a surrogate primary key.
10	TeamMemberRole(TMRId, TMId, RoleId)
Candidate Keys	[1] TMRId, [2] TMId, RoleId
Foreign Keys	[1] TMId references TeamMember(TMId), [2] RoleId references Role(RoleId)
Nullable Attributes	
Non-nullable Attributes	TMRId, TMId, RoleId
Notes	[1] TMRId is created as a surrogate primary key.
11	ProjectStatus(PSId, PSName, Description)
Candidate Keys	[1] PSId
Foreign Keys	
Nullable Attributes	Description
Non-nullable Attributes	PSId, PSName
Notes	[1] PSId is created as a surrogate primary key.
12	Project(ProjectId, PName, Description, ExpCompTime, ActCompTime, CurrentStatusId, ParentProjectId, TeamId, CreatorAdminId, LeaderTMId)
Candidate Keys	[1] ProjectId
Foreign Keys	[1] CurrentStatusId references Status(StatusId), [2] CreatorAdminId references TeamAdmin(AdminId), [3] LeaderTMId references TeamMember(TMId), [4] ParentProjectId references Project(ProjectId), [5] TeamId references Team(TeamId)
Nullable Attributes	ParentProjectId, LeaderTMId
Non-nullable Attributes	ProjectId, PName, Description, ExpCompTime, ActCompTime, TeamId, CreatorAdminId, CurrentStatusId
Notes	

13	Status(StatusId, ProjectId, PSId, PStime)
Candidate Keys	[1] StatusId, [2] PastStatusOfProjectId, PSId, PStime
Foreign Keys	[1] PastStatusOfProjectId references Project(ProjectId), [2] PSId references ProjectStatus(PSId)
Nullable Attributes	PastStatusOfProjectId
Non-nullable Attributes	Status, PSId, PStime
Notes	