## CSCI 4333.1 Design of Database Systems Spring 2017

## **Suggested Solution for HW #5**

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

## The relation schema:

Candidate Keys [1] SwimmerId  Foreign Keys [1] Main_CT_Id references CareTaker(CT_Id), [2] CurrentLevelId references Level(LeveIId).  Nullable Attributes  Notes [1] The relationship "Main Caretaker" is implemented as three attributes Main_CT_Id, Main_CT_Relationship, Main_CT_Since. It is also acceptable to use a separate relation to implement the relationship. [2] CurrentLeveIId is a derived column that can be obtained from the table LeveIHistory.  2	,	1 Swimmer(Swimmerld, FName, LName, Phone, Email, JoinTime, CurrentLevelld, Main_CT_ld,	
Foreign Keys [1] Main_CT_Id references CareTaker(CT_Id), [2] CurrentLevelId references Level(LevelId).  Notes [1] The relationship "Main Caretaker" is implemented as three attributes Main_CT_Id, Main_CT_Relationship, Main_CT_Since. It is also acceptable to use a separate relation to implement the relationship. [2] CurrentLevelId is a derived column that can be obtained from the table LevelHistory.  2	Main_CT_Relationship, Main_CT_Since)		
Level(LevelId).   Nullable Attributes   Caretaker/CT_Id, Main_CT_Relationship, Main_CT_Since. It is also acceptable to use a separate relation to implement the relationship. [2] CurrentLevelId is a derived column that can be obtained from the table LevelHistory.    Caretaker(CT_Id, FName, LName, Phone, Email)			
Nullable Attributes  Notes	Foreign Keys	1	
Notes		Level(LevelId).	
Main_CT_Relationship, Main_CT_Since. It is also acceptable to use a separate relation to implement the relationship. [2] CurrentLevelld is a derived column that can be obtained from the table LevelHistory.  2	Nullable Attributes		
use a separate relation to implement the relationship. [2] CurrentLevelId is a derived column that can be obtained from the table LevelHistory.  2	Notes	· · · · · · · · · · · · · · · · · · ·	
derived column that can be obtained from the table LevelHistory.  Caretaker(CT_Id, FName, LName, Phone, Email)  Candidate Keys [1] CT_Id  Foreign Keys Nullable Attributes Notes [1] OC_Id, SwimmerId, CT_Id, Relationship, Since)  Candidate Keys [1] OC_Id, [2] {SwimmerId, CT_Id}  Foreign Keys [1] SwimmerId references Swimmer(SwimmerId), [2] CT_Id references Caretaker(CT_Id)  Nullable Attributes Notes [1] A surrogate key, OC_Id, is created as the primary key. This is optional.  4 Level(LevelId, Level, Description)  Candidate Keys [1] LevelId, [2] Level  Foreign Keys Nullable Attributes Possibly Description, depending on assumptions made.  Notes  5 LevelHistory(LH_Id, SwimmerId, LevelId, StartDate, Comment)  Candidate Keys [1] LH_Id, [2] SwimmerId, LevelId  Foreign Keys [1] SwimmerId, LevelId  Foreign Keys [1] SwimmerId, LevelId  Foreign Keys [1] LH_Id, [2] SwimmerId, LevelId  Foreign Keys [1] LH_Id, [2] SwimmerId, LevelId  Foreign Keys [1] A surrogate key, LH_Id, is created as the primary key. This is optional.  6 Coach(CoachId, FName, LName, Phone, Email)  Candidate Keys (1) CoachId  Foreign Keys  Nullable Attributes			
2 Caretaker(CT_Id, FName, LName, Phone, Email) Candidate Keys [1] CT_Id Foreign Keys Nullable Attributes Notes 3 OtherCaretaker(OC_Id, SwimmerId, CT_Id, Relationship, Since) Candidate Keys [1] OC_Id, [2] {SwimmerId, CT_Id} Foreign Keys [1] SwimmerId references Swimmer(SwimmerId), [2] CT_Id references Caretaker(CT_Id) Nullable Attributes Notes [1] A surrogate key, OC_Id, is created as the primary key. This is optional. 4 Level(LevelId, Level, Description) Candidate Keys [1] LevelId, [2] Level Foreign Keys Nullable Attributes Possibly Description, depending on assumptions made. Notes 5 LevelHistory(LH_Id, SwimmerId, LevelId, StartDate, Comment) Candidate Keys [1] LH_Id, [2] SwimmerId, LevelId Foreign Keys [1] SwimmerId, LevelId Foreign Keys [1] SwimmerId references Swimmer(SwimmerId), [2] LevelId references Level(LevelId). Nullable Attributes Comment Notes (1) A surrogate key, LH_Id, is created as the primary key. This is optional. 6 Coach(CoachId, FName, LName, Phone, Email) Candidate Keys (1) CoachId Foreign Keys Nullable Attributes		, , , , , , , , , , , , , , , , , , , ,	
Candidate Keys [1] CT_Id  Foreign Keys  Nullable Attributes  Notes  3 OtherCaretaker(OC Id, Swimmerld, CT_Id, Relationship, Since)  Candidate Keys [1] OC_Id, [2] {Swimmerld, CT_Id}  Foreign Keys [1] Swimmerld, CT_Id}  Foreign Keys [1] Swimmerld references Swimmer(Swimmerld), [2] CT_Id references Caretaker(CT_Id)  Nullable Attributes  Notes [1] A surrogate key, OC_Id, is created as the primary key. This is optional.  4 Level(LevelId, Level, Description)  Candidate Keys [1] LevelId, [2] Level  Foreign Keys  Nullable Attributes Possibly Description, depending on assumptions made.  Notes  5 LevelHistory(LH_Id, Swimmerld, LevelId, StartDate, Comment)  Candidate Keys [1] LH_Id, [2] Swimmerld, LevelId  Foreign Keys [1] LH_Id, [2] Swimmerld, LevelId  Nullable Attributes Comment  Notes [1] A surrogate key, LH_Id, is created as the primary key. This is optional.  6 Coach(CoachId, FName, LName, Phone, Email)  Candidate Keys (1) CoachId  Foreign Keys  Nullable Attributes		,	
Foreign Keys Nullable Attributes Notes 3 OtherCaretaker(OC Id, Swimmerld, CT_Id, Relationship, Since) Candidate Keys [1] OC_Id, [2] {\$wimmerld, CT_Id} Foreign Keys [1] Swimmerld references Swimmer(Swimmerld), [2] CT_Id references Caretaker(CT_Id) Nullable Attributes Notes [1] A surrogate key, OC_Id, is created as the primary key. This is optional. 4 Level(LevelId, Level, Description) Candidate Keys [1] LevelId, [2] Level Foreign Keys Nullable Attributes Possibly Description, depending on assumptions made. Notes 5 LevelHistory(LH Id, Swimmerld, LevelId, StartDate, Comment) Candidate Keys [1] LH_Id, [2] Swimmerld, LevelId Foreign Keys [1] Swimmerld, LevelId Foreign Keys [1] Swimmerld, LevelId Foreign Keys [1] Swimmerld, LevelId Nullable Attributes Comment Notes [1] A surrogate key, LH_Id, is created as the primary key. This is optional. 6 Coach(CoachId, FName, LName, Phone, Email) Candidate Keys [1) CoachId Foreign Keys Nullable Attributes			
Nullable Attributes  Notes  3 OtherCaretaker(OC_ld, Swimmerld, CT_ld, Relationship, Since)  Candidate Keys [1] OC_ld, [2] {Swimmerld, CT_ld}  Foreign Keys [1] Swimmerld references Swimmer(Swimmerld), [2] CT_ld references Caretaker(CT_ld)  Nullable Attributes  Notes [1] A surrogate key, OC_ld, is created as the primary key. This is optional.  4 Level(Levelid, Level, Description)  Candidate Keys [1] Levelld, [2] Level  Foreign Keys  Nullable Attributes Possibly Description, depending on assumptions made.  Notes  5 LevelHistory(LH_ld, Swimmerld, Levelld, StartDate, Comment)  Candidate Keys [1] LH_ld, [2] Swimmerld, Levelld  Foreign Keys [1] Swimmerld references Swimmer(Swimmerld), [2] Levelld references Level(Levelld).  Nullable Attributes Comment  Notes (1) A surrogate key, LH_ld, is created as the primary key. This is optional.  6 Coach(Coachld, FName, LName, Phone, Email)  Candidate Keys (1) Coachld  Foreign Keys  Nullable Attributes	· ·	[1] CT_Id	
Notes  3 OtherCaretaker(OC Id, Swimmerld, CT_Id, Relationship, Since)  Candidate Keys [1] OC_Id, [2] {Swimmerld, CT_Id}  Foreign Keys [1] Swimmerld references Swimmer(Swimmerld), [2] CT_Id references Caretaker(CT_Id)  Nullable Attributes  Notes [1] A surrogate key, OC_Id, is created as the primary key. This is optional.  4 Level(LevelId, Level, Description)  Candidate Keys [1] Levelld, [2] Level  Foreign Keys  Nullable Attributes Possibly Description, depending on assumptions made.  Notes  5 LevelHistory(LH_Id, Swimmerld, LevelId, StartDate, Comment)  Candidate Keys [1] LH_Id, [2] Swimmerld, LevelId  Foreign Keys [1] Swimmerld references Swimmer(Swimmerld), [2] LevelId references Level(LevelId).  Nullable Attributes Comment  Notes (1) A surrogate key, LH_Id, is created as the primary key. This is optional.  6 Coach(CoachId, FName, LName, Phone, Email)  Candidate Keys (1) CoachId  Foreign Keys  Nullable Attributes			
3 OtherCaretaker(OC Id, Swimmerld, CT_Id, Relationship, Since)  Candidate Keys [1] OC_Id, [2] {Swimmerld, CT_Id}  Foreign Keys [1] Swimmerld references Swimmer(Swimmerld), [2] CT_Id references Caretaker(CT_Id)  Nullable Attributes  Notes [1] A surrogate key, OC_Id, is created as the primary key. This is optional.  4 Level(LevelId, Level, Description)  Candidate Keys [1] LevelId, [2] Level  Foreign Keys  Nullable Attributes Possibly Description, depending on assumptions made.  Notes  5 LevelHistory(LH_Id, Swimmerld, LevelId, StartDate, Comment)  Candidate Keys [1] LH_Id, [2] Swimmerld, LevelId  Foreign Keys [1] Swimmerld references Swimmer(Swimmerld), [2] LevelId references Level(LevelId).  Nullable Attributes Comment  Notes (1) A surrogate key, LH_Id, is created as the primary key. This is optional.  6 Coach(CoachId, FName, LName, Phone, Email)  Candidate Keys (1) CoachId  Foreign Keys  Nullable Attributes	Nullable Attributes		
Candidate Keys [1] OC_Id, [2] {SwimmerId, CT_Id}  Foreign Keys [1] SwimmerId references Swimmer(SwimmerId), [2] CT_Id references	Notes		
Foreign Keys  [1] Swimmerld references Swimmer(Swimmerld), [2] CT_Id references Caretaker(CT_Id)  Nullable Attributes  Notes  [1] A surrogate key, OC_Id, is created as the primary key. This is optional.  4 Level(LevelId, Level, Description)  Candidate Keys  [1] LevelId, [2] Level  Foreign Keys  Nullable Attributes  Possibly Description, depending on assumptions made.  Notes  5 LevelHistory(LH_Id, Swimmerld, LevelId, StartDate, Comment)  Candidate Keys  [1] LH_Id, [2] Swimmerld, LevelId  Foreign Keys  [1] Swimmerld references Swimmer(Swimmerld), [2] LevelId references Level(LevelId).  Nullable Attributes  (1) A surrogate key, LH_Id, is created as the primary key. This is optional.  6 Coach(CoachId, FName, LName, Phone, Email)  Candidate Keys  (1) CoachId  Foreign Keys  Nullable Attributes	3 OtherCaretaker( <u>OC_I</u>	d, SwimmerId, CT_Id, Relationship, Since)	
Nullable Attributes   Notes [1] A surrogate key, OC_Id, is created as the primary key. This is optional.   4 Level(Levelld, Level, Description)   Candidate Keys [1] Levelld, [2] Level   Foreign Keys Possibly Description, depending on assumptions made.   Notes 5 LevelHistory(LH Id, Swimmerld, Levelld, StartDate, Comment)   Candidate Keys [1] LH_Id, [2] Swimmerld, Levelld   Foreign Keys [1] Swimmerld references Swimmer(Swimmerld), [2] Levelld references Level(Levelld).   Nullable Attributes Comment   Notes (1) A surrogate key, LH_Id, is created as the primary key. This is optional.   6 Coach(CoachId, FName, LName, Phone, Email)   Candidate Keys (1) CoachId   Foreign Keys (1) CoachId   Nullable Attributes (1) CoachId	Candidate Keys	[1] OC_Id, [2] {SwimmerId, CT_Id}	
Nullable Attributes         Notes       [1] A surrogate key, OC_Id, is created as the primary key. This is optional.         4       Level(LevelId, Level, Description)         Candidate Keys       [1] LevelId, [2] Level         Foreign Keys       Possibly Description, depending on assumptions made.         Notes       5         5       LevelHistory(LH Id, SwimmerId, LevelId, StartDate, Comment)         Candidate Keys       [1] LH_Id, [2] SwimmerId, LevelId         Foreign Keys       [1] SwimmerId references Swimmer(SwimmerId), [2] LevelId references Level(LevelId).         Nullable Attributes       Comment         Notes       (1) A surrogate key, LH_Id, is created as the primary key. This is optional.         6       Coach(CoachId, FName, LName, Phone, Email)         Candidate Keys       (1) CoachId         Foreign Keys       Nullable Attributes	Foreign Keys	[1] SwimmerId references Swimmer(SwimmerId), [2] CT_Id references	
Notes [1] A surrogate key, OC_Id, is created as the primary key. This is optional.  4		Caretaker(CT_Id)	
4       Level(LevelId, Level, Description)         Candidate Keys       [1] LevelId, [2] Level         Foreign Keys       Foreign Keys         Nullable Attributes       Possibly Description, depending on assumptions made.         Notes       5         5       LevelHistory(LH Id, SwimmerId, LevelId, StartDate, Comment)         Candidate Keys       [1] LH_Id, [2] SwimmerId, LevelId         Foreign Keys       [1] SwimmerId references Swimmer(SwimmerId), [2] LevelId references Level(LevelId).         Nullable Attributes       Comment         Notes       (1) A surrogate key, LH_Id, is created as the primary key. This is optional.         6       Coach(CoachId, FName, LName, Phone, Email)         Candidate Keys       (1) CoachId         Foreign Keys       Nullable Attributes	Nullable Attributes		
Candidate Keys [1] Levelld, [2] Level  Foreign Keys  Nullable Attributes Possibly Description, depending on assumptions made.  Notes  5 LevelHistory(LH Id, Swimmerld, Levelld, StartDate, Comment)  Candidate Keys [1] LH_Id, [2] Swimmerld, Levelld  Foreign Keys [1] Swimmerld references Swimmer(Swimmerld), [2] Levelld references Level(Levelld).  Nullable Attributes Comment  Notes (1) A surrogate key, LH_Id, is created as the primary key. This is optional.  6 Coach(CoachId, FName, LName, Phone, Email)  Candidate Keys (1) CoachId  Foreign Keys  Nullable Attributes	Notes	[1] A surrogate key, OC_Id, is created as the primary key. This is optional.	
Foreign Keys         Nullable Attributes       Possibly Description, depending on assumptions made.         Notes       5       LevelHistory(LH Id, Swimmerld, LevelId, StartDate, Comment)         Candidate Keys       [1] LH_Id, [2] Swimmerld, LevelId         Foreign Keys       [1] Swimmerld references Swimmer(Swimmerld), [2] LevelId references Level(LevelId).         Nullable Attributes       Comment         Notes       (1) A surrogate key, LH_Id, is created as the primary key. This is optional.         6       Coach(CoachId, FName, LName, Phone, Email)         Candidate Keys       (1) CoachId         Foreign Keys       Nullable Attributes	4 Level( <u>Levelld</u> , Level, <u>Description</u> )		
Nullable Attributes       Possibly Description, depending on assumptions made.         Notes       LevelHistory(LH Id, SwimmerId, LevelId, StartDate, Comment)         Candidate Keys       [1] LH_Id, [2] SwimmerId, LevelId         Foreign Keys       [1] SwimmerId references Swimmer(SwimmerId), [2] LevelId references Level(LevelId).         Nullable Attributes       Comment         Notes       (1) A surrogate key, LH_Id, is created as the primary key. This is optional.         6       Coach(CoachId, FName, LName, Phone, Email)         Candidate Keys       (1) CoachId         Foreign Keys         Nullable Attributes	Candidate Keys	[1] Levelld, [2] Level	
Notes  5 LevelHistory(LH_Id, Swimmerld, LevelId, StartDate, Comment)  Candidate Keys  [1] LH_Id, [2] Swimmerld, LevelId  Foreign Keys  [1] Swimmerld references Swimmer(Swimmerld), [2] LevelId references  Level(LevelId).  Nullable Attributes  Comment  Notes  (1) A surrogate key, LH_Id, is created as the primary key. This is optional.  6 Coach(CoachId, FName, LName, Phone, Email)  Candidate Keys  (1) CoachId  Foreign Keys  Nullable Attributes	Foreign Keys		
5 LevelHistory(LH_Id, SwimmerId, LevelId, StartDate, Comment)  Candidate Keys [1] LH_Id, [2] SwimmerId, LevelId  Foreign Keys [1] SwimmerId references Swimmer(SwimmerId), [2] LevelId references Level(LevelId).  Nullable Attributes Comment  Notes (1) A surrogate key, LH_Id, is created as the primary key. This is optional.  6 Coach(CoachId, FName, LName, Phone, Email)  Candidate Keys (1) CoachId  Foreign Keys  Nullable Attributes	Nullable Attributes	Possibly Description, depending on assumptions made.	
Candidate Keys [1] LH_Id, [2] SwimmerId, LevelId  Foreign Keys [1] SwimmerId references Swimmer(SwimmerId), [2] LevelId references Level(LevelId).  Nullable Attributes Comment  Notes (1) A surrogate key, LH_Id, is created as the primary key. This is optional.  6 Coach(CoachId, FName, LName, Phone, Email)  Candidate Keys (1) CoachId  Foreign Keys  Nullable Attributes	Notes		
Foreign Keys  [1] SwimmerId references Swimmer(SwimmerId), [2] LevelId references Level(LevelId).  Nullable Attributes  Comment  (1) A surrogate key, LH_Id, is created as the primary key. This is optional.  Coach(CoachId, FName, LName, Phone, Email)  Candidate Keys  (1) CoachId  Foreign Keys  Nullable Attributes	5 LevelHistory( <u>LH_Id</u> , Sv	wimmerld, Levelld, StartDate, Comment)	
Level(LevelId).  Nullable Attributes  Comment  Notes  (1) A surrogate key, LH_Id, is created as the primary key. This is optional.  Coach(CoachId, FName, LName, Phone, Email)  Candidate Keys  (1) CoachId  Foreign Keys  Nullable Attributes	Candidate Keys	[1] LH_Id, [2] SwimmerId, LevelId	
Nullable Attributes  Comment  (1) A surrogate key, LH_Id, is created as the primary key. This is optional.  Coach(CoachId, FName, LName, Phone, Email)  Candidate Keys  (1) CoachId  Foreign Keys  Nullable Attributes	Foreign Keys	[1] Swimmerld references Swimmer(Swimmerld), [2] Levelld references	
Notes (1) A surrogate key, LH_Id, is created as the primary key. This is optional.  6   Coach(CoachId, FName, LName, Phone, Email)  Candidate Keys (1) CoachId  Foreign Keys  Nullable Attributes		Level(LevelId).	
6 Coach(CoachId, FName, LName, Phone, Email) Candidate Keys (1) CoachId Foreign Keys Nullable Attributes	Nullable Attributes	Comment	
Candidate Keys (1) CoachId  Foreign Keys Nullable Attributes	Notes	(1) A surrogate key, LH_Id, is created as the primary key. This is optional.	
Foreign Keys Nullable Attributes	6 Coach(CoachId, FName, LName, Phone, Email)		
Nullable Attributes	Candidate Keys	(1) Coachid	
Nullable Attributes	Foreign Keys		
Notes			
	Notes		

7 Meet(MeetID, Title, Date, StartTime, EndTIme, Venueld, CoachId)	
Candidate Keys	[1] MeetId
Foreign Keys	[1] Coachid references Coach(Coachid), [2] Venueld references
	Venue(Venueld)
Nullable Attributes	
Notes	
8 Venue(Venueld, Name, Address, City, State, ZipCode, Phone)	
Candidate Keys	[1] Venueld, [2] Name (likely), [3] {Address, City, State, ZipCode} (likely)
Foreign Keys	
Nullable Attributes	
Notes	
9 Event( <u>EventId</u> , Title, S	tartTime, EndTime, MeetId, LevelId)
Candidate Keys	[1] EventId
Foreign Keys	[1] MeetId references Meet(MeetId), [2] LevelId references Level(LevelId).
Nullable Attributes	
Notes	
	ationId, SwimmerId, EventId, Committed, CommitTime, Participated, Result,
Comment, Comment(	CoachId)
Candidate Keys	[1] ParticipationId, [2] SwimmerId, EventId.
Foreign Keys	[1] SwimmerId references Swimmer(SwimmerId), [2] EventId references
	Event(EventId), [3] CommentCoachId references Coach(CoachId)
Nullable Attributes	Committed, CommitTime, Participated, Result, Comment, CommentCoachId
Notes	(1) A surrogate key, ParticipationId, is created as the primary key. It is
	optional.
11 V_TaskList( <u>VTL_Id</u> , MeetId, Required, Description, Penalty, PenaltyAmt)	
Candidate Keys	[1] VTL_Id, [2] MeetId
Foreign Keys	[1] MeetId references Meet(MeetId)
Nullable Attributes	Penalty, PenaltyAmt
Notes	[1] A surrogate key, VTL_Id, is created as the primary key.
12 V_Task( <u>VT_Id</u> , VTL_Id	, Name, Comment, Num_V)
Candidate Keys	[1] VT_Id, [2] {VTL_Id, Name} (likely)
Foreign Keys	[1] VTL_Id references V_TaskList(VTL_Id)
Nullable Attributes	Comment (possibly)
Notes	[1] A surrogate key, VT_Id, is created as the primary key. [2] Num_V is not
	nullable and has a default value of 1.
	mentId, CT_Id, VT_Id, CommitTime, Rescinded, RescindTime, CarriedOut,
Comment, Comment	
Candidate Keys	[1] CommitmentId, [2] {CT_ID, VT_Id}
Foreign Keys	[1] CT_Id references Caretaker(CT_Id), [2] VT_Id references V_Task(VT_Id),
	[3] CommentCoachId references Coach(CoachId)
Nullable Attributes	Rescinded, RescindTime, CarriedOut, Comment, CommentCoachId
Notes	[1] A surrogate key, CommitmentId, is created as the primary key.