**Ch3-Extra**

**Extra Credit:** Chapter 3 Extra Credit (5 Points) Assignment - Due \_\_\_ \_\_ \_\_\_ Before Class

Apply the normalization process to the following relations. Show the following steps for each relation:

1. Show the candidate keys from the original relation.
2. Show the functional dependencies from the original relation.
3. Is any determinant not a candidate key? If so, show the following:
   1. The new normalized relations.
   2. The primary key in each new relation.
   3. The foreign keys in the new relations.
   4. The referential integrity constraints for the foreign keys.

**Relation 1:** Child in a traditional family with a mother and father.

* CHILD (LastName, MomName, MomSSN, DadName, DadSSN, ChildName, ChildSSN)
* Assumptions:
  + Families usually have more than one child.
  + Everyone in a family has the same last name.
  + Each person has a unique Social Security Number (SSN).

Step 1: Candidate Keys: ChildSSN

Step 2: Functional Dependencies:

MomSSN 🡪 MomName

DadSSN 🡪 DadName

Step 3: MomSSN and DadSSN are not candidate keys.

Step 3 a,b:

MOM ( MomSSN, MomName )

DAD ( DadSSN, DadName )

Step 3 c:

CHILD (LastName, ChildName, ChildSSN, *MomSSN*, *DadSSN* )

Step 3 d:

MomSSN in CHILD must exist in MomSSN in MOM.

DadSSN in CHILD must exist in DadSSN in DAD.

**Relation 2:** Relationships between parents and children in modern families.

* RELATIONSHIP (ParentSSN, ParentLastName, ParentFirstName, Relationship, ChildSSN,  
   ChildLastName, ChildFirstName)
* Assumptions:
  + Each parent may have different relationships with their different children.
  + The relationships can be biological, surrogate, adoptive, step, foster, or guardian.
  + Each child can have one or more parents, possibly three or more.
  + Each person has a unique Social Security Number (SSN).

Step 1: Candidate Keys: Relationship

Step 2: Functional Dependencies:

ParentSSN 🡪 ParentLastName, ParentFirstName

ChildSSN 🡪 ChildLastName, ChildFirstName

Step 3: ParentSSN and ChildSSN are not candidate keys.

Step 3 a,b:

PARENT ( ParentSSN, ParentLastName, ParentFirstName )

CHILD ( ChildSSN, ChildLastName, ChildFirstName )

Step 3 c:

RELATIONSHIP ( Relationship, *ParentSSN*, *ChildSSN* )

Step 3 d:

ParentSSN in RELATIONSHIP must exist in ParentSSN in PARENT.

ChildSSN in RELATIONSHIP must exist in ChildSSN in CHILD.