A music database consists of the following preliminary specification:

Music Database Relations
Musicians {Mno, MName, MDoB, MCountry} PK [Mno]
Compositions {Cno, CTitle, CMno, CDate} PK [Cno]; FK [CMno references **Musicians**]
Ensembles {Eno, EName, ECountry, EMnoMgr} PK [Eno]; FK [EMnoMgr references **Musicians**]
Performances {Pno, PDate, PCno, PCity, PCountry, PEno} CKs [PDate, PEno], [Pno] ; FK [PCno references **Compositions**]; FK [PEno references **Ensembles**]
Ensemble_Members {EmEno, EmMno, EmInstrument} PK [EmEno, EmMno]; FK [EmEno references **Ensembles**]; FK EmMno references **Musicians**]

1.
Prepare a database specification (either a RAL or an ESG showing database-related details only) for the database. This database specification may be refined by introducing a sixth relational table, and adjusting three other tables to each have a foreign key that references this additional table.

1a. Identify the additional table that is required, and clearly describe the adjustments that need to be made to three tables in order to have a normalized database. [08]

1b. Propose an ESG or RAL that provides specifications for the six relational tables of the music database. [36]

1c. Provide some sample data for the music database. You data should demonstrate that you understand the important role of foreign keys. [10]

2.
Write relational calculus statements to realize the following:

2a. List the registered musicians from USA or JAM (where "USA" and "JAM" are abbreviated codes for United States and Jamaica respectively). [03]

2b. Give the Eno & EName of every ensemble that includes a SAXAPHONE or CLARINET player. [03]

2c. Give the the Eno & EName of every ensemble that includes a SAXAPHONE but not a CLARINET player. [04]

2d. List all compositions (Cno and CTitle) by MOZART [04]

2e. List all performances (Pno, Cno, Mno, & PCountry) of compositions in the country of origin. [06]

2f. Give the Eno & EName of every ensemble that includes a SAXAPHONE or CLARINET player, but not both. [06]

2g. Find Cno & CTitle for compositions all of which have been performed in USA. [03]

2h. List countries in which MOZART's compositions have been performed. [04]

2i. Give ENAME of ensembles whose manager is JAMAICAN. [03]

3.
Write relational algebra statements corresponding to relational calculus statements of question #2

3a. List the registered musicians from USA or JAM (where "USA" and "JAM" are abbreviated codes for United States and Jamaica respectively). [03]

3b. Give the Eno & EName of every ensemble that includes a SAXAPHONE or CLARINET player. [03]

3c. Give the the Eno & EName of every ensemble that includes a SAXAPHONE but not a CLARINET player. [04]

3d. List all compositions (Cno and CTitle) by MOZART [04]

3e. List all performances (Pno, Cno, Mno, & PCountry) of compositions in the country of origin. [06]

3f. Give the Eno & EName of every ensemble that includes a SAXAPHONE or CLARINET player, but not both. [06]

3g. Find Cno & CTitle for compositions all of which have been performed in USA. [03]

3h. List countries in which MOZART's compositions have been performed. [04]

3i. Give ENAME of ensembles whose manager is JAMAICAN. [03]

Total Possible Points: 126