Complex Systems Theory and Practice
Lab 3

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Part I
Normalization

1. Import database from csv. Identify all the functional relations in the database.

2. Assuming the functional relations from the previous task find all the candidate keys of the database.

3. Determine the highest normal form that is not violated. Normalize the database up to 3NF.

4. Create a pdf report from all the above steps and send it to the lecturer at least 24h before the deadline.

Part II
MongoDB

1. Install MongoDB or connect to a web Mongo interface. Create `MongoMusic` database with 3 collections: `bands`, `albums`, `songs`.

2. Export data from `Music` database (list 2) to appropriate file format (e.g., JSON) and import the data into `MongoMusic` database.

3. Add at least 7 new bands. Each band should have field related to its name and place of origin (it should be embedded document including cities, state or federal district and country). At least 5 of the new bands should have their members listed (as an array or array of embedded documents). Please add such data that at least one person belongs to more than one band.

4. Add at least 10 new albums. Each album should have a title, a genre or genres and performer that may be a band or an array of bands.

5. Add at least 30 new songs. Try to use loops to make the process easier. Each song has its title and one or more performers, it may have an album or may not be on any album, and the length in format hh:mm:ss. You don't need to fix the length of the songs imported from list 2, however remember that both formats are present in the database.

6. Show all collections from `MongoMusic`.

7. For each band find the number of albums, remember to count those of multiple performers as well, if the band is one of the performers.

8. Use the information from the previous task to add the information on number of albums to all the bands.

9. Delete from the database all the bands that have a person called *John* as a member.

10. Select all the rock songs with their performers.

11. Find all genres that have at least 7 albums belonging to them.

12. Find the band that recorded the most albums.

13. Find the longest and the shortest song. Please remember about two possible formats.

14. Find the average length of each jazz album. Please remember about two possible formats of length of a song.

15. Change all the country information that may be not up to date (e.g., change Macedonia to Northern Macedonia, Czech Republic to Czechia, check if there is no Yugoslavia, USSR etc.)

16. For each person in the database print out a pair (person, numer of albums). Note that one person may be a member of more than one band and may have a solo career as well.