CS 787 – Decision Guidance Systems
HA1 – JSON & Python comprehensions

Assume a JSON database of the form as given in the collection "db1.json" (in the distributed folder **cs787_ha1_python_comprehensions_fall2022_template** under testDBs).

The meaning of the stored info is self-explanatory. For the purpose of queries below, assume that the possible grades are A, B, C and F; and that to satisfy a prerequisite for a class/course means to have taken the prerequisite courses (in transcript) with the grade of B or better.

You need to implement Boolean and Data queries given below.

Instructions:

- Download the folder **cs787_ha1_python_comprehensions_fall2022_template**
- In the sub-folder **solution_python_comprehensions** duplicate the file **queries_template.py** into **queries.py**
- Implement the queries in questions 1 and 2 below, by replacing placeholders in the template **queries.py** with correct Boolean expressions and Python comprehensions
- In command line, make **solution_python_comprehensions** folder your current folder
- Run **python produce_answers.py** which will generate **answers.json**
- Run **python report.py** which will generate **report.json**
- In **report.json** you can see how many correct queries you implemented out of the total number; which queries are correct; and whether each query generates correct answer for every test database db1, db2, … under the folder **testDB**
- To debug, you can examine the generated file **answers.json** and compare it with the file **correct_answers.json** under the folder **testDBs**
- Recommended IDE: **Atom Studio.** If you decide to use another IDE, make sure you have plug-ins for JSON handling ("prettify" it; collaps and extend it etc), and support for Python. You also need to have a working Python environment, version 3.8 or later.
- To submit: upload implemented **queries.py** to Blackboard. Nothing else!

Queries you need to implement:

1. Write Python queries returning True or False for each of the following logical sentences.

    a. The student with ssn = 82 has taken the course “CS 530” (must be in Transcipts)
    b. A student named “John Smith” has taken the course “CS 530” (must be in Transcipts).
    c. All students named “John Smith” has taken the course “CS 530” (must be in Transcipts)
    d. The student with ssn = 82 has satisfied all prerequisites for each class she is enrolled in.
    e. Every student has satisfied all prerequisites each class she is enrolled in.
    f. Every student who majors in “CS” has satisfied all prerequisites for each class she is enrolled in.
    g. A student named “John Smith” is enrolled in a class for which he did satisfied all prerequisites.
    h. Some courses do not have prerequisites
    i. All classes offered this semester have prerequisites.
    j. Some students received only grades “A” or “B” in every course they have taken (must appear in Transcripts)
    k. All students currently enrolled in classes taught by professor Brodsky (i.e., the name is "Brodsky" in faculty), major in “CS”
    l. Some students who are currently enrolled in classes taught by professor Brodsky major in “CS”

2. Write Python (comprehension) queries to express/compute each of the following sequences. Eliminate duplicates, and sort the answers (by ssn for students, by (dcode, cno) for courses, by class for classes).

    a. All students { ssn: ..., name: ..., major: ..., status: ...} who have taken the course “cs530” (must be in transcripts)
    b. All students { ssn: ..., name: ..., major: ..., status: ...} named “John” (i.e., name = "John" in student) who have taken the course “CS 530” (must be in transcripts)
    c. All students { ssn: ..., name: ..., major: ..., status: ...} who satisfied all prerequisites each class they are enrolled in.

d. All students { ssn: ..., name: ..., major: ..., status: ...} who are enrolled in a class for which they have not satisfied all its prerequisites.
e. All students { ssn: ..., name: ..., major: ..., status: ...} named “John” who are enrolled in a class for which they have not satisfied all its prerequisites.
f. All courses {dcode: …, cno: ….} that do not have prerequisites
g. All courses {dcode: …, cno: ….} that do have some prerequisites
h. All classes {class: ..., dcode: ..., cno: ..., instr: ...} offered this semester that have prerequisites.
i. All students { ssn: ..., name: ..., major: ..., status: ...} who received only grades “A” or “B” in every course they have taken (must appear in Transcripts)
j. All CS students { ssn: ..., name: ..., major: ..., status: ...} who are currently enrolled in a class taught by professor Brodsky (name = “Brodsky” in faculty).