Midterm Exam Scheduling - Implementation Report

https://github.com/belkiz-ozbek/303-term-project/tree/main

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The purpose of this program is to implement a scheduling algorithm for midterm exams, considering various constraints such as student and professor availability, classroom capaciDes, and the ability to block specific hours for common courses. The program reads input data from CSV files, including the class list, blocked hours and classroom capaciDes, and outputs a schedule that adheres to the specified constraints.

1. Reading CSV Files

The program reads three CSV files: one containing class lists, another containing blocked hours, and a third containing classroom capaciKes. The user is prompted to input the file names with the .csv extension for each of these datasets via the command line. It uses separate funcKons (readingToClassesStruct, readingToBlockedHoursStruct, and readingToClassroomsStruct) to parse the data into appropriate data structures (Classes, BlockedHours, and Classrooms arrays). **2. Scheduling Algorithm**

The scheduling algorithm is implemented using backtracking. The program aOempts to assign exam Dmes for each class while adhering to the specified constraints. It checks student and professor availability, ensures that a classroom's capacity is not exceeded, and considers any blocked hours for common courses.

The `backtrackToFindSchedule` funcDon recursively explores possible schedules, and the `checkSchedule` funcDon verifies whether a given schedule is valid based on the defined constraints.

3. Challenges Faced

One notable challenge was ensuring the correctness of the scheduling algorithm and handling various constraints simultaneously. The implementaDon required careful consideraDon of class capaciDes, student and professor availability, and blocked hours.

While tesDng the program, we encountered different outputs in different environments, which posed challenges during the implementaDon.

4. Conclusion

The program uDlizes backtracking to explore possible schedules while considering student, professor, and classroom constraints. The final output provides a clear representaDon of the exam schedule, helping users visualize the assigned Dmes for each class.

5. Output Screenshot

```
All exams are scheduled

Exam Schedule:
Day        Starting Time        Room       Prof Name       Course ID
-------------------------------------------------------------------------
Saturday   1000                 B206       Dr. Brown       BIOLOGY202
Thursday   900                  B206       Dr. Flores      ANTHROPOLOGY201
Friday     1000                 A105       Dr. Flores      ANTHROPOLOGY201
Tuesday    1000                 B206       Dr. Flores      ANTHROPOLOGY201
WednesdayThu:  930                  B206       Dr. Wilson      ANTHROPOLOGY20
WednesdayThu  1530                 %
Thursday   1130                 B206       Dr. Lewis       CHEMISTRY301
Friday     1130                 B206       Dr. Johnson     CHEMISTRY301
Friday     1630                 B206       Dr. Hernandez   ECON101
Thursday   1530                 B206       Dr. Garcia      ECON101
Thursday   1430                 B206       Dr. Moore       ECON101
Thursday   1430                 B206       Dr. Anderson    ECON301
Thursday   1530                 B206       Dr. Scott       ECON301
Thursday   1700                 B210       Dr. Allen       ENGL301
Saturday   1030                 B206       Dr. Allen       ENGL301
Monday     1130                 B206       Prof. Martinez  HIST101
Friday     1430                 B206       Prof. Baker     HIST201
Saturday   1000                 B206       Prof. Davis     HIST201
Friday     1030                 B206       Prof. Clark     HIST201
WednesdayThu  1730                  B206       Prof. Miller    MATH301
Thursday   1330                 %
Thursday   1430                 B206       Dr. Clark       MUSIC301
Monday     900                  B206       Dr. Davis       PHY301
Friday     1430                 B210       Prof. King      POLSCI201
Friday     1030                 B206       Prof. King      PSYCH101
Monday     1430                 B210       Prof. Moore     PSYCH201
WednesdayThu:  930                  B206       Prof. Moore     PSYCH201
WednesdayThu*  1330                 %
WednesdayThu  1630                 B212       Prof. Turner    PSYCH201
Friday     1530                 %
Tuesday    1430                 B206       Dr. Wilson      ANTHROPOLOGY101
Saturday   1700                 B206       Dr. Brown       ANTHROPOLOGY301
WednesdayThu  1600                 B212       Prof. Clark     ART103
Friday     1030                 %
Tuesday    1600                 B206       Dr. Wilson      BIOLOGY201
Tuesday    1100                 B206       Dr. Lewis       BIOLOGY201
WednesdayThu  1100                 B206       Prof. White     CHEM101
WednesdayThu  1630                 %
Monday     1700                 B206       Dr. Bailey      CHEM101
```