

AUTOMATIC TIMETABLE GENERATOR

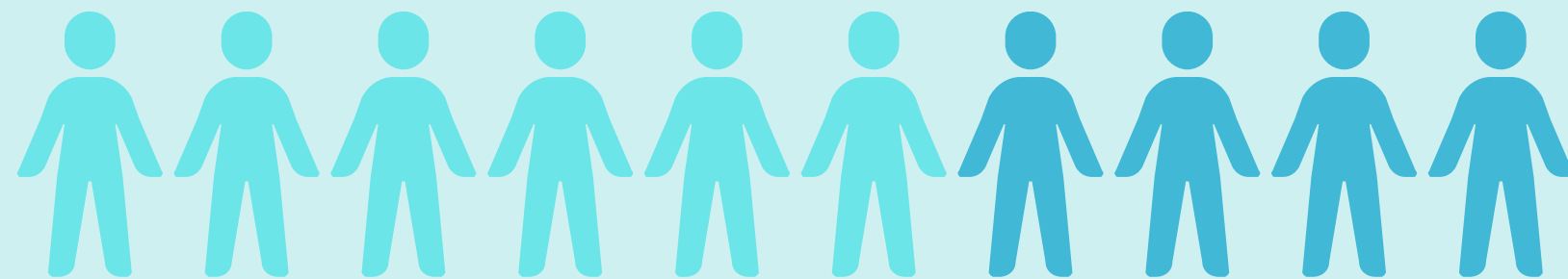
DSA Squad - p1

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PROBLEM

Given slots (list of instructors, list of courses, and the course credit details), generate a weekly lecture and lab timetable with no clashes and continuous sessions of the same instructor. It might be possible to assign two instructors to the same course as well as some instructors should only be given lectures during the initial hours. Also, it should return a timetable for an instructor and a classroom/lab.



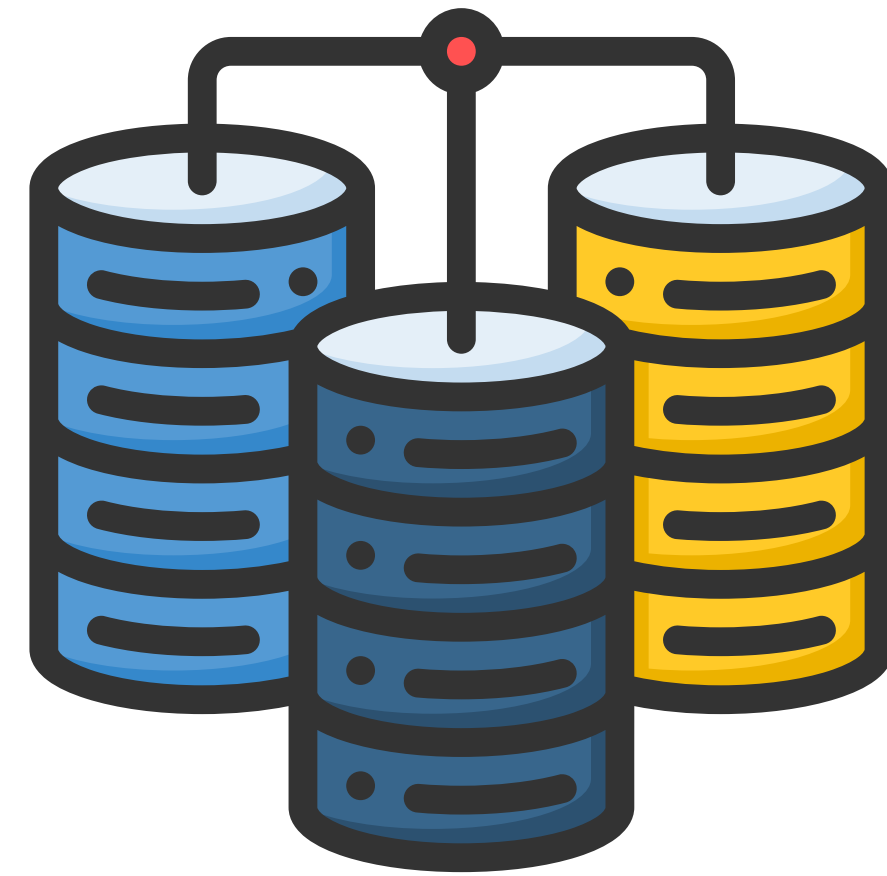
APPROACH-1

Make slots
(Including elective
courses)



DATA STRUCTURE USED

- Vector(Array)
- Maps



LOGICAL REPRESENTATION OF BUILD AND ASSIGN SLOTS

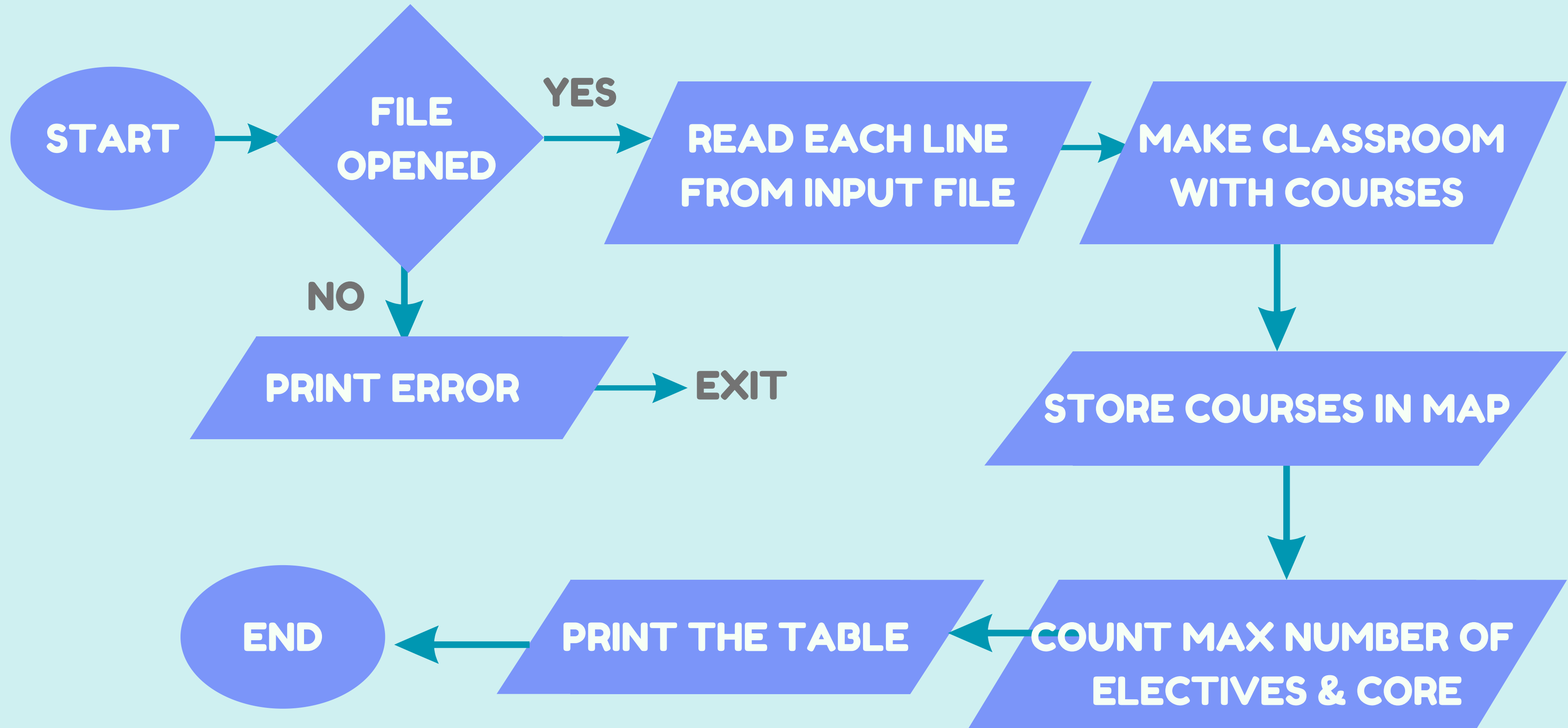


	CORE COURSES				ELECTIVES			
	S1	S2	S3	S4	S5	S6	S7	S8
CLASSROOM 1	C1	C2	C3	C4				
CLASSROOM 2	C5	C6	C7	C8	C9	E1		
CLASSROOM 3	C10	C11				E2	E3	E4
CLASSROOM 4	C12	C13	C14			E5	E6	
CLASSROOM 5	C15					E7	E8	E9

assign timeslots in timetable

TIME	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY
8-9	S1	S6	S3	S8	S5
9-10	S2	S7	S4	S1	S6
10-11	S3	S8	S5	S2	S7
11-12	S4	S1	S6	S3	S8
12-13	S5	S2	S7	S4	S1

FLOW CHART FOR MAKING SLOTS



TIME COMPLEXITY

Parsing CSV File:

- The time complexity for reading each file is : $O(n)$

Grouping of courses:

- Here, we assume m different classrooms. And insertion of each course takes $O(\log m)$ time.
- Thus, for all courses : $O(n * \log m)$.

Counting of Core and Elective Courses:

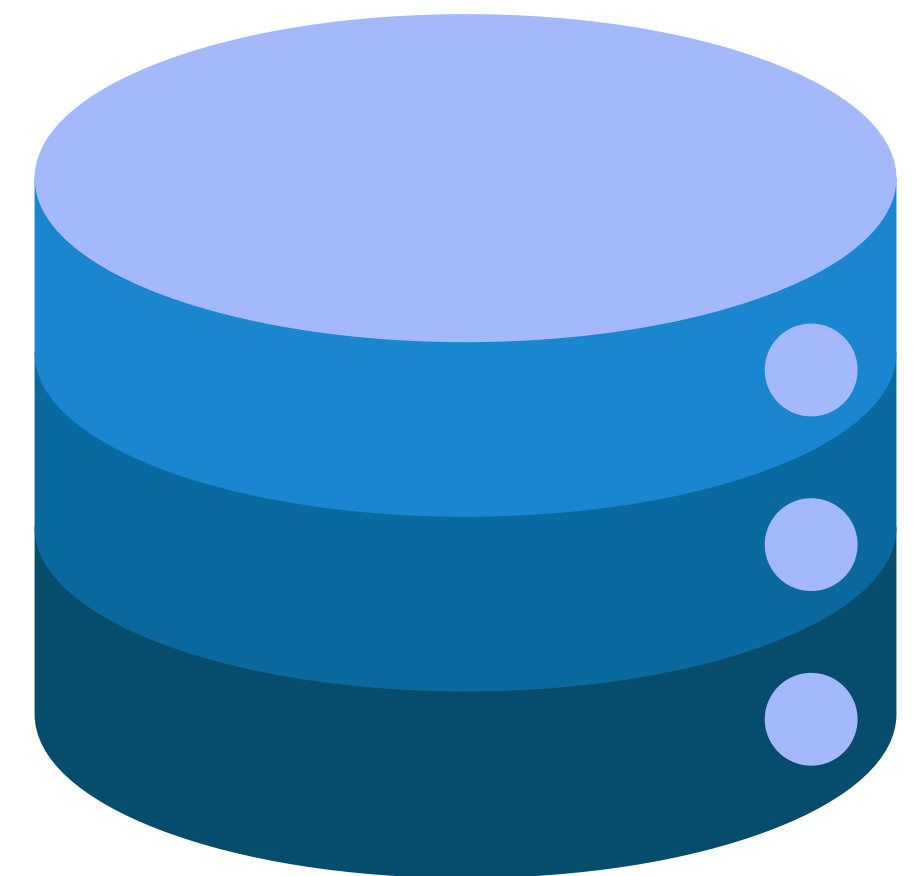
- For every classroom, in order to count all the courses we need to iterate through the course vector once.
- Let us assume c to be the average number of courses per classroom.
- Accordingly, the total time complexity will be : $O(m * c)$.



SPACE COMPLEXITY

Printing of the table :

- Assuming t to be the total number of slots (core + elective), printing each slot takes constant time.
- So, total Time Complexity: $O(m * t)$
- Hence, the Overall Time Complexity is : $O(n * \log m)$



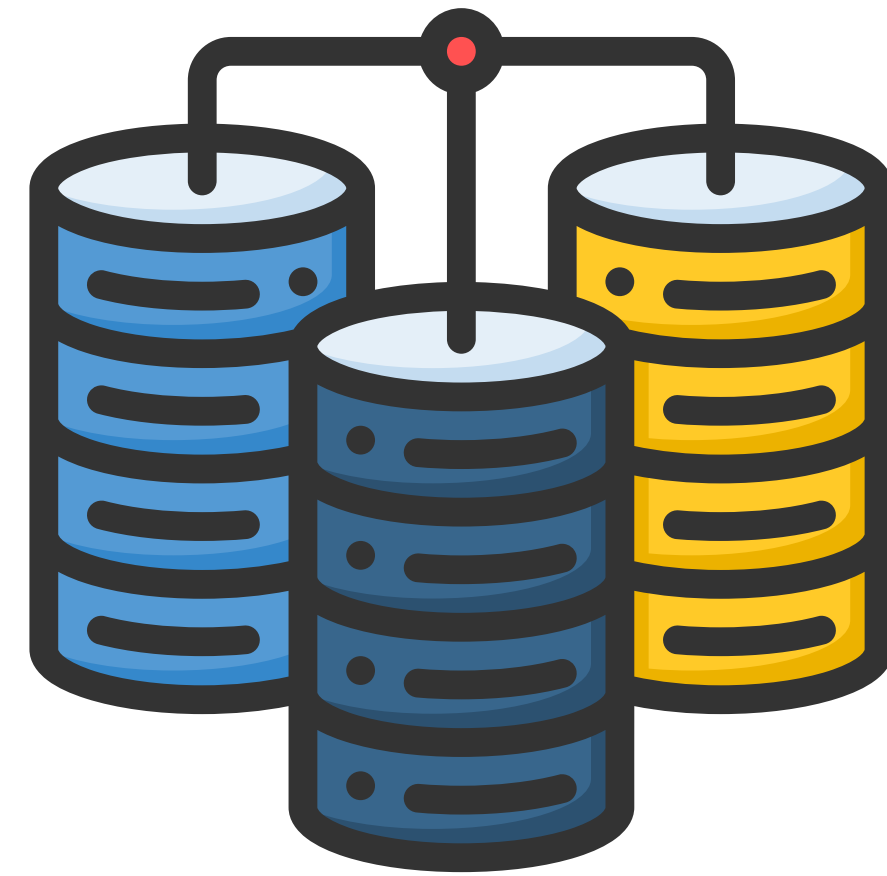
APPROACH-2

Direct Timetable generator
(with rooms and
excluding elective courses)

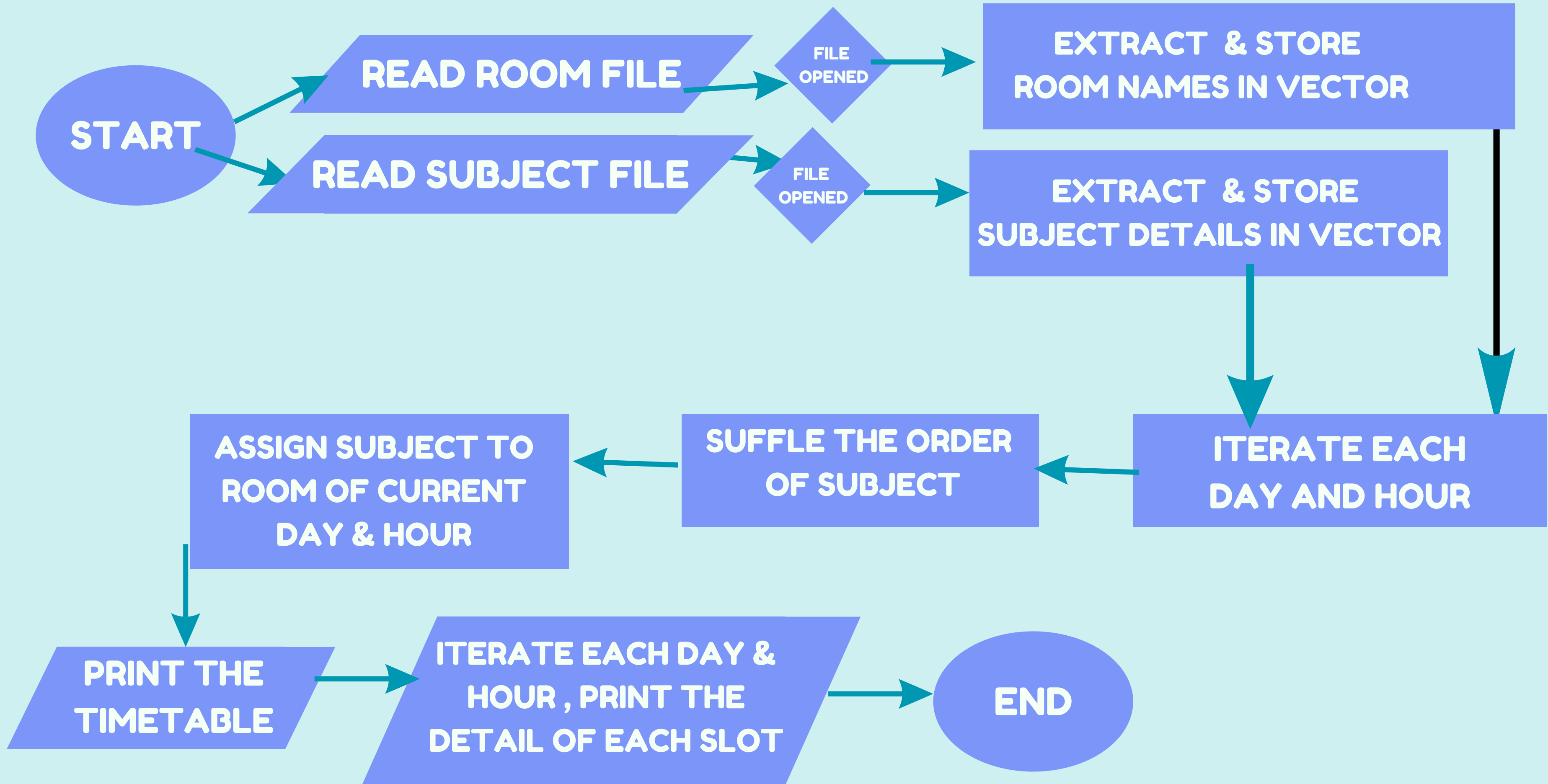


DATA STRUCTURE USED

- Class
- Unordered Map
- Vector(including 3d vector)
- String



FLOW CHART FOR MAKING TIMETABLE WITH ROOMS



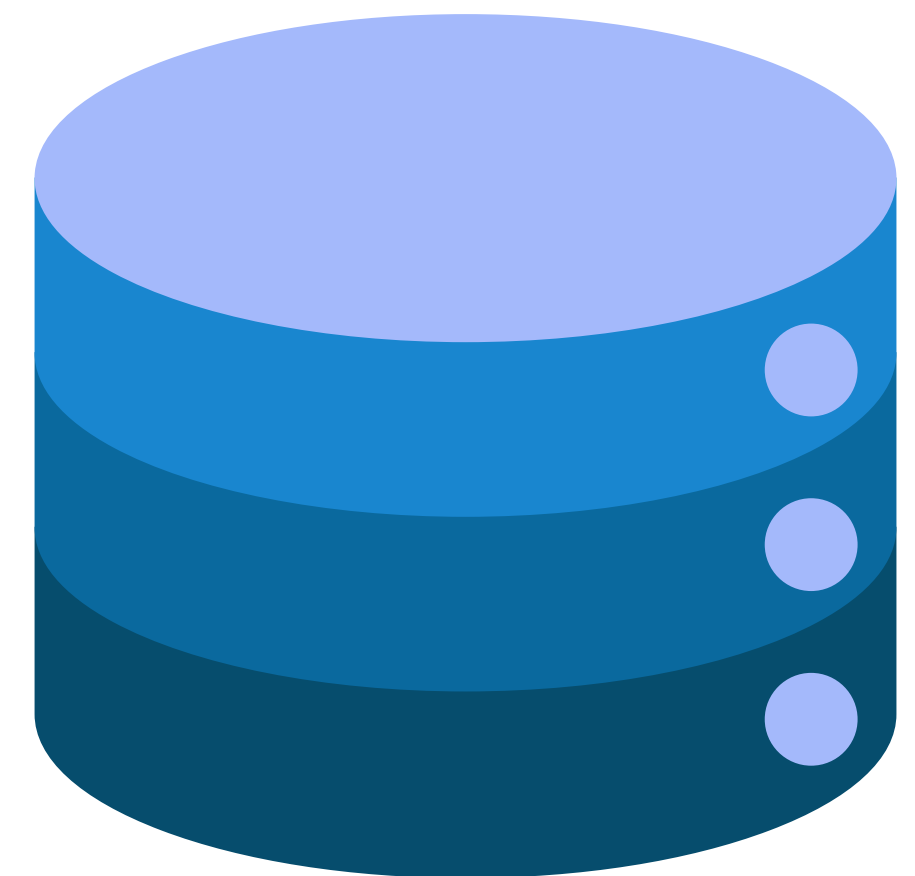
TIME COMPLEXITY

- For the generate timetable function since we are running 4 nested for loops there:
 $O(d * h * s * l)$
- The number of days per week $d=5$ and number of hours per day $h=5$
- So it would become $O(25 * s * l) = O(s * l)$ where s is the number of subjects and l is the number of rooms



SPACE COMPLEXITY

- For the 3-d vector timeslot where we are storing the timeslots
- Number of days in a week and hours in a day so it would be : $O(d \cdot h \cdot t)$
- Where d is the number of days , h is the number of hours (here $h=d=5$)
- So we have $O(25 \cdot t)$ where t is the number of timeslots a vector representing scheduled classes for that specific day and hour



GITHUB LINK: **AUTOMATIC TIMETABLE**
GENERATOR

VIDEO LINK: **AUTOMATIC TIMETABLE**
GENERATOR

THANK YOU!