SOFTWARE SYSTEM FOR ENGINEERING JOINT SEAT ALLOCATION

UCS2201 – Fundamentals and Practice of Software Development

A PROJECT REPORT

Submitted By

Rajesh G -3122 22 5001 101
Magesh K-3122 22 5001 069
Prithivirajan D-3122 22 5001 099

Department of Computer Science and Engineering

Sri Sivasubramaniya Nadar College of Engineering
(An Autonomous Institution, Affiliated to Anna University)
Kalavakkam – 603110

July 2023

Sri Sivasubramaniya Nadar College of Engineering

(An Autonomous Institution, Affiliated to Anna University)

BONAFIDE CERTIFICATE

Certified that this project report titled "**SOFTWARE SYSTEM FOR ENGINEERING JOINT SEAT ALLOCATION**" is the bonafide work of "Rajesh G (3122 22 5001 101), Magesh K(3122 22 5001 069) ,Prithivirajan D(3122 22 5001 099)" who carried out the project work in the UCS2201 – Fundamentals and Practice of Software Development during the academic year 2022-23.

Internal Examiner External Examiner

Date:19/7/2023

TABLE OF CONTENTS

Content

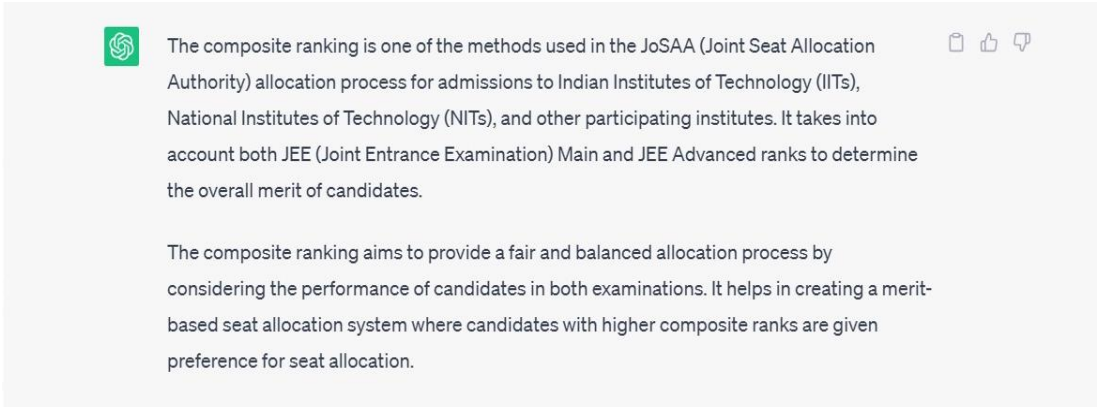
Abstract

❖ PROBLEM STATEMENT

- Development of a software system for the engineering counselling and admission process for two sets of institutes (for example, say IITs and NITs) each having a set of different branches, each branch with a certain number of seats available.
- Admission to each set of institutes is based on its own qualifying exam (for example, JEE-Advanced and JEE-Main). Each candidate will have a specific rank in one or both merit lists.

❖ EXTENDED EXPLORATION OF PROBLEM STATEMENT

- On analysing the problem in detail , we came to know that this engineering seat allocation is based on the principle of JOSAA.
- JOSAA , Joint Seat Allocation Authority is the soul of the Indian education system.
- JOSAA holds the responsibility of allocating the seats of IITs , NITs and IIITs .
- Joint seat allocation is the process of allocating the seats simultaneously in IITs , NITs and IIITs.
- JOSAA follows the method of composite ranking which allows JOSAA to generate a single rank list and allocate the seats simultaneously.
- **Composite Ranking**:
  Composite rank=(Weightage 1 * Normalised JEE Mains Rank)+(Weightage 2 * Normalised JEE Advanced Rank). Normalised JEE Mains or Advanced Rank=(Actual Rank-Min_Rank)/(Max_Rank-Min_Rank)
- Weightage is decided every year by JOSAA.



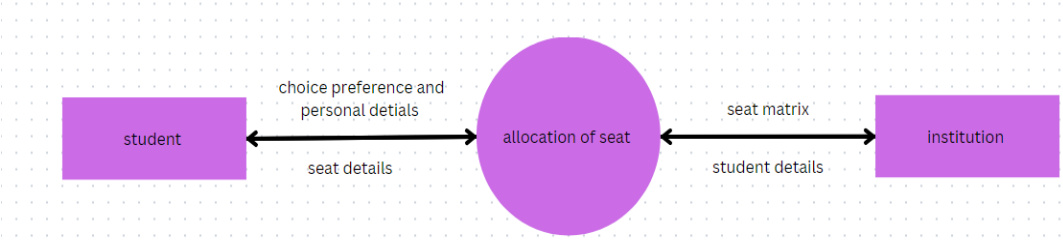
The composite ranking is one of the methods used in the JoSAA (Joint Seat Allocation Authority) allocation process for admissions to Indian Institutes of Technology (IITs), National Institutes of Technology (NITs), and other participating institutes. It takes into account both JEE (Joint Entrance Examination) Main and JEE Advanced ranks to determine the overall merit of candidates.

The composite ranking aims to provide a fair and balanced allocation process by considering the performance of candidates in both examinations. It helps in creating a merit-based seat allocation system where candidates with higher composite ranks are given preference for seat allocation.

❖ DATA FLOW DIAGRAMS

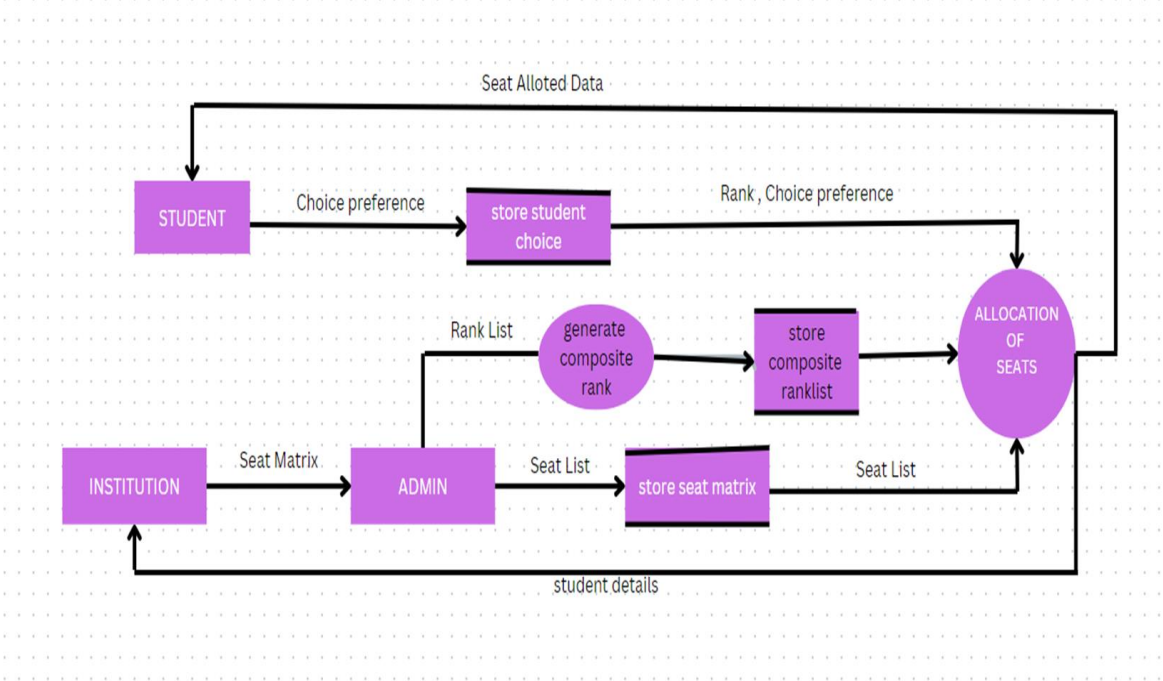
0th Level:

This is the Zero level Data Flow Diagram of Engineering Counselling System, where we have elaborated the high-level processes of Seat Allotment Order. It's basic overview of the whole Engineering.

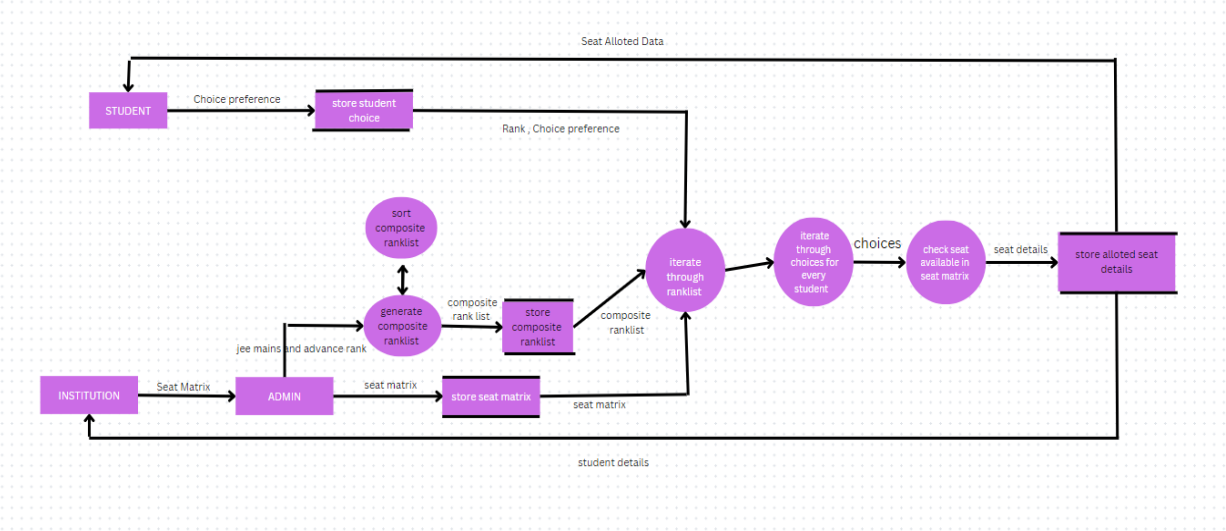


1st level :

This is the First Level Data Flow Diagram of Engineering Counselling system that shows how the system is divided into sub-systems(processes), each of which deals with one or more of the data flows to or from an external agent, and which together provide all of the functionality of the Engineering Counselling system as a whole. Data Flow Diagram level 1 provides a more detailed breakout of pieces of the 0th level.

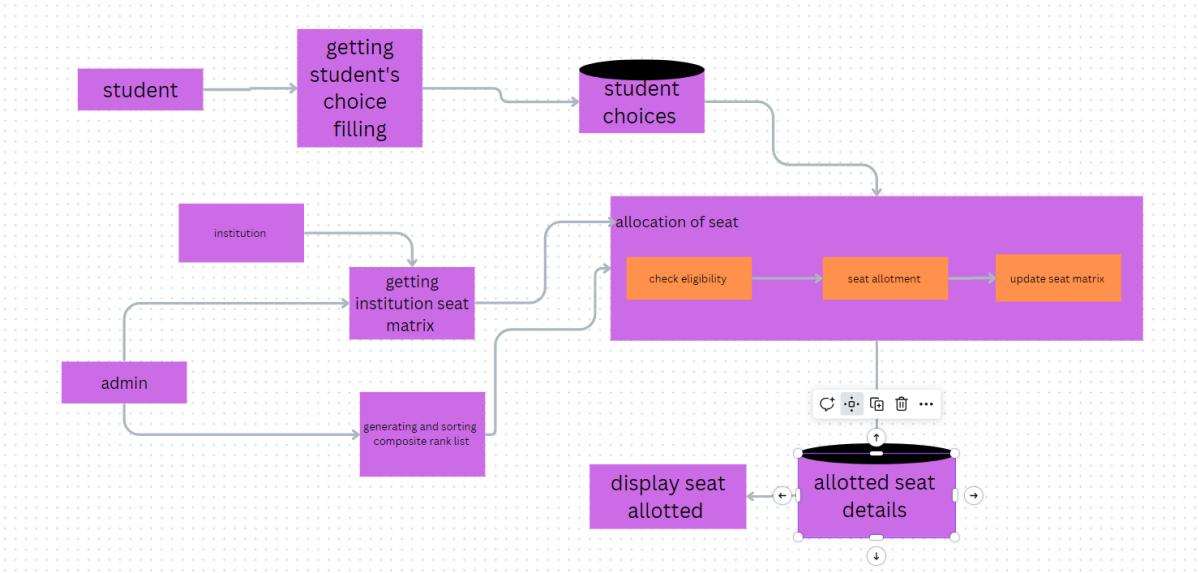


2nd level :



❖ DESIGN REPORT:

This is the design report for the seat allocation .



❖MODULES AND THEIR FLOWCHARTS:

1) Generating and sorting composite rank list .

2) Getting Institution's seat matrix

3) Allocation of seat .

4) Getting student's choice preference

5) Edit choice preference

6) Display seat allocated to admin

7)Display seat allocated to student .

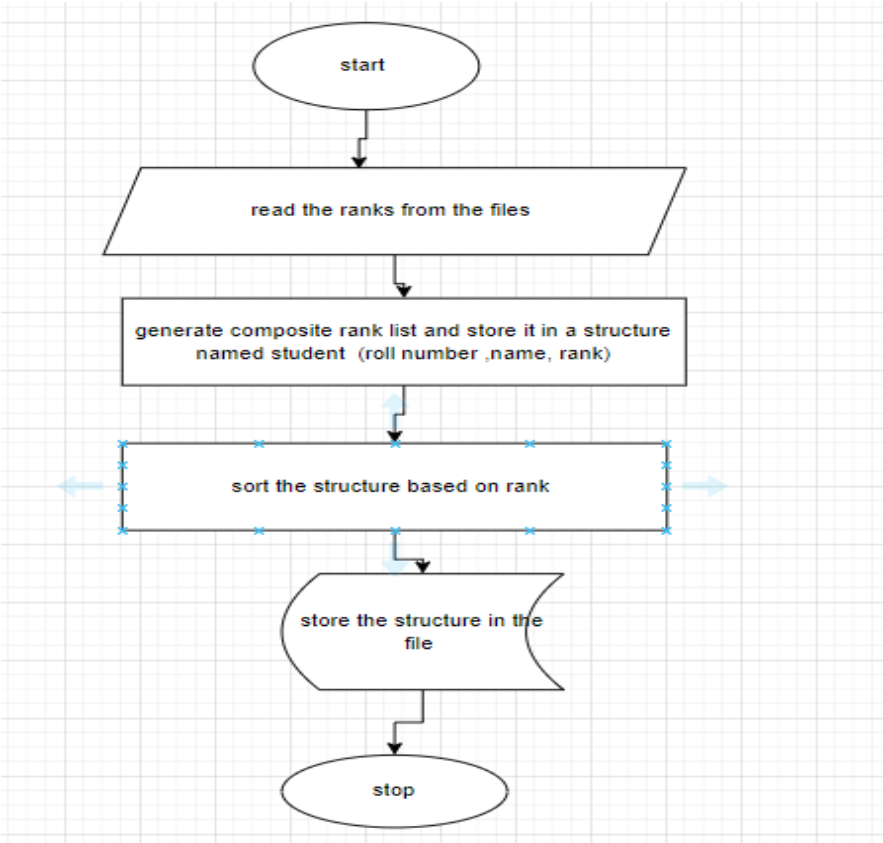
8) Login module.

9) View update seat matrix after allocation .

10) Display every student choices to admin.

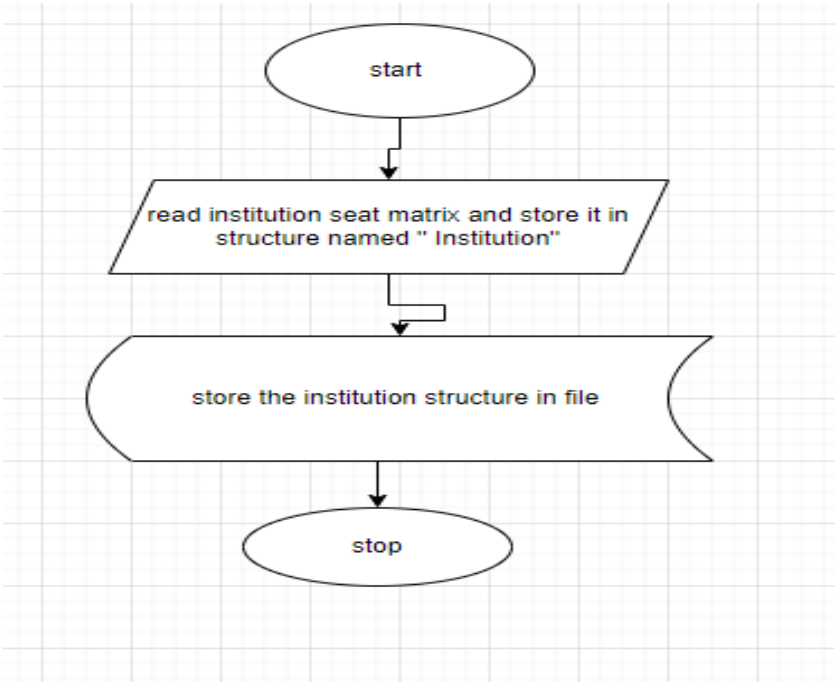
Generating and sorting composite rank list .

This module is used to retrieve the student mains and advance rank from the file and generate the composite rank and sort the composite rank and store it in structure named ''student''.



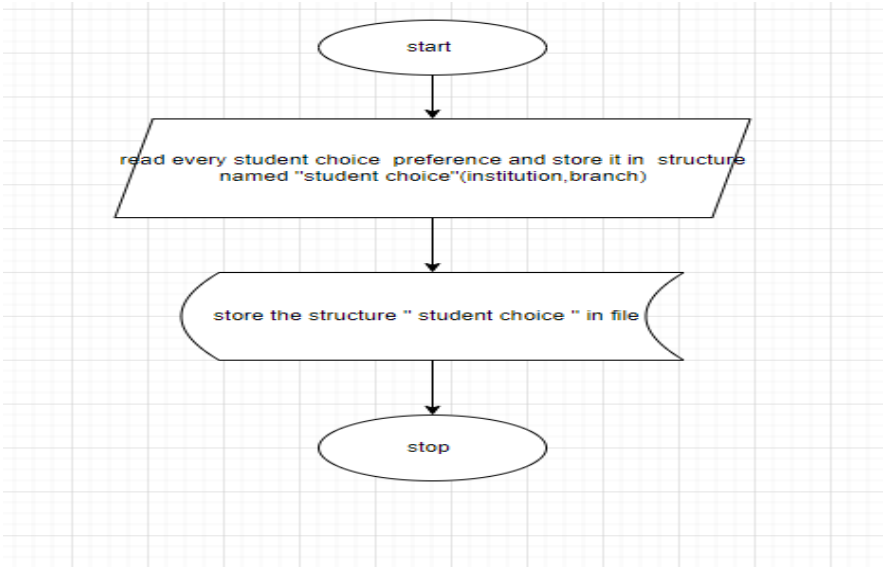
Getting Institution's seat matrix

this module is used to retrieve the college details and their branches and its corresponding seat matrix and store it in a structure ''institution".



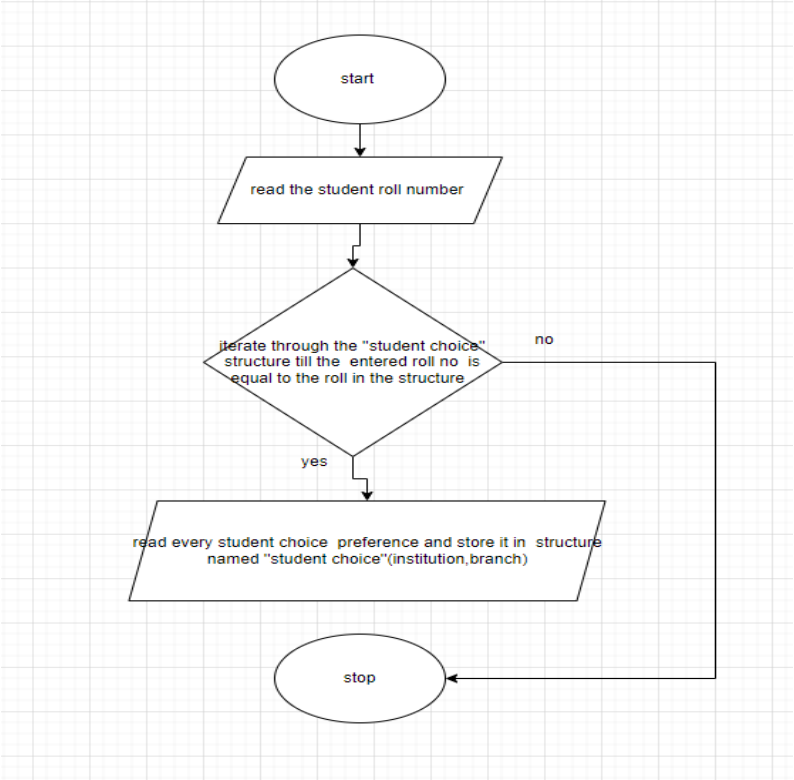
Getting student's choice preference

This module is used to used to enter every student choice preference and store it in a structure named ''student choice".



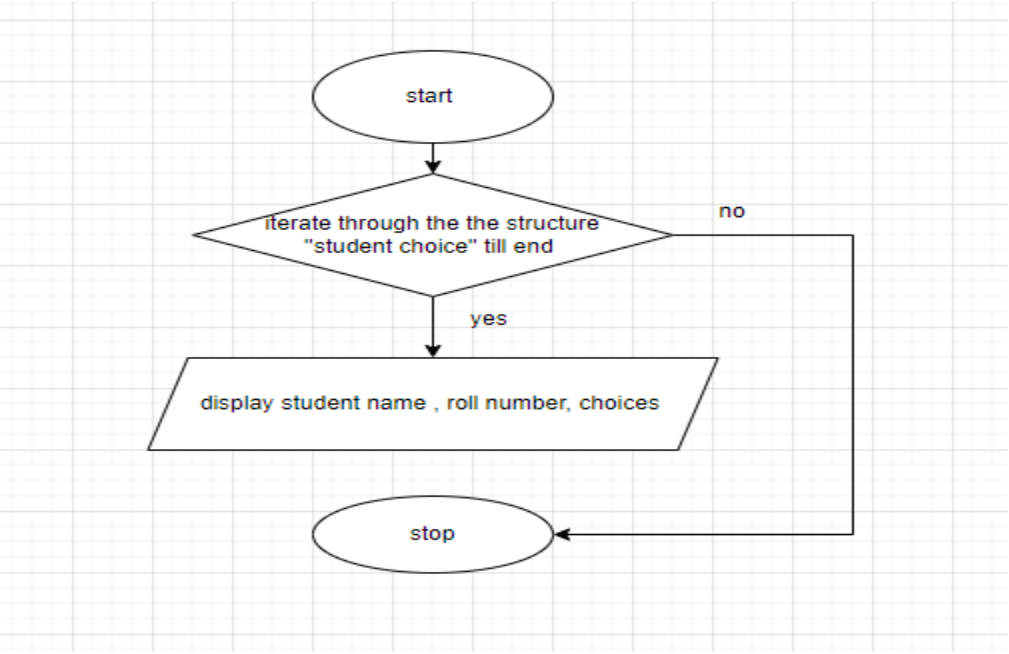
Edit choice preference

This module is used to edit the choices entered by the student and store it in file.



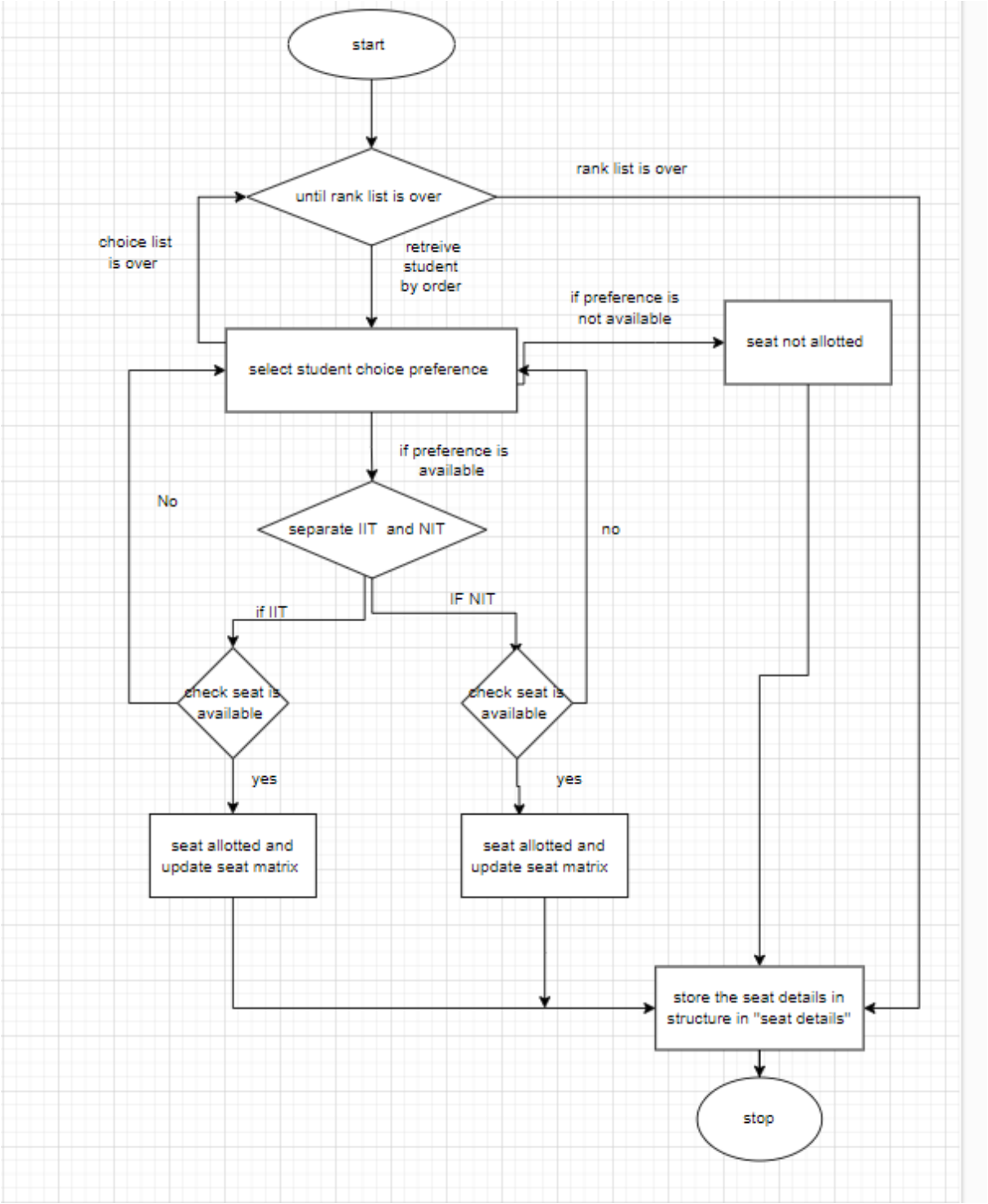
Display every student choices to admin.

This module is used to display every student choices which has been store in a structure named ''student choice".



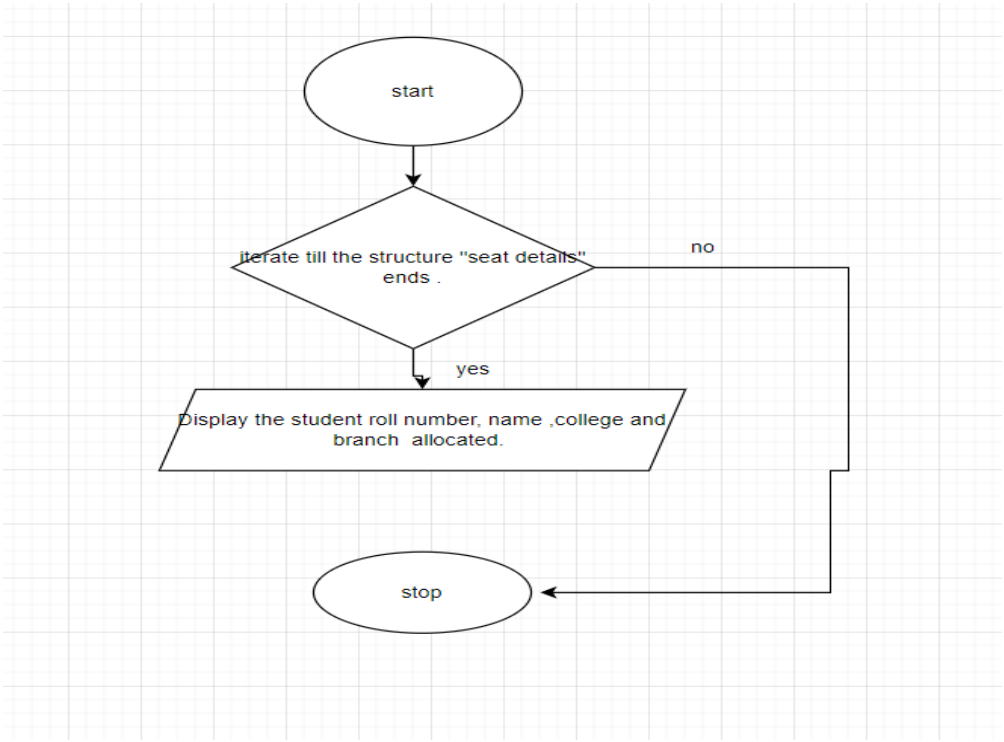
ALLOCATION OF SEAT

This module is used to allocate seat for the students who entered their choices and stores it the structure named "seat details".



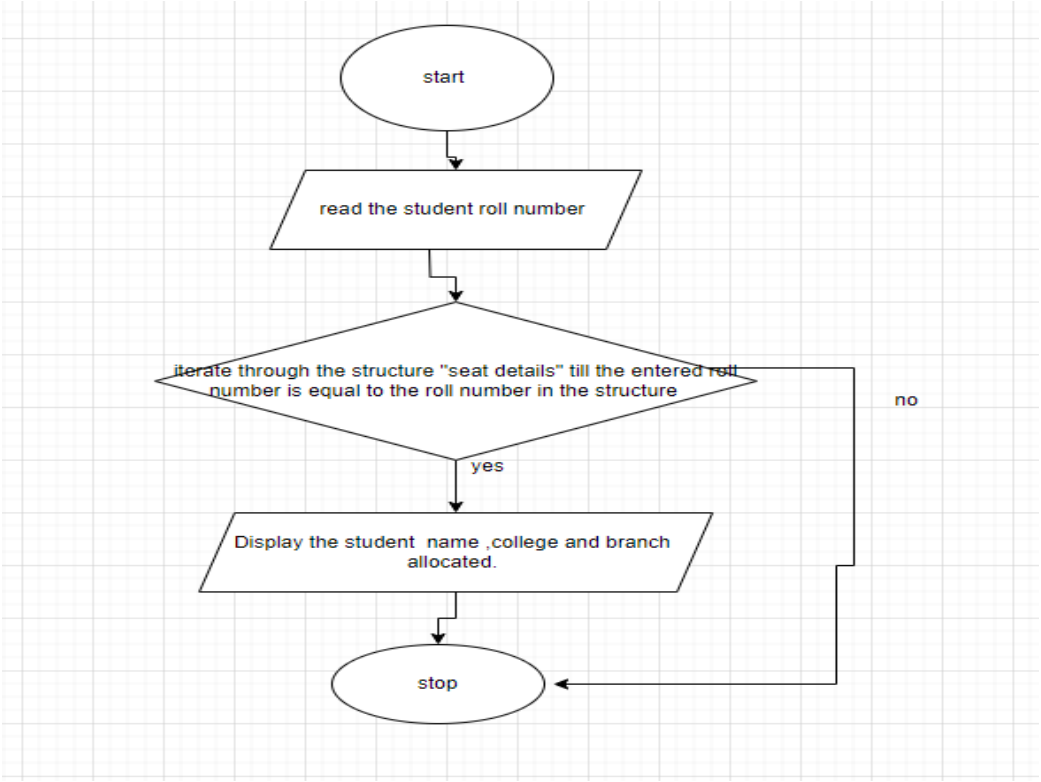
Display seat allocated to admin

This module is used to display the seat allocation of every students to admin.



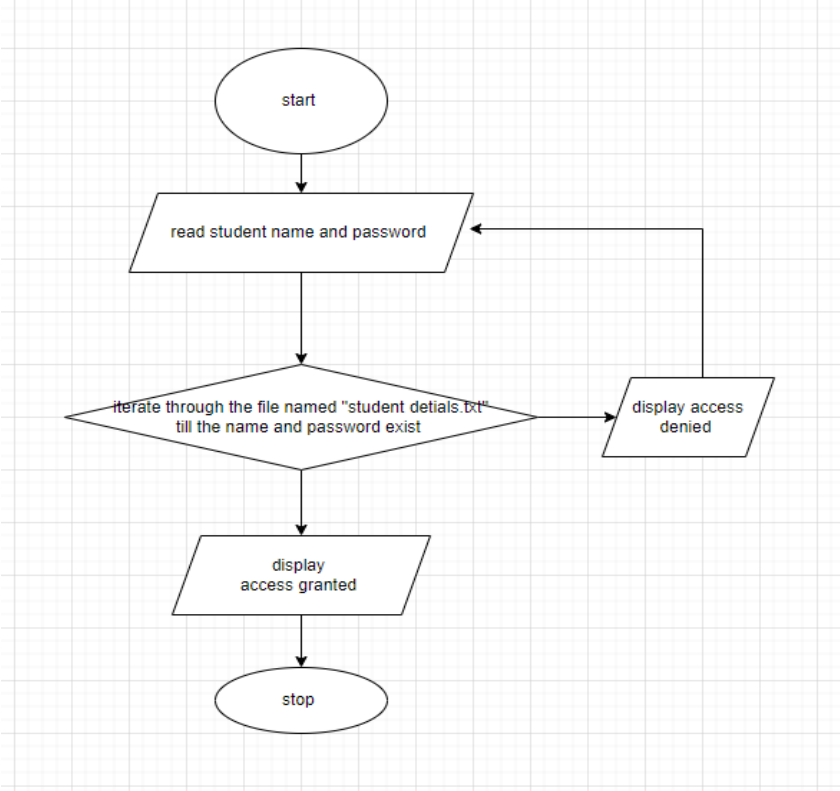
Display seat allocated to student .

This module is used to display the seat allocated to individual student .



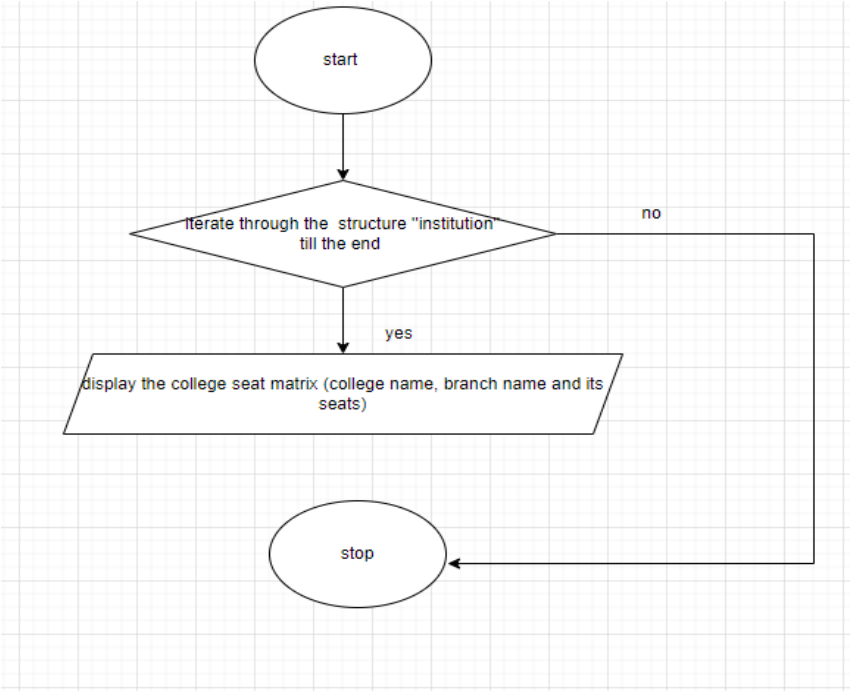
Login module:

This module allows the student and admin enter their login id and password .



View update seat matrix after allocation.

This module is used to display the seat matrix of every college to student and admin



❖ IMPLEMENTATION

1)Arrays of structure are used in our project as shown as below, because it is easy to access through out the project.

```
#define size 40
struct student {
  int rollno;
  char name[size];
  int mains_rank, adv_rank;
};
```

- The ''student'' structure stores the student roll number , name, mains and advance rank.

```
struct student2 {
  int rollno;
  char name[size];
  float rank;
};
```

- The ''student2'' structure stores the student roll number , name and composite rank.

```
struct student stud2[len], stud3[len];
struct student2 stud4[len], temp;
```

```
struct institution {
  char inst_name[size];

  struct dept {
    char dept_name[20];
    int no_of_seats;
  } dp[5];
};
```

```
scanf( %d , &inst_len);
struct institution inst1[inst_len];
```

- The ''institution'' structure stores the institution name , branches and seat matrix .

```
struct choice {
  int rollno;
  struct preference {
    char inst[20];
    char dept[20];
  } ch[10];
};
```

- The ''choice'' structure stores the students roll number , institution name and branch.

```
struct seatdetails {
  int rollno;
  char name[40];
  char clg[40];
  char branch[40];
};
```

```
struct seatdetails seat[len];
```

- The ''seat details'' structure stores the student roll number, name , college and branch allocated to them.

2)String and stdlib library are used our project .

3)We used replit to run our project , Replit is an online integrated development environment (IDE) that can be **used with a variety of programming languages**, including JavaScript,python.

4)User interface design

We have created different interface for student and admin.

```
~/project$ ./main
press 1 for admin
 press 0 for student-entering choice filling
 press 2 for student viewing the seat alloted
```

- If admin enters with their login id and password there are 6 different interface for update seat matrix , view the seat matrix, view the sorted composite rank list , view the students choice filling, and view the seat allocated to every student and view the updated seat matrix.

```
~/project$ ./main
press 1 for admin
 press 0 for student-entering choice filling
 press 2 for student viewing the seat alloted  1
Enter the username:
ADMIN
Enter the password:
PASSWORD
access granted

enter 1  for update institue details
 press 2 for viewing the seat matrix of respective collges
 press 3 for viewing sorted composite ranklist
 press 4 for viewing the student choice filling
 press 5 for viewing the alloted seat details
 press 6 for viewing updated seat matrix
```

- There are two interface for to student

If student enters ,with their id and password in ‘’student entering choice filling’’ interface .He have another 4 different interface ,entering their choices, seeing the seat matrix of every college, viewing the sorted composite rank list and edit choices .

```
~/project$ ./main
press 1 for admin
 press 0 for student-entering choice filling
 press 2 for student viewing the seat alloted  0
Enter the username:
Vijay
Enter the password:
Vi
access granted

press 1 for entering your choice preference
 press 2 for seeing the college and their respective seat matrix
 press 3 for viewing the sorted composite rank list
 press 4 for edit  choices
```

If student enters in ‘’student viewing the seat allocated’’. The student can see the seat allocated to him and view the seat matrix for next round.

```
~/project$ ./main
press 1 for admin
 press 0 for student-entering choice filling
 press 2 for student viewing the seat alloted  2
Enter the username:
Vijay
Enter the password:
Vi
access granted
 enter your roll no1
     Name: Vijay     college: IIT-MADRAS     branch: CSE
press 1 for viewing the updated seat matrix 1

 IIT-MADRAS CSE-0  IT-0  ECE-0  EEE-0  MECH-1
 IIT-MUMBAI CSE-0  IT-0  ECE-0  EEE-0  MECH-2
 IIT-DELHI CSE-0  IT-0  ECE-0  EEE-1  MECH-3
 NIT-MADRAS CSE-0  IT-0  ECE-0  EEE-0  MECH-0
 NIT-MUMBAI CSE-0  IT-0  ECE-0  EEE-0  MECH-0
 NIT-DELHI CSE-0  ECE-0  IT-0  EEE-0  MECH-0  ~/project$
```

❖ VALIDATION THROUGH DETAILED TEST CASES FOR VARIOUS SCENARIOS

In our project we have 6 colleges with some departments .the total number of seats available is 93 ,but we have 100 students. Students will be eliminate from the counselling, that depends on their choice preference and seat will be allotted to other students.

Seat matrix:

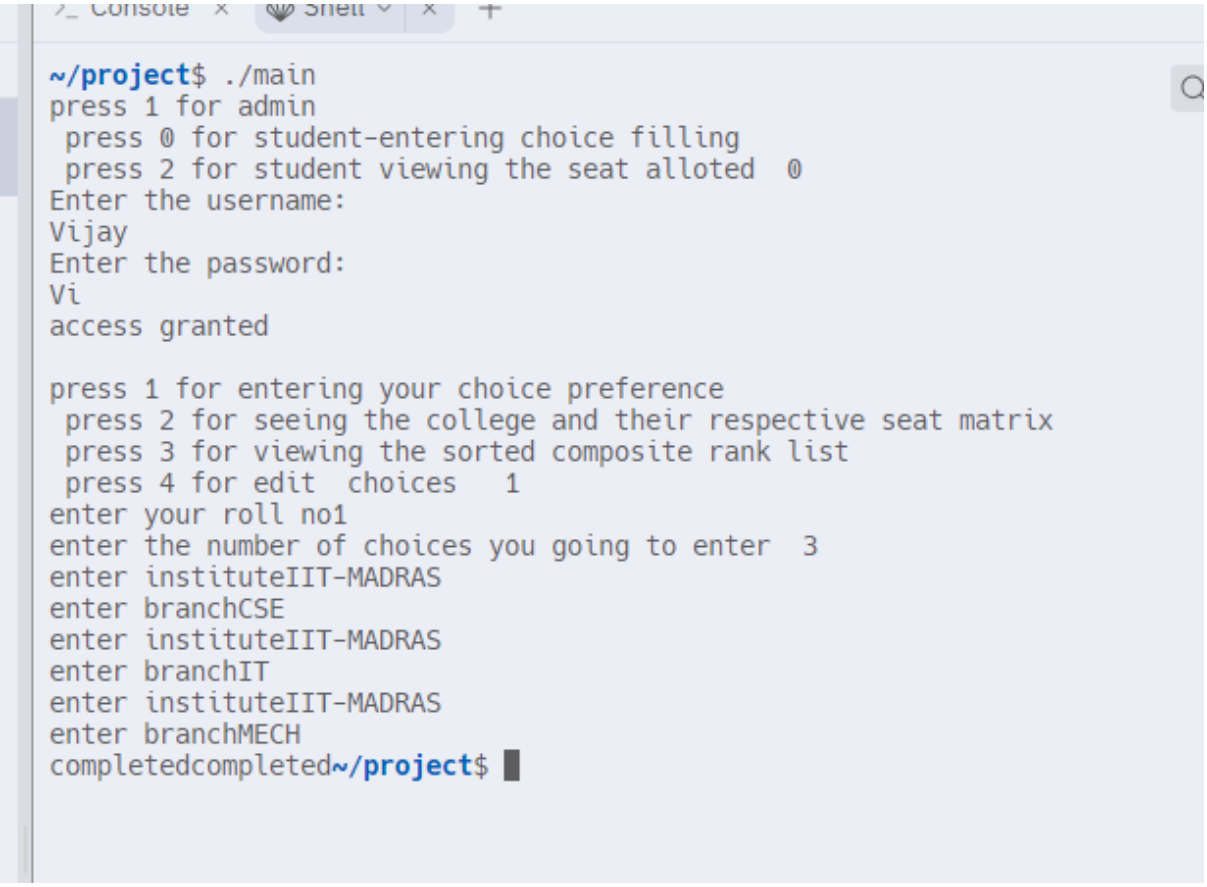
```
 IIT-MADRAS CSE-5  IT-3  ECE-5  EEE-3  MECH-3
 IIT-MUMBAI CSE-5  IT-5  ECE-3  EEE-3  MECH-3
 IIT-DELHI CSE-5  IT-5  ECE-3  EEE-3  MECH-3
 NIT-MADRAS CSE-3  IT-3  ECE-2  EEE-2  MECH-2
 NIT-MUMBAI CSE-3  IT-3  ECE-2  EEE-2  MECH-2
 NIT-DELHI CSE-3  ECE-3  IT-3  EEE-2  MECH-2  ~/proj
```

Allocated Seat details :

```
88  Victor  NIT-DELHI  IT
91  PoojaHedge  NIT-DELHI  ECE
80  KritiSanon  NIT-DELHI  IT
97  AnjuKurian  NIT-DELHI  IT
100  AshwinRavichander  NIT-DELHI  ECE
78  RohitDhawan  NIT-DELHI  ECE
95  DivyaBharathi  NIT-DELHI  EEE
87  JohnKennady  NIT-DELHI  EEE
60  FarahKhan  NIT-DELHI  MECH
56  JackieShroff  NIT-DELHI  MECH
85  Roshini  College not available
99  Priya  College not available
94  ShahidKapoor  College not available
52  AamirKhan  College not available
70  JhanviKapoor  College not available
20  Arunmozhi  College not available   completed~/project$
```

Test cases:

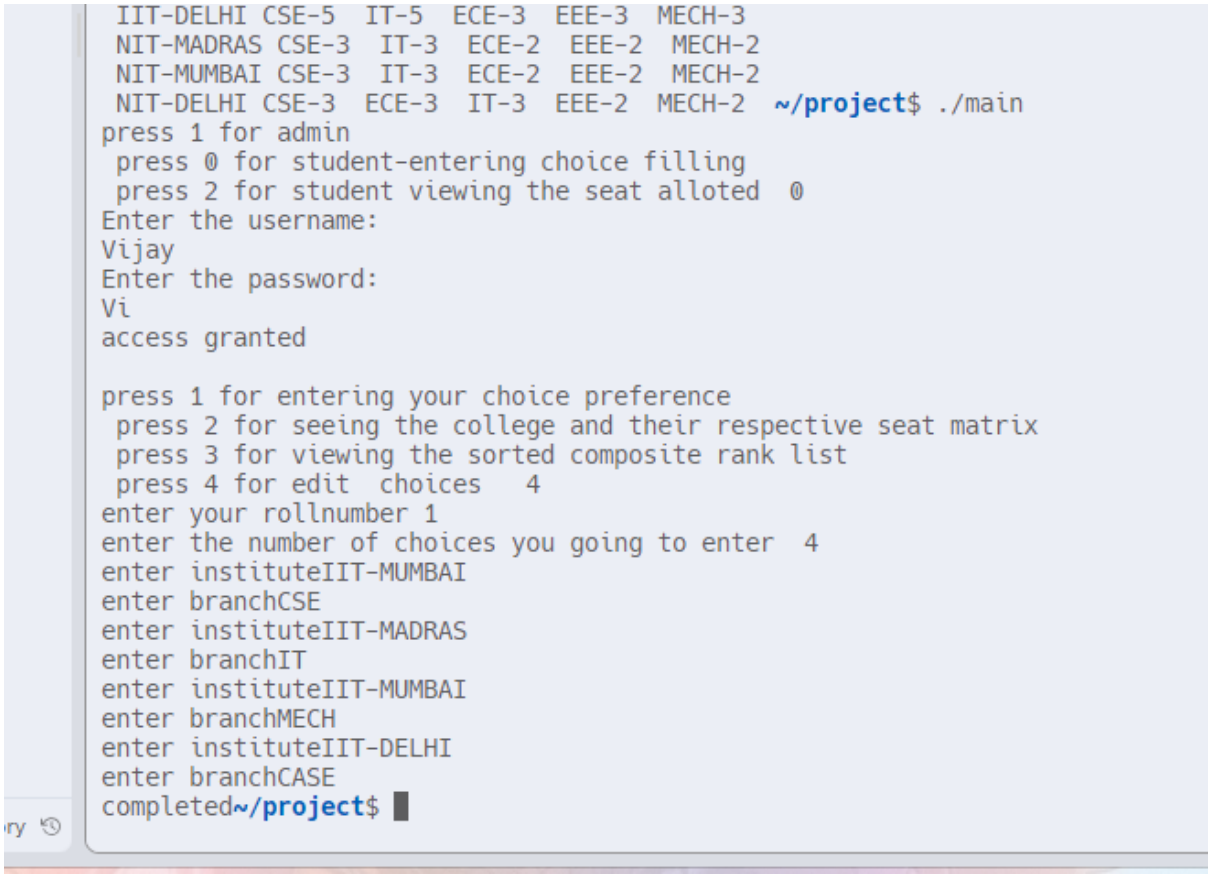
Test case for entering choice filling :



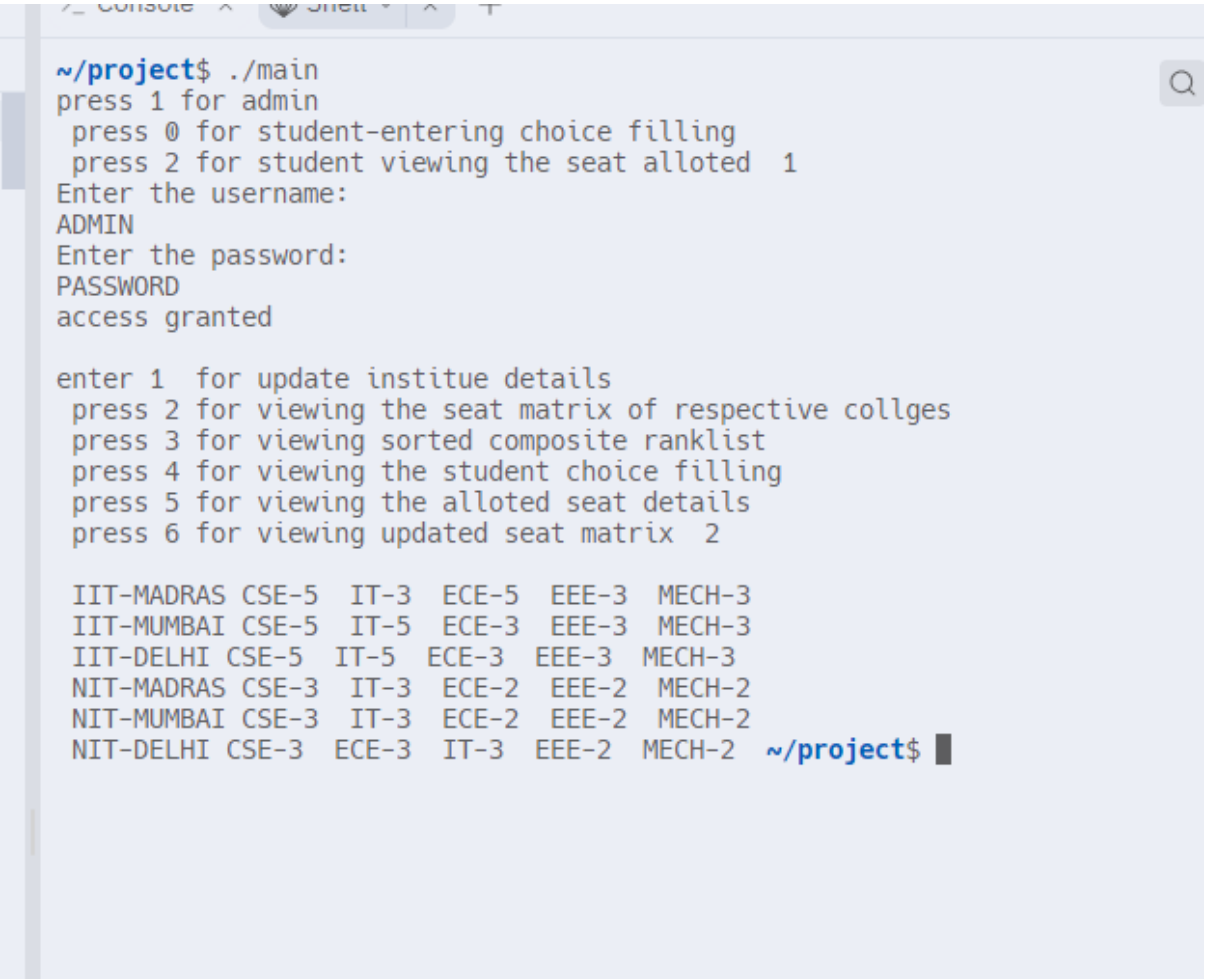
Test cases for viewing the seat matrix before allocation:

```
enter instituteIIT-MADRAS
enter branchMECH
completedcompleted~/project$ ./main
press 1 for admin
 press 0 for student-entering choice filling
 press 2 for student viewing the seat alloted  0
Enter the username:
Vijay
Enter the password:
Vi
access granted

press 1 for entering your choice preference
 press 2 for seeing the college and their respective seat matrix
 press 3 for viewing the sorted composite rank list
 press 4 for edit  choices   2

these are the colleges and their seat details
 IIT-MADRAS CSE-5  IT-3  ECE-5  EEE-3  MECH-3
 IIT-MUMBAI CSE-5  IT-5  ECE-3  EEE-3  MECH-3
 IIT-DELHI CSE-5  IT-5  ECE-3  EEE-3  MECH-3
 NIT-MADRAS CSE-3  IT-3  ECE-2  EEE-2  MECH-2
 NIT-MUMBAI CSE-3  IT-3  ECE-2  EEE-2  MECH-2
 NIT-DELHI CSE-3  ECE-3  IT-3  EEE-2  MECH-2  ~/project$
```

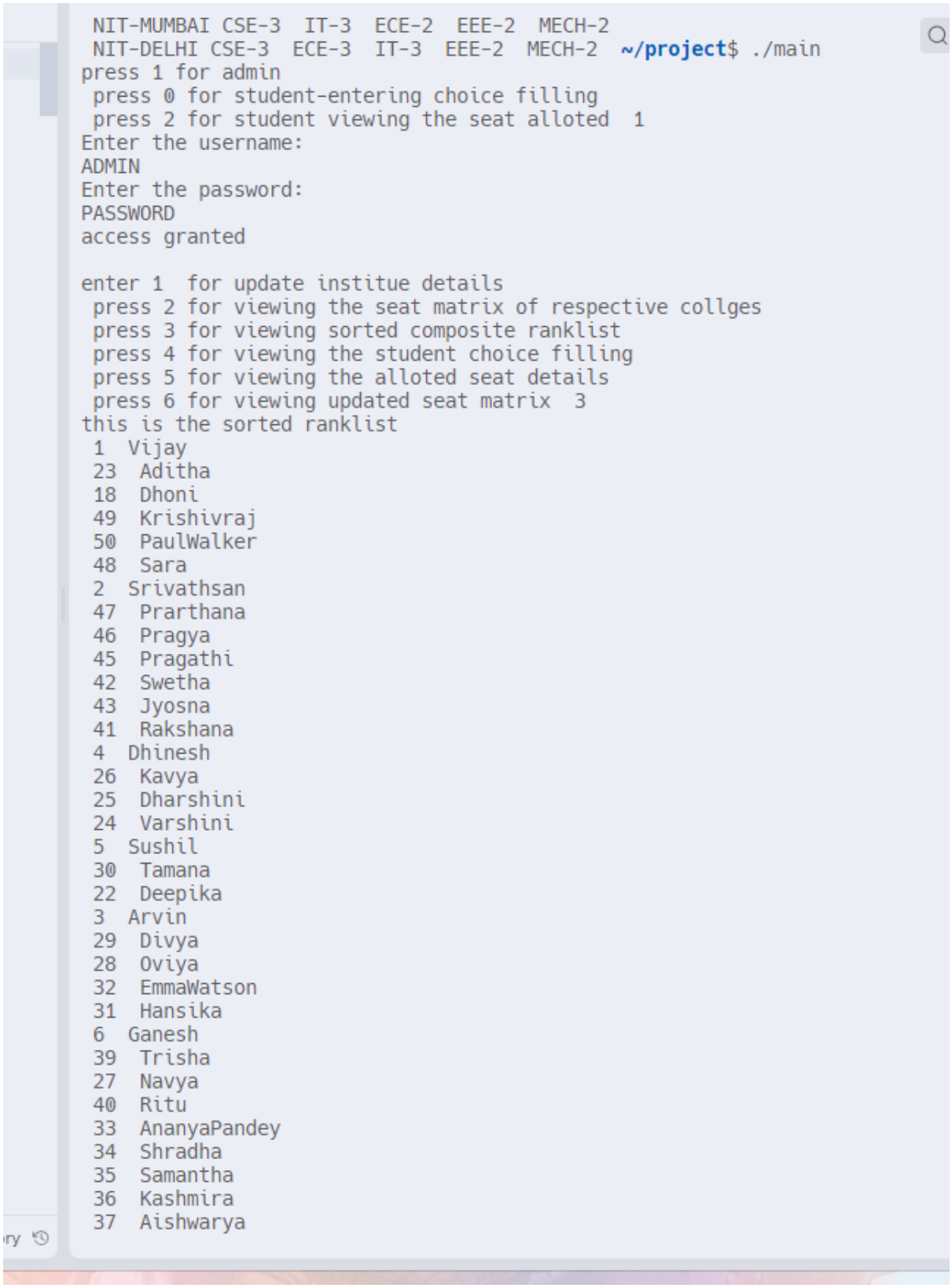
Test case for editing choice list by student :



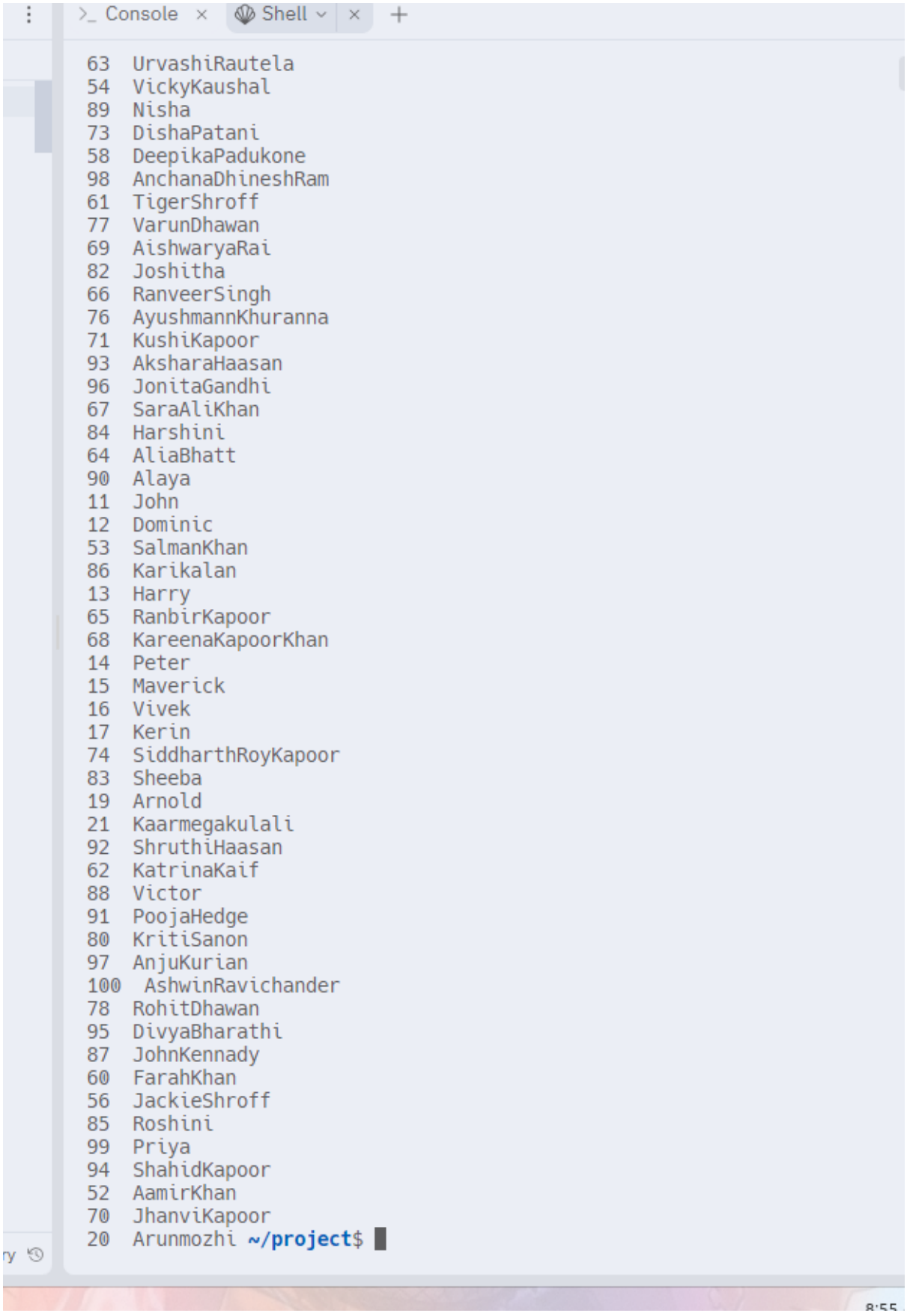
Test cases for viewing the seat matrix by admin:



Test cases for viewing the composite rank list:



```
 NIT-MUMBAI CSE-3  IT-3  ECE-2  EEE-2  MECH-2
 NIT-DELHI CSE-3  ECE-3  IT-3  EEE-2  MECH-2  ~/project$ ./main
press 1 for admin
 press 0 for student-entering choice filling
 press 2 for student viewing the seat alloted  1
Enter the username:
ADMIN
Enter the password:
PASSWORD
access granted

enter 1  for update institue details
 press 2 for viewing the seat matrix of respective collges
 press 3 for viewing sorted composite ranklist
 press 4 for viewing the student choice filling
 press 5 for viewing the alloted seat details
 press 6 for viewing updated seat matrix  3
this is the sorted ranklist
 1  Vijay
 23  Aditha
 18  Dhoni
 49  Krishivraj
 50  PaulWalker
 48  Sara
 2  Srivathsan
 47  Prarthana
 46  Pragya
 45  Pragathi
 42  Swetha
 43  Jyosna
 41  Rakshana
 4  Dhinesh
 26  Kavya
 25  Dharshini
 24  Varshini
 5  Sushil
 30  Tamana
 22  Deepika
 3  Arvin
 29  Divya
 28  Oviya
 32  EmmaWatson
 31  Hansika
 6  Ganesh
 39  Trisha
 27  Navya
 40  Ritu
 33  AnanyaPandey
 34  Shradha
 35  Samantha
 36  Kashmira
 37  Aishwarya
```


Console
Shell
63 UrvashiRautela
54 VickyKaushal
89 Nisha
73 DishaPatani
58 DeepikaPadukone
98 AnchanaDhineshRam
61 TigerShroff
77 VarunDhawan
69 AishwaryaRai
82 Joshitha
66 RanveerSingh
76 AyushmannKhuranna
71 KushiKapoor
93 AksharaHaasan
96 JonitaGandhi
67 SaraAliKhan
84 Harshini
64 AliaBhatt
90 Alaya
11 John
12 Dominic
53 SalmanKhan
86 Karikalan
13 Harry
65 RanbirKapoor
68 KareenaKapoorKhan
14 Peter
15 Maverick
16 Vivek
17 Kerin
74 SiddharthRoyKapoor
83 Sheeba
19 Arnold
21 Kaarmegakulali
92 ShruthiHaasan
62 KatrinaKaif
88 Victor
91 PoojaHedge
80 KritiSanon
97 AnjuKurian
100 AshwinRavichander
78 RohitDhawan
95 DivyaBharathi
87 JohnKennady
60 FarahKhan
56 JackieShroff
85 Roshini
99 Priya
94 ShahidKapoor
52 AamirKhan
70 JhanviKapoor
20 Arunmozhi ~/project$

Test cases for viewing the student choices from admin side:-

```
 70  JhanviKapoor
 20  Arunmozhi ~/project$ ./main
press 1 for admin
 press 0 for student-entering choice filling
 press 2 for student viewing the seat alloted  1
Enter the username:
ADMIN
Enter the password:
PASSWORD
access granted

enter 1  for update institue details
 press 2 for viewing the seat matrix of respective collges
 press 3 for viewing sorted composite ranklist
 press 4 for viewing the student choice filling
 press 5 for viewing the alloted seat details
 press 6 for viewing updated seat matrix  4


ROLL NO:1
choices=: IIT-MUMBAI-CSE   IIT-MADRAS-IT   IIT-MUMBAI-MECH   IIT-DELHI-CASE   a-a   a-a   a-a

ROLL NO:23
choices=: IIT-MADRAS-CSE   IIT-MADRAS-IT   IIT-MADRAS-ECE   IIT-MADRAS-EEE   IIT-MADRAS-MECH

ROLL NO:18
choices=: IIT-MADRAS-CSE   IIT-MADRAS-IT   IIT-MADRAS-ECE   IIT-MADRAS-EEE   IIT-MADRAS-MECH

ROLL NO:49
choices=: IIT-MADRAS-CSE   IIT-MADRAS-IT   IIT-MADRAS-ECE   IIT-MADRAS-EEE   IIT-MADRAS-MECH

ROLL NO:49
choices=: IIT-MADRAS-CSE   IIT-MADRAS-IT   IIT-MADRAS-ECE   IIT-MADRAS-EEE   IIT-MADRAS-MECH

ROLL NO:50
choices=: IIT-MADRAS-CSE   IIT-MADRAS-IT   IIT-MADRAS-ECE   IIT-MADRAS-EEE   IIT-MADRAS-MECH

ROLL NO:48
choices=: IIT-MADRAS-CSE   IIT-MADRAS-IT   IIT-MADRAS-ECE   IIT-MADRAS-EEE   IIT-MADRAS-MECH

ROLL NO:2
choices=: IIT-MADRAS-CSE   IIT-MADRAS-IT   IIT-MADRAS-ECE   IIT-MADRAS-EEE   IIT-MADRAS-MECH

ROLL NO:47
choices=: IIT-MADRAS-CSE   IIT-MADRAS-IT   IIT-MADRAS-ECE   IIT-MADDRAS-EEE   IIT-MADRAS-MECH

ROLL NO:46
choices=: IIT-MADRAS-CSE   IIT-MADRAS-IT   IIT-MADRAS-ECE   IIT-MADRAS-EEE   IIT-MADRAS-MECH

ROLL NO:45
```

Test cases for allocating seats for students :

```
ROLL NO:52
choices=: NIT-MADRA-IT   NIT-MADRAS-CSE   NIT-MUMBAI-MECH   a-a   a-a   a-a
~/project$ ./main
press 1 for admin
 press 0 for student-entering choice filling
 press 2 for student viewing the seat alloted  1
Enter the username:
ADMIN
Enter the password:
PASSWORD
access granted

enter 1  for update institue details
 press 2 for viewing the seat matrix of respective collges
 press 3 for viewing sorted composite ranklist
 press 4 for viewing the student choice filling
 press 5 for viewing the alloted seat details
 press 6 for viewing updated seat matrix  5

1  Vijay  IIT-MUMBAI  CSE
23  Aditha  IIT-MADRAS  CSE
18  Dhoni  IIT-MADRAS  CSE
49  Krishivraj  IIT-MADRAS  CSE
50  PaulWalker  IIT-MADRAS  CSE
48  Sara  IIT-MADRAS  IT
2  Srivathsan  IIT-MADRAS  IT
47  Prarthana  IIT-MADRAS  IT
46  Pragya  IIT-MADRAS  ECE
45  Pragathi  IIT-MADRAS  ECE
42  Swetha  IIT-MADRAS  ECE
43  Jyosna  IIT-MADRAS  ECE
41  Rakshana  IIT-MADRAS  ECE
4  Dhinesh  IIT-MADRAS  EEE
26  Kavya  IIT-MADRAS  EEE
25  Dharshini  IIT-MADRAS  EEE
24  Varshini  IIT-MUMBAI  CSE
5  Sushil  IIT-MUMBAI  CSE
30  Tamana  IIT-MUMBAI  CSE
22  Deepika  IIT-MUMBAI  CSE
3  Arvin  IIT-MUMBAI  IT
29  Divya  IIT-MUMBAI  IT
28  Oviya  IIT-MUMBAI  IT
32  EmmaWatson  IIT-MUMBAI  IT
31  Hansika  IIT-MUMBAI  ECE
6  Ganesh  IIT-MUMBAI  ECE
39  Trisha  IIT-MUMBAI  ECE
27  Navya  IIT-MUMBAI  EEE
40  Ritu  IIT-MUMBAI  IT
33  AnanyaPandey  IIT-MUMBAI  EEE
34  Shradha  IIT-MUMBAI  EEE
35  Samantha  IIT-MUMBAI  MECH
```

Test cases for viewing the seat matrix after seat allocation:

```
52  AamirKhan  College not available
70  JhanviKapoor  College not available
20  Arunmozhi  College not available   completed~/project$ ./main
press 1 for admin
 press 0 for student-entering choice filling
 press 2 for student viewing the seat alloted  1
Enter the username:
ADMIN
Enter the password:
PASSWORD
access granted

enter 1  for update institue details
 press 2 for viewing the seat matrix of respective collges
 press 3 for viewing sorted composite ranklist
 press 4 for viewing the student choice filling
 press 5 for viewing the alloted seat details
 press 6 for viewing updated seat matrix  6

 IIT-MADRAS CSE-0  IT-0  ECE-0  EEE-0  MECH-2
 IIT-MUMBAI CSE-0  IT-0  ECE-0  EEE-0  MECH-1
 IIT-DELHI CSE-0  IT-0  ECE-0  EEE-1  MECH-3
 NIT-MADRAS CSE-0  IT-0  ECE-0  EEE-0  MECH-0
 NIT-MUMBAI CSE-0  IT-0  ECE-0  EEE-0  MECH-0
 NIT-DELHI CSE-0  ECE-0  IT-0  EEE-0  MECH-0  ~/project$
```

Test cases for student to view their seat :

```
bash: Vijay: command not found
~/project$ ./main
press 1 for admin
 press 0 for student-entering choice filling
 press 2 for student viewing the seat alloted  2
Enter the username:
Vijay
Enter the password:
Vi
access granted
 enter your roll no1
     Name: Vijay     college: IIT-MUMBAI     branch: CSE
press 1 for viewing the updated seat matrix 1

 IIT-MADRAS CSE-0  IT-0  ECE-0  EEE-0  MECH-2
 IIT-MUMBAI CSE-0  IT-0  ECE-0  EEE-0  MECH-1
 IIT-DELHI CSE-0  IT-0  ECE-0  EEE-1  MECH-3
 NIT-MADRAS CSE-0  IT-0  ECE-0  EEE-0  MECH-0
 NIT-MUMBAI CSE-0  IT-0  ECE-0  EEE-0  MECH-0
 NIT-DELHI CSE-0  ECE-0  IT-0  EEE-0  MECH-0  ~/project$
```

❖ OBSERVATION

Society:

We have created the system with responsibility and we ensure that itis fair for all the candidates and the merit is not violated.

Legal:

Our system is soulfully designed by us. We have not copied our code or used other's logic in our code. We took references from JOSAA's Business Policy and from Google.

Ethical :

Only the authorised users can access our system . Privacy of the information of the candidates is protected and no third party access it. We ensure that this mode runs for lifetime successfully.

❖ LIMITATION

College and Departments:

At present we have developed the model only for few colleges and departments only.

Accept or Decline:

We do not provide the accept or decline options to the candidates which may leads to the wastage of seats.

Multiple rounds:

Our model only conducts a single round of counselling which is practically not applicable.

LEARNING OUTCOME

- Collaboration and teamwork: Working on a team project provides an opportunity to develop essential collaboration and teamwork skills.
- Project management skills: Team projects often require students to plan, organize, and manage their time effectively.

They learn how to set goals, create project timelines, allocate resources, and meet deadlines

- Problem-solving and critical thinking: College projects often involve complex problems that require innovative solutions

- Communication and presentation skills: Team projects provide opportunities for students to enhance their communication and presentation skills.
- Interdisciplinary learning: Team projects often involve students from diverse backgrounds and disciplines.

- Leadership and responsibility: In team projects, students have the chance to take on leadership roles, where they learn to guide and motivate their team members

- Adaptability and resilience: College projects may encounter unexpected obstacles or changes along the way.

❖ REFERENCE

www.google.com
https://josaa.nic.in/
CHATGPT(AI)