

Subject: Data Structure and Algorithms

Code: CSD201

Assignment2 Report

Title: Dormitory Management System

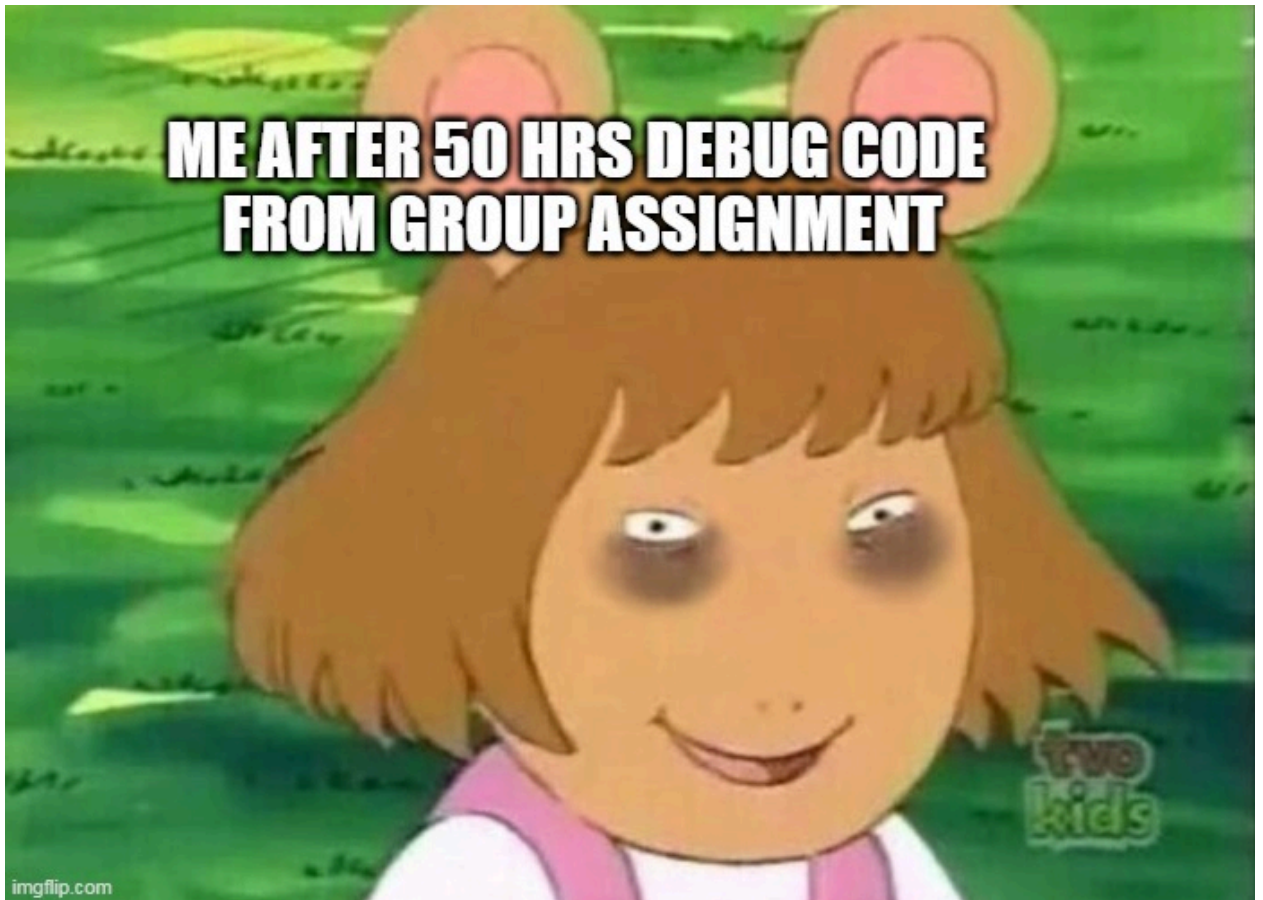
Group number: 02

Members:

1. Vũ Thị Khánh Huyền – HE190252
2. Lê Kiên Cường – HE191111
3. Phạm Khắc Nghĩa- HE191134
4. Vũ Thị Thanh Thảo-HE191226
5. Nguyễn Tuấn Hùng-HE191510

### Tasks status

Name/ Number	Content	Member	Status
<b>1. RoomList</b>			
1.1.	Load data from file	Vũ Thị Khánh Huyền	
1.2.	Input & add to the tree	Phạm Khắc Nghĩa	
1.3.	Display data by in-order traversal	Vũ Thị Thanh Thảo	
1.4.	Save room tree to file by post-order traversal	Vũ Thị Khánh Huyền	
1.5.	Search by rcode	Nguyễn Tuấn Hùng	
1.6.	Delete by rcode by copying	Lê Kiên Cường	
1.7.	Delete by rcode by merging	Lê Kiên Cường	
1.8	Simply balancing	Phạm Khắc Nghĩa	
1.9	Display data by breadth-first traversal	Vũ Thị Thanh Thảo	
1.10	Count the number of rooms	Vũ Thị Thanh Thảo	
1.11	Search by name	Nguyễn Tuấn Hùng	
1.12	Search booked by rcode	Vũ Thị Khánh Huyền	
<b>2. StudentList</b>			
2.1.	Load data from file	Phạm Khắc Nghĩa	
2.2.	Input & add to the tree	Vũ Thị Thanh Thảo	
2.3.	Display data by pre-order traversal	Vũ Thị Thanh Thảo	
2.4.	Save student tree to file by in-order traversal	Phạm Khắc Nghĩa	
2.5.	Search by scode	Nguyễn Tuấn Hùng	
2.6.	Delete by scode by copying	Vũ Thị Khánh Huyền	
2.7.	Search by name	Nguyễn Tuấn Hùng	
2.8	Search booking room by scode	Giống phần trước	
<b>3. BookingList</b>			
3.1.	Load data from file	Giống phần trước	
3.2.	Book the room	Lê Kiên Cường	
3.3.	Display data	Giống phần trước	
3.4.	Save booking list to file	Giống phần trước	
3.5.	Sort by rcode + scode	Giống phần trước	
3.6.	Leave the room by rcode + scode	Lê Kiên Cường	



Tasks results (Screenshot): Lưu ý, cần load data của Room, Student, Booking lên trước để quan sát kết quả đúng nhất. Kết quả của các mục save được lưu vào 1 file khác có tên tmp.txt để tiện quan sát kết quả và so sánh.

## 1. Room tree

### 1.1. Load data from file

Input: data in file

```
D410,410,D,4,double,2,2,1040000.0
D312,312,D,3,triple,6,0,980000.0
C312,312,C,3,double,3,1,1040000.0
E255,255,E,2,double,0,4,1040000.0
H155,155,H,1,triple,5,1,980000.0
G521,521,G,5,double,4,0,1040000.0
```

Output: screen after loading data

```
Enter your choice (1-13): 1
Read succesfully!
```

### 1.2. Input and Add to the end

Input: a new room-or and old one <couldn't be added if have the same key>

```
Enter your choice (1-13): 2
Room code: F155
Room name: 155
Dom: F
Floor: 1
Room type (Double / Triple): triple
```

if the added have the same key <RoomCode>

```
Enter your choice (1-13): 2
Room code: D410
Room name: 410
Dom: D
Floor: 4
Room type (Double / Triple): triple
Key cannot be duplicated!
```

Output: screen after added new Room data

RCODE	NAME	DOM	FLOOR	TYPE	BEDS	BOOKED	PRICE
C312	312	C	3	double	3	1	1040000.0
D312	312	D	3	triple	6	0	980000.0
D410	410	D	4	double	2	2	1040000.0
E255	255	E	2	double	0	4	1040000.0
F155	155	F	1	triple	6	0	980000.0
G521	521	G	5	double	4	0	1040000.0
H155	155	H	1	triple	5	1	980000.0

### 1.3 Display data by in-order traversal (lúc trước khi add new Room)

RCODE	NAME	DOM	FLOOR	TYPE	BEDS	BOOKED	PRICE
C312	312	C	3	double	3	1	1040000.0
D312	312	D	3	triple	6	0	980000.0
D410	410	D	4	double	2	2	1040000.0
E255	255	E	2	double	0	4	1040000.0
G521	521	G	5	double	4	0	1040000.0
H155	155	H	1	triple	5	1	980000.0

### 1.5 Search by Rcode

```

Enter your choice (1-13): 5
Room code want to search infor: c312
CODE      NAME      DOM      FLOOR  TYPE      BEDS    BOOKED    PRICE
C312      312      C       3      double    3       1         1040000.0
1. Load data from file

```

## 1.6. Delete by rcode by copying

### If room have booked student, cannot delete

```

Enter your choice (1-13): 6
Enter room code that you want to delete by copying: C312
This room is currently booked by students, cannot delete!

```

### If room do not have any booked student, perform delete the room D312

#### - Room BFS, before delete

RCODE	NAME	DOM	FLOOR	TYPE	BEDS	BOOKED	PRICE
D410	410	D	4	double	2	2	1040000.0
D312	312	D	3	triple	6	0	980000.0
E255	255	E	2	double	0	4	1040000.0
C312	312	C	3	double	3	1	1040000.0
H155	155	H	1	triple	5	1	980000.0
G521	521	G	5	double	4	0	1040000.0

#### - Booking list, before delete, still having D312 in the 3rd row from bottom up

ROOM CODE	STUDENT CODE	BOOKING DATE	LEAVE DATE	STATUS
D410	HE190255	20/10/2022	null	1
D410	HS178292	12/09/2020	10/02/2021	0
C312	HE192873	16/09/2023	null	1
D410	HE170233	20/10/2022	null	1
C312	HS178292	16/04/2022	15/02/2024	0
E255	HK170003	15/05/2021	null	1
H155	HS185633	09/04/2022	null	1
E255	HE167888	15/05/2021	null	1
D312	HE190255	01/05/2021	10/05/2022	0
E255	HS178292	15/03/2024	null	1
E255	HK187423	15/05/2021	null	1

```

Enter room code that you want to delete by copying: D312
Delete successfully!

```

#### - Room table after deleting room D312

RCODE	NAME	DOM	FLOOR	TYPE	BEDS	BOOKED	PRICE
D410	410	D	4	double	2	2	1040000.0
C312	312	C	3	double	3	1	1040000.0
E255	255	E	2	double	0	4	1040000.0
H155	155	H	1	triple	5	1	980000.0
G521	521	G	5	double	4	0	1040000.0

- **Booking list, before delete, D312 totally disappears**

ROOM CODE	STUDENT CODE	BOOKING DATE	LEAVE DATE	STATUS
D410	HE190255	20/10/2022	null	1
D410	HS178292	12/09/2020	10/02/2021	0
C312	HE192873	16/09/2023	null	1
D410	HE170233	20/10/2022	null	1
C312	HS178292	16/04/2022	15/02/2024	0
E255	HK170003	15/05/2021	null	1
H155	HS185633	09/04/2022	null	1
E255	HE167888	15/05/2021	null	1
E255	HS178292	15/03/2024	null	1
E255	HK187423	15/05/2021	null	1

## 1.7. Delete by rcode by merging

**If room have booked student, cannot delete**

Enter your choice (1-13): 7

Enter room code that you want to delete by merging: H155

This room is currently booked by students, cannot delete!

**If room do not have any booked student, perform delete the room G521**

- **Before delete room G521**

RCODE	NAME	DOM	FLOOR	TYPE	BEDS	BOOKED	PRICE
D410	410	D	4	double	2	2	1040000.0
D312	312	D	3	triple	6	0	980000.0
E255	255	E	2	double	0	4	1040000.0
C312	312	C	3	double	3	1	1040000.0
H155	155	H	1	triple	5	1	980000.0
G521	521	G	5	double	4	0	1040000.0

- **Room G521 have no booking so we don't have to care about bookings**

ROOM CODE	STUDENT CODE	BOOKING DATE	LEAVE DATE	STATUS
D410	HE190255	20/10/2022	null	1
D410	HS178292	12/09/2020	10/02/2021	0
C312	HE192873	16/09/2023	null	1
D410	HE170233	20/10/2022	null	1
C312	HS178292	16/04/2022	15/02/2024	0
E255	HK170003	15/05/2021	null	1
H155	HS185633	09/04/2022	null	1
E255	HE167888	15/05/2021	null	1
D312	HE190255	01/05/2021	10/05/2022	0
E255	HS178292	15/03/2024	null	1
E255	HK187423	15/05/2021	null	1

Enter your choice (1-13): 7

Enter room code that you want to delete by merging: G521

Delete successfully!

### Room table after deleting room G521

Enter your choice (1-13): 3

RCODE	NAME	DOM	FLOOR	TYPE	BEDS	BOOKED	PRICE
C312	312	C	3	double	3	1	1040000.0
D312	312	D	3	triple	6	0	980000.0
D410	410	D	4	double	2	2	1040000.0
E255	255	E	2	double	0	4	1040000.0
H155	155	H	1	triple	5	1	980000.0

## 1.8 simply balance tree

### input: current tree (breath first)

RCODE	NAME	DOM	FLOOR	TYPE	BEDS	BOOKED	PRICE
D410	410	D	4	double	2	2	1040000.0
D312	312	D	3	triple	6	0	980000.0
E255	255	E	2	double	0	4	1040000.0
C312	312	C	3	double	3	1	1040000.0
H155	155	H	1	triple	5	1	980000.0
G521	521	G	5	double	4	0	1040000.0

### output: a tree with same data but balance

Enter your choice (1-13): 8

Balance tree successfully!!

### result after balance (breath)

RCODE	NAME	DOM	FLOOR	TYPE	BEDS	BOOKED	PRICE
D410	410	D	4	double	2	2	1040000.0
C312	312	C	3	double	3	1	1040000.0
G521	521	G	5	double	4	0	1040000.0
D312	312	D	3	triple	6	0	980000.0
E255	255	E	2	double	0	4	1040000.0
H155	155	H	1	triple	5	1	980000.0

## 1.9 Display data by breadth-first traversal

Enter your choice (1-13): 9

RCODE	NAME	DOM	FLOOR	TYPE	BEDS	BOOKED	PRICE
D410	410	D	4	double	2	2	1040000.0
D312	312	D	3	triple	6	0	980000.0
E255	255	E	2	double	0	4	1040000.0
C312	312	C	3	double	3	1	1040000.0
H155	155	H	1	triple	5	1	980000.0
G521	521	G	5	double	4	0	1040000.0

## 1.10 Count the number of rooms

Đếm số lượng phòng:

Tổng số phòng trong hệ thống: 6

## 1.11 Search by name

Enter your choice (1-13): 11

Room name you want to search: 312

CODE	NAME	DOM	FLOOR	TYPE	BEDS	BOOKED	PRICE
C312	312	C	3	double	3	1	1040000.0
D312	312	D	3	triple	6	0	980000.0

## 1.12 Search booked by rcode

### - If room code exists

Enter room code to search: D410

Room found: D410,410,D,4,double,2,2,1040000.0

Student info in that room:

HE190255,Vu Huyen,2005

HE170233,Ha Phuong,2003

### - If not

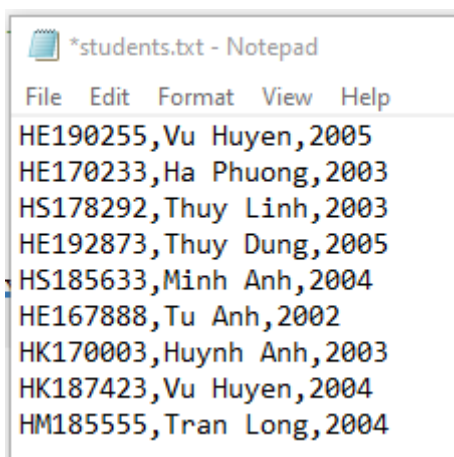
Enter room code to search: D566

Room with code D566 does not exist.

## 2. Student Tree

### 2.1 read data from file

input: data from text



```
*students.txt - Notepad
File Edit Format View Help
HE190255,Vu Huyen,2005
HE170233,Ha Phuong,2003
HS178292,Thuy Linh,2003
HE192873,Thuy Dung,2005
HS185633,Minh Anh,2004
HE167888,Tu Anh,2002
HK170003,Huynh Anh,2003
HK187423,Vu Huyen,2004
HM185555,Tran Long,2004
```

output: after added data and display by preorder



```

Enter your choice (1-9): 3
SCODE      | STUDENT NAME      | BIRTH YEAR
-----
HE190255   | Vu Huyen          | 2005
HE170233   | Ha Phuong         | 2003
HE167888   | Tu Anh            | 2002
HS178292   | Thuy Linh         | 2003
HE192873   | Thuy Dung         | 2005
HK170003   | Huynh Anh         | 2003
HK187423   | Vu Huyen          | 2004
HM185555   | Tran Long         | 2004
HS185633   | Minh Anh          | 2004

```

## 2.2 Input & add to the tree

### If users enter an string which is incorrect format

```

Student code:
Invalid input. Please enter only alphanumeric characters and spaces.
Student code: HE191226
Student name: th54
Birth year: 2457
Invalid input. Please enter a value between 1900 and 2023.
Birth year:
Invalid input. Please enter an integer.

```

### When everything is entered in the correct format

```

Student code: HE191226
Student name: Thao
Birth year: 2005
Student added successfully.

```

## 2.3 Display data by pre-order traversal

```

SCODE      | STUDENT NAME      | BIRTH YEAR
-----
HE190255   | Vu Huyen          | 2005
HE170233   | Ha Phuong         | 2003
HE167888   | Tu Anh            | 2002
HS178292   | Thuy Linh         | 2003
HE192873   | Thuy Dung         | 2005
HK170003   | Huynh Anh         | 2003
HK187423   | Vu Huyen          | 2004
HM185555   | Tran Long         | 2004
HS185633   | Minh Anh          | 2004

```

## 2.4 save student tree to file by in-order traversal

Before Save data:

3. DATA

Enter your choice (1-9): 3

SCODE	STUDENT NAME	BIRTH YEAR
HE190255	Vu Huyen	2005
HE170233	Ha Phuong	2003
HE167888	Tu Anh	2002
HM185555	Tran Long	2004
HE192873	Thuy Dung	2005
HK170003	Huynh Anh	2003
HK187423	Vu Huyen	2004
HS185633	Minh Anh	2004

- **Load to file:**



\*temp.txt - Notepad

File Edit Format View Help

HE167888,Tu Anh,2002  
HE170233,Ha Phuong,2003  
HE190255,Vu Huyen,2005  
HE192873,Thuy Dung,2005  
HK170003,Huynh Anh,2003  
HK187423,Vu Huyen,2004  
HM185555,Tran Long,2004  
HS185633,Minh Anh,2004

- |

## 2.5 Search by scode

- **If exists student having that scode**

Enter student code to search: HE190255

Student found: HE190255,Vu Huyen,2005

- **If not**

Enter your choice (1-9): 5

Enter student code to search: HU1174

Student with code HU1174 not found.

## 2.6 Delete by scode by copying

- If room have booked student, cannot delete

Enter student code that you want to delete by copying: HE190255  
This student is currently booking a room, cannot delete!

- Student data, and booking data before deleting

SCODE	STUDENT NAME	BIRTH YEAR
HE190255	Vu Huyen	2005
HE170233	Ha Phuong	2003
HE167888	Tu Anh	2002
HS178292	Thuy Linh	2003
HE192873	Thuy Dung	2005
HK170003	Huynh Anh	2003
HK187423	Vu Huyen	2004
HM185555	Tran Long	2004
HS185633	Minh Anh	2004

ROOM CODE	STUDENT CODE	BOOKING DATE	LEAVE DATE	STATUS
D410	HE190255	20/10/2022	null	1
D410	HS178292	12/09/2020	10/02/2021	0
C312	HE192873	16/09/2023	null	1
D410	HE170233	20/10/2022	null	1
C312	HS178292	16/04/2022	15/02/2024	0
E255	HK170003	15/05/2021	null	1
H155	HS185633	09/04/2022	null	1
E255	HE167888	15/05/2021	null	1
D312	HE190255	01/05/2021	10/05/2022	0
E255	HS178292	15/03/2024	null	1
E255	HK187423	15/05/2021	null	1

- If student do not book any room, perform delete the student HM185555 (no need to show booking after deleting, cause this student did not book any rooms)

Enter student code that you want to delete by copying: HM185555  
Delete successfully!

SCODE		STUDENT NAME		BIRTH YEAR
-----				
HE190255		Vu Huyen		2005
HE170233		Ha Phuong		2003
HE167888		Tu Anh		2002
HS178292		Thuy Linh		2003
HE192873		Thuy Dung		2005
HK170003		Huynh Anh		2003
HK187423		Vu Huyen		2004
HS185633		Minh Anh		2004

- If student totally left all room, perform delete the student HE190255

Assume HE190255 leave the room D410, and now we delete this student

ROOM CODE		STUDENT CODE		BOOKING DATE		LEAVE DATE		STATUS
-----								
D410		HE190255		20/10/2022		04/11/2024		0
D410		HS178292		12/09/2020		10/02/2021		0
C312		HE192873		16/09/2023		null		1
D410		HE170233		20/10/2022		null		1
C312		HS178292		16/04/2022		15/02/2024		0
E255		HK170003		15/05/2021		null		1
H155		HS185633		09/04/2022		null		1
E255		HE167888		15/05/2021		null		1
D312		HE190255		01/05/2021		10/05/2022		0
E255		HS178292		15/03/2024		null		1
E255		HK187423		15/05/2021		null		1

ENTER your CHOICE (1-9) : 0

Enter student code that you want to delete by copying: HE190255

Delete successfully!

1 2 3 4 5 6 7 8 9 0

SCODE		STUDENT NAME		BIRTH YEAR
-----				
HE170233		Ha Phuong		2003
HE167888		Tu Anh		2002
HS178292		Thuy Linh		2003
HE192873		Thuy Dung		2005
HK170003		Huynh Anh		2003
HK187423		Vu Huyen		2004
HM185555		Tran Long		2004
HS185633		Minh Anh		2004

All record about student with HE190255 has been totally deleted

ROOM CODE	STUDENT CODE	BOOKING DATE	LEAVE DATE	STATUS
D410	HS178292	12/09/2020	10/02/2021	0
C312	HE192873	16/09/2023	null	1
D410	HE170233	20/10/2022	null	1
C312	HS178292	16/04/2022	15/02/2024	0
E255	HK170003	15/05/2021	null	1
H155	HS185633	09/04/2022	null	1
E255	HE167888	15/05/2021	null	1
D312	HE190255	01/05/2021	10/05/2022	0
E255	HS178292	15/03/2024	null	1
E255	HK187423	15/05/2021	null	1

## 2.7 Search by Sname

- If exists student having that name

Enter student name to search: Vu Huyen

Students found:

HE190255, Vu Huyen, 2005

HK187423, Vu Huyen, 2004

- If not

Enter your choice (1-5): 1

Enter student name to search: Ching chong ding dong

No students found with name: Ching chong ding dong

## 2.8 Search booking room by scode

- If exists student having that scode

Enter student code that you want to search: HE190255

HE190255, Vu Huyen, 2005

ROOM CODE	STUDENT CODE	BOOKING DATE	LEAVE DATE	STATUS
D410	HE190255	20/10/2022	null	1
D312	HE190255	01/05/2021	10/05/2022	0

- If not

Enter student code that you want to search: HA7749

This student code doesn't exist!

## 3. Booking list

### 3.1 load data from file

before add any data:

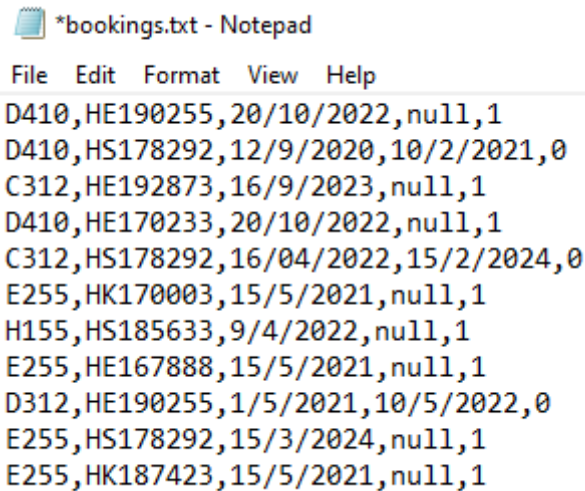
```
Enter your choice (1-7): 3
ROOM CODE | STUDENT CODE | BOOKING DATE | LEAVE DATE | STATUS
```

---

read data:

```
Enter your choice (1-7): 1
Read succesfully!
```

data from text



```
*bookings.txt - Notepad
File Edit Format View Help
D410,HE190255,20/10/2022,null,1
D410,HS178292,12/9/2020,10/2/2021,0
C312,HE192873,16/9/2023,null,1
D410,HE170233,20/10/2022,null,1
C312,HS178292,16/04/2022,15/2/2024,0
E255,HK170003,15/5/2021,null,1
H155,HS185633,9/4/2022,null,1
E255,HE167888,15/5/2021,null,1
D312,HE190255,1/5/2021,10/5/2022,0
E255,HS178292,15/3/2024,null,1
E255,HK187423,15/5/2021,null,1
```

after add data from text and be display:

```
Enter your choice (1-7): 3
ROOM CODE | STUDENT CODE | BOOKING DATE | LEAVE DATE | STATUS
```

---

D410	HE190255	20/10/2022	null	1
D410	HS178292	12/09/2020	10/02/2021	0
C312	HE192873	16/09/2023	null	1
D410	HE170233	20/10/2022	null	1
C312	HS178292	16/04/2022	15/02/2024	0
E255	HK170003	15/05/2021	null	1
H155	HS185633	09/04/2022	null	1
E255	HE167888	15/05/2021	null	1
D312	HE190255	01/05/2021	10/05/2022	0
E255	HS178292	15/03/2024	null	1
E255	HK187423	15/05/2021	null	1

### 3.2. Book the room

### If student is currently living in other room, cannot booking

```
Enter your choice (1-7): 2
Enter room code: D410
Enter student code: HS178292
Invalid booking, this student is still in a Dom!
```

### If the room is currently having no room left, cannot booking

```
Enter your choice (1-7): 2
Enter room code: E255
Enter student code: HE190255
This room is already full!
```

### If student is not booking in any room and room is having available bed(s), perform booking

```
Enter your choice (1-7): 2
Enter room code: D410
Enter student code: HK187423
Booking successfully!
```

## 3.3 Display the room data

```
Enter your choice (1-7): 3
```

ROOM CODE	STUDENT CODE	BOOKING DATE	LEAVE DATE	STATUS
D410	HE190255	20/10/2022	null	1
D410	HS178292	12/09/2020	10/02/2021	0
C312	HE192873	16/09/2023	null	1
D410	HE170233	20/10/2022	null	1
C312	HS178292	16/04/2022	15/02/2024	0
E255	HK170003	15/05/2021	null	1
H155	HS185633	09/04/2022	null	1
E255	HE167888	15/05/2021	null	1
D312	HE190255	01/05/2021	10/05/2022	0
E255	HS178292	15/03/2024	null	1
E255	HK187423	15/05/2021	null	1

## 3.4 Save booking list to file

data before save:

ROOM CODE	STUDENT CODE	BOOKING DATE	LEAVE DATE	STATUS
H155	HS185633	09/04/2022	null	1
E255	HS178292	15/03/2024	null	1
E255	HK187423	15/05/2021	null	1
E255	HK170003	15/05/2021	null	1
E255	HE167888	15/05/2021	null	1
D410	HS178292	12/09/2020	10/02/2021	0
D410	HE190255	20/10/2022	null	1
D410	HE170233	20/10/2022	null	1
D312	HE190255	01/05/2021	10/05/2022	0
C312	HS178292	16/04/2022	15/02/2024	0
C312	HE192873	16/09/2023	null	1

saved to file:



\*temp.txt - Notepad

File Edit Format View Help

```
H155,HS185633,09/04/2022,null,1
E255,HS178292,15/03/2024,null,1
E255,HK187423,15/05/2021,null,1
E255,HK170003,15/05/2021,null,1
E255,HE167888,15/05/2021,null,1
D410,HS178292,12/09/2020,10/02/2021,0
D410,HE190255,20/10/2022,null,1
D410,HE170233,20/10/2022,null,1
D312,HE190255,01/05/2021,10/05/2022,0
C312,HS178292,16/04/2022,15/02/2024,0
C312,HE192873,16/09/2023,null,1
```

### 3.5 Sort by rcode + scode

Sorted by rcode and scode in descending order.

ROOM CODE	STUDENT CODE	BOOKING DATE	LEAVE DATE	STATUS
H155	HS185633	09/04/2022	null	1
E255	HS178292	15/03/2024	null	1
E255	HK187423	15/05/2021	null	1
E255	HK170003	15/05/2021	null	1
E255	HE167888	15/05/2021	null	1
D410	HS178292	12/09/2020	10/02/2021	0
D410	HE190255	20/10/2022	null	1
D410	HE170233	20/10/2022	null	1
D312	HE190255	01/05/2021	10/05/2022	0
C312	HS178292	16/04/2022	15/02/2024	0
C312	HE192873	16/09/2023	null	1

### 3.6. Leave the room by rcode + scode



Enter your choice (1-7): 6  
Enter room code: E255  
Enter student code: HE167888  
Leave room successfully

**Booking table after student leaving, leave date set to today date**

E255		HE167888		15/05/2021		04/11/2024		0
------	--	----------	--	------------	--	------------	--	---

**Room table after student leaving, set beds plus 1 and booked minus 1**

E255		255		E		2		double		1		3		1040000.0	
------	--	-----	--	---	--	---	--	--------	--	---	--	---	--	-----------	--