Data Structures & Algorithms
Python Programming Assignment 2 Set A (60 marks)

SUBMISSION REQUIREMENTS:

1) Name the **ZIP files** containing your solutions according to the following requirements:

   ZIP all Python files to be submitted into a zip file and named it as “**ADMINNO_ASSN.zip**”. For example: “**123456F_ASSN.zip**”.

2) At the beginning of every Python file to be submitted, include your “**Name, Student Admin no. and Tutorial Group**” as comments.

3) Submission Due Date: **13 August 2023**

4) The deliverable is to be submitted to your module tutor via Bright Space

5) Late Submission: Marks will be deducted for late submission at the rate of 6 marks per day (10% of 60 marks per day)

6) Code review will be scheduled in week 16/17 during LAB and TUT sessions. There will be code walkthrough and technical question asked about the assignment completed by student.

7) Marks could be deducted if good coding practices are not observed during code review

Loyalty Program Management System Phase II

User Requirements (60 marks)
We have reached phase two of the project development. This assignment will build on the application (loyalty management program) which you have developed in assignment 1. The customer would like to add more features

The customer would like us to add these functions to the application:

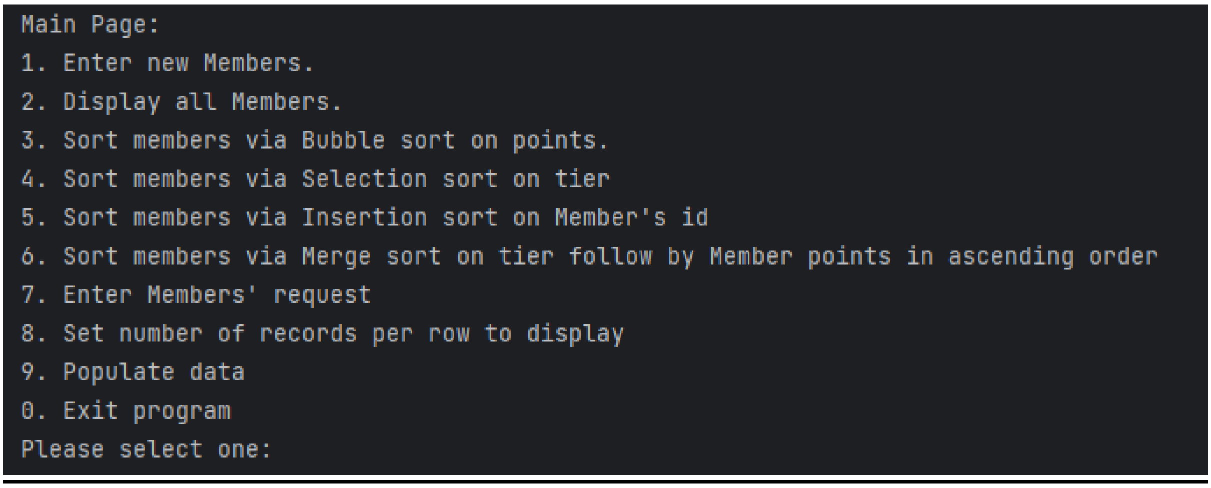
1.	Create a function to allow the employee to use insertion sort to sort the Member id in ascending order.	10 marks
2.	Create a function to allow the employee to use Merge Sort to sort the members in ascending order by their members' tier follows by their members points	14 marks
3.	Add new functions to handle member's request.	-
3a	Create a queue system so that the employee can service request from the members. Add a function in the application that allow employee to add member's request into the system using a new class object named "MemRequest" that contains member id and request into the queue. Before allowing the object to be added into the queue, the function will also perform a sequential search to check if the member ID already exists in the system. The object will only be allowed to be added if the member is a valid member. The queue will allow duplicate request to be added.	10 marks
3b	Create a function to allow the employee to see the number of requests in the queue	3 marks
3c	Create a function to allow employee to handle the next request in the queue with the details displayed as shown in the screen captures below. Once viewed, the member request will be removed from the queue and the number of remaining requests will be shown.	12 marks
4	To improve on the display of all records. A function is to be added to allow the employee to specify the number of records to display per row when displaying all the records. Recursive function must be used to create this new function. The default is one record per row.	10 marks
5	Update the menu with the new additions.	1 mark

Note: Proper code discipline must be maintained. For example, proper use of classes and separation of files for each class for code readability and maintenance.

Sample output screen shots

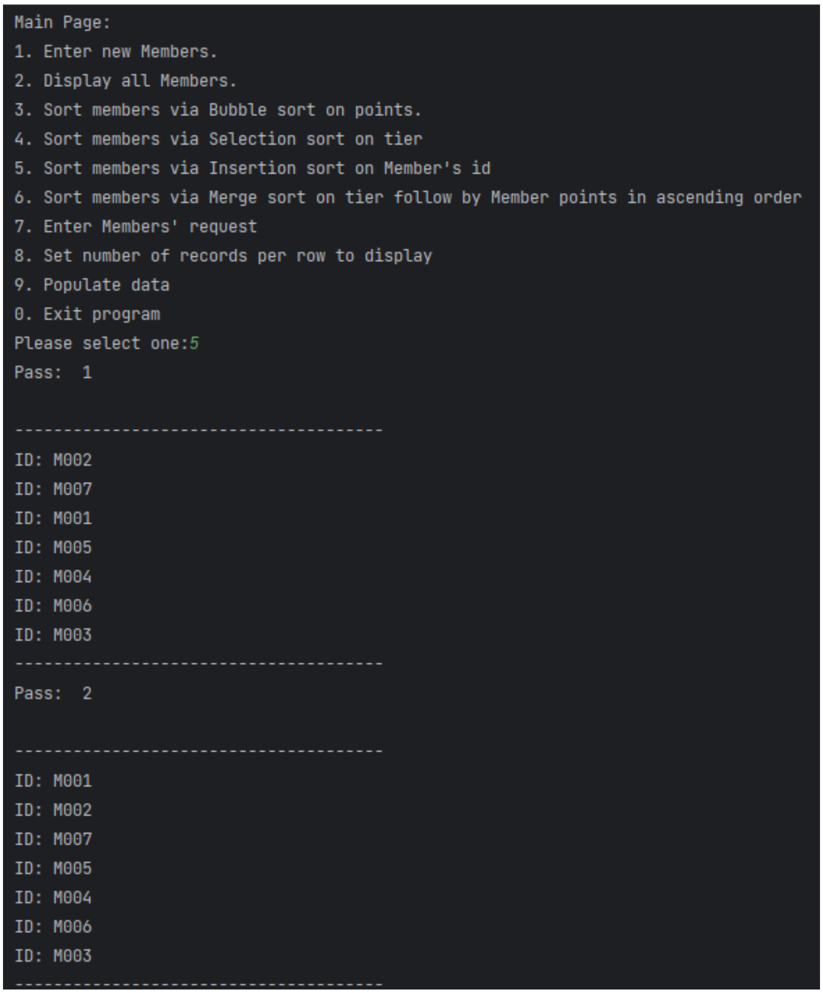
Continuing from Phase 1

Menu

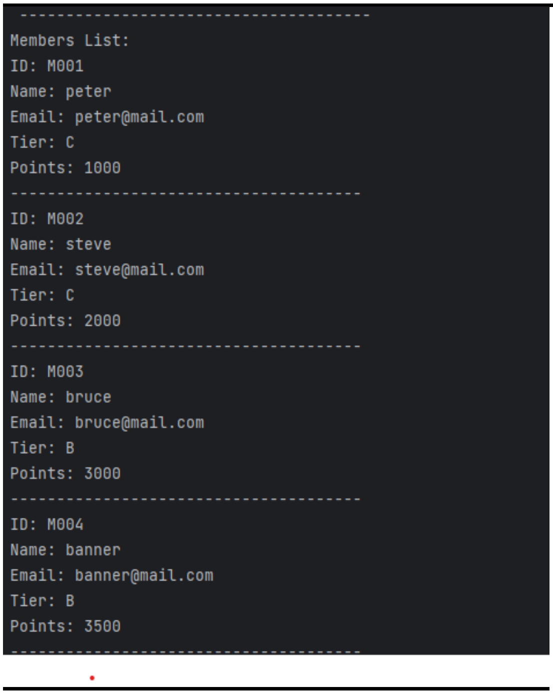


```
Main Page:
1. Enter new Members.
2. Display all Members.
3. Sort members via Bubble sort on points.
4. Sort members via Selection sort on tier
5. Sort members via Insertion sort on Member's id
6. Sort members via Merge sort on tier follow by Member points in ascending order
7. Enter Members' request
8. Set number of records per row to display
9. Populate data
0. Exit program
Please select one:
```

Insertion Sort (after you have populate data and remember to include the display for each passes)

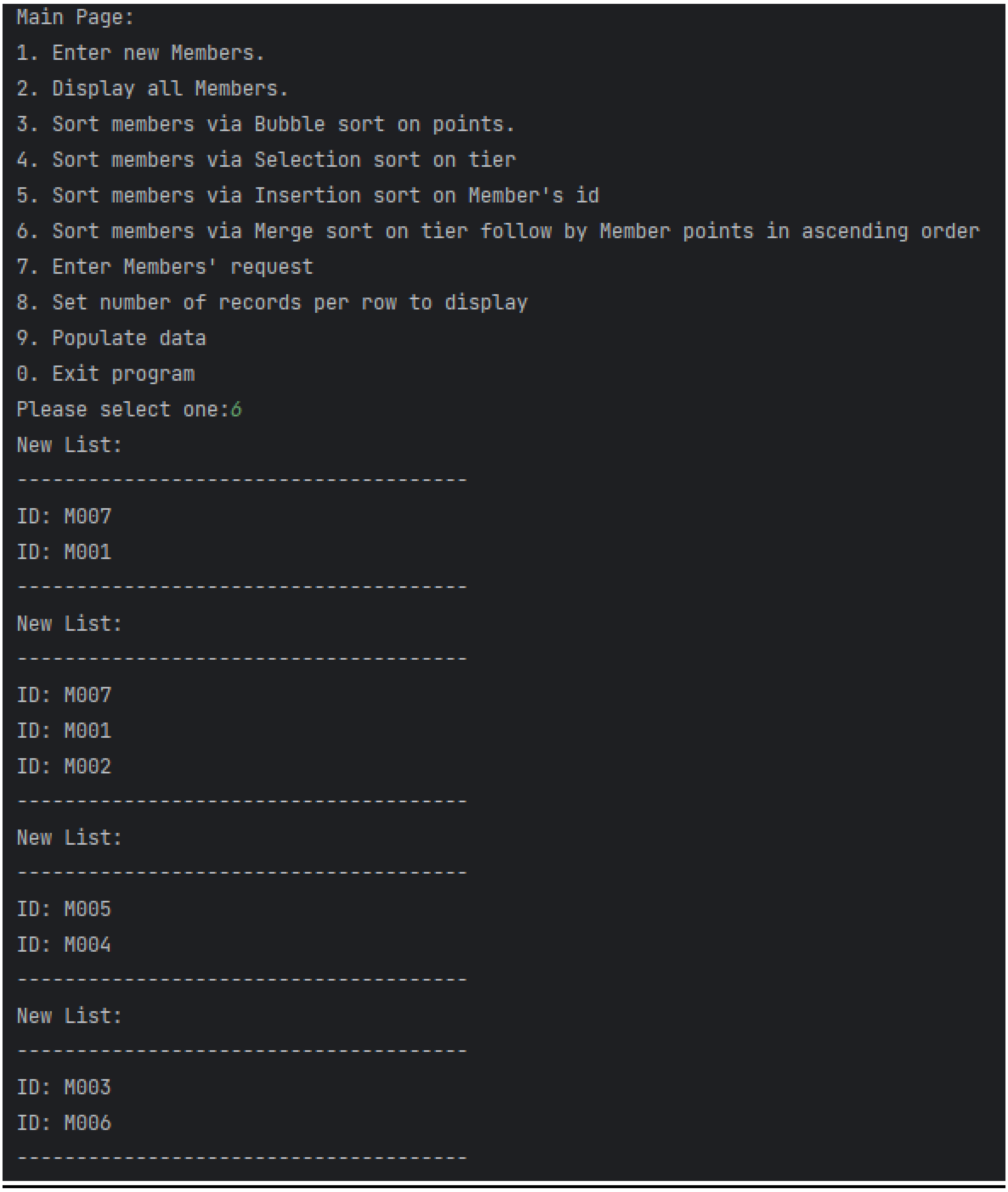


```
Main Page:
1. Enter new Members.
2. Display all Members.
3. Sort members via Bubble sort on points.
4. Sort members via Selection sort on tier
5. Sort members via Insertion sort on Member's id
6. Sort members via Merge sort on tier follow by Member points in ascending order
7. Enter Members' request
8. Set number of records per row to display
9. Populate data
0. Exit program
Please select one:5
Pass:  1

--------------------------------------
ID: M002
ID: M007
ID: M001
ID: M005
ID: M004
ID: M006
ID: M003
--------------------------------------
Pass:  2

--------------------------------------
ID: M001
ID: M002
ID: M007
ID: M005
ID: M004
ID: M006
ID: M003
--------------------------------------
```



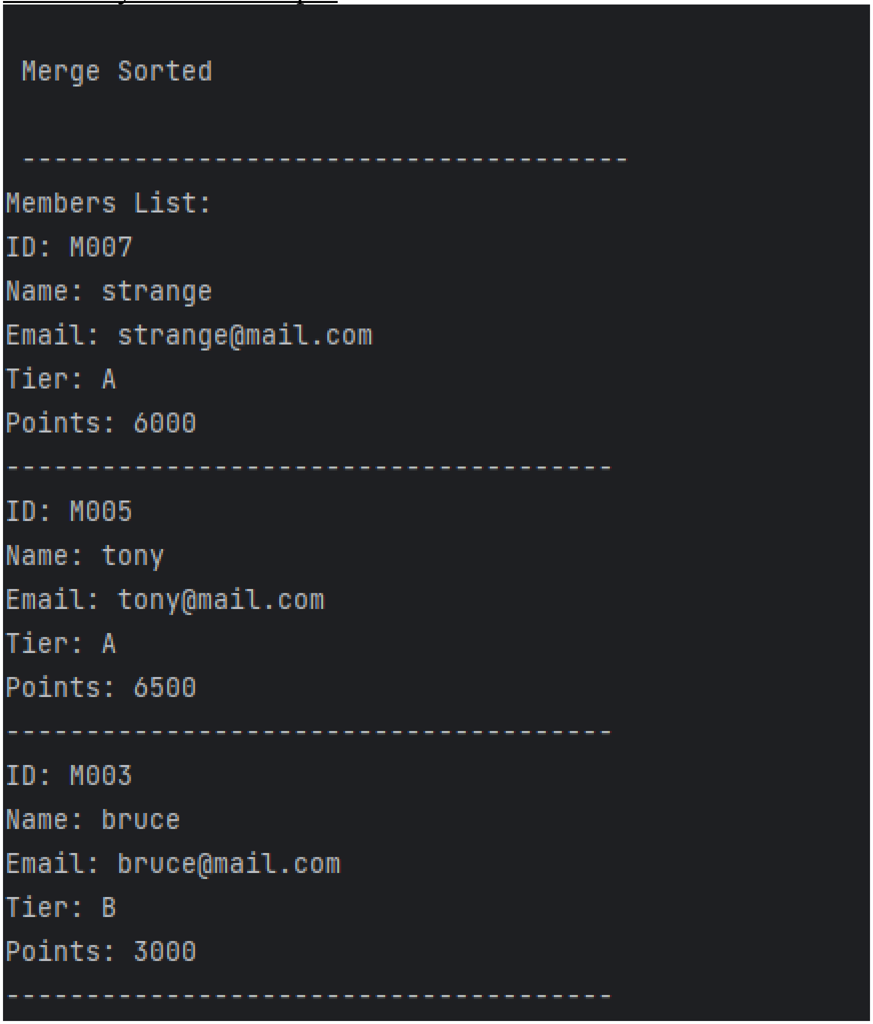
```
--------------------------------------
Members List:
ID: M001
Name: peter
Email: peter@mail.com
Tier: C
Points: 1000
--------------------------------------
ID: M002
Name: steve
Email: steve@mail.com
Tier: C
Points: 2000
--------------------------------------
ID: M003
Name: bruce
Email: bruce@mail.com
Tier: B
Points: 3000
--------------------------------------
ID: M004
Name: banner
Email: banner@mail.com
Tier: B
Points: 3500
--------------------------------------
```

Using Merge Sort to sort the members in ascending order by their members’ tier follows by their members points (Showing the left and right list after they merged for each pass)



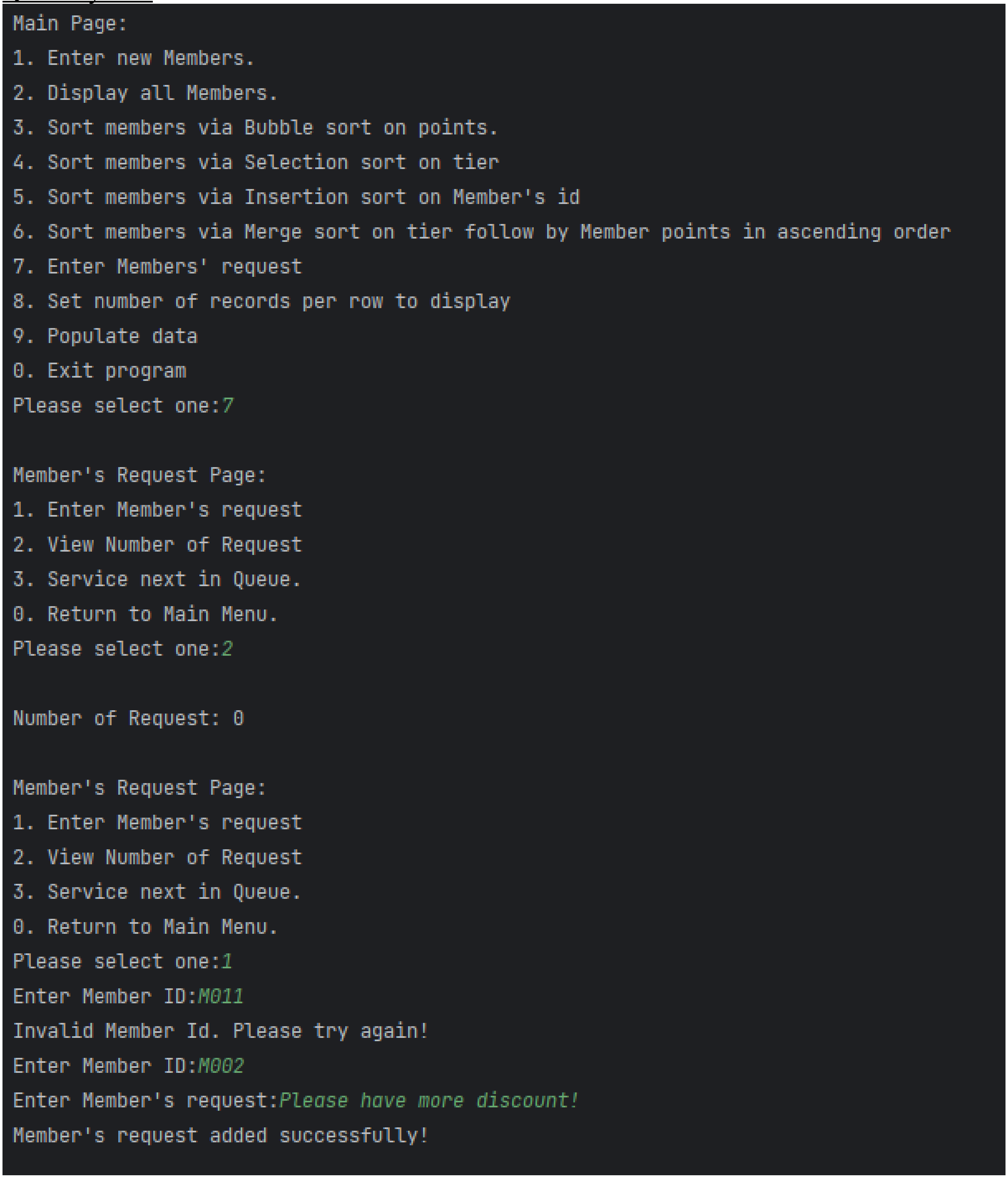
```
Main Page:
1. Enter new Members.
2. Display all Members.
3. Sort members via Bubble sort on points.
4. Sort members via Selection sort on tier
5. Sort members via Insertion sort on Member's id
6. Sort members via Merge sort on tier follow by Member points in ascending order
7. Enter Members' request
8. Set number of records per row to display
9. Populate data
0. Exit program
Please select one:6
New List:
--------------------------------------
ID: M007
ID: M001
--------------------------------------
New List:
--------------------------------------
ID: M007
ID: M001
ID: M002
--------------------------------------
New List:
--------------------------------------
ID: M005
ID: M004
--------------------------------------
New List:
--------------------------------------
ID: M003
ID: M006
--------------------------------------
```

Follow by the final output

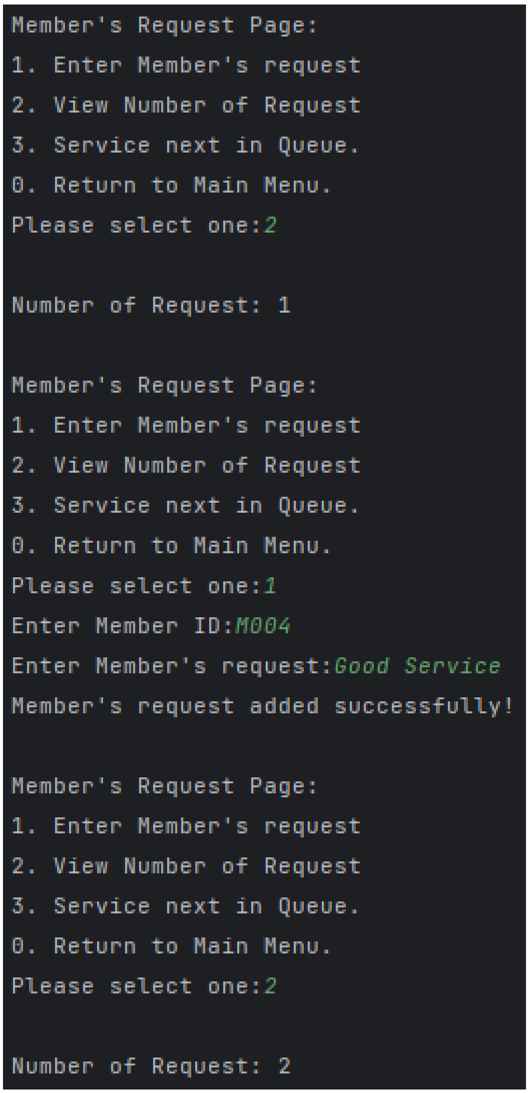


```
 Merge Sorted

 --------------------------------------
Members List:
ID: M007
Name: strange
Email: strange@mail.com
Tier: A
Points: 6000
--------------------------------------
ID: M005
Name: tony
Email: tony@mail.com
Tier: A
Points: 6500
--------------------------------------
ID: M003
Name: bruce
Email: bruce@mail.com
Tier: B
Points: 3000
--------------------------------------
```

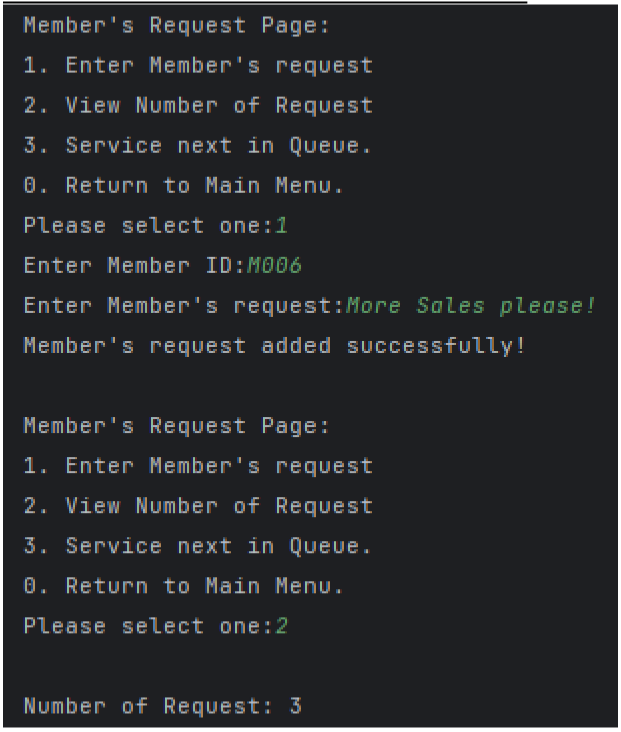
Queue system



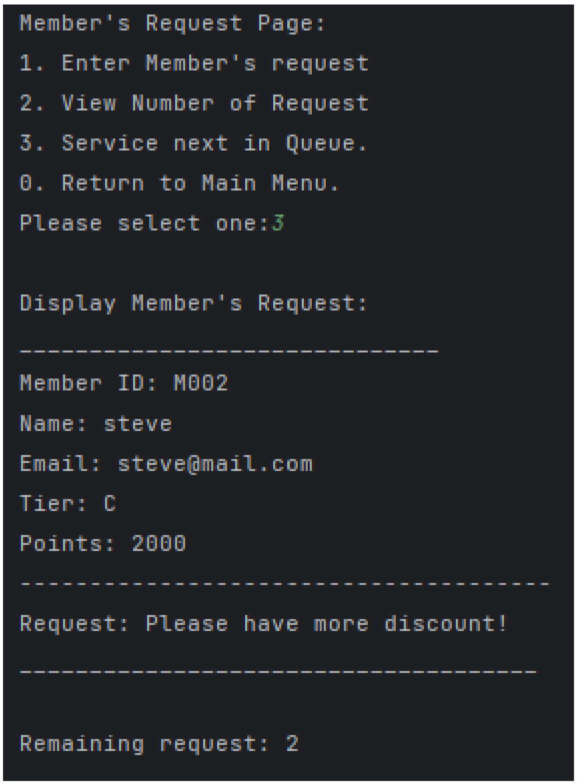
```
Main Page:
1. Enter new Members.
2. Display all Members.
3. Sort members via Bubble sort on points.
4. Sort members via Selection sort on tier
5. Sort members via Insertion sort on Member's id
6. Sort members via Merge sort on tier follow by Member points in ascending order
7. Enter Members' request
8. Set number of records per row to display
9. Populate data
0. Exit program
Please select one:7

Member's Request Page:
1. Enter Member's request
2. View Number of Request
3. Service next in Queue.
0. Return to Main Menu.
Please select one:2

Number of Request: 0

Member's Request Page:
1. Enter Member's request
2. View Number of Request
3. Service next in Queue.
0. Return to Main Menu.
Please select one:1
Enter Member ID:M011
Invalid Member Id. Please try again!
Enter Member ID:M002
Enter Member's request:Please have more discount!
Member's request added successfully!
```



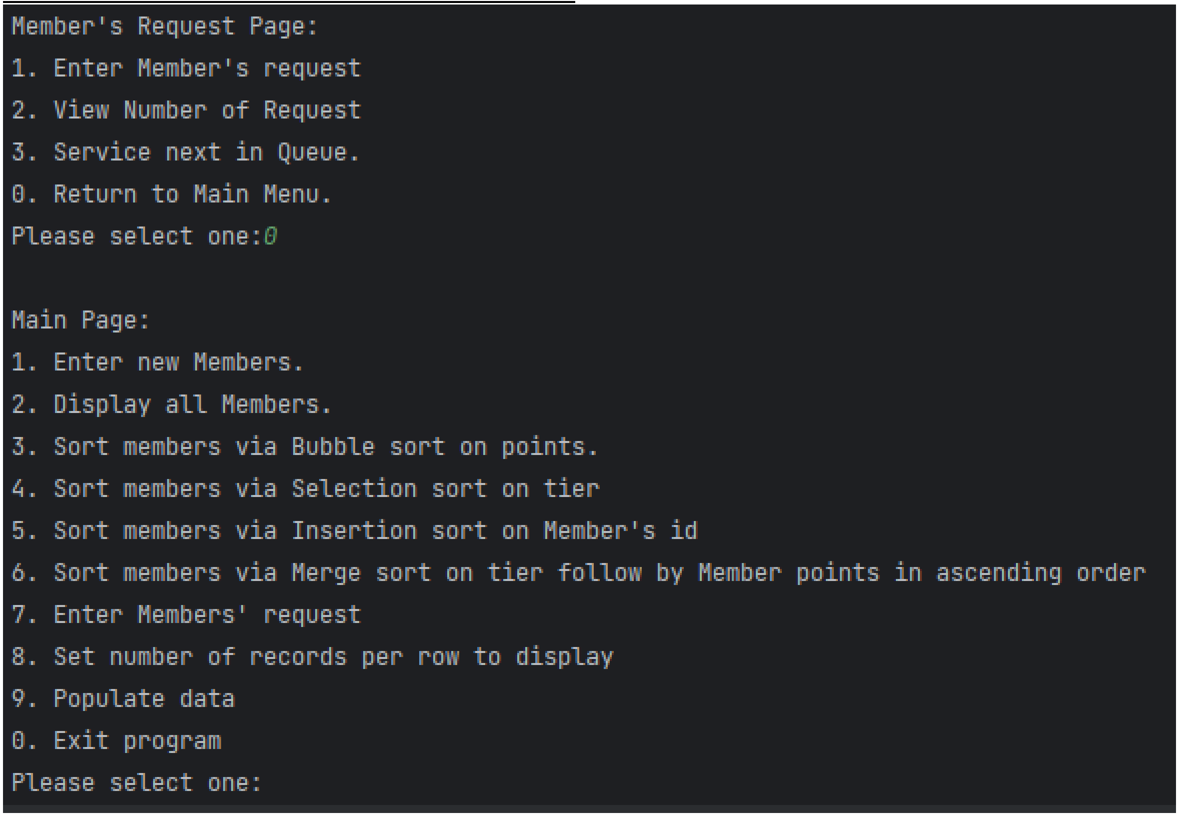
```
Member's Request Page:
1. Enter Member's request
2. View Number of Request
3. Service next in Queue.
0. Return to Main Menu.
Please select one:2

Number of Request: 1

Member's Request Page:
1. Enter Member's request
2. View Number of Request
3. Service next in Queue.
0. Return to Main Menu.
Please select one:1
Enter Member ID:M004
Enter Member's request:Good Service
Member's request added successfully!

Member's Request Page:
1. Enter Member's request
2. View Number of Request
3. Service next in Queue.
0. Return to Main Menu.
Please select one:2

Number of Request: 2
```



```
Member's Request Page:
1. Enter Member's request
2. View Number of Request
3. Service next in Queue.
0. Return to Main Menu.
Please select one:1
Enter Member ID:M006
Enter Member's request:More Sales please!
Member's request added successfully!

Member's Request Page:
1. Enter Member's request
2. View Number of Request
3. Service next in Queue.
0. Return to Main Menu.
Please select one:2

Number of Request: 3
```

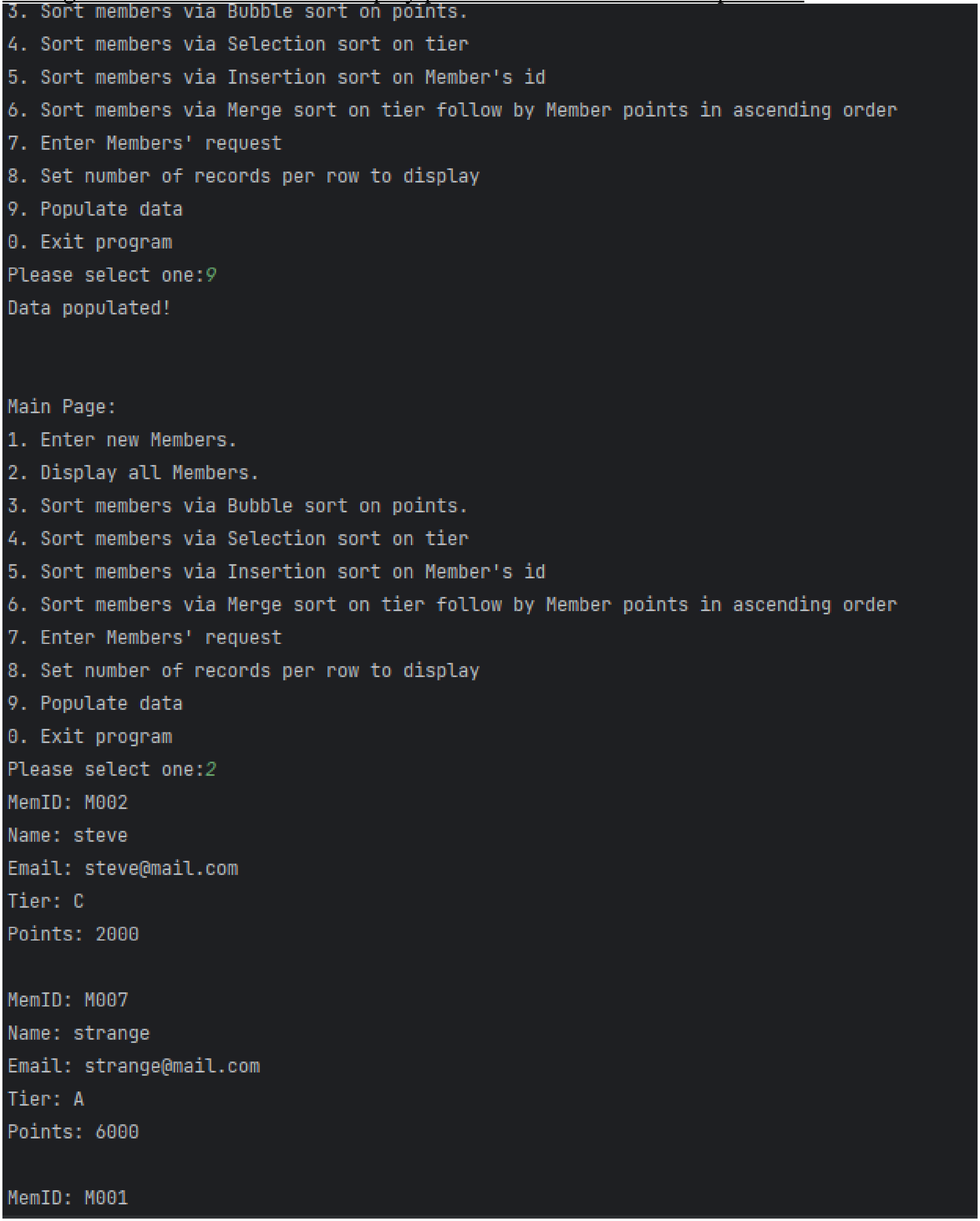


```
Member's Request Page:
1. Enter Member's request
2. View Number of Request
3. Service next in Queue.
0. Return to Main Menu.
Please select one:3

Display Member's Request:

------------------------------
Member ID: M002
Name: steve
Email: steve@mail.com
Tier: C
Points: 2000
--------------------------------------
Request: Please have more discount!

-------------------------------------

Remaining request: 2
```

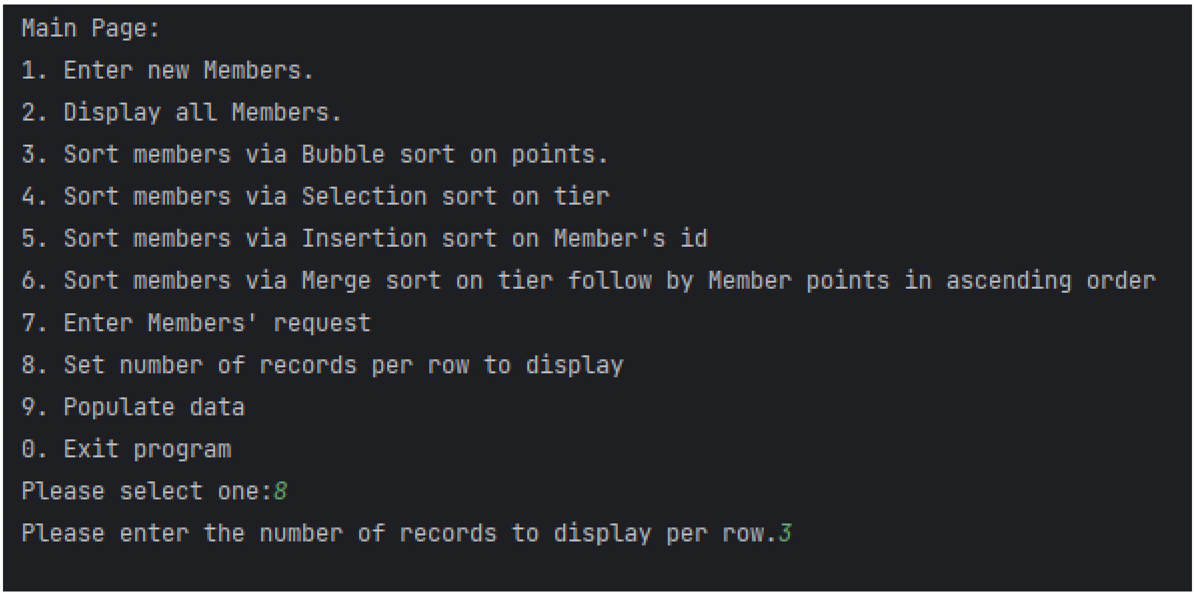


```
Member's Request Page:
1. Enter Member's request
2. View Number of Request
3. Service next in Queue.
0. Return to Main Menu.
Please select one:0

Main Page:
1. Enter new Members.
2. Display all Members.
3. Sort members via Bubble sort on points.
4. Sort members via Selection sort on tier
5. Sort members via Insertion sort on Member's id
6. Sort members via Merge sort on tier follow by Member points in ascending order
7. Enter Members' request
8. Set number of records per row to display
9. Populate data
0. Exit program
Please select one:
```

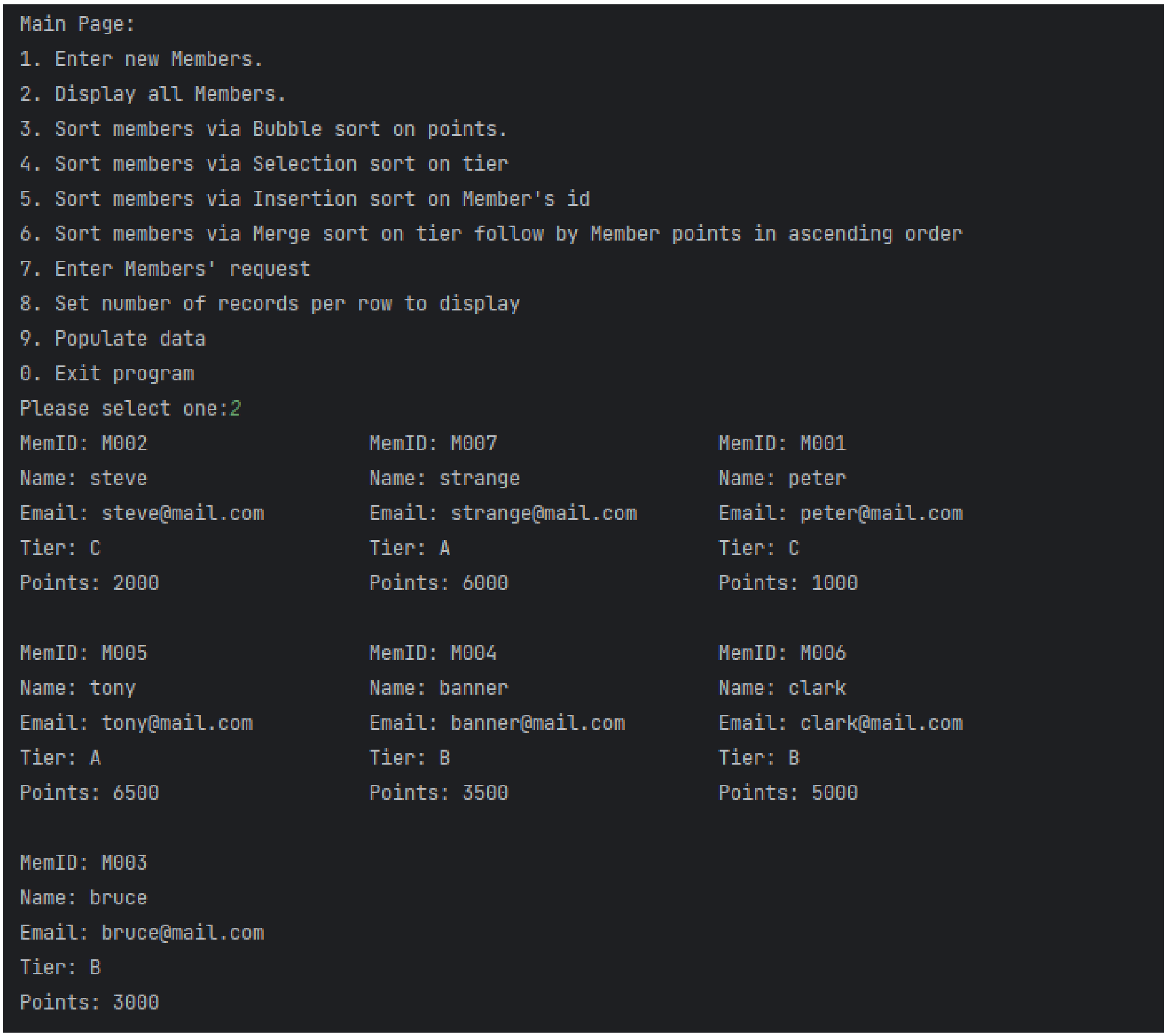
Setting the number of records to display per row. Default is 1 record per row.



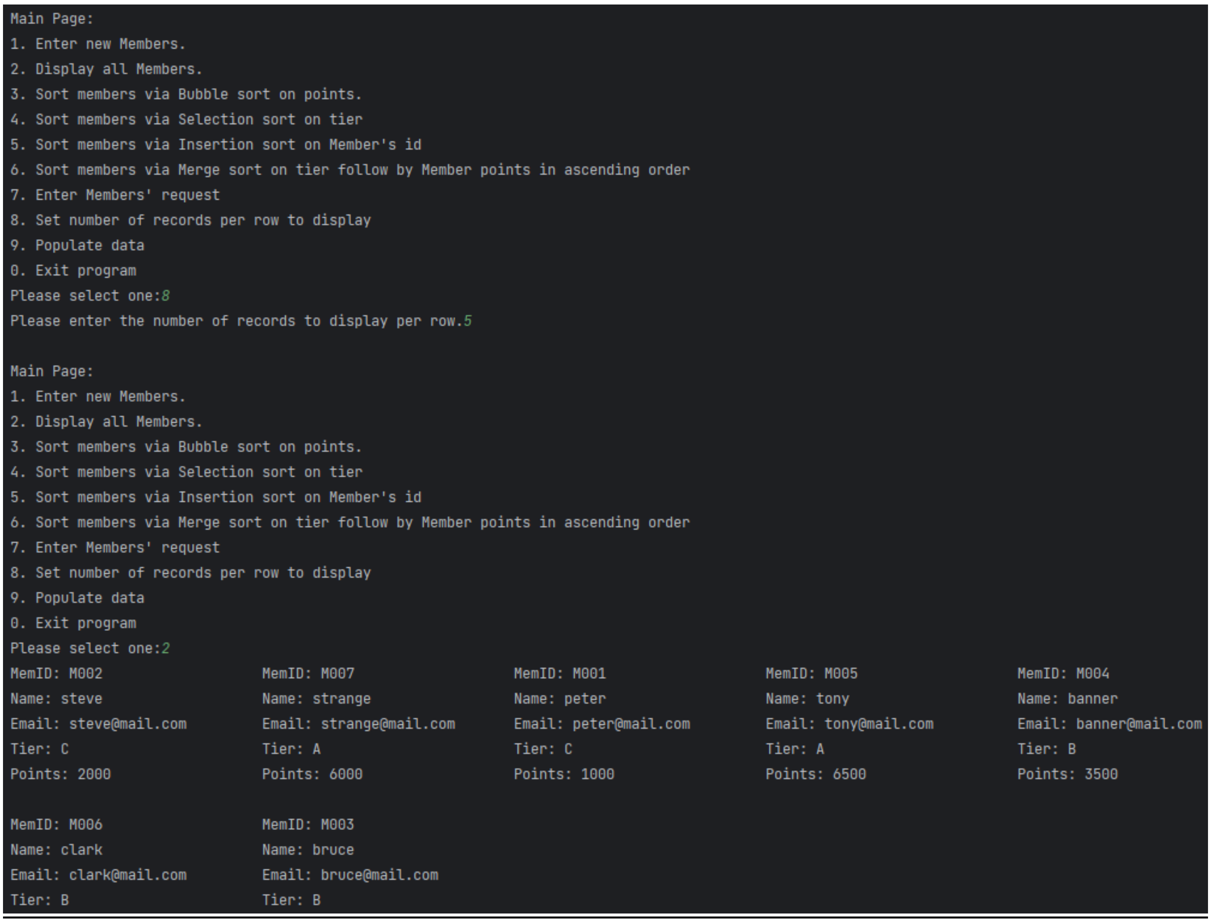
```
3. Sort members via Bubble sort on points.
4. Sort members via Selection sort on tier
5. Sort members via Insertion sort on Member's id
6. Sort members via Merge sort on tier follow by Member points in ascending order
7. Enter Members' request
8. Set number of records per row to display
9. Populate data
0. Exit program
Please select one:9
Data populated!


Main Page:
1. Enter new Members.
2. Display all Members.
3. Sort members via Bubble sort on points.
4. Sort members via Selection sort on tier
5. Sort members via Insertion sort on Member's id
6. Sort members via Merge sort on tier follow by Member points in ascending order
7. Enter Members' request
8. Set number of records per row to display
9. Populate data
0. Exit program
Please select one:2
MemID: M002
Name: steve
Email: steve@mail.com
Tier: C
Points: 2000

MemID: M007
Name: strange
Email: strange@mail.com
Tier: A
Points: 6000

MemID: M001
```



```
Main Page:
1. Enter new Members.
2. Display all Members.
3. Sort members via Bubble sort on points.
4. Sort members via Selection sort on tier
5. Sort members via Insertion sort on Member's id
6. Sort members via Merge sort on tier follow by Member points in ascending order
7. Enter Members' request
8. Set number of records per row to display
9. Populate data
0. Exit program
Please select one:8
Please enter the number of records to display per row.3
```

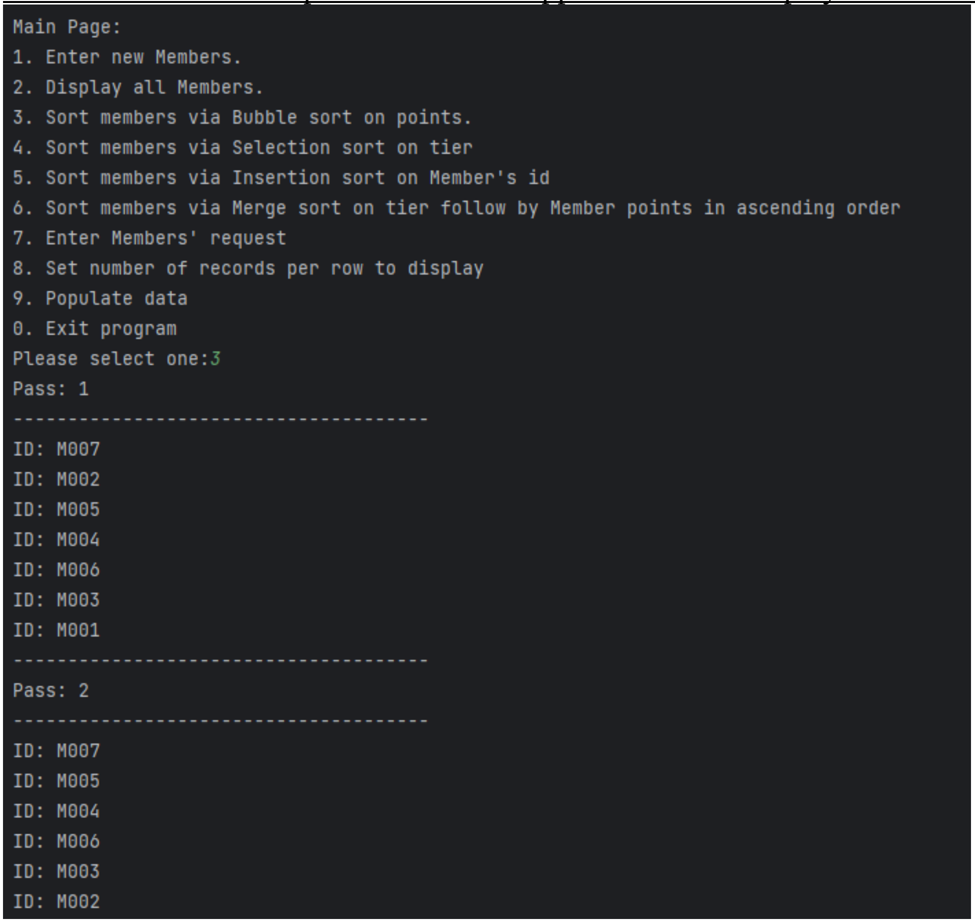


```
Main Page:
1. Enter new Members.
2. Display all Members.
3. Sort members via Bubble sort on points.
4. Sort members via Selection sort on tier
5. Sort members via Insertion sort on Member's id
6. Sort members via Merge sort on tier follow by Member points in ascending order
7. Enter Members' request
8. Set number of records per row to display
9. Populate data
0. Exit program
Please select one:2
MemID: M002                   MemID: M007                   MemID: M001
Name: steve                   Name: strange                 Name: peter
Email: steve@mail.com         Email: strange@mail.com       Email: peter@mail.com
Tier: C                       Tier: A                       Tier: C
Points: 2000                  Points: 6000                  Points: 1000

MemID: M005                   MemID: M004                   MemID: M006
Name: tony                    Name: banner                  Name: clark
Email: tony@mail.com          Email: banner@mail.com        Email: clark@mail.com
Tier: A                       Tier: B                       Tier: B
Points: 6500                  Points: 3500                  Points: 5000

MemID: M003
Name: bruce
Email: bruce@mail.com
Tier: B
Points: 3000
```

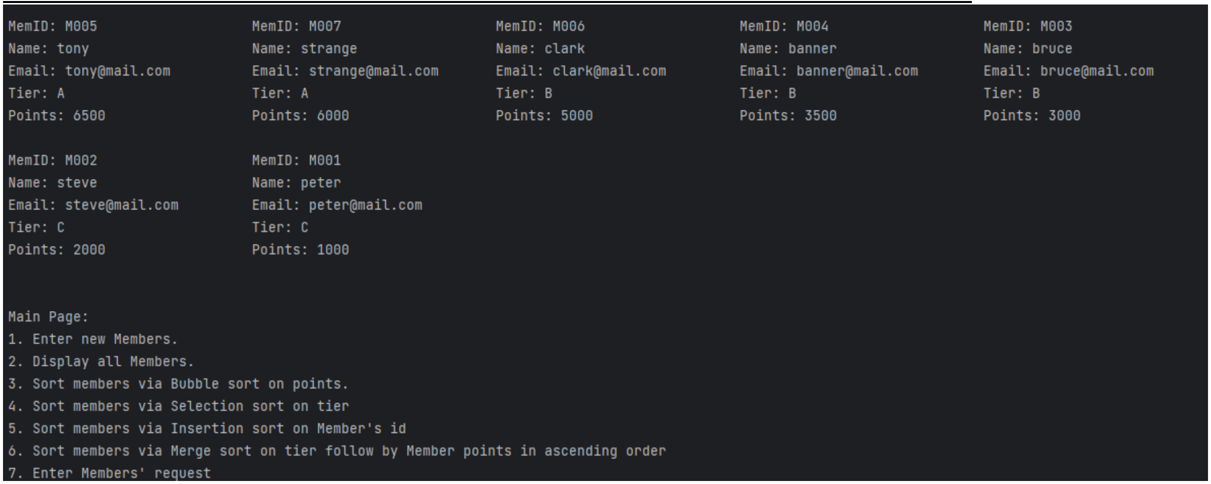


```
Main Page:
1. Enter new Members.
2. Display all Members.
3. Sort members via Bubble sort on points.
4. Sort members via Selection sort on tier
5. Sort members via Insertion sort on Member's id
6. Sort members via Merge sort on tier follow by Member points in ascending order
7. Enter Members' request
8. Set number of records per row to display
9. Populate data
0. Exit program
Please select one:8
Please enter the number of records to display per row.5

Main Page:
1. Enter new Members.
2. Display all Members.
3. Sort members via Bubble sort on points.
4. Sort members via Selection sort on tier
5. Sort members via Insertion sort on Member's id
6. Sort members via Merge sort on tier follow by Member points in ascending order
7. Enter Members' request
8. Set number of records per row to display
9. Populate data
0. Exit program
Please select one:2
MemID: M002                   MemID: M007                   MemID: M001                   MemID: M005                   MemID: M004
Name: steve                   Name: strange                 Name: peter                   Name: tony                    Name: banner
Email: steve@mail.com         Email: strange@mail.com       Email: peter@mail.com         Email: tony@mail.com          Email: banner@mail.com
Tier: C                       Tier: A                       Tier: C                       Tier: A                       Tier: B
Points: 2000                  Points: 6000                  Points: 1000                  Points: 6500                  Points: 3500

MemID: M006                   MemID: M003
Name: clark                   Name: bruce
Email: clark@mail.com         Email: bruce@mail.com
Tier: B                       Tier: B
```

The number of records per row will also applies to all the display outcome for all the sorts.



```
Main Page:
1. Enter new Members.
2. Display all Members.
3. Sort members via Bubble sort on points.
4. Sort members via Selection sort on tier
5. Sort members via Insertion sort on Member's id
6. Sort members via Merge sort on tier follow by Member points in ascending order
7. Enter Members' request
8. Set number of records per row to display
9. Populate data
0. Exit program
Please select one:3
Pass: 1
--------------------------------------
ID: M007
ID: M002
ID: M005
ID: M004
ID: M006
ID: M003
ID: M001
--------------------------------------
Pass: 2
--------------------------------------
ID: M007
ID: M005
ID: M004
ID: M006
ID: M003
ID: M002
```



```
MemID: M005                   MemID: M007                   MemID: M006                   MemID: M004                   MemID: M003
Name: tony                    Name: strange                 Name: clark                   Name: banner                  Name: bruce
Email: tony@mail.com          Email: strange@mail.com       Email: clark@mail.com         Email: banner@mail.com        Email: bruce@mail.com
Tier: A                       Tier: A                       Tier: B                       Tier: B                       Tier: B
Points: 6500                  Points: 6000                  Points: 5000                  Points: 3500                  Points: 3000

MemID: M002                   MemID: M001
Name: steve                   Name: peter
Email: steve@mail.com         Email: peter@mail.com
Tier: C                       Tier: C
Points: 2000                  Points: 1000


Main Page:
1. Enter new Members.
2. Display all Members.
3. Sort members via Bubble sort on points.
4. Sort members via Selection sort on tier
5. Sort members via Insertion sort on Member's id
6. Sort members via Merge sort on tier follow by Member points in ascending order
7. Enter Members' request
```