DATA STRUCTURE PROGRAM MANUAL

BENCHMARKING PROCESS
1. Add Contacts
   a. Enter command '1' then press enter.

```
Welcome to Contacts Manager Performance Testing


Select an option:
1. Run custom performance test
0. Exit


Enter your choice: 1
```

   b. Enter the number of desired contacts then press enter.

```
Select an option:
1. Run custom performance test
0. Exit

Enter your choice: 1
Enter number of contacts: 1000
```

   c. Enter command 'add' then press enter.

```
- list: Test listing all contacts
- suggest: Test suggesting contacts
- update: Test updating a contact
- delete: Test deleting a contact
- addconnection: Test adding a connection
- removeconnection: Test removing a connection
Enter operations to test (comma-separated): add
```

   d. Now the time and spaces used can be seen.

```
----------------------------------------
Adjacency List - addContact: Total Time: 24.09 ms, Total Memory: 592545 bytes
Adjacency Matrix - addContact: Total Time: 5.60 ms, Total Memory: 1414790 bytes
HashMap - addContact: Total Time: 2.03 ms, Total Memory: 519515 bytes
========================================
```

2. Search Contacts
   a. Enter command '1' then press enter.

```
Welcome to Contacts Manager Performance Testing

Select an option:
1. Run custom performance test
0. Exit

Enter your choice: 1
```

b. Enter the number of desired contacts then press enter.

```
Select an option:
1. Run custom performance test
0. Exit

Enter your choice: 1
Enter number of contacts: 1000
```

c. Enter command 'search' then press enter.

```
- list: Test listing all contacts
- suggest: Test suggesting contacts
- update: Test updating a contact
- delete: Test deleting a contact
- addconnection: Test adding a connection
- removeconnection: Test removing a connection
Enter operations to test (comma-separated): search
```

d. Now the time and spaces used can be seen.

```
----------------------------------------
Adjacency List - searchContact: Total Time: 0.218 ms, Total Memory: 47112 bytes
Adjacency Matrix - searchContact: Total Time: 0.0204 ms, Total Memory: 0 bytes
HashMap - searchContact: Total Time: 0.0769 ms, Total Memory: 47112 bytes
========================================
```

3. List All Contacts
   a. Enter command '1' then press enter.

```
Welcome to Contacts Manager Performance Testing

Select an option:
1. Run custom performance test
0. Exit

Enter your choice: 1
```

b. Enter the number of desired contacts then press enter.

```
Select an option:
1. Run custom performance test
0. Exit

Enter your choice: 1
Enter number of contacts: 1000
```

c. Enter command 'list' then press enter.

```
- list: Test listing all contacts
- suggest: Test suggesting contacts
- update: Test updating a contact
- delete: Test deleting a contact
- addconnection: Test adding a connection
- removeconnection: Test removing a connection
Enter operations to test (comma-separated): list
```

d. Now the time and spaces used can be seen.

```
----------------------------------------
Adjacency List - listAllContacts: Total Time: 0.000487 ms, Total Memory: 84 bytes
Adjacency Matrix - listAllContacts: Total Time: 0.000567 ms, Total Memory: 84 bytes
HashMap - listAllContacts: Total Time: 0.000385 ms, Total Memory: 84 bytes
========================================
```

4. Suggest Connections
   a. Enter command '1' then press enter.

```
Welcome to Contacts Manager Performance Testing

Select an option:
1. Run custom performance test
0. Exit

Enter your choice: 1
```

   b. Enter the number of desired contacts then press enter.

```
Select an option:
1. Run custom performance test
0. Exit

Enter your choice: 1
Enter number of contacts: 1000
```

   c. Enter command 'suggest' then press enter.

```
- list: Test listing all contacts
- suggest: Test suggesting contacts
- update: Test updating a contact
- delete: Test deleting a contact
- addconnection: Test adding a connection
- removeconnection: Test removing a connection
Enter operations to test (comma-separated): suggest
```

d. Now the time and spaces used can be seen.

```
Adjacency List - suggestContacts: Total Time: 3.21 ms, Total Memory: 304444 bytes
Adjacency Matrix - suggestContacts: Total Time: 0.666 ms, Total Memory: 290608 bytes
HashMap - suggestContacts: Total Time: 1.07 ms, Total Memory: 290608 bytes
```

5. Update Contacts
   a. Enter command '1' then press enter.

```
Welcome to Contacts Manager Performance Testing

Select an option:
1. Run custom performance test
0. Exit

Enter your choice: 1
```

   b. Enter the number of desired contacts then press enter.

```
Select an option:
1. Run custom performance test
0. Exit

Enter your choice: 1
Enter number of contacts: 1000
```

   c. Enter command 'update' then press enter.

```
- list: Test listing all contacts
- suggest: Test suggesting contacts
- update: Test updating a contact
- delete: Test deleting a contact
- addconnection: Test adding a connection
- removeconnection: Test removing a connection
Enter operations to test (comma-separated): update
```

   d. Now the time and spaces used can be seen.

```
Adjacency List - updateContact: Total Time: 0.0158 ms, Total Memory: 3228 bytes
Adjacency Matrix - updateContact: Total Time: 0.0136 ms, Total Memory: 4037 bytes
HashMap - updateContact: Total Time: 0.00783 ms, Total Memory: 1509 bytes
```

6. Delete Contacts
    a. Enter command '1' then press enter.

    ```
    Welcome to Contacts Manager Performance Testing

    Select an option:
    1. Run custom performance test
    0. Exit

    Enter your choice: 1
    ```

    b. Enter the number of desired contacts then press enter.

    ```
    Select an option:
    1. Run custom performance test
    0. Exit

    Enter your choice: 1
    Enter number of contacts: 1000
    ```

    c. Enter command 'delete' then press enter.

    ```
    - list: Test listing all contacts
    - suggest: Test suggesting contacts
    - update: Test updating a contact
    - delete: Test deleting a contact
    - addconnection: Test adding a connection
    - removeconnection: Test removing a connection
    Enter operations to test (comma-separated): delete
    ```

    d. Now the time and spaces used can be seen.

    ```
    Adjacency List - deleteContact: Total Time: 0.0144 ms, Total Memory: 3613 bytes
    Adjacency Matrix - deleteContact: Total Time: 0.0107 ms, Total Memory: 2737 bytes
    HashMap - deleteContact: Total Time: 0.00890 ms, Total Memory: 4969 bytes
    ```

7. Add Connections
    a. Enter command '1' then press enter.

    ```
    Welcome to Contacts Manager Performance Testing

    Select an option:
    1. Run custom performance test
    0. Exit

    Enter your choice: 1
    ```

    b. Enter the number of desired contacts then press enter.

```
Select an option:
1. Run custom performance test
0. Exit

Enter your choice: 1
Enter number of contacts: 1000
```

c.   Enter command 'addconnection' then press enter.

```
- suggest: Test suggesting contacts
- update: Test updating a contact
- delete: Test deleting a contact
- addconnection: Test adding a connection
- removeconnection: Test removing a connection
Enter operations to test (comma-separated): addconnection
```

d.   Now the time and spaces used can be seen.

```
Adjacency List - addConnection: Total Time: 0.342 ms, Total Memory: 291088 bytes
Adjacency Matrix - addConnection: Total Time: 0.0848 ms, Total Memory: 291088 bytes
HashMap - addConnection: Total Time: 0.159 ms, Total Memory: 291088 bytes
=========================================
```

8. Remove Connections
   a.   Enter command '1' then press enter.

```
Welcome to Contacts Manager Performance Testing

Select an option:
1. Run custom performance test
0. Exit

Enter your choice: 1
```

   b.   Enter the number of desired contacts then press enter.

```
Select an option:
1. Run custom performance test
0. Exit

Enter your choice: 1
Enter number of contacts: 1000
```

   c.   Enter command 'removeconnection' then press enter.

```
- suggest: Test suggesting contacts
- update: Test updating a contact
- delete: Test deleting a contact
- addconnection: Test adding a connection
- removeconnection: Test removing a connection
Enter operations to test (comma-separated): removeconnection
```

d. Now the time and spaces used can be seen


```
--------------------------------------
Adjacency List - removeConnection: Total Time: 0.241 ms, Total Memory: 322100 bytes
Adjacency Matrix - removeConnection: Total Time: 0.0902 ms, Total Memory: 290416 bytes
HashMap - removeConnection: Total Time: 0.212 ms, Total Memory: 290416 bytes
--------------------------------------
```

CONTACT MANAGER FX (GUI)

1. View Selection
   Choose which data structure you want to view.

2. Add Contacts
   To add a contact, enter their name in the box beside the 'Add' button followed by their id and press the 'Add' button.
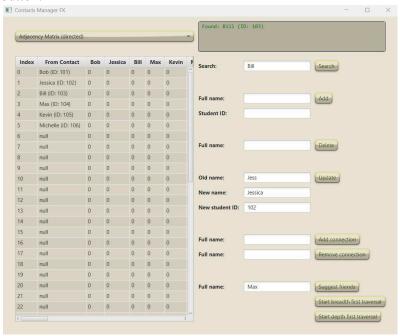
3. Update Contacts

   To update a contact, enter their old name from the contact in the box beside the 'Update' button and continue to enter their new name and id, then press the 'Update' button.
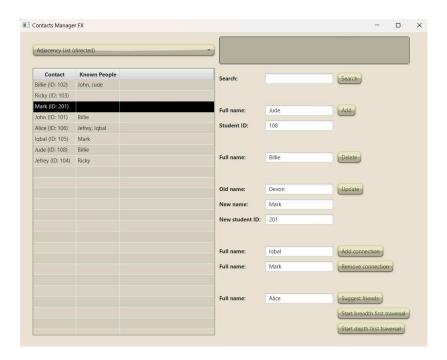

4. Search Contacts

   To search for a contact, enter their name in the search category and then press the 'Search' button.
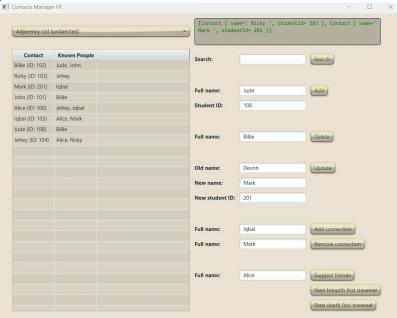

5. Delete Contacts

   To delete a contact, enter their name in the box beside the 'Delete' button and then press the button.
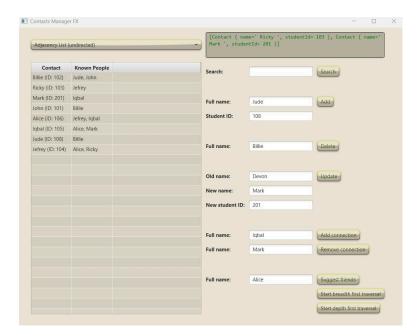
6. Suggest Connections
    To suggest a contact, enter their name in the box beside the 'Suggest friends' button and then press the button.

7. Add Connections
    To add a connection, enter the name in the box beside the 'Add connections' button and add another name below it to add connection between those two names then press the button.

8. Remove Connections
   To remove a connection, enter their name in the box beside the 'Remove connections' button and add another name below it to remove connection between those two names then press the button.