Sample Run:

```
[hughesc2@compile p2]$ valgrind --leak-check=full ./cmsc257-s21-p2
==31711== Memcheck, a memory error detector
==31711== Copyright (C) 2002-2017, and GNU GPL'd, by Julian Seward et al.
==31711== Using Valgrind-3.15.0 and LibVEX; rerun with -h for copyright info
==31711== Command: ./cmsc257-s21-p2
==31711==

**************    HUGHESC2 INBOX    **************
**************     Total Inbox: 0010   **************

1. Show Inbox
2. Show Email by ID
3. Sort Inbox by Sender
4. Sort Inbox by ID
5. Search Inbox by Keyword
6. Delete
7. Exit Inbox

1

ID   SENDER---------------   MM/DD/YYYY   SUBJECT--------
--   --------------------    --/--/----    ---------------
00 - asonmez@mail.com       - 11/20/2020 - Welcome to your
01 - mmartinez@mail.com     - 11/30/2020 - Padding out you
02 - dboyle@mail.com        - 12/02/2020 - 3rd email!
03 - cbluer@mail.com        - 12/08/2020 - 4th email!
04 - cboyle@mail.com        - 12/18/2020 - 5th email!
05 - sblack@mail.com        - 01/01/2021 - 6th email!
06 - sblack@mail.com        - 01/05/2021 - 7th email!
07 - sblack@mail.com        - 02/15/2021 - 8th email!
08 - sblack@mail.com        - 02/25/2021 - 9th email!
09 - dboyle@mail.com        - 03/15/2021 - Last email!

**************    HUGHESC2 INBOX    **************
**************     Total Inbox: 0010   **************

1. Show Inbox
2. Show Email by ID
3. Sort Inbox by Sender
4. Sort Inbox by ID
5. Search Inbox by Keyword
6. Delete
7. Exit Inbox

2

Enter the ID of the email you want to read:
2
```

```
dboyle@mail.com - 3rd email!
Email Recieved on: 12/02/2020

Alright, time for another email for your inbox. Not going too lie, it's a bit of a pain coming up with s
tuff for these strings. Anyways, have fun with your code!


**************    HUGHESC2 INBOX    **************
**************    Total Inbox: 0010    **************

1. Show Inbox
2. Show Email by ID
3. Sort Inbox by Sender
4. Sort Inbox by ID
5. Search Inbox by Keyword
6. Delete
7. Exit Inbox

3

**************    HUGHESC2 INBOX    **************
**************    Total Inbox: 0010    **************

1. Show Inbox
2. Show Email by ID
3. Sort Inbox by Sender
4. Sort Inbox by ID
5. Search Inbox by Keyword
6. Delete
7. Exit Inbox

1

ID   SENDER---------------   MM/DD/YYYY   SUBJECT--------
--   --------------------   --/--/----   ---------------
00 - asonmez@mail.com       - 11/20/2020 - Welcome to your
03 - cbluer@mail.com        - 12/08/2020 - 4th email!
04 - cboyle@mail.com        - 12/18/2020 - 5th email!
02 - dboyle@mail.com        - 12/02/2020 - 3rd email!
09 - dboyle@mail.com        - 03/15/2021 - Last email!
01 - mmartinez@mail.com     - 11/30/2020 - Padding out you
05 - sblack@mail.com        - 01/01/2021 - 6th email!
06 - sblack@mail.com        - 01/05/2021 - 7th email!
07 - sblack@mail.com        - 02/15/2021 - 8th email!
08 - sblack@mail.com        - 02/25/2021 - 9th email!

**************    HUGHESC2 INBOX    **************
**************    Total Inbox: 0010    **************
```

```
**************   HUGHESC2 INBOX   **************
**************    Total Inbox: 0010   **************

1. Show Inbox
2. Show Email by ID
3. Sort Inbox by Sender
4. Sort Inbox by ID
5. Search Inbox by Keyword
6. Delete
7. Exit Inbox

5

Enter the keyword you wish to search for:
oyl


ID   SENDER---------------   MM/DD/YYYY   SUBJECT--------
--   --------------------   --/--/----   ---------------
04 - cboyle@mail.com        - 12/18/2020 - 5th email!
02 - dboyle@mail.com        - 12/02/2020 - 3rd email!
09 - dboyle@mail.com        - 03/15/2021 - Last email!

**************   HUGHESC2 INBOX   **************
**************    Total Inbox: 0010   **************

1. Show Inbox
2. Show Email by ID
3. Sort Inbox by Sender
4. Sort Inbox by ID
5. Search Inbox by Keyword
6. Delete
7. Exit Inbox

5

Enter the keyword you wish to search for:
you


ID   SENDER---------------   MM/DD/YYYY   SUBJECT--------
--   --------------------   --/--/----   ---------------
00 - asonmez@mail.com       - 11/20/2020 - Welcome to your inbox.
02 - dboyle@mail.com        - 12/02/2020 - 3rd email!
01 - mmartinez@mail.com     - 11/30/2020 - Padding out your inbox.

**************   HUGHESC2 INBOX   **************
**************    Total Inbox: 0010   **************
```

```
***************    HUGHESC2 INBOX    ***************
***************    Total Inbox: 0010   ***************

1. Show Inbox
2. Show Email by ID
3. Sort Inbox by Sender
4. Sort Inbox by ID
5. Search Inbox by Keyword
6. Delete
7. Exit Inbox


6

Enter the ID of the email you wish to delete:
2
Email with ID = 2 is deleted


***************    HUGHESC2 INBOX    ***************
***************    Total Inbox: 0009   ***************

1. Show Inbox
2. Show Email by ID
3. Sort Inbox by Sender
4. Sort Inbox by ID
5. Search Inbox by Keyword
6. Delete
7. Exit Inbox


1

ID   SENDER---------------    MM/DD/YYYY    SUBJECT--------
--   ---------------------    --/--/----    ---------------
00 - asonmez@mail.com       - 11/20/2020 - Welcome to your
03 - cbluer@mail.com        - 12/08/2020 - 4th email!
04 - cboyle@mail.com        - 12/18/2020 - 5th email!
09 - dboyle@mail.com        - 03/15/2021 - Last email!
01 - mmartinez@mail.com     - 11/30/2020 - Padding out you
05 - sblack@mail.com        - 01/01/2021 - 6th email!
06 - sblack@mail.com        - 01/05/2021 - 7th email!
07 - sblack@mail.com        - 02/15/2021 - 8th email!
08 - sblack@mail.com        - 02/25/2021 - 9th email!

***************    HUGHESC2 INBOX    ***************
***************    Total Inbox: 0009   ***************

1. Show Inbox
2. Show Email by ID
3. Sort Inbox by Sender
```

```
**************    HUGHESC2 INBOX    **************
**************    Total Inbox: 0009    **************

1. Show Inbox
2. Show Email by ID
3. Sort Inbox by Sender
4. Sort Inbox by ID
5. Search Inbox by Keyword
6. Delete
7. Exit Inbox

5

Enter the keyword you wish to search for:
you


ID   SENDER---------------   MM/DD/YYYY   SUBJECT--------
--   --------------------    --/--/----   ---------------
00 - asonmez@mail.com        - 11/20/2020 - Welcome to your inbox.
01 - mmartinez@mail.com      - 11/30/2020 - Padding out your inbox.

**************    HUGHESC2 INBOX    **************
**************    Total Inbox: 0009    **************

1. Show Inbox
2. Show Email by ID
3. Sort Inbox by Sender
4. Sort Inbox by ID
5. Search Inbox by Keyword
6. Delete
7. Exit Inbox

4

**************    HUGHESC2 INBOX    **************
**************    Total Inbox: 0009    **************

1. Show Inbox
2. Show Email by ID
3. Sort Inbox by Sender
4. Sort Inbox by ID
5. Search Inbox by Keyword
6. Delete
7. Exit Inbox

1

ID   SENDER---------------   MM/DD/YYYY   SUBJECT--------
```

```
00 - asonmez@mail.com      - 11/20/2020 - Welcome to your
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04 - cboyle@mail.com       - 12/18/2020 - 5th email!
05 - sblack@mail.com       - 01/01/2021 - 6th email!
06 - sblack@mail.com       - 01/05/2021 - 7th email!
07 - sblack@mail.com       - 02/15/2021 - 8th email!
08 - sblack@mail.com       - 02/25/2021 - 9th email!
09 - dboyle@mail.com       - 03/15/2021 - Last email!

**************   HUGHESC2 INBOX   **************
**************   Total Inbox: 0009  **************

1. Show Inbox
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4. Sort Inbox by ID
5. Search Inbox by Keyword
6. Delete
7. Exit Inbox

7
Exiting e-mail client - Good Bye!

==31711==
==31711== HEAP SUMMARY:
==31711==     in use at exit: 112,448 bytes in 9 blocks
==31711==   total heap usage: 12 allocs, 3 frees, 112,576 bytes allocated
==31711==
==31711== 448 (56 direct, 392 indirect) bytes in 1 blocks are definitely lost in loss record 8 of 9
==31711==    at 0x4C29F73: malloc (vg_replace_malloc.c:309)
==31711==    by 0x4009F6: create_email (in /home/hughesc2/p2/cmsc257-s21-p2)
==31711==    by 0x400822: initialize (in /home/hughesc2/p2/cmsc257-s21-p2)
==31711==    by 0x40076E: main (in /home/hughesc2/p2/cmsc257-s21-p2)
==31711==
==31711== 112,000 bytes in 1 blocks are definitely lost in loss record 9 of 9
==31711==    at 0x4C29F73: malloc (vg_replace_malloc.c:309)
==31711==    by 0x4007A3: initialize (in /home/hughesc2/p2/cmsc257-s21-p2)
==31711==    by 0x40076E: main (in /home/hughesc2/p2/cmsc257-s21-p2)
==31711==
==31711== LEAK SUMMARY:
==31711==    definitely lost: 112,056 bytes in 2 blocks
==31711==    indirectly lost: 392 bytes in 7 blocks
==31711==      possibly lost: 0 bytes in 0 blocks
==31711==    still reachable: 0 bytes in 0 blocks
==31711==         suppressed: 0 bytes in 0 blocks
==31711==
==31711== For lists of detected and suppressed errors, rerun with: -s
==31711== ERROR SUMMARY: 2 errors from 2 contexts (suppressed: 0 from 0)
```

Known Limitations:

- Valgrind output shows that all memory is not freed from heap