Execution Output For All Test Cases [Part I and II]

Main memory Output (Part I)

Here are some outputs of the program's use cases

The menu of the main memory program:

```
Welcome to Memory management Program
---------------------------------------------------------------
command menu:

RQ   -------> Request for a contiguous block of memory.
              Flag:
              F-first fit
              B-best fit
              W-worst fit
Ex: RQ P0 40000 W, The first parameter to the RQ command is the new process that requires the memory, followed by the
amount of memory being requested, and finally the strategy. (In this situation, "W" refers to worst fit.)

RL   -------> Release of a contiguous block of memory.
Ex: RL P0, This command will release the memory that has been allocated to process P0.

C    -------> Compact unused holes of memory into one single block.
STAT -------> Report the regions of free and allocated memory.
X    -------> Exit.


Enter the memory size (MAX) in unit format for example 1 MB
(Note: your memory size will be in range from 0 ... MAX - 1):
```

Case 1:

This case represents the allocation of some processes using First fit allocation, releasing of some process and compacting of unused memory:

```
(Note: your memory size will be in range from 0 ... MAX - 1): 1 MB


./allocator 1048576

allocator> RQ P0 100 F

Request Succeded
allocator> RQ P1 100 F

Request Succeded
allocator> RQ P2 100 F

Request Succeded
allocator> RQ P3 100 F

Request Succeded
allocator> RQ P4 100 F

Request Succeded
allocator> STAT

Addresses [0:99]  Process P0
Addresses [100:199]  Process P1
Addresses [200:299]  Process P2
Addresses [300:399]  Process P3
Addresses [400:499]  Process P4
Addresses [500:1048575] Unused

allocator> RL P2

Release Succeded
allocator> RL P3


allocator> STAT

Addresses [0:99]  Process P0
Addresses [100:199]  Process P1
Addresses [200:399] Unused
Addresses [400:499]  Process P4
Addresses [500:1048575] Unused
```

```
allocator> C
allocator> STAT

Addresses [0:99]  Process P0
Addresses [100:199]  Process P1
Addresses [200:299]  Process P4
Addresses [300:1048575] Unused

allocator> X
------------------------------------------------------------------------
Thank you for using this program :)
BUILD SUCCESSFUL (total time: 1 minute 53 seconds)
```

Case 2:

This case represents the allocation of some processes using Best fit allocation, releasing of some process and compacting of unused memory:

```
(Note: your memory size will be in range from 0 ... MAX - 1): 2 MB


./allocator 2097152

allocator> RQ P0 100 B

Request Succeded
allocator> RQ P1 10 B

Request Succeded
allocator> RQ P2 10 B

Request Succeded
allocator> RQ P3 50 B

Request Succeded
allocator> RQ P4 100 B

Request Succeded
allocator> STAT

Addresses [0:99]  Process P0
Addresses [100:109]  Process P1
Addresses [110:119]  Process P2
Addresses [120:169]  Process P3
Addresses [170:269]  Process P4
Addresses [270:2097151] Unused

allocator> RL P2

Release Succeded
allocator> RL P0


 Release Succeded
 allocator> RQ P5 10 B

 Request Succeded
 allocator> STAT
```

```
Addresses [0:99] Unused
Addresses [100:109]  Process P1
Addresses [110:119]  Process P5
Addresses [120:169]  Process P3
Addresses [170:269]  Process P4
Addresses [270:2097151] Unused

allocator> C
allocator> STAT

Addresses [0:9]  Process P1
Addresses [10:19]  Process P5
Addresses [20:69]  Process P3
Addresses [70:169]  Process P4
Addresses [170:2097151] Unused

allocator> X
------------------------------------------------------------------------
Thank you for using this program :)
BUILD SUCCESSFUL (total time: 2 minutes 7 seconds)
```

Case 3:

This case represents the allocation of some processes using Worst fit allocation, releasing of some process, and compacting of unused memory:

```
(Note: your memory size will be in range from 0 ... MAX - 1): 1 MB


./allocator 1048576

 allocator> rq p0 400 w

 Request Succeded
 allocator> rq p1 300 w

 Request Succeded
 allocator> rq p2 500 w

 Request Succeded
 allocator> rq p3 130 w

 Request Succeded
 allocator> stat

 Addresses [0:399]  Process P0
 Addresses [400:699]  Process P1
 Addresses [700:1199]  Process P2
 Addresses [1200:1329]  Process P3
 Addresses [1330:1048575] Unused

 allocator> rl p0

 Release Succeded
 allocator> rl p3

 Release Succeded
 allocator> stat

 Addresses [0:399] Unused
 Addresses [400:699]  Process P1
 Addresses [700:1199]  Process P2
 Addresses [1200:1048575] Unused
```

```
allocator> c
allocator> stat

Addresses [0:299]  Process P1
Addresses [300:799]  Process P2
Addresses [800:1048575] Unused

allocator> x
------------------------------------------------------------
Thank you for using this program :)
BUILD SUCCESSFUL (total time: 1 minute 18 seconds)
```

Case 4:

This case represents the allocation of some processes using Worst, Best and First fit allocation, releasing of some process, and compacting of unused memory:

```
(Note: your memory size will be in range from 0 ... MAX - 1): 1 MB


./allocator 1048576


 allocator> RQ P0 100 F

 Request Succeded
 allocator> RQ P1 100 F

 Request Succeded
 allocator> RQ P2 100 F

 Request Succeded
 allocator> RQ P3 100 F

 Request Succeded
 allocator> RQ P4 100 F

 Request Succeded
 allocator> RQ P5 100 F

 Request Succeded
 allocator> RQ P6 100 F

 Request Succeded
 allocator> RQ P7 100 F

 Request Succeded
 allocator> RQ P8 100 F

 Request Succeded
 allocator> STAT

 Addresses [0:99]  Process P0
 Addresses [100:199]  Process P1
 Addresses [200:299]  Process P2
 Addresses [300:399]  Process P3
 Addresses [400:499]  Process P4
 Addresses [500:599]  Process P5
 Addresses [600:699]  Process P6
 Addresses [700:799]  Process P7
 Addresses [800:899]  Process P8
 Addresses [900:1048575] Unused
```

```
allocator> RL P2

Release Succeded
allocator> RL P3

Release Succeded
allocator> RL P5

Release Succeded
allocator> RL P7

Release Succeded
allocator> RL P8

Release Succeded
allocator> STAT

Addresses [0:99]  Process P0
Addresses [100:199]  Process P1
Addresses [200:399] Unused
Addresses [400:499]  Process P4
Addresses [500:599] Unused
Addresses [600:699]  Process P6
Addresses [700:1048575] Unused

allocator> RQ P9 200 B

Request Succeded
allocator> STAT

Addresses [0:99]  Process P0
Addresses [100:199]  Process P1
Addresses [200:399]  Process P9
Addresses [400:499]  Process P4
Addresses [500:599] Unused
Addresses [600:699]  Process P6
Addresses [700:1048575] Unused

allocator> RQ P10 450 B

Request Succeded
allocator> STAT

Addresses [0:99]  Process P0
Addresses [100:199]  Process P1
Addresses [200:399]  Process P9
Addresses [400:499]  Process P4
Addresses [500:599] Unused
Addresses [600:699]  Process P6
Addresses [700:1149]  Process P10
Addresses [1150:1048575] Unused

allocator> RQ P11 300 B
```

```
allocator> STAT

Addresses [0:99]  Process P0
Addresses [100:199]  Process P1
Addresses [200:399]  Process P9
Addresses [400:499]  Process P4
Addresses [500:599] Unused
Addresses [600:699]  Process P6
Addresses [700:1149]  Process P10
Addresses [1150:1449]  Process P11
Addresses [1450:1048575] Unused

allocator> RL P10

Release Succeded
allocator> STAT

Addresses [0:99]  Process P0
Addresses [100:199]  Process P1
Addresses [200:399]  Process P9
Addresses [400:499]  Process P4
Addresses [500:599] Unused
Addresses [600:699]  Process P6
Addresses [700:1149] Unused
Addresses [1150:1449]  Process P11
Addresses [1450:1048575] Unused

allocator> RL P9


Release Succeded
allocator> STAT

Addresses [0:99]  Process P0
Addresses [100:199]  Process P1
Addresses [200:399] Unused
Addresses [400:499]  Process P4
Addresses [500:599] Unused
Addresses [600:699]  Process P6
Addresses [700:1149] Unused
Addresses [1150:1449]  Process P11
Addresses [1450:1048575] Unused

allocator> RQ P13 230 W

Request Succeded
allocator> STAT

Addresses [0:99]  Process P0
Addresses [100:199]  Process P1
Addresses [200:399] Unused
Addresses [400:499]  Process P4
Addresses [500:599] Unused
Addresses [600:699]  Process P6
Addresses [700:1149] Unused
Addresses [1150:1449]  Process P11
Addresses [1450:1679]  Process P13
Addresses [1680:1048575] Unused
```

```
allocator> RQ P14 10 B

Request Succeded
allocator> STAT

Addresses [0:99]  Process P0
Addresses [100:199]  Process P1
Addresses [200:399] Unused
Addresses [400:499]  Process P4
Addresses [500:509]  Process P14
Addresses [510:599] Unused
Addresses [600:699]  Process P6
Addresses [700:1149] Unused
Addresses [1150:1449]  Process P11
Addresses [1450:1679]  Process P13
Addresses [1680:1048575] Unused

allocator> RQ P15 80 F

Request Succeded
allocator> STAT

Addresses [0:99]  Process P0
Addresses [100:199]  Process P1
Addresses [200:279]  Process P15
Addresses [280:399] Unused
Addresses [400:499]  Process P4
Addresses [500:509]  Process P14
Addresses [510:599] Unused
Addresses [600:699]  Process P6
Addresses [700:1149] Unused
Addresses [1150:1449]  Process P11
Addresses [1450:1679]  Process P13
Addresses [1680:1048575] Unused

allocator> RL P11

Release Succeded
allocator> RL P13

Release Succeded
allocator> STAT

Addresses [0:99]  Process P0
Addresses [100:199]  Process P1
Addresses [200:279]  Process P15
Addresses [280:399] Unused
Addresses [400:499]  Process P4
Addresses [500:509]  Process P14
Addresses [510:599] Unused
Addresses [600:699]  Process P6
Addresses [700:1048575] Unused

allocator> C
```

```
allocator> STAT

Addresses [0:99]  Process P0
Addresses [100:199]  Process P1
Addresses [200:279]  Process P15
Addresses [280:379]  Process P4
Addresses [380:389]  Process P14
Addresses [390:489]  Process P6
Addresses [490:1048575] Unused

allocator> X
------------------------------------------------------
Thank you for using this program :)
BUILD SUCCESSFUL (total time: 7 minutes 46 seconds)
```

Virtual Memory Output (Part II)

The output of Retrieving five logical address:

```
The resul of retriving the values of 5 logical addresses:
-------------------------------------------------------------------------------------------------------------
Logical Address         Page #          Offset          Frame #         Value           Same as model answer
-------------------------------------------------------------------------------------------------------------
30705                   119             241             125             0               Yes
63258                   247             26              26              61              Yes
43121                   168             113             56              0               Yes
21311                   83              63              78              -49             Yes
15913                   62              41              108             0               Yes
```

The output of the Statistics

```
--------------------------------------------------------------------------------
                              Statistics
--------------------------------------------------------------------------------
#       Logical Address         Page #          State
--------------------------------------------------------------------------------
1       37540                   146             Page not found
2       16916                   66              Page Found in the page table
3       5527                    21              Page not found
4       63921                   249             Page not found
5       62716                   244             Page Found in the page table
6       32874                   128             Page Found in the page table
7       62493                   244             Page Found in the page table
8       30198                   117             Page Found in the page table
9       53683                   209             Page Found in the page table
10      40185                   156             Page Found in the page table
11      28781                   112             Page Found in the page table
12      64390                   251             Page Found in the page table
13      63101                   246             Page not found
14      61802                   241             Page not found
15      19648                   76              Page not found
16      29031                   113             Page Found in the page table
17      24462                   95              Page Found in the page table
18      48399                   189             Page Found in the page table
19      44981                   175             Page Found in the page table
20      28092                   109             Page Found in the page table
21      9448                    36              Page not found
22      44744                   174             Page Found in the page table
23      61496                   240             Page not found
24      64815                   253             Page Found in the page table
25      18295                   71              Page Found in the page table
26      31453                   122             Page not found
27      12218                   47              Page Found in the page table
28      22760                   88              Page Found in the page table
29      60746                   237             Page not found
30      12199                   47              Page Found in the page table
31      57982                   226             Page Found in the page table
32      62255                   243             Page not found
33      27966                   109             Page Found in the page table
34      54894                   214             Page Found in the page table
35      21793                   85              Page not found
36      38929                   152             Page Found in the page table
37      26544                   103             Page not found
38      32865                   128             Page Found in the page table
39      14964                   58              Page not found
40      41462                   161             Page not found
41      64243                   250             Page Found in the page table
42      2315                    9               Page Found in the page table
43      56089                   219             Page not found
44      52038                   203             Page not found
```

```
45      64454                   251             Page Found in the page table
46      55041                   215             Page Found in the page table
47      18633                   72              Page Found in the page table
48      14557                   56              Page Found in the page table
49      61006                   238             Page Found in the page table
50      47982                   187             Page not found
51      59484                   232             Page not found
52      50924                   198             Page not found
53      62615                   244             Page Found in the page table
54      7591                    29              Page Found in the page table
55      64747                   252             Page Found in the page table
56      6942                    27              Page not found
57      6727                    26              Page Found in the page table
58      32315                   126             Page Found in the page table
59      34998                   136             Page not found
60      60645                   236             Page Found in the page table
61      6308                    24              Page Found in the page table
62      45688                   178             Page Found in the page table
63      969                     3               Page Found in the page table
64      40891                   159             Page Found in the page table
65      49294                   192             Page Found in the page table
66      41118                   160             Page Found in the page table
67      21395                   83              Page Found in the page table
68      6091                    23              Page Found in the page table
69      32541                   127             Page Found in the page table
70      17665                   69              Page Found in the page table
71      3784                    14              Page Found in the page table
72      28718                   112             Page Found in the page table
73      59240                   231             Page Found in the page table
74      40178                   156             Page Found in the page table
75      60086                   234             Page Found in the page table
76      42252                   165             Page Found in the page table
77      44770                   174             Page Found in the page table
78      22514                   87              Page Found in the page table
79      3067                    11              Page Found in the page table
80      15757                   61              Page Found in the page table
-----------------------------
Number of Page-fault is: 22
-----------------------------
```

The output of the page replacement routine

```
-------------------------------------------------------------------------------------------
                        The testing of the page replacement routine
-------------------------------------------------------------------------------------------

Step 1: running page replacement routine
-------------------------------------------------------------------------------
Logical Address         New Page #              Victim Page #           Reused Frame
-------------------------------------------------------------------------------
13641                   53                      114                     102
21639                   84                      70                      114
21124                   82                      23                      90
25576                   99                      118                     113
11232                   43                      105                     17
```

```
Step 2: The resul of retriving the values of 5 logical addresses:
-----------------------------------------------------------------------------------------------------
Logical Address         Page #          Offset          Frame #         Value           Same as model answer
-----------------------------------------------------------------------------------------------------
16947                   66              51              67              -100            Yes
21639                   84              135             114             9               Yes
24328                   95              8               96              -121            Yes
25576                   99              232             113             103             Yes
4976                    19              112             59              127             Yes
```