Operating Systems Programming Projects for Chap. 7 & Chap. 9

Team members:

資工三 方文昊 **108590048** (Wrote and designed the programs and documentation)

資工三 鄭琳玲 **108590056** (Wrote and designed the programs and documentation)

資工三 黃聖耀 **108590061** (Wrote and designed the programs and documentation)

電資三 李以謙 **108820021** (Wrote and designed the programs and documentation)

Folder name description:

- **chap_7** → Programming Projects Chap. 7, Banker's Algorithm
- **chap_9**→ Programming Projects Chap. 9, Designing a Virtual Memory Manager

Programming Project for Chap. 7

In Linux, go to the chap_7 folder, then open the linux terminal inside of the folder,
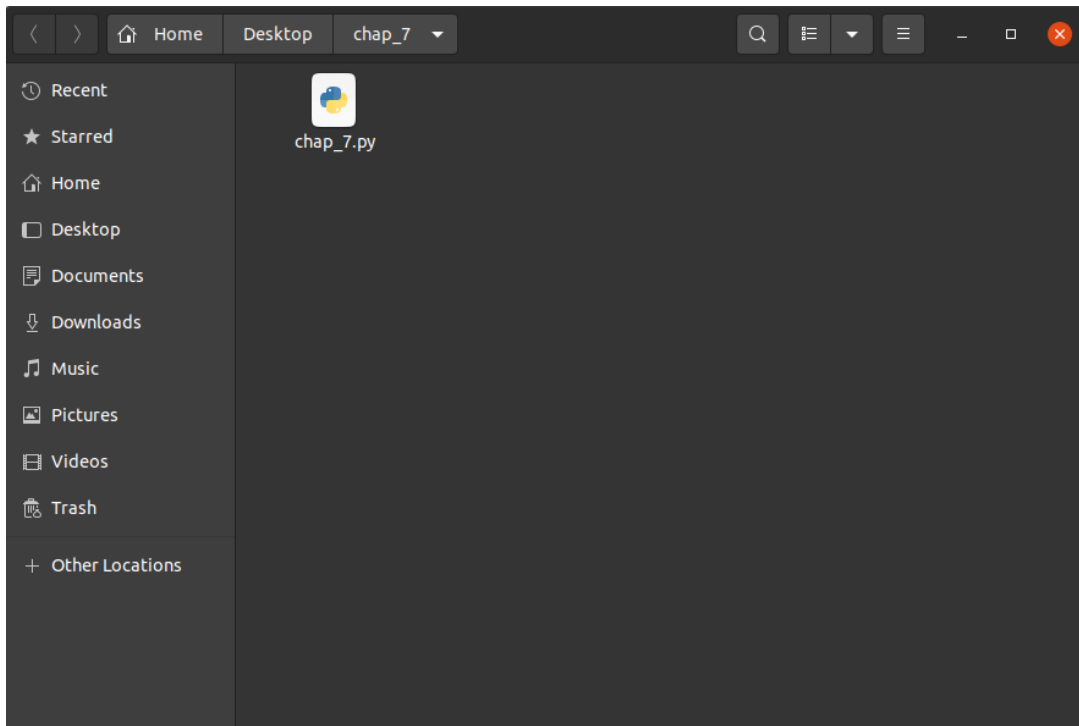
then in the linux terminal, input **python3 chap_7.py**, after that input the number of resources, number of processes, the allocations, the maximums and the available (or as shown as the screenshot below).

Then example result:

```
Allocation:

P0 2 0 0
P1 1 2 1
P2 3 2 0
P3 2 2 0
P4 1 0 1

Maximum:

P0 8 2 2
P1 3 4 3
P2 2 9 2
P3 2 3 3
P4 3 0 1

Need:

P0 6 2 2
P1 2 2 2
P2 -1 7 2
P3 0 1 3
P4 2 0 0

Available:  5 3 3

After the comparison with P0's allocation, therefore, the available is 5 3 3
After the comparison with P0's allocation, therefore, the available is 5 3 3
After the comparison with P0's allocation, therefore, the available is 5 3 3

After the comparison with P0's allocation, therefore, the new available is 7 3 3

After the comparison with P2's allocation, therefore, the available is 7 3 3
After the comparison with P2's allocation, therefore, the available is 7 3 3
After the comparison with P2's allocation, therefore, the available is 7 3 3

After the comparison with P2's allocation, therefore, the new available is 10 5 3

After the comparison with P4's allocation, therefore, the available is 10 5 3
After the comparison with P4's allocation, therefore, the available is 10 5 3
After the comparison with P4's allocation, therefore, the available is 10 5 3

After the comparison with P4's allocation, therefore, the new available is 11 5 4

After the comparison with P1's allocation, therefore, the available is 11 5 4
After the comparison with P1's allocation, therefore, the available is 11 5 4
After the comparison with P1's allocation, therefore, the available is 11 5 4

After the comparison with P1's allocation, therefore, the new available is 12 7 5

After the comparison with P3's allocation, therefore, the available is 12 7 5
After the comparison with P3's allocation, therefore, the available is 12 7 5
After the comparison with P3's allocation, therefore, the available is 12 7 5

After the comparison with P3's allocation, therefore, the new available is 14 9 5

The sequence of safe-state is P0 P2 P4 P1 P3
```
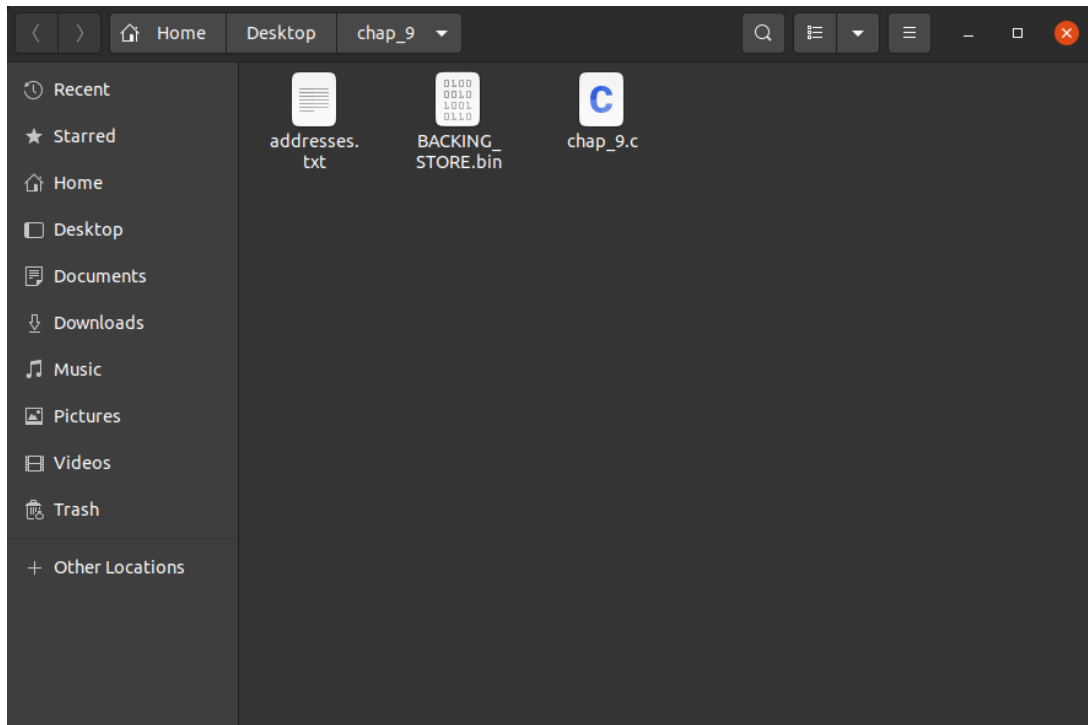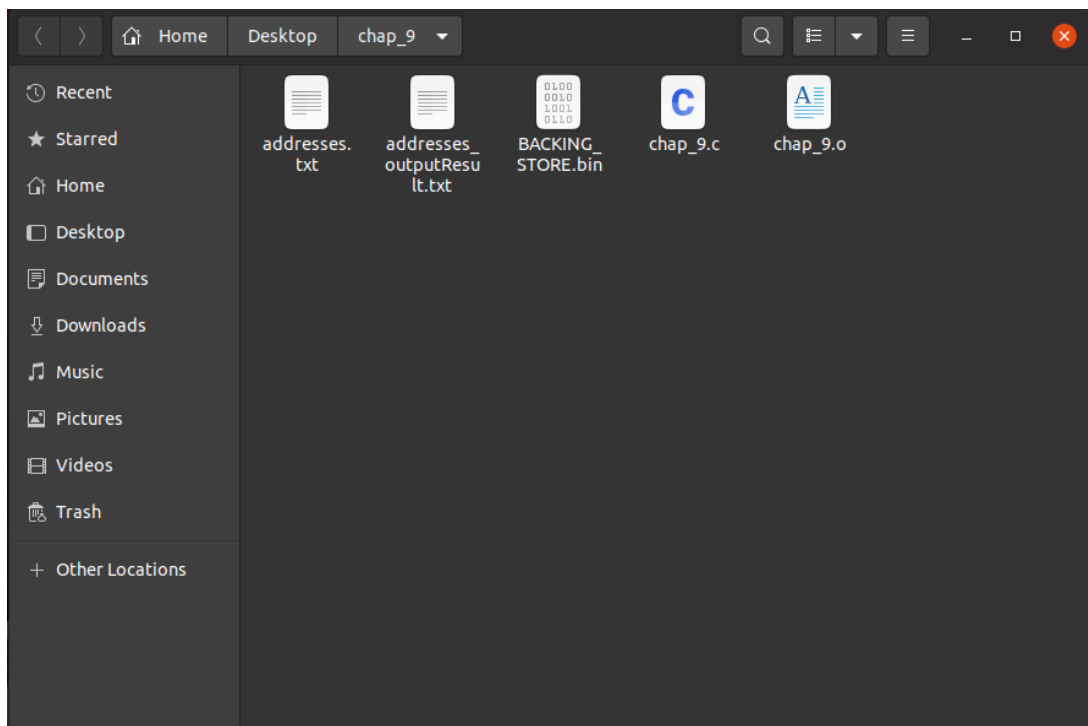
Programming Project for Chap. 9

In Linux, go to the chap_9 folder, then open the linux terminal inside of the folder,
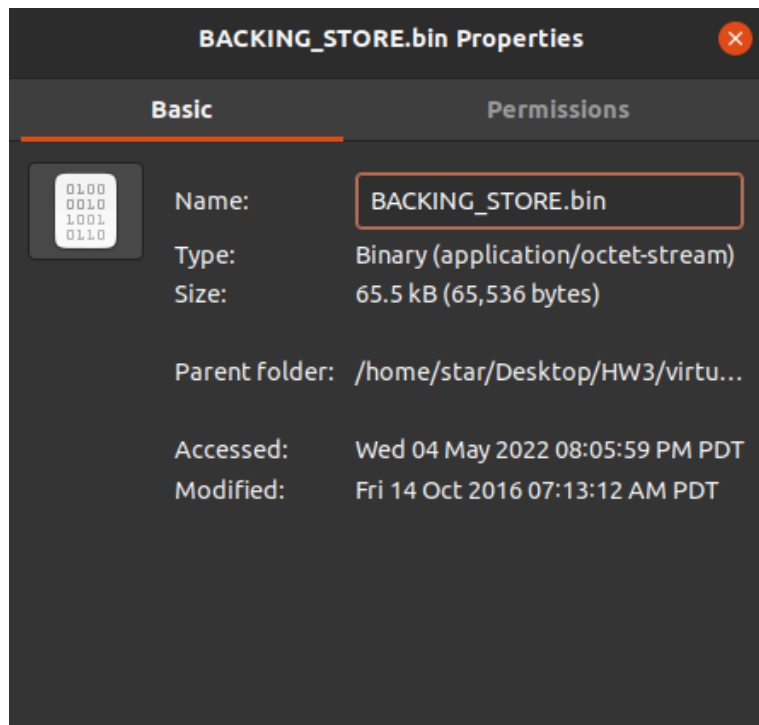

then in the linux terminal, input **gcc chap_9.c -o chap_9.o**

Then input **./chap_9.o <name of input file>** (e.g. ./chap_9.o addresses.txt), or as shown in the screenshot below.

```
star@ubuntu:~/Desktop/chap_9$ gcc chap_9.c -o chap_9.o
star@ubuntu:~/Desktop/chap_9$ ./chap_9.o addresses.txt
star@ubuntu:~/Desktop/chap_9$
```

The backing store is represented by the file BACKING_STORE.bin, a binary file of size 65,536 bytes.

BACKING_STORE.bin Properties		
Basic	Permissions	
Name:	BACKING_STORE.bin	
Type:	Binary (application/octet-stream)	
Size:	65.5 kB (65,536 bytes)	
Parent folder:	/home/star/Desktop/HW3/virtu...	
Accessed:	Wed 04 May 2022 08:05:59 PM PDT	
Modified:	Fri 14 Oct 2016 07:13:12 AM PDT	

After executing the program with the test file *addresses.txt,* the output file *addresses_outputResult.txt* will be generated,

```
  1 The virtual address: 16916, The physical address: 20, The value: 0
  2 The virtual address: 62493, The physical address: 285, The value: 0
  3 The virtual address: 30198, The physical address: 758, The value: 29
  4 The virtual address: 53683, The physical address: 947, The value: 108
  5 The virtual address: 40185, The physical address: 1273, The value: 0
  6 The virtual address: 28781, The physical address: 1389, The value: 0
  7 The virtual address: 24462, The physical address: 1678, The value: 23
  8 The virtual address: 48399, The physical address: 1807, The value: 67
  9 The virtual address: 64815, The physical address: 2095, The value: 75
 10 The virtual address: 18295, The physical address: 2423, The value: -35
 11 The virtual address: 12218, The physical address: 2746, The value: 11
 12 The virtual address: 22760, The physical address: 3048, The value: 0
 13 The virtual address: 57982, The physical address: 3198, The value: 56
 14 The virtual address: 27966, The physical address: 3390, The value: 27
 15 The virtual address: 54894, The physical address: 3694, The value: 53
 16 The virtual address: 38929, The physical address: 3857, The value: 0
 17 The virtual address: 32865, The physical address: 4193, The value: 0
 18 The virtual address: 64243, The physical address: 4595, The value: -68
 19 The virtual address: 2315, The physical address: 4619, The value: 66
 20 The virtual address: 64454, The physical address: 5062, The value: 62
 21 The virtual address: 55041, The physical address: 5121, The value: 0
 22 The virtual address: 18633, The physical address: 5577, The value: 0
 23 The virtual address: 14557, The physical address: 5853, The value: 0
 24 The virtual address: 61006, The physical address: 5966, The value: 59
 25 The virtual address: 62615, The physical address: 407, The value: 37
 26 The virtual address: 7591, The physical address: 6311, The value: 105
 27 The virtual address: 64747, The physical address: 6635, The value: 58
 28 The virtual address: 6727, The physical address: 6727, The value: -111
 29 The virtual address: 32315, The physical address: 6971, The value: -114
 30 The virtual address: 60645, The physical address: 7397, The value: 0
```

```
 980 The virtual address: 58219, The physical address: 34155, The value: -38
 981 The virtual address: 37606, The physical address: 21478, The value: 36
 982 The virtual address: 18426, The physical address: 2554, The value: 17
 983 The virtual address: 21238, The physical address: 37878, The value: 20
 984 The virtual address: 11983, The physical address: 59855, The value: -77
 985 The virtual address: 48394, The physical address: 1802, The value: 47
 986 The virtual address: 11036, The physical address: 39964, The value: 0
 987 The virtual address: 30557, The physical address: 16221, The value: 0
 988 The virtual address: 23453, The physical address: 20637, The value: 0
 989 The virtual address: 49847, The physical address: 31671, The value: -83
 990 The virtual address: 30032, The physical address: 592, The value: 0
 991 The virtual address: 48065, The physical address: 25793, The value: 0
 992 The virtual address: 6957, The physical address: 26413, The value: 0
 993 The virtual address: 2301, The physical address: 35325, The value: 0
 994 The virtual address: 7736, The physical address: 57912, The value: 0
 995 The virtual address: 31260, The physical address: 23324, The value: 0
 996 The virtual address: 17071, The physical address: 175, The value: -85
 997 The virtual address: 8940, The physical address: 46572, The value: 0
 998 The virtual address: 9929, The physical address: 44745, The value: 0
 999 The virtual address: 45563, The physical address: 46075, The value: 126
1000 The virtual address: 12107, The physical address: 2635, The value: -46
1001 The number of the addresses is 1000
1002 The Number of the page fault is 244
1003 The rate of the page fault is 0.244000
1004 The number of Hits of TLB is 55
1005 The hit rate of TLB is 0.055000
```