

Programming Project

Team members and Responsibility:

電資三 108820001 羅羽軒: ch7

電資三 108820003 林天佑: ch7

電資三 108820016 郭梓琳: ch9

電資三 108820031 簡上博: ch9

Environment

下載 python3 :

1. `sudo apt-get update`
2. `sudo apt-get install python3`
3. `python3 --version`

下載GCC:

1. `sudo apt update` (更新軟體包)
2. `sudo apt install build-essential` (安裝build-essential)
3. `gcc --version` (確認gcc安裝成功)

Ch7 (Banker's Algorithm)

This is a multithreaded program that implements the banker's algorithm discussed in Section 7.5.3. This assignment combines three topics: (1) multithreading (2) preventing race conditions (3) deadlock avoidance.

How to execute?

1. open terminal in this directory
2. enter ``python3 main.py`` to run

Execution snapshot

```
lohsuan@MSI:/mnt/d/college/3junior/OS_team_pj/hw3/proj7$ python3 main.py
Enter the number of resources: 3
Enter the number of processes: 5
Enter the allocation of P0: 0 1 0
Enter the allocation of P1: 2 0 0
Enter the allocation of P2: 3 0 2
Enter the allocation of P3: 2 1 1
Enter the allocation of P4: 0 0 2
Enter the maximum of P0: 7 5 3
Enter the maximum of P1: 3 2 2
Enter the maximum of P2: 9 0 2
Enter the maximum of P3: 2 2 2
Enter the maximum of P4: 4 3 3
Enter the available: 3 3 2

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

Maximum:
P0 7 5 3
P1 3 2 2
P2 9 0 2
P3 2 2 2
P4 4 3 3

Need:
P0 7 4 3
P1 1 2 2
P2 6 0 0
P3 0 1 1
P4 4 3 1

Available: 3 3 2
```

```

Comparing with the allocation of P0, the available: 3 3 2
Comparing with the allocation of P0, the available: 3 3 2
Comparing with the allocation of P0, the available: 3 3 2
Comparing with the allocation of P0, the available: 3 3 2
Comparing with the allocation of P0, the available: 3 3 2
Comparing with the allocation of P0, the available: 3 3 2
Comparing with the allocation of P0, the available: 3 3 2
Comparing with the allocation of P0, the available: 3 3 2
Comparing with the allocation of P4, the available: 3 3 2
Comparing with the allocation of P4, the available: 3 3 2
Comparing with the allocation of P4, the available: 3 3 2

After comparing with the allocation of P4, the new available: 3 3 4

Comparing with the allocation of P0, the available: 3 3 4
Comparing with the allocation of P0, the available: 3 3 4
Comparing with the allocation of P0, the available: 3 3 4
Comparing with the allocation of P0, the available: 3 3 4

After comparing with the allocation of P0, the new available: 3 4 4

Comparing with the allocation of P1, the available: 3 4 4
Comparing with the allocation of P1, the available: 3 4 4
Comparing with the allocation of P1, the available: 3 4 4

After comparing with the allocation of P1, the new available: 5 4 4

Comparing with the allocation of P2, the available: 5 4 4
Comparing with the allocation of P2, the available: 5 4 4
Comparing with the allocation of P2, the available: 5 4 4

After comparing with the allocation of P2, the new available: 8 4 6

Comparing with the allocation of P3, the available: 8 4 6
Comparing with the allocation of P3, the available: 8 4 6
Comparing with the allocation of P3, the available: 8 4 6

After comparing with the allocation of P3, the new available: 10 5 7

The safe-state sequence: 4 0 1 2 3
lohsuan@MSI:/mnt/d/college/3junior/OS_team_pj/hw3/proj7$ █

```

Ch9 (Designing a Virtual Memory Manager)

This is a program that translates logical to physical addresses for a virtual address space of size $2^{16}=65,536$ bytes. The program should read from a file, addresses.txt, containing logical addresses and, using a TLB as well as a page table, will translate each logical address to its corresponding physical address and output the value of the byte stored at the translated physical address.

How to execute?

1. open terminal in this directory
2. enter make to compile
3. enter make exec or ./main addresses.txt to execute
4. enter make clean to clean up (optional)

Execution snapshot (因結果過長, 截取部分為開頭及結尾)

```
bo@bo-VirtualBox:~/Desktop/os_github/OS_team_pj/hw3/proj9$ make
gcc VirtualMemoryManager.c -o main
bo@bo-VirtualBox:~/Desktop/os_github/OS_team_pj/hw3/proj9$ make exec
./main addresses.txt
Virtual address: 16916   Physical address: 20      Value: 0
Virtual address: 62493   Physical address: 285     Value: 0
Virtual address: 30198   Physical address: 758     Value: 29
Virtual address: 53683   Physical address: 947     Value: 108
Virtual address: 40185   Physical address: 1273    Value: 0
Virtual address: 28781   Physical address: 1389    Value: 0
Virtual address: 24462   Physical address: 1678    Value: 23
Virtual address: 48399   Physical address: 1807    Value: 67
Virtual address: 64815   Physical address: 2095    Value: 75
Virtual address: 18295   Physical address: 2423    Value: -35
Virtual address: 12218   Physical address: 2746    Value: 11
Virtual address: 22760   Physical address: 3048    Value: 0
Virtual address: 57982   Physical address: 3198    Value: 56
Virtual address: 27966   Physical address: 3390    Value: 27
Virtual address: 54894   Physical address: 3694    Value: 53
Virtual address: 38929   Physical address: 3857    Value: 0
Virtual address: 32865   Physical address: 4193    Value: 0
Virtual address: 64243   Physical address: 4595    Value: -68
Virtual address: 2315    Physical address: 4619    Value: 66
Virtual address: 64454   Physical address: 5062    Value: 62
Virtual address: 55041   Physical address: 5121    Value: 0
Virtual address: 18633   Physical address: 5577    Value: 0
Virtual address: 14557   Physical address: 5853    Value: 0
Virtual address: 61006   Physical address: 5966    Value: 59
Virtual address: 62615   Physical address: 407     Value: 37
Virtual address: 7591    Physical address: 6311    Value: 105
Virtual address: 64747   Physical address: 6635    Value: 58
Virtual address: 6727    Physical address: 6727    Value: -111
Virtual address: 32315   Physical address: 6971    Value: -114
Virtual address: 60645   Physical address: 7397    Value: 0
Virtual address: 6308    Physical address: 7588    Value: 0
Virtual address: 45688   Physical address: 7800    Value: 0
Virtual address: 969     Physical address: 8137    Value: 0
Virtual address: 40891   Physical address: 8379    Value: -18
```

Virtual address: 24999	Physical address: 52647	Value: 105
Virtual address: 51933	Physical address: 27357	Value: 0
Virtual address: 34070	Physical address: 60950	Value: 33
Virtual address: 65155	Physical address: 48515	Value: -96
Virtual address: 59955	Physical address: 10547	Value: -116
Virtual address: 9277	Physical address: 22845	Value: 0
Virtual address: 20420	Physical address: 16836	Value: 0
Virtual address: 44860	Physical address: 13116	Value: 0
Virtual address: 50992	Physical address: 42800	Value: 0
Virtual address: 10583	Physical address: 27479	Value: 85
Virtual address: 57751	Physical address: 61335	Value: 101
Virtual address: 23195	Physical address: 35995	Value: -90
Virtual address: 27227	Physical address: 28763	Value: -106
Virtual address: 42816	Physical address: 19520	Value: 0
Virtual address: 58219	Physical address: 34155	Value: -38
Virtual address: 37606	Physical address: 21478	Value: 36
Virtual address: 18426	Physical address: 2554	Value: 17
Virtual address: 21238	Physical address: 37878	Value: 20
Virtual address: 11983	Physical address: 59855	Value: -77
Virtual address: 48394	Physical address: 1802	Value: 47
Virtual address: 11036	Physical address: 39964	Value: 0
Virtual address: 30557	Physical address: 16221	Value: 0
Virtual address: 23453	Physical address: 20637	Value: 0
Virtual address: 49847	Physical address: 31671	Value: -83
Virtual address: 30032	Physical address: 592	Value: 0
Virtual address: 48065	Physical address: 25793	Value: 0
Virtual address: 6957	Physical address: 26413	Value: 0
Virtual address: 2301	Physical address: 35325	Value: 0
Virtual address: 7736	Physical address: 57912	Value: 0
Virtual address: 31260	Physical address: 23324	Value: 0
Virtual address: 17071	Physical address: 175	Value: -85
Virtual address: 8940	Physical address: 46572	Value: 0
Virtual address: 9929	Physical address: 44745	Value: 0
Virtual address: 45563	Physical address: 46075	Value: 126
Virtual address: 12107	Physical address: 2635	Value: -46

Page Fault Rate = 0.2440
TLB hit rate= 0.0540