

Lab 9 Results

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a)

- a. Memory allocation: in fixed size partitioning programs and processes get allocated into fixed size memory partitions. While paging projects get divided into multiple pages.
- b. Contiguous memory: In fixed size partitions the entire program or process is loaded into a single block, meaning that all code is contiguous. In paging this is not the case as programs are loaded into potentially non-contiguous pages.
- c. Limiting size: fixed size partitioning has a limit to how large programs can be (the size of the partition) while paging is only limited by the total size of the memory.

b)

- a. Contiguous memory: variable size partitioning loads the entire process into memory in one contiguous block of memory while segmentation separates the program into multiple segments and loads them in non-contiguous ways.
- b. Memory management: in variable size partitioning the MMU handles the contiguous blocks of memory and requires no extra steps. In segmentation we have to use a segment table to tell the MMU which segments belong to which processes (since they are non-contiguous).

c) Program of 5A split into two: lab9_c_producer and lab9_c_consumer.

```
diegoros@diegoros-VMware-Virtual-Platform:~/CS6233/assignments/lab9/dr3432_lab9$ make
gcc -o lab9_c_producer lab9_c_producer.c -lrt
gcc -o lab9_c_consumer lab9_c_consumer.c -lrt
Usage: "./lab9_c_producer <n>" in one terminal window, and "./lab9_c_consumer <n>" in another.
```

d)

```
diegoros@diegoros-VMware-Virtual-Platform: ~/CS6233/assignments/lab9/dr3432_lab9
diegoros@diegoros-VMware-Virtual-Platform:~/CS6233/assignments/lab9/dr3432_lab9$ ./lab9_c_producer 5
Location of shared buffer producer: 0x771aa1b24000
Location of n producer: 0x5b7010b50014
diegoros@diegoros-VMware-Virtual-Platform:~/CS6233/assignments/lab9/dr3432_lab9$

diegoros@diegoros-VMware-Virtual-Platform:~/CS6233/assignments/lab9/dr3432_lab9$ ./lab9_c_consumer 5
Location of shared buffer consumer: 0x78a8f45c0000
Location of n consumer: 0x59ab6aa9b01c
Printing fibonacci sequence of 5:
0
1
1
2
3
5
diegoros@diegoros-VMware-Virtual-Platform:~/CS6233/assignments/lab9/dr3432_lab9$
```

e) The address printed above was the virtual address for each process.

f)

```
diegoros@diegoros-VMware-Virtual-Platform: ~/CS6233/assignments/lab9/dr3432_lab9
diegoros@diegoros-VMware-Virtual-Platform:~/CS6233/assignments/lab9/dr3432_lab9$ ./lab9_c_producer 5
Location of shared buffer producer: 0x771aa1b24000
Location of n producer: 0x5b7010b50014
diegoros@diegoros-VMware-Virtual-Platform:~/CS6233/assignments/lab9/dr3432_lab9$

diegoros@diegoros-VMware-Virtual-Platform:~/CS6233/assignments/lab9/dr3432_lab9$ ./lab9_c_consumer 5
Location of shared buffer consumer: 0x78a8f45c0000
Location of n consumer: 0x59ab6aa9b01c
Printing fibonacci sequence of 5:
0
1
1
2
3
5
diegoros@diegoros-VMware-Virtual-Platform:~/CS6233/assignments/lab9/dr3432_lab9$
```

g)

```
diegoros@diegoros-VMware-Virtual-Platform: ~/CS6233/assignments/lab9/dr3432_lab9
0000000000004010 l 0 .bss 0000000000000001 completed.0
0000000000003d70 l 0 .fini_array 0000000000000000 __do_global_dtors_aux_fini_array_entry
0000000000001280 l F .text 0000000000000000 frame_dummy
0000000000003d68 l 0 .init_array 0000000000000000 __frame_dummy_init_array_entry
0000000000000000 l df *ABS* 0000000000000000 lab9_c_producer.c
0000000000004014 l 0 .bss 0000000000000004 n
0000000000000000 l df *ABS* 0000000000000000 crtstuff.c
0000000000002230 l 0 .eh_frame 0000000000000000 __FRAME_END__
0000000000000000 l df *ABS* 0000000000000000
0000000000003d78 l 0 .dynamic 0000000000000000 _DYNAMIC
000000000000212c l .eh_frame_hdr 0000000000000000 __GNU_EH_FRAME_HDR
0000000000003f68 l 0 .got 0000000000000000 _GLOBAL_OFFSET_TABLE_
0000000000000000 F *UND* 0000000000000000 __libc_start_main@GLIBC_2.34
0000000000000000 w *UND* 0000000000000000 ITM_deregisterTMCloneTable
0000000000004000 w .data 0000000000000000 data_start

diegoros@diegoros-VMware-Virtual-Platform: ~/CS6233/assignments/lab9/dr3432_lab9
0000000000001220 l F .text 0000000000000000 __do_global_dtors_aux
0000000000004018 l 0 .bss 0000000000000001 completed.0
0000000000003d78 l 0 .fini_array 0000000000000000 __do_global_dtors_aux_fini_array_entry
0000000000001260 l F .text 0000000000000000 frame_dummy
0000000000003d70 l 0 .init_array 0000000000000000 __frame_dummy_init_array_entry
0000000000000000 l df *ABS* 0000000000000000 lab9_c_consumer.c
000000000000401c l 0 .bss 0000000000000004 n
0000000000000000 l df *ABS* 0000000000000000 crtstuff.c
0000000000002230 l 0 .eh_frame 0000000000000000 __FRAME_END__
0000000000000000 l df *ABS* 0000000000000000
0000000000003d80 l 0 .dynamic 0000000000000000 _DYNAMIC
000000000000212c l .eh_frame_hdr 0000000000000000 __GNU_EH_FRAME_HDR
0000000000003f70 l 0 .got 0000000000000000 _GLOBAL_OFFSET_TABLE_
0000000000000000 F *UND* 0000000000000000 __libc_start_main@GLIBC_2.34
0000000000000000 w *UND* 0000000000000000 ITM_deregisterTMCloneTable
```

- h) The addresses printed for n did not match. They do not match since this does not include any dynamic linking done at runtime as well as the addresses displayed above starting sequentially at 0 since the program is not loaded into memory.
- i) The entry point (labeled `_start`) for my producer code is at `00...011a0` and for my consumer code it is at `00...01180`.

```
diegoros@diegoros-VMware-Virtual-Platform: ~/CS6233/assignments/lab9/dr3432_lab9
0000000000004000 g      .data 0000000000000000      __data_start
0000000000000000 w      *UND* 0000000000000000      __gmon_start__
0000000000004008 g      O .data 0000000000000000      .hidden __dso_handle
0000000000002000 g      O .rodata 0000000000000004      _IO_stdin_used
0000000000000000 F *UND* 0000000000000000      time@GLIBC_2.2.5
0000000000004018 g      .bss 0000000000000000      _end
00000000000011a0 g      F .text 0000000000000026      _start
0000000000004010 g      .bss 0000000000000000      __bss_start
0000000000001289 g      F .text 0000000000000019a      main
0000000000000000 F *UND* 0000000000000000      perror@GLIBC_2.2.5
0000000000000000 F *UND* 0000000000000000      atoi@GLIBC_2.2.5
0000000000000000 F *UND* 0000000000000000      exit@GLIBC_2.2.5
0000000000004010 g      O .data 0000000000000000      .hidden __TMC_END__
0000000000000000 F *UND* 0000000000000000      shm_open@GLIBC_2.34
0000000000000000 w      *UND* 0000000000000000      _ITM_registerTMCloneTable

diegoros@diegoros-VMware-Virtual-Platform: ~/CS6233/assignments/lab9/dr3432_lab9
0000000000000000 w      *UND* 0000000000000000      __gmon_start__
0000000000004008 g      O .data 0000000000000000      .hidden __dso_handle
0000000000002000 g      O .rodata 0000000000000004      _IO_stdin_used
00000000000013cf g      F .text 00000000000000c3      fibonacciPrint
0000000000000000 F *UND* 0000000000000000      fflush@GLIBC_2.2.5
0000000000004020 g      .bss 0000000000000000      _end
0000000000001180 g      F .text 0000000000000026      _start
0000000000004010 g      .bss 0000000000000000      __bss_start
0000000000000000 F *UND* 0000000000000000      munmap@GLIBC_2.2.5
0000000000001269 g      F .text 00000000000000166      main
0000000000000000 F *UND* 0000000000000000      perror@GLIBC_2.2.5
0000000000000000 F *UND* 0000000000000000      atoi@GLIBC_2.2.5
0000000000000000 F *UND* 0000000000000000      exit@GLIBC_2.2.5
0000000000004010 g      O .data 0000000000000000      .hidden __TMC_END__
0000000000000000 F *UND* 0000000000000000      shm_open@GLIBC_2.34
```

Producer objdump

Consumer objdump