

A+ will be down for a version upgrade on Tuesday 03.01.2023 at 9-12.

This course has already ended.

« 4. Threads, Memory Management, Virtu...

5. Memory and Linux System Calls » (/os/...


CS-C3140 (/os/2022/)

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/ 4.1 Threads exercises and C programming warmup

Threads exercises and C programming warmup

Exercise 1

 The deadline for the assignment has passed (Sunday, 23 October 2022, 23:59).

Threads, Memory Management, Virtual Memory questionnaire

1. Review questions. Please consult Chapter 4,7 & 8 from "Operating Systems - Internals and Design Principles" by William Stallings

Question 1 2 / 2

What is one reason mode switch between threads may be cheaper than a mode switch between processes.

- ☐ The time taken to switch between user and kernel mode is more than the time taken to switch between two processes
- ☒ **Less processing of information is involved**
- ☐ The thread takes less time to terminate as compared to the process but unlike the process, threads do not isolate.

✓ Correct!

Question 2 2 / 2

What are the two separate and potentially independent characteristics embodied in the concept of a process?

✓ Resource ownership

- ☐ Multiprocessing
- ☐ Process management

✓ Scheduling/execution

✓ Correct!

Question 3 2 / 2

What are the factors affecting relocation of a program?

- ✓ In a multiprogramming system, the available main memory is generally shared among a number of processes**
- ✓ Once a program is swapped out to disk, it is limiting to specify when it is next swapped back in**
- ☐ Programs in other processes should not be able to reference memory locations in a process for reading or writing purposes without permission

✓ Correct!

Question 4 2 / 2

How is a thread different from a process?

- ☐ Threads share CPU and only one thread active (running) at a time
- ⦿ Threads share memory with other threads**
- ☐ Processes can create children while threads cannot

✓ Correct!

Question 5 2 / 2

Which of the statements are correct?

- ✓ Main memory is divided into blocks of the same size called frames**
- ☐ Main memory is divided into blocks of the same size called pages
- ☐ Programs and data stored on disk are divided into equal, fixed-sized blocks called frames

✓ Correct!

Question 6 2 / 2

What is the disadvantage of using kernel-level threads.

- ☐ Kernel routines themselves cannot be multithreaded
- ⦿ The transfer of control from one thread to another within the same process requires a mode switch to the kernel**
- ☐ The scheduling algorithm can be tailored to the application without disturbing the underlying OS scheduler.

✓ Correct!

Question 7 2 / 2**What is true about a segment?**

- ☐ It is not required that all segments of all programs be of the same length, although there is no maximum segment length
- ☐ It is required that all segments of all programs be of the same length, although there is a maximum segment length
- ☒ **It is not required that all segments of all programs be of the same length, although there is a maximum segment length**

✓ Correct!


Question 8 2 / 2**In a fixed partitioning scheme, what are the advantages of using unequal-size partitions?**

- ☒ **Internal fragmentation is reduced because a small program can be put into a small partition**
- ☐ Two small programs can be put into one large partition
- ☒ **It is possible to provide one or two quite large partitions and still have a large number of partitions**

✓ Correct!

Submit

Exercise 2

 The deadline for the assignment has passed (Sunday, 23 October 2022, 23:59).

C Programming Warmup

The next part of the assignment will be a programming warmup using the C programming language. Please visit the following Google Collab (contains instructions if you haven't used Collab before) and try to solve all 6 problems. Once you have the answers, enter them here on A+.

C Warmup Google Collab

(<https://colab.research.google.com/drive/1X1xFlkDCyuQuiwv9RoKnWHh6xuCELzAj?usp=sharing#scrollTo=MvYnYMkSlc05>)

C is a systems programming language that was essential to building the Linux kernel. If you are totally new to the language, here are some good resources for learning The following exercises are only introducing the basics of the language so you don't need advanced knowledge to do well.

1. Warmup with C - Questions from Google Collab

Question 1 2 / 2

What format specifiers (in order) do you need to use in the printf function to get the following output: 65, I, 5

- ☐ %d, %f, %c
- ☒ %d, %c, %d
- ☐ %d, %d, %d

✓ Correct!

Question 2 2 / 2

What data types and format specifiers (in order) do you need to use in this example to get the following output: 4000000000, 23.111099, 43, I like coding in C

- ☐ data types (int, double, float, char) and descriptors (%l, %d, %f, %c)
- ☐ data types (long, double, int, char) and descriptors (%ld, %lf, %d, %s)
- ☒ data types (long, float, int, char) and descriptors (%ld, %f, %d, %s)

✓ Correct!

Question 3 2 / 2

What values should we assign to variables a and b to get the following output: 12, 3, 104, 208

- ☐ a = 4, b = 106
- ☒ a = 3, b = 105
- ☐ a = 3, b = 106

✓ Correct!

Question 4 2 / 2

What values should we assign to variables a and b to get the following output: 8, 0

- ☐ a = 256, b can be any even number
- ☒ a = 12, b can be any power of two
- ☐ a = 12, b can only be 0

✓ Correct!

Question 5 2 / 2

What non-zero integer value can you assign to variable 'overflow' so that the output is still 'c'?

- ☐ overflow can only be 256
- ☐ overflow = '0'

☒ **overflow can be any multiple of 256**

✓ Correct!

Question 6 2 / 2

What does the program output?

- ☐ some integer values are returned, but I do get warnings
- ☐ the program outputs "3, 2"
- ☐ there isn't any way to print addresses using the printf function
- ☒ **hex values are returned with no warnings**

✓ Correct!

Submit

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