

CPS321 - 2025 Spring - Assignment #3

DUE DATE: Apr. 5 (Fri.) no later than 11:59 PM EST via email

REQUIREMENTS

- Each group will hand in only **one submission**.
- **Print names of all members** are required in submissions.
- The submission file should be titled: CPS321_2025_Spring_[HW NUMBER]_[PRINT NAMES].zip/others .
- All submissions will be sent to Fanchao (fmeng@misericordia.edu) via **emails**. Fanchao will confirm each submission.
- **Late submissions are NOT accepted** unless you have the permission from Fanchao.

Problems (100 points in total)

Virtual Addresses & Physical Addresses in Linux

The objective of this task is to concretely understand how a virtual memory address space of a process is mapped to the physical memory address space.

MANDATORY TASK

1. Write a C program. Define a function in the program. Inside the function body, define a local variable that is not a pointer (e.g., `int`), and a pointer. Allocate a piece of memory from the heap, and use the pointer to capture the memory address. Your primary task is to convert the addresses of the non-pointer variable and the pointer variable respectively to physical addresses. Please print the virtual addresses and the physical addresses. In addition, please explain in detail the conversion algorithm.

BONUS TASK

1. Create two processes. Share a piece of memory allocated from the heap. Examine the virtual addresses and the physical addresses of this shared memory in the two processes respectively. Summarize your observations.

Submission

1. Both code and statements are required.