

# OSTEP Chapter 15

*ECE 3600, Fall 2022*

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# 1. Address Translation

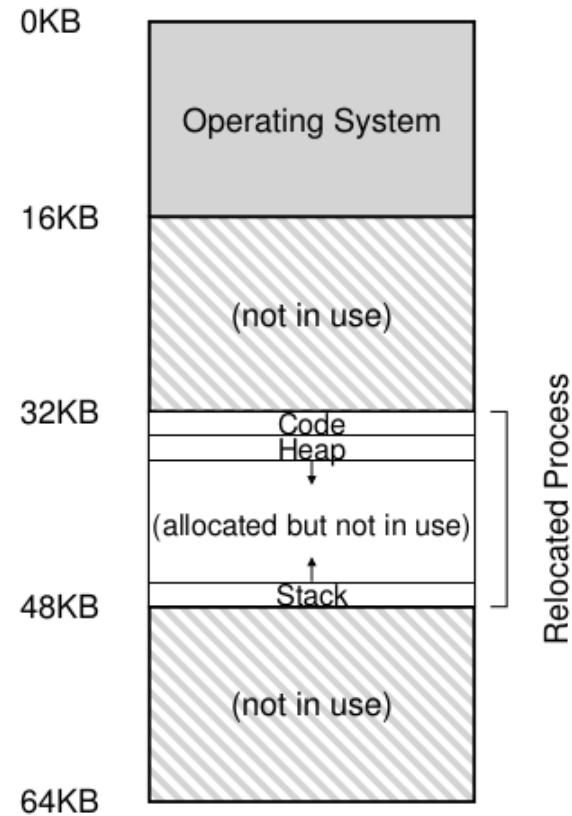


Figure 15.1: A Process And Its Address Space    Figure 15.2: Physical Memory with a Single Relocated Process

## 2. Base and Bounds

Address space limit:

$$0 \leq \text{virtual\_address} < \text{virtual\_address\_space\_size}$$

Bound limit:

$$0 \leq \text{virtual\_address} < \text{bound}$$

Translation:

$$\text{physical\_address} = \text{virtual\_address} + \text{base}$$

$$0 \leq \text{physical\_address} < \text{physical\_address\_space\_size}$$

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Exercises from the book using [relocation.py](#):

1. Run with seeds 1, 2, and 3, and compute whether each virtual address generated by the process is in or out of bounds. If in bounds, compute the translation.
2. Run with these flags: `-s 0 -n 10`. What value do you have set `-l` (the bounds register) to in order to ensure that all the generated virtual addresses are within bounds?
3. Run with these flags: `-s 1 -n 10 -l 100`. What is the maximum value that base can be set to, such that the address space still fits into physical memory in its entirety?