Homework
Part 1: Virtualization – 3) Memory 1

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1 Address Spaces

1.1 Understand the UNIX Memory API ★

If you don't feel at home allocating memory in C programs, refresh your knowledge by reading *OSTEP, Chapter 14* ([ADADb]) and conduct the corresponding homework. At least, review Section 14.4 regarding common mistakes which can be made.

1.2 The Linux Address Space

Find out about the organization of the address space in your GNU/Linux system. At which addresses do the individual parts (e.g. text section, stack, …) discussed during the course roughly start (ignoring ASLR)?

1. Write a small program in C which displays relevant example addresses.
2. Search the Linux kernel documentation (found at [lin]) for information regarding the organization of the Linux virtual address space.

1.3 `free` and `pmap`

Conduct the coding homework found at the end of *OSTEP, Chapter 13* ([ADADa]).

2 Address Translation

Conduct the simulation homework from *OSTEP, Chapter 15* (`relocation.py`), found at [ost]. The tasks to be performed are described at the end of the respective chapter PDF.

★ Question 5 is optional.

3 Segmentation

Conduct the simulation homework from *OSTEP, Chapter 16* (`segmentation.py`), found at [ost]. The tasks to be performed are described at the end of the respective chapter PDF.

References

[ADADa] Remzi H. Arpaci-Dusseau and Andrea C. Arpaci-Dusseau, *OSTEP Chapter 13, The Abstraction: Address Spaces*, http://pages.cs.wisc.edu/~remzi/OSTEP/vm-intro.pdf.

[ADADb] ———, *OSTEP Chapter 14, Interlude: Memory API*, http://pages.cs.wisc.edu/~remzi/OSTEP/vm-api.pdf.

[lin] *The Linux Kernel Documentation*, https://www.kernel.org/doc/html/latest/.

[ost] *GitHub.com, remzi-arpacidusseau/ostep-homework*, https://github.com/remzi-arpacidusseau/ostep-homework.