

6paging-lab

CST 334 (Operating Systems)
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Lab: Paging

1. Copy these files to your home directory on hosting: (or get from OSTEP site)

</home/CLASSES/brunsglenn/OSTEP/HW-Paging-LinearTranslate/paging-linear-translate.py>

</home/CLASSES/brunsglenn/OSTEP/HW-Paging-LinearTranslate/README-paging-linear-translate>

2. Run the program as follows from your home directory:

[./paging-linear-translate.py](#)

Your job is to translate virtual addresses to physical addresses using a paging table.

The info at the top of the program output shows that the address space size is 16K, and that the page size is 4K. So the virtual address space is broken into 4 blocks, each of 4K.

We need 14 bits to address 16K memory. The highest two bits of the 14 bits give a 2 bit value indicating the page number. The lower 12 bits give the offset into the page.

xx xxxx xxxx xxxx (blue bits give virtual page number; black bits give offset)

The Page Table of the program output has an entry for each of the 4 pages in the virtual address space. The first entry shows that virtual page 0 maps to physical frame number 0xc (hexadecimal c). If an entry in this table does not start with 0x8 then the corresponding page is not valid. In this table, virtual pages 1 and 2 are not valid.

The Virtual Address Trace at the bottom of the program output is a list of virtual addresses to be translated to physical addresses.

The first virtual address is:

11 0010 0010 1001 (or 0x3229 hex)

The top two bits are binary 11, or decimal 3, so we look at the last row of the page table (remember: the first row of the page table is for virtual page number 0). It says the physical page frame is 6. This is a valid row of the page table, so we construct the physical address as:

0110 0010 0010 1001

All we had to do was replace the virtual page number piece with the physical frame number -- the offset stays the same. The result is 0x6229 hex.

3. Repeat the translation for the rest of the virtual addresses in the trace. If the virtual page number maps to an invalid row of the page table, then write “invalid address”.
4. Run the program with the -c option to check your answers.
5. Try again with a different set of virtual addresses by using “./paging-linear-translate.py -s 2”.

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