Segmentation

Annalise Tarhan

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1 Translate the addresses generated by the following parameters.

1.1 segmentation.py -a 128 -p 512 -b 0 -l 20 -B 512 -L 20 -s 0

VA 0: 108 PA 512-(128-108) = 492 (segment 1)
VA 1: 97 OOB (segment 1)
VA 2: 53 OOB (segment 0)
VA 3: 33 OOB (segment 0)
VA 4: 65 OOBn(segment 1)

1.2 segmentation.py -a 128 -p 512 -b 0 -l 20 -B 512 -L 20 -s 1

VA 0: 17 PA 0+(17-0) = 17 (segment 0)
VA 1: 108 PA 512-(128-108) = 492 (segment 1)
VA 2: 97 OOB (segment 1)
VA 3: 32 OOB (segment 0)
VA 4: 63 OOB (segment 0)

1.3 segmentation.py -a 128 -p 512 -b 0 -l 20 -B 512 -L 20 -s 2

VA 0: 122 PA 512-(128-122) = 506 (segment 1)
VA 1: 121 PA 512-(128-121) = 505 (segment 1)
VA 2: 7 PA 0+(7-0) = 7 (segment 0)
VA 3: 10 PA 0+(10-0) = 10 (segment 0)
VA 4: 106 OOB (segment 1)

2 Test your understanding of this tiny address space.

What is the highest legal virtual address in segment 0? 19

What about the lowest legal virtual address in segment 1? 108

What are the lowest and highest illegal addresses in the entire address space? 20, 107

2.1 How would you run segmentation.py with the -A flag to test if you are right?

./segmentation.py -a 128 -p 512 -b 0 -l 20 -B 512 -L 20 -A 19,20,107,108 -c

3 Let's say we have a tiny 16-byte address space in a 128-byte physical memory. What base and bounds would you set up so as to get the simulator to generate the following translation results for the specified address stream?

-b 0 -l 2 -B 16 -L 2

4 Assume we want to generate a problem where roughly 90% of the randomly-generated virtual addresses are valid. How should you configure the simulator to do so? Which parameters are important to getting this outcome?

Segment 0 should take up 45% of the address space and segment 1 should take another 45%. One way to do that would be to set the bound of segment 0 at 0, and the limit equal to .45 times the size of address space. Segment 1's bound should be the highest valid address, and it's limit should be the same as segment 0's.

5 Can you run the simulator such that no virtual addresses are valid? How?

Yes. Make the limit of each segment equal zero.