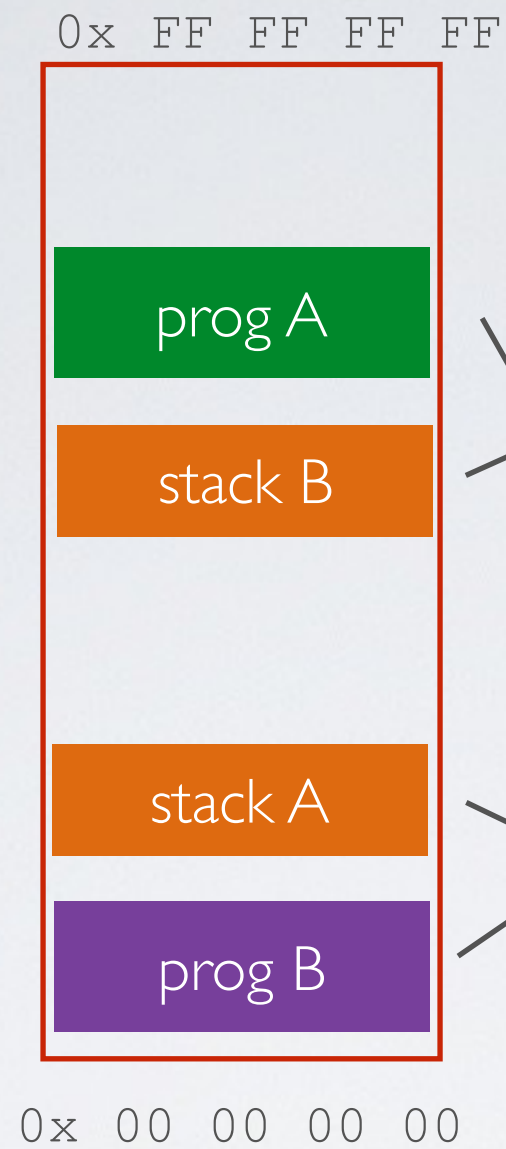# Another problem

What if we run out of memory because of too many concurrent programs?

✓ Swap memory
move some data to the disk

➡ Managing memory becomes very complex
but necessary

Swap

0x FF FF FF FF

prog A

stack B

physical memory

stack A

prog B

0x 00 00 00 00

hard drive

heap A

heap B

0x FF FF FF FF

stack B

heap B

prog B

0x 00 00 00 00

virtual memory for program B

0x FF FF FF FF

stack A

heap A

prog A

0x 00 00 00 00

virtual memory for program A