CS5250 Advanced Operating Systems

Pop Quiz 7

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First time trying this… hope I won't fall flat on my face.

This is an exercise to test if you understand virtual address translation.

In the same Luminous folder is a ZIP file. It contains a single Intel x86-64 Linux static executable called "pop7-linux-executable". I created it on a Centos machine and tested it on my Windows bash environment. It should work out of the box in a 64 bit Linux environment. It is a very simple executable that "pretends" to be a set of page tables. This assignment is individualized. So to start, input your student number. It will generate a unique virtual address for you. Then you are to use the page table simulator and input physical addresses to walk the page table and arrive at the final physical address for the virtual address you are given. Please provide the details of the steps involved in getting to the final result.

Caveat: the app is quite simple and dumb – input a page table address and it will output a fake physical address for the next level.

Virtual Address = 0x0e43ef48615c
binary :
PML4 = 000011100
Dir ptr = 100001111
Dir = 101111010
Table = 010000110
Offset = 000101011100

PML4E = table(CR3 + PML4 * 16 bits) = table(0x104d210f0) = 0x2cb03ec000
PDPTE = table(PML4E + DirPtr * 16) = table(0x2cb03ed0f0) = 0x6c02123000
PDE = table(PDPTE + Dir * 16) = table(0x6c021247a0) = 0x4a0db4e000
PTE = table(PDE + table * 16) = table(0x4a0db4e860) = 0x5cfb8dc000
Physical Address = 0x5cfb8dc000 + 0b000101011100 * 16 = 0x5cfb8dd5c0