CSCE 410/611 Operating Systems Spring 2023

Homework for Week 15 (LAST HW!)

(Due Date: Check Canvas)

1. (variation of [1]) Why is it possible to store the state of a virtual machine on stable storage, while it is nearly impossible to do the same for a native OS?

Virtual machines are designed with the idea of being saved and stored having the interrupts and save state methods built in. This is also helped by the virtual machines layer of abstraction that allows portable application. This must be built in and predesigned into the virtual machines software. A OS is designed to interact with the hardware making the saving state much more difficult.

2. Explain briefly how the hypervisor may get to know that it has to create a new shadow page table when a new process is created in the guest OS?

The hypervisor receives the instruction call and checks if the OS has changed any memory accesses, and makes a shadow page table if the OS has modified page table access. Then it will copy the pertinent information into the shadow page table from the OS’s memory call and then updates the shadow page table when needed. It lastly changes the pointer of the processor to the shadow page table, effectively making a page that only the guest OS points too.

References

[1] A. Silberschatz, P. Galvin, and G. Gagne, *Applied Operating Systems Concepts*, John Wiley & Sons, Inc., New York, NY, 2000.

[2] Deitel, Deitel, and Choffnes, *Operating Systems*, Pearson / Prentice Hall, 2004. [3] A. S. Tanenbaum, *Modern Operating Systems*, Pearson / Prentice Hall, 2008. [4] L. F. Bic, A. C. Shaw, *Operating Systems Principles*, Prentice Hall 2003. [5] C. Crowley, *Operating Systems, A Design-Oriented Approach*, Irwin 1997. [6] M. Herlihy, N. Shavit, *The Art of Multiprocessor Programming*, Elsevier, 2008

1