C211 – Operating Systems

Tutorial: Virtual Machines

1. Can a hypervisor virtualise the x86 architecture on top of any hardware architecture (e.g, ARM)?
2. Consider a Type 1 hypervisor that can support up to n virtual machines at the same time. PCs usually have a maximum of four disk primary partitions. Can n be larger than 4? If so, where can the data be stored?
3. VMWare does binary translation one basic block at a time, then it executes the block and starts translating the next one. Could it translate the entire program in advance and then execute it? If so, what are the advantages and disadvantages of each technique?
4. Does binary translation slow down user-level function calls?
5. Does it make sense to paravirtualize an operating system if the source code is available? What if it is not?
6. PCs differ in minor ways at the very lowest level, things like how timers are managed, how interrupts are handled, and some of the details of DMA. Do these differences mean that virtualized appliances are not going to work well in practice? Explain your answer.