CPE 434/534 Operating Systems

Take Home Exam 2

Satarts Oct 12, 2015 -----Due Thursday Oct. 19, 2015

**Undergraduate students, answer 80 points; Graduate students answer 100 points**

**Please prepare solutions on a computer or write your answers in black ink on white paper**

**Write your name on your paper**

**There are two questions on the back of this exam**

1. Read the papers on the canvas site called “A component based performance comparison of four hypervisors” , and “Performance Overhead among three hypervisors: an experimental study using hadoop benchmarks” and answer the following questions

a- (10)For a web site that is going to do heavy computation like a bit-coin computation center, which hyper-visor would you recommend and why

b- (10)for a retail sales datacenter web site that is going to communicate with remote users and service order requests (like amazon), which hyper-visor would you recommend and why

c- (10)for a an aircraft control tower center that is going to track and deconflict aircraft which hypervisor would you recommend and why

2. (10)Describe the difference between the three kinds of virtualization: full virtualization (re-write), para virtualization and hardware assisted virtualization

3. (10) Can a hypervisor provide more cores to a virtual machine then on the hardware. If so, how?

4. (10)Considering that hard disk drives today come with large cache memories to speed up memory access, is there any advantage to using the elevator algorithm over simpler algorithms like shortest seek time first.

5. (20) We have discussed the difficulty of sharing pages between processes. For systems that have large numbers of virtual machines (say hundreds) all running the same software (say linux) your text describes de-duplication as a means for reducing memory space by sharing common text sections (like the linux kernel). Could you design a system that shared data pages across virtual machines such as offered by the shm facilities currently in linux. Explain what specific issues you would have to consider and recommend approaches to dealing with them.

6. (20) Virus protection software typically finds viruses in: (true or false)

1- application programs' (jeff.exe)

2- shared libraries (the C shared library)

3- operating system programs (ls, dir, gcc)

4- operating system kernel (linux )

5- hypervisor software

6- device driver software (software in the device driver that is added to an operating system)

7- bios code

8- code resident on devices themselves (like disk drives).

9- data files like pdf, doc, etc.

10- network routers and switches

7. (10) For homework you provided a solution to backing up file systems while the system is still in operation. Will your solution solve text problem 4-27. If yes, explain why. If no, how would you improve your solution to solve that problem.

8. (10) Operating systems frequently exploit locality to improve performance. Briefly describe two examples where operating systems do so, and state how locality is exploited.