ANSWERS TO THE SECOND COSC 6360 QUIZ

Fall 2020

Mach

- What becomes of the **read()**, **write()** and **lseek()** UNIX system calls in the Mach file system?

Answer

- What becomes of the **read()**, **write()** and **lseek()** UNIX system calls in the Mach file system?
  - ***They get replaced by library functions performing the same functions within each process address space.***

Mach

- What happens to pages that the Mach page replacement policy expels from its Global FIFO pool of pages?

Answer

- What happens to pages that the Mach page replacement policy expels from its Global FIFO pool of pages?
  - ***The expelled page is put at the end of a global queue from which it can be reclaimed if a process attempts to access it.***

Superpages

- According to Navarro et al., why should we perform periodic speculative demotion of superpages?

Answer

- According to Navarro et al., why should we perform periodic speculative demotion of superpages?
  - ***These speculative demotions allow us to check which constituent pages of the page frame remain active.***

Superpages

- According to Navarro et al., what is the advantage of ***reservation-based allocation*** for page frames?

Answer

- According to Navarro et al., what is the advantage of ***reservation-based allocation*** for page frames?
  - ***Reservation-based allocation leaves enough free page frames around each newly allocated page frame to let a superpage grow around it.***

Linux Scalability

- What is the problem that sloppy counters attempt to solve?

Answer

- What is the problem that sloppy counters attempt to solve?
  - ***Sloppy counters reduce the frequency of accesses to a heavily shared counter, thus eliminating a potential source of contention.***

Linux Scalability

- Consider the following sloppy counter with two local values (Local A and Local B) and one global value (Global X).

Local A = 1 Local B = 2 Global X = 6

- What will be the new values of Local A and Global X after core A starts using one extra reference?

Answer

- Consider the following sloppy counter with two local values (Local A and Local B) and one global value (Global X).

Local A = 1 Local B = 2 Global X = 6

- What will be the new values of Local A and Global X after core A starts using one extra reference?

Local A = 0 Local B = 2 Global X = 6

Nooks

- How does Nooks switch between the kernel protection domain and the lightweight protection domains of its extensions?

- What is the main drawback of this approach?

Answer

- How does Nooks switch between the kernel protection domain and the lightweight protection domains of its extensions?
  - ***Nooks switches between the kernel protection domain and the lightweight protection domains of its extensions by switching page tables.***
- What is the main drawback of this approach?
  - ***The main disadvantage of the approach is that each change of page table forces a TLB flush, which has a negative impact on the performance of the virtual memory.***

Nooks

- How does Nooks control the way extensions manipulate kernel data structures?

Answer

- How does Nooks control the way extensions manipulate kernel data structures?
  - ***Nooks prevents extensions extension from directly modifying kernel data structures***
  - ***Its object tracking code will:***
    - ***Copy kernel data structures into extension address space***
    - ***Copy them back*** after ***changes have been applied***

Nooks

- What changes should be brought to Nooks if we wanted to make it able to protect the kernel against malicious extensions?

Answer

- What changes should be brought to Nooks if we wanted to make it able to protect the kernel against malicious extensions?
  - ***Nooks should require extensions to run outside the kernel in a mode that would not allow them to modify its address space, as*** microkernels ***require it.***

You cannot leave in the kernel address space any code that you cannot trust 100 percent.

CAP Theorem

- Assume you have to manage a set of five servers managing five replicas of the same database.
- What would be the drawback of a policy that would require all writes to update ***all five replicas*** and allow all reads to be performed by ***any available*** replica?

Answer

- Assume you have to manage a set of five servers managing five replicas of the same database.
- What would be the drawback of a policy that would require all writes to update ***all five replicas*** and allow all reads to be performed by ***any available*** replica?

  - ***The policy would limit the*** availability ***of the database.***

Since all updates must access all five replicas, the database will always remain consistent, even in the presence of network partitions!