



# Solutions for Second Quiz

COSC 6360

Fall 2015



# First question

- A system of physical clocks consists of two clocks, namely, one that is ***slow*** and loses ***two minutes*** every hour and another that is ***fast*** and advances by ***two minutes*** every hour.

Assuming that the two clocks are managed by Lamport's physical clock protocol, what will be the time marked by each clock at two o'clock given that:

- Both clocks indicated the correct time at noon;
- The processors on which the clocks resides continuously exchanged messages between themselves from noon to 1 pm then remain silent;
- Message transmission delays are negligible.



# Answer

Actual time	Slow clock	Fast clock
Noon	12:00 pm	12:00 pm
1 pm	1:02pm	1:02 pm
2 pm	2:00 pm	2:04 pm



## Second question

- What is the main purpose of ***Corey kernel shares***?



# Answer

- What is the main purpose of **Corey kernel shares**?
  - Kernel shares are lookup tables for kernel objects that allow applications to control which object identifiers are visible to other cores in order **to limit contention**.



# Third question

- How does Raft prevent a candidate server that is ***not up to date*** from ever becoming the new leader of a cluster?



# Answer

- How does Raft prevent a candidate server that is ***not up to date*** from ever becoming the new leader of a cluster?
  - Candidates include in their ***RequestVote*** RPCs information about the state of their log
  - Before voting for a candidate, servers check that the log of the candidate is at least as up to date as their own log.



# Fourth question

- What is the main motivation for initiating the ***speculative demotion*** of a superpage?





# Answer

- What is the main motivation for initiating the ***speculative demotion*** of a superpage?
  - Speculative demotion lets the system find out which parts of a superpage are still active
    - Allows the system to monitor access to individual pages



# Fifth question

- In the ARC cache replacement policy, which events result in an update of **target\_T1**?
  - **Target\_T1 will increase when**
  - **Target\_T1 will decrease when**



# Answer

- In the ARC cache replacement policy, which events result in an update of **target\_T1**?
  - **Target\_T1 will increase** when a page in **B1** causes a page fault.
  - **Target\_T1 will decrease** when a page in **B2** causes a page fault.



# Sixth question

- What *must happen* before Proof Carrying Code becomes widely used?



# Answer

- What ***must happen*** before Proof Carrying Code becomes widely used?
- We must find a ***cost-effective way*** to construct ***safety proofs*** for non-trivial extensions.



# Seventh question

- What is the major performance penalty occurring when Nooks crosses a ***lightweight protection domain boundary***?



# Answer

- What is the major performance penalty occurring when Nooks crosses a ***lightweight protection domain boundary***?
- Crossing protection boundaries requires switching the kernel page table, which results in a flush of the current TLB (and an avalanche of TLB misses).