COSC 6360 SECOND MIDTERM AUGUST 1, 2005

This exam is **closed book**. You can have **one sheet** (i.e., **two pages**) of notes.
Please be **specific** and answer **every part** of every question.

1. Consider a RAID-5 system with four data blocks per stripe (b_0, b_1. b_2 and b_3) and one parity block p.

(a) How much of the total disk space is used by the parity blocks? (5 points)

_____20__ percent

(b) What is the minimum number of disk drives required to implement this organization? (5 points)

_____5___ drives

(c) What is the *most efficient* way to update block b_3? (10 points)

Read block(s) old block b_3 and old parity block p

Compute new parity block = old block b_3 XOR new block b_3 XOR old parity block p

Write new block b_3 and new parity block p

2. What is the major disadvantage of *logical clocks* over *physical clocks*? (10 points)

3. What are *replays?* (5 points) What can they be used for? (5 points) What does Kerberos to allow servers to distinguish them from authentic messages? (10 points)

4. Why are *guarded commands* an essential part of CSP's design? (5 points) Why do UNIX IPC packages not require them? (5 points)

5. What is the function of Totem's *guaranteed vector messages*? (10 points) (***Hint:*** *explain what would happen without them.)*

6. Give two techniques that could be used by a mischievous extension to circumvent the measures taken by Nooks to protect the kernel. (2×5 points)

7. Spring treats the thread issuing a cross-domain call and all downstream threads as a single *scheduling entity* called a *shuttle*. Why does it not merge them instead into a single thread within the calling domain? (2×5 points) (***Hint****: I expect two reasons*.)

8. What is the function of a *software abstraction* in xOK**?** (5 points)

9. What is the performance advantage of using a *type-safe programming language* in your kernel rather than relying on *dynamic checks*? (5 points) (***Hint:*** *The answer is rather short.*)