CS 241: Dining Philosophers

This week, we are going to be focusing on deadlock: both detection and the conditions to get out of it.

Coffman Conditions

What are the four Coffman conditions, and what do they mean?

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Give one example for each Coffman condition in the following scenario: Snow shovelers have a limited number of snow shovels. They get paid by how much snow they shovel, meaning that they would all like to get paid a lot and roughly the same amount.

Detection: Resource Allocation Graphs

- P1 acquires R2
- P2 acquires R1
- P3 acquires R3
- P3 acquires R4
- P2 waits for R3
- P1 waits for R4
- P3 waits for R1
- P3 waits for R2

Failed Solutions: Simple

Draw the "grab left, grab right" solution's deadlock state (circle the philosopher and the fork).

Figure 1:

Failed Solutions: Livelock

Circle the livelock fork condition (should look familiar).

Figure 2:

Coffman Condition Broken:

Advantages:

Drawbacks:

Stallings' Solution

Is there a way to circle philosophers and forks to cause deadlock?

Figure 3:

Coffman Condition Broken:

Advantages:

Drawbacks:

Resource Hierarchy

Number the forks. Following the rules of the hierarchy guideline, is there a way to circle the forks to get deadlock?

Figure 4:

Coffman Condition Broken:

Advantages:

Drawbacks: