

COMP 3500: Homework 2

Points Possible: 100

Note: You do not need to submit hard copies.

There should be no collaboration among students. A student shouldn't share any project code with any other student. Collaborations among students in any form will be treated as a serious violation of the University's academic integrity code.

Goals:

- To understand the principles of deadlocks.
- To learn how to solve deadlock and starvation problems.
- To collaborate and discuss deadlock problems with your group members.

Questions:

1. [40 points]

(a) Possibility of Deadlock occurring:

P0 request A
P1 request D
P2 request C
P0 request B
P1 request E
P2 request F
P0 request C
P1 request B
P2 request D

(b)

no deadlocks:

Process P0

get(B)
get(C)
get(A)

Process P1

get(D)
get(E)
get(B)

Process P2

get(F)
get(D)
get(C)

2. [20 points]

Yes. If process foo() executes semWait(S) and in parallel process bar() executes semWait(R), both processes will be blocked, when each process tries to execute there next instruction.

3. [20 points]

What is the difference among deadlock avoidance, detection, and prevention?

Deadlock prevention ensures that at least one of the necessary conditions for deadlock can never occur. Deadlock avoidance ensures that the system does not enter an unsafe state. Deadlock detection determines that a deadlock exists and identifies the processes and resources involved in the deadlock.

4. [20 points]

Consider a system consisting of four resources of the same type that are shared by three processes, each of which needs at most two resources. Show that the system is deadlock-free.

Given:

$N = 3$

$R = 4$

-> requires ≤ 2 Resources
at

$P1 \rightarrow 11$

$P2 \rightarrow 1$

$P3 \rightarrow 1$

completes its execution and releases all allocated resources then P2 takes the resources and completes execution and then releases. Then P3 takes the resources and complete execution.

No deadlocks occur.

Deadlock occurs when Resources = 3.

Submission:

- A heading at the top of your file contains your name and your Auburn UserIDs. • Submit your solution as a single PDF file named as "hw2.pdf" through Canvas
- File formats other than PDF will not be accepted by Canvas.

Late Submission Penalty:

- Ten percent (10%) penalty per day for late submission. For example, an assignment submitted after the deadline but up to 1 day (24 hours) late can achieve a maximum of 90% of points allocated for the assignment. An assignment submitted after the deadline but up to 2 days (48 hours) late can achieve a maximum of 80% of points allocated for the assignment.

- Assignment submitted more than 3 days (72 hours) after the deadline will not be graded.

Rebuttal period:

- You will be given a period of one week (i.e., 7 days) to read and respond to the comments and grades of your homework or project assignment. The TA may use this opportunity to address any concern and question you have. The TA also may ask for additional information from you regarding your homework or project.