CS 170: QUIZ

Given below is the code of two processes P and Q that print the numbers 0 to 19 to <stdout>.

The goal is to add appropriate synchronization code that ensures that one process is never more than two numbers ahead of the other one in printing out numbers. That is, assume that P has just printed out ‘7’. Now, P has to wait until Q prints out ‘6’ before being able to continue to print out ‘8’. Of course, when Q has already printed out ‘6’ and ‘7’ before, P is allowed to immediately print out ‘8’ and ‘9’.

While a strict alternation between processes would be possible to maintain the required invariant, this is considered too restrictive. That is, it should be possible for one process to print out several numbers in a row, provided that it does not go more than two ahead of the other one.

Correct: P(0), Q(0), Q(1), Q(2), P(1), P(2), P(3), P(4), Q(3), …
Wrong: P(0), P(1), Q(0), Q(1), Q(2), Q(3), Q(4) problem, because 4 > 1 +2

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Shared Variables / Semaphores

Process P

for (int cnt = 0; cnt < 20; ++cnt) {
    printf("%d\n", cnt);
}

Process Q

for (int cnt = 0; cnt < 20; ++cnt) {
    printf("%d\n", cnt);
}
```