(6 p) The following is a proposal for a solution to synchronize an arbitrary number of threads who need to access a shared resource, allowing at most $C$ threads to access the resource at the same time. Argue about its safety and progress properties.

```
shared var
    S: binary semaphore init 1;
    doorway: binary semaphore init 1;
    count: integer init C;

thread-i {
    repeat

        [Other code]

        wait(doorway)
        wait(S)
        count := count - 1
        if count > 0 signal(doorway) end-if
        signal(S)

        [Code accessing the Shared Resource]

        wait(S)
        count := count + 1
        if count == 1 signal(doorway) end-if
        signal(S)

    forever

}
```