TKT20016 Review questions 5

1 Communication mechanics

(a) Shared memory and signals are used only within one computer because:

- They rely on HW/OS-specific features that require common memory space or internal process signaling.
- Different computers have isolated memory and separate OS instances, so these mechanisms cannot directly cross machine boundaries.

(b) Differences between message passing w/ sockets and queues:

↳ Sockets:

- Low-Level, bidirectional stream or datagram communication
- require explicit connection management and error handling.

↳ Message Queues:

- Offer asynchronous, decoupled communication with build-in buffering.
- Often include features like message persistence, ordering and prioritization

2. Concurrency terms

(a) Definitions:

* Race condition: flaw where system behavior depend on timing of concurred operations on shared data, leading to unpredictable results.
* Atomic operation: invisible operation that completes entirely without interference from other processes.
* Critical section: portion of code that accesses shared resources and must be executed by only one process at a time.

(b) Five requirements for mutex solution:

* Mutual exclusion: Only one process can enter critical section at any moment.
* Progress: processes outside critical section should not prevent others from entering when section is free.
* Bounded waiting: there is limit to process waits to enter the critical section.
* Deadlock freedom: Solution must avoid situations where processes wait indefinitely for each other.
* Efficiency: overhead for aquiring and releasing mutex should be minimal when there is no contention.