TKT20016 Review questions 3

(I) Memory management terms

(a) Page: fixed size block of virtual memory that is mapped to frame in physical memory. OS manage memory in terms of pages.

Frame: fixed size block in physical memory (RAM) that can hold page from virtual memory

Segment: variable size block of memory that correspond to logical part of program such as code or data.

Differences and relations:

Paging divide memory into fixed size pages and frames.

Segmentation divide memory into logical segments of varying size

(b) Define physical and logical memory adress

Physical address: Actual address in RAM where data is stored. Managed by HW.

Logical address: Address generated by process during execution, must be translated to physical address by MMU.

Why use logical addresses?

- enables process isolation
- support virtual memory
- allow dynamic relocation.

(c) Internal and external fragmentation

Internal: Happen when allocated blocks are larger than needed.

→ happen with fixed size pages; inside pages.

External: Happen when memory is split into small non-contiguous blocks.

→ make difficult to allocate large contiguous memory regions.

happen in free memory due to variable size allocations.

II Virtual memory

(a) Trashing happen when system spend more time swapping pages in/out of memory than executing actual process. → reduced performance.

(b) Locality principle:

* Spatial locality: If memory location is accessed, nearby locations are likely accessed soon.

* Temporal locality: If memory location is accessed, it likely will be accessed again soon.

virtual memory

↳ Locality reduce number of page faults. Allow efficient caching w/ TLB and page cache. Improve performance by improving cache utilization.

(c) TLB relies on temporal locality. TLB caches recently used virtual → physical address mappings.