CSPB 3753 - Fall 2024 - Knox - Operating Systems

Started on	Friday, 6 December 2024, 9:10 PM
State	Finished
Completed on	Friday, 6 December 2024, 10:19 PM
Time taken	1 hour 8 mins
Grade	**83.00** out of 100.00

Question **1**

Partially correct

Mark 9.00 out of 10.00

Term Definitions:

1. Allocate space such that the remaining chuck is as small as possible.
2. The virtual memory process of moving of pages in and out of actual memory.
3. Binding of a virtual address to a physical address is delayed until run time.
4. Allocate available memory to each process evenly.
5. An address within the virtual address space of a process.
6. The breaking of physical memory into fixed-sized blocks.
7. The frame selected to be released to allow another page to be loaded.
8. The various small unused blocks that are generated from contiguous allocation methods.
9. Condition in which excessive paging operations are taking place.
10. Bit indicating the associated page loaded in memory has been modified.
11. Binding of a virtual address to a physical address is performed when creating the executable.
12. The unused space within an allocated block caused by rounding up to the allocation granularity.
13. A process to select a replacement frame from the set of all frames in the system.
14. Allocate available memory to each process according to its size.
15. The breaking of virtual memory into fixed-sized blocks.
16. Bit indicating that the page has be used recently.
17. Allocate space such that the remaining chuck is as large as possible.
18. Run-time address of actual memory used to store process data.
19. A process to select a replacement frame from the set of frames allocated to the process.
20. Set of pages referenced by the process during a time interval.

Place the number of the best definition next to each term

compile time address binding	11 ✔	page replacement	13 ✖
external fragmentation	8 ✔	proportional frame allocation	14 ✔
frames	6 ✔	reference bit	16 ✔
local page replacement policy	19 ✔	thrashing	9 ✔
logical address	5 ✔	worst fit allocation	17 ✔

Your answer is partially correct.

9 of your answers are correct.

Question **2**

Incorrect

Mark 0.00 out of 2.00

Which of the following is NOT true about Virtual Memory?

Select one:

- a. separates logical memory as viewed by the user from physical memory
- b. technique that allows the execution of process code that is not in memory
- c. abstracts main memory into an extremely large, uniform array of storage
- d. manages hardware cache built into the CPU to automatically speed up memory access ✖

Your answer is incorrect.

Question **3**

Correct

Mark 2.00 out of 2.00

What is the hardware device that performs run-time mapping from virtual to physical addresses?

Select one:

- a. memory controller
- b. demand paging
- c. memory management unit ✔
- d. hierarchal paging

Your answer is correct.

Question **4**

Correct

Mark 2.00 out of 2.00

To support paging, what are the names for the blocks of logical and physical address spaces?

Select one:

- a. frames and segments
- b. pages and segments
- c. segments and frames
- d. segments and pages
- e. frames and pages
- f. pages and frames ✔

Your answer is correct.

Question **5**

Correct

Mark 2.00 out of 2.00

What is the name for an data structure used to lookup actual memory address from a logical address?

Select one:

- a. page table ✔
- b. logical address
- c. physical address
- d. frame table

Your answer is correct.

Question **6**

Incorrect

Mark 0.00 out of 2.00

What is the term for sections of memory that are not available for allocation?

Select one:

- a. fragmentation
- b. relocation
- c. paging ✖
- d. swapping

Your answer is incorrect.

Question **7**

Correct

Mark 2.00 out of 2.00

What needs to occur if kernel finds the allocated memory is full during a page fault?

Select one:

- a. follow the page replacement policy ✔
- b. return an exception to the process
- c. place the process on the waiting queue
- d. place the process on the terminated queue

Your answer is correct.

Question **8**

Incorrect

Mark 0.00 out of 2.00

What is the difference from *demand paging* to pure *demand paging*?

Select one:

- a. start executing a process with no pages in memory
- b. select the best pages to preload into memory ✖
- c. find the best page(s) to evict from memory
- d. only page in, never page out

Your answer is incorrect.

Question **9**

Incorrect

Mark 0.00 out of 2.00

What are page reference bits?

Select one:

- a. bits in a page table that are set each time a page is referenced
- b. low order bits that represent the offset within a page
- c. data bits representing the data in memory
- d. bits representing the status of the frame ✖

Your answer is incorrect.

Question **10**

Incorrect

Mark 0.00 out of 2.00

Which policy below will allocate more frames to a process that needs them?

Select one:

- a. fixed
- b. proportional
- c. working set ✖
- d. local replacement

Your answer is incorrect.

Question **11**

Correct

Mark 2.00 out of 2.00

Why should files be memory mapped?

Select one:

- a. because memory is volatile
- b. to increase the speed of access to data ✔
- c. to access the internal data structures of the kernel
- d. because memory space is larger than disk space

Your answer is correct.

Question **12**

Correct

Mark 5.00 out of 5.00

Which of the following are benefits gained by using Virtual Memory?

Select one or more:

- [x] a. Code to handle unusual error conditions does not need to be placed in memory ✔
- [x] b. Performance increases because less IO required to load processes ✔
- [ ] c. Kernel policies are easier to implement
- [x] d. Can support data that is larger than memory available ✔
- [x] e. Memory can easily be shared between processes ✔
- [ ] f. Thrashing is reduced when using local replacement policies
- [ ] g. No hardware support is required for an efficient implementation

Your answer is correct.

Question **13**

Correct

Mark 5.00 out of 5.00

The purpose(s) of Virtual memory are: (select all that apply)

Select one or more:

- [x] a. a process can now have "infinite" RAM ✔
- [x] b. decouples memory management from an application ✔
- [ ] c. replaces on-demand paging to solve thrashing
- [ ] d. does not suffer from internal fragmentation

Your answer is correct.

Question **14**

Correct

Mark 5.00 out of 5.00

Which of the following are advantages of DLL over a static library?

Select one or more:

- [x] a. shared code memory ✔
- [ ] b. faster execution
- [x] c. all processes get latest library code ✔
- [ ] d. everything is cached
- [ ] e. can be computed at compile time

Your answer is correct.

Question **15**

Correct

Mark 10.00 out of 10.00

Given five named free memory blocks (in order):

F1: 100K F2: 360K F3: 220K F4: 300K F5: 500K

find the block to which following space requests (in order of request) would be placed using the BEST fit policy:

228 K	F4	✔
340 K	F2	✔
117 K	F3	✔
496 K	F5	✔

Your answer is correct.

Question **16**

Correct

Mark 10.00 out of 10.00

Given five named free memory blocks (in order):

F1: 100K F2: 360K F3: 220K F4: 300K F5: 500K

find the block to which following space requests (in order of request) would be placed

using the WORST fit policy:

228 K	F5 ✔
340 K	F2 ✔
117 K	F4 ✔
496 K	NA ✔

Your answer is correct.

Question **17**

Correct

Mark 10.00 out of 10.00

Assume primary memory has 4 page frames all of which are empty. For the following sequence of page references, calculate the number of page faults under the OPT. [Please input an integer value of page in memory for each place in table, use 0 for unassigned frame]

Sequence: 6 4 6 2 3 2 8 6 4 2 . . .

SEQ	6	4	6	2	3	2	8	6	4	2
OPT	step 1	step 2	step 3	step 4	step 5	step 6	step 7	step 8	step 9	step 10
1	6 ✔	6 ✔	6 ✔	6 ✔	6 ✔	6 ✔	6 ✔	6 ✔	6 ✔	6 ✔
2	0 ✔	4 ✔	4 ✔	4 ✔	4 ✔	4 ✔	4 ✔	4 ✔	4 ✔	4 ✔
3	0 ✔	0 ✔	0 ✔	2 ✔	2 ✔	2 ✔	2 ✔	2 ✔	2 ✔	2 ✔
4	0 ✔	0 ✔	0 ✔	0 ✔	3 ✔	3 ✔	8 ✔	8 ✔	8 ✔	8 ✔

How many page faults occur?

5 ✔

Your answer is correct.

Question **18**

Correct

Mark 10.00 out of 10.00

Assume primary memory has 4 page frames all of which are empty. For the following sequence of page references, calculate the number of page faults under the LRU. [Please input an integer value of page in memory for each place in table, use 0 for unassigned frame]

Sequence: 6 4 6 2 3 2 8 6 4 2 . . .

SEQ	6	4	6	2	3	2	8	6	4	2
LRU	step 1	step 2	step 3	step 4	step 5	step 6	step 7	step 8	step 9	step 10
1	6 ✔	6 ✔	6 ✔	6 ✔	6 ✔	6 ✔	6 ✔	6 ✔	6 ✔	6 ✔
2	0 ✔	4 ✔	4 ✔	4 ✔	4 ✔	4 ✔	8 ✔	8 ✔	8 ✔	8 ✔
3	0 ✔	0 ✔	0 ✔	2 ✔	2 ✔	2 ✔	2 ✔	2 ✔	2 ✔	2 ✔
4	0 ✔	0 ✔	0 ✔	0 ✔	3 ✔	3 ✔	3 ✔	3 ✔	4 ✔	4 ✔

How many page faults occur?

6 ✔

Your answer is correct.

Question **19**

Complete

Mark 1.00 out of 7.00

What steps did you need to perform to create a predictive paging algorithm?

To create a predictive paging algorithm, you have to first find a way to change the page replacement policy. To modify the page repalcement policy, one has to find a way to develop a way to make predictions. The predicitions come from patterns such as determining which pages get referenced and if in what pattern as well. These predictions are then fed to the new page replacement policy to predict when a page needs to be replaced.

Iterate the above process to make sure the algorithm is making predicitions in ways that you seem fit.

Comment:

- missing explanation of how and what information is collect or calculated
- missing how to use that information to predict next page(s) needed

Question **20**

Complete

Mark 7.00 out of 7.00

Define the external fragmentation problem and provide an example of this problem. Describe two general approaches for memory management that can help solve the external fragmentation problem.

External fragmentation is essentially when there are a bunch of chunks of memory that are spread out in the memory space. This causes a problem because the free memory that remains may add up to a requested amount but is scattered in non-contiguous chunks within the main space.

If for example, you have a memory space of 16 GB, and your free space overtime looks something like 2 GB, 4GB, and 1 GB, and a program requests a contiguos block of 5 GB, this can't be performed even though there are 7 GB total that are free.

To solve this, one can first use **paging** as a memory management technique. If paging is not available, one can use **compaction** (taking all the free non-contiguous blocks and smashing them together into one contiguous piece).

Comment:

Question **21**

Complete

Mark 1.00 out of 1.00

Write some comments about the exam or write the justification on your answers to some difficult questions (may allow for partial credit).
You should NOT write comments for every question, just a few that you felt were the **most** difficult for you.
You should **write "no comments"** in the answer if you have none.

-- no comments --

Comment: