LE16.1

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LE16.1.1: Page Maps

0.0/1.0 point (ungraded)

Consider a virtual memory system for the Beta that uses a single-level pagemap to translate virtual addresses into physical addresses. Assume 32-bit virtual (byte) addresses, a page size of 2^{12} (4096) bytes, and a physical memory of 2^{28} bytes.

1. The Beta produces 32-bit byte addresses, A[31:0]. Which of these bits should be interpreted as the virtual page number?

   address bits specifying virtual page: A[[ ] **:** [ ] **]**

2. Assuming each pagemap entry includes R and D bits, what is the total pagemap size in **bits**? You can express your answer as a mathematical expression, e.g., 10*(2^17).

   pagemap size, in bits: [ ]

3. At any given time, what is the maximum number of entries in the page map that can have their R bit set to one? Assume that no virtual pages are mapped to the same physical page.

   Maximum number of page map entries with R=1: [ ]

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LE16.1.2: Address Translation

0.0/1.0 point (ungraded)

The following table shows the first 8 entries in the page map. Recall that the resident bit is 1 if the page is resident in physical memory and 0 if the page is on disk or hasn't been allocated.

VPN	R	PPN
0×0	0	0×7
0×1	1	0×9
0×2	0	0×3
0×3	1	0×2
0×4	1	0×5
0×5	0	0×5
0×6	0	0×4
0×7	1	0×1

Suppose there are 1024 (2^{10}) bytes per page.

What is the physical address (in hex) corresponding to the virtual address 0×0F74? Please enter "--" if the address cannot be determined because the page is not resident.

0x: [ ]

What is the physical address (in hex) corresponding to the virtual address 0×1678? Please enter "--" if the address cannot be determined because the page is not resident.

0x: [ ]

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Calculator

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Semantics of LE16.1.2 Answer

When I entered 16-bit answer in hex, marked incorrect. Same answer in 12-bits of hex marks correct. Only concerned about this auto... 3

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