

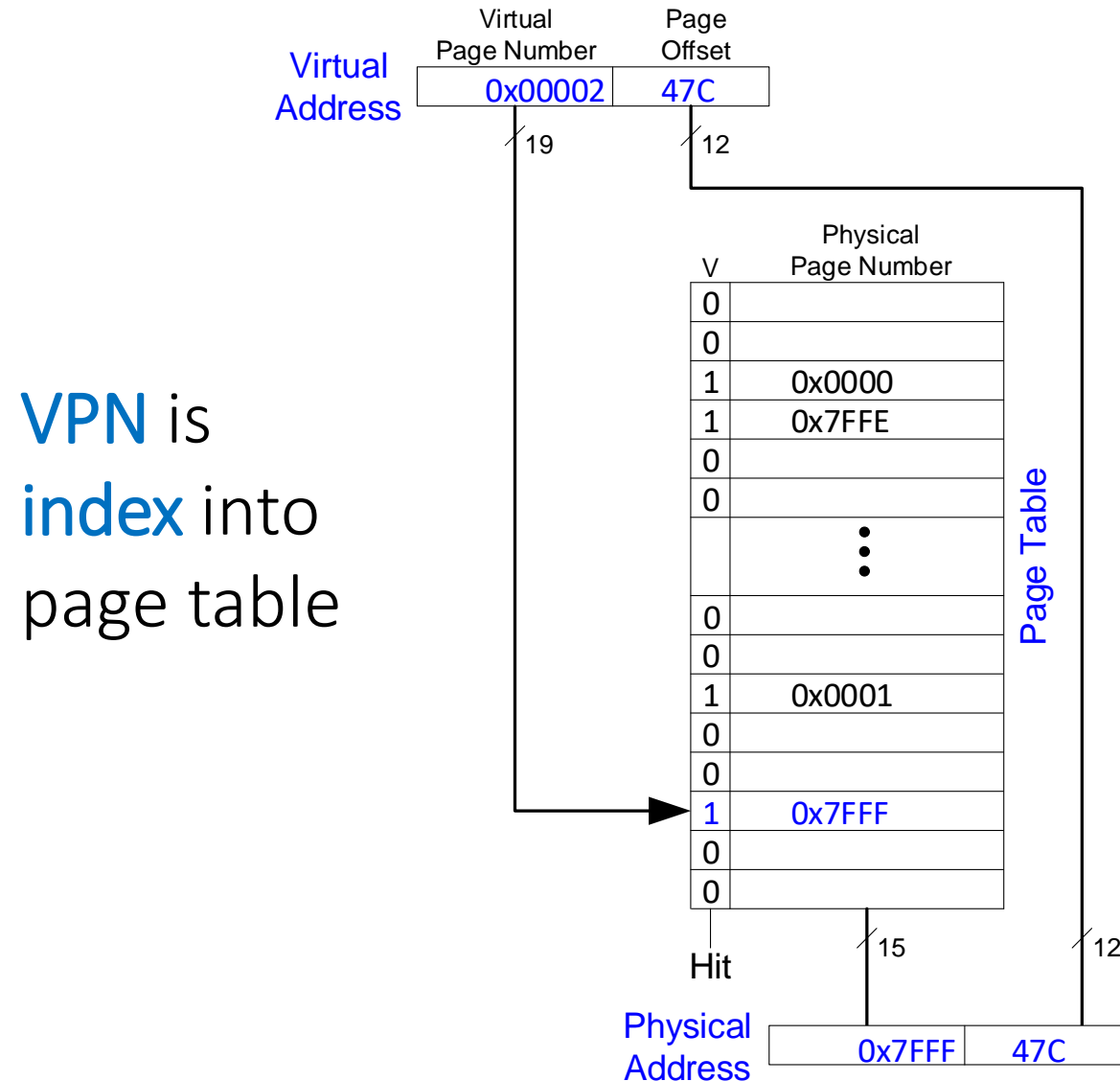
Chapter 7: Microarchitecture

Page Table

How to Perform Translation

- **Page table**
 - Entry for each virtual page
 - Entry fields:
 - **Valid bit:** 1 if page in physical memory
 - **Physical page number:** where the page is located

Page Table Example



Page Table Example 1

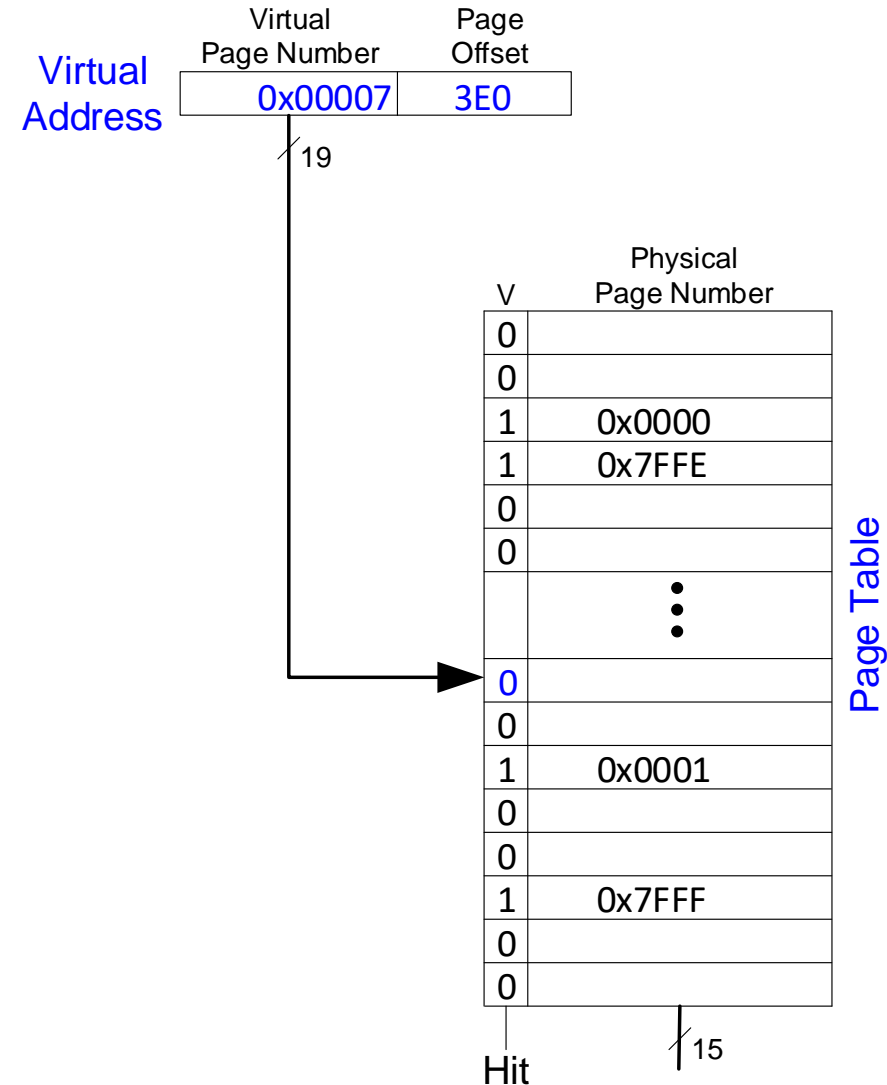
What is the physical address of virtual address **0x5F20**?

V	Physical Page Number	Virtual Page Number
0		7FFFF
0		7FFFE
1	0x0000	7FFFD
1	0x7FFE	7FFFC
0		7FFFB
0		7FFFA
	⋮	⋮
0		00007
0		00006
1	0x0001	00005
0		00004
0		00003
1	0x7FFF	00002
0		00001
0		00000

Page Table

Page Table Example 2

What is the physical address of virtual address **0x73E4**?



Page Table Challenges

- Page table is **large**
 - usually located in physical memory
- Load/store requires **2 main memory accesses**:
 - one for translation (page table read)
 - one to access data (after translation)
- Cuts memory performance in half
 - *Unless we get clever...*