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1. Page size = 4096 bytes = 2^{12} bytes
Physical mem = 2^{18} bytes
Virtual mem = 2^{32} bytes.
Virtual add = 0x11123456

Steps

1. Divide the virtual add. space into pages of size 4096 bytes.

2. Divide the physical address space into frames of 4096 bytes.

3. When the system gets the hex 0x11123456 it converts it into binary.

4. Then it finds the offset which is the LSBs depending on the page size. Here the last 12 bits are the offset (0x456) in Hex.

5. Then the system looks for the page # in the page table (0x11123) in the TLB

6. If it exists then the corresponding mapping is accessed and appended with the offset to find the actual physical add. (Page hit) / (TLB hit)

7. If not, then it goes to main memory to find the page # there. If found then the entry is cached in the TLB and appended with offset

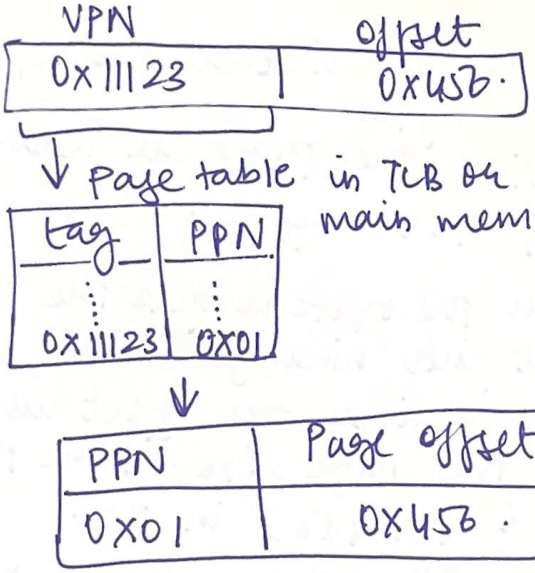
8. If its not found in the main mem. then it means that the page is not loaded and exists in secondary storage. This is a page fault and we need to wait for the data from storage.

The appended add. (Page Table entry + Offset) is the physical mem. location.

Software operations :
- maintain page table in TLB and main mem.

Hardware operations (MMU):
- Using the page table to translate address and append the offset to form virtual add.

Virtual add
0X11123456 →



Physical Add :

2. Page fault if empty page or replaced page has no modif = 8 ms
else 20 ms
mem access time = 100 ns
Page replaced to be modified = 70 %.
Effective Access time ≤ 200 ns.
Page Fault Rate (PFT) = P.

200 ns = P (page fault time) + (1-p) · mem access time

Page fault time = $\frac{70}{100}$ (20ns) + $\frac{30}{100}$ (8 ms)

= 16 400 000 ns.

∴ 200ns = P(16,400,000) + (1-p) 100ns

→ 200 = 16400000 P + 100 − 100p.

→ ~~100 = 16399900 p~~.

→ P = 100/163999 ≈ 6.1 × 10^{-6}