

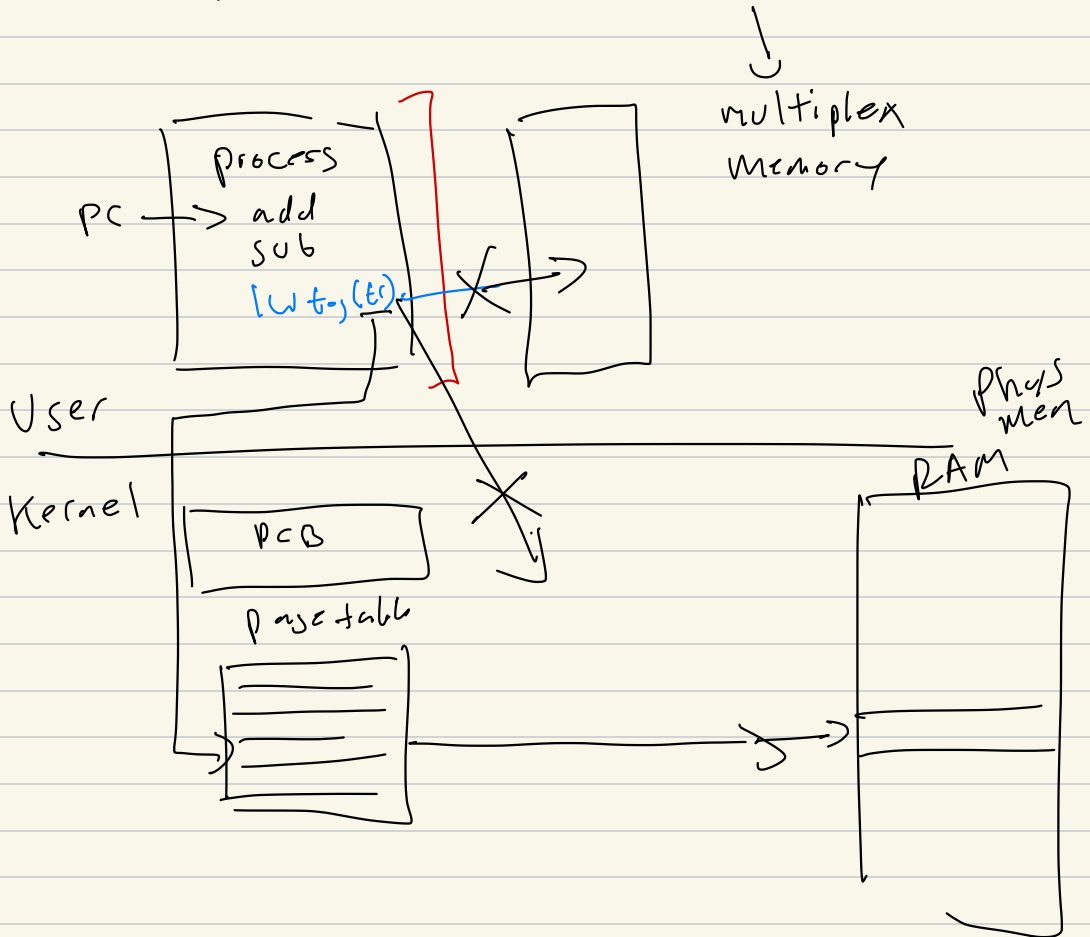
Process Model / Process Isolation

Isolation:

Processor Modes: kernel / user

Interrupts: timer interrupt — multiple CPU

Virtual Memory: page tables

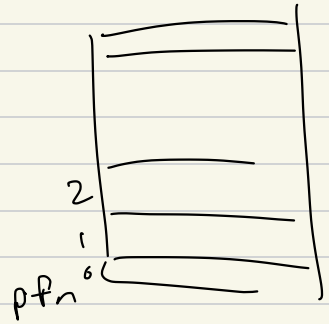
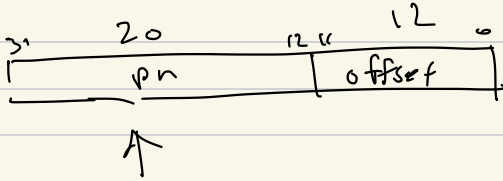


Page Tables

$$2^{32} = 4 \text{ GB}$$

32 bit example

4KB pages



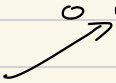
Page table

$$2^{20}$$

PTE
32 bits
4 byte
 2^2

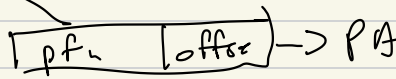
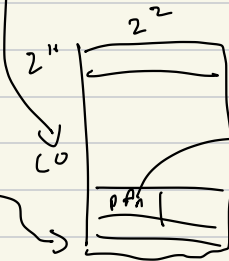
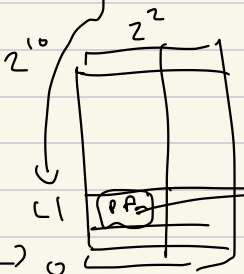
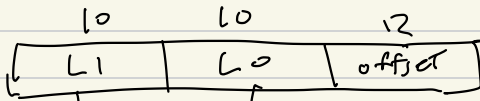
$$2^2 \times 2^{20} = 2^{22} = 4 \text{ MB}$$

PT
ptr

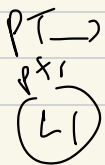


$$pn + offset = PA$$

Multi-level Page Tables



Memory



$$2^2 \times 2^{10} = 2^{12} = 4 \text{ KB}$$

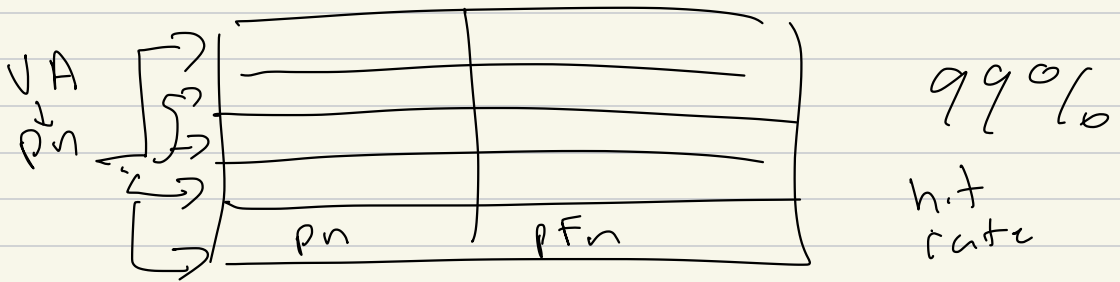
"WALK"

Processor Translation

Translation Cache

TLB

Translation Lookaside Buffer



Fully Association