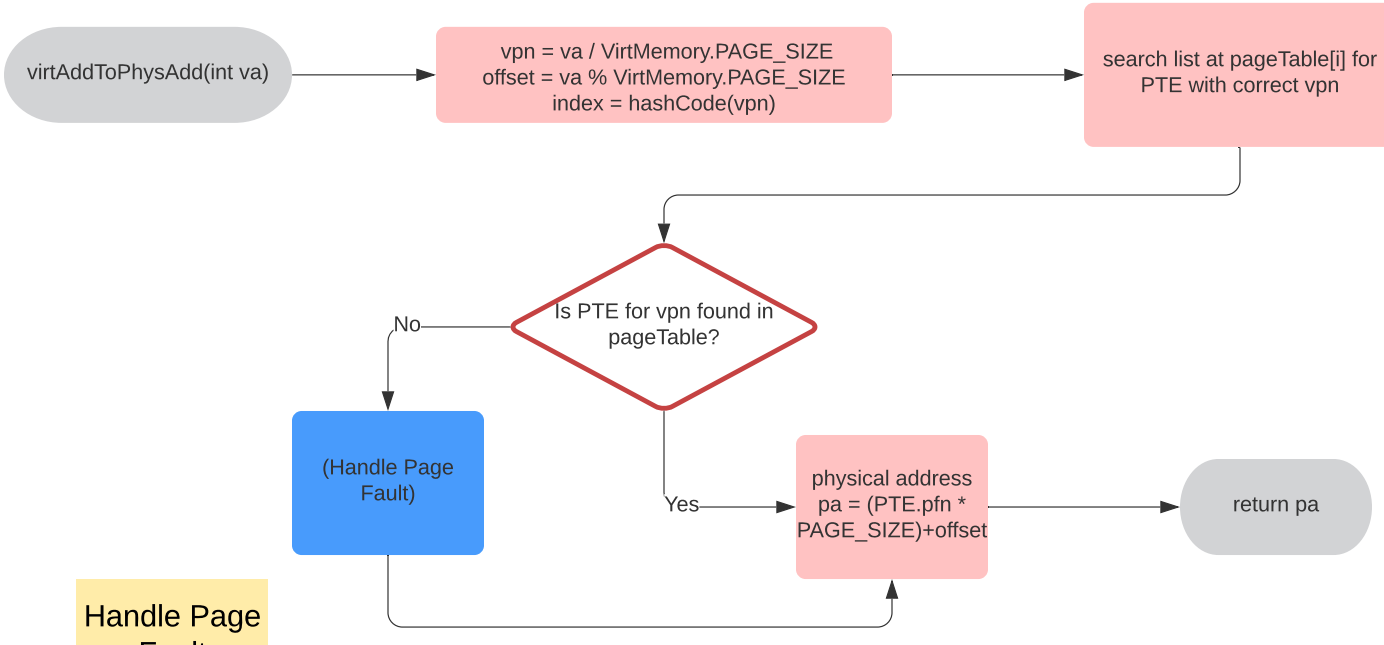
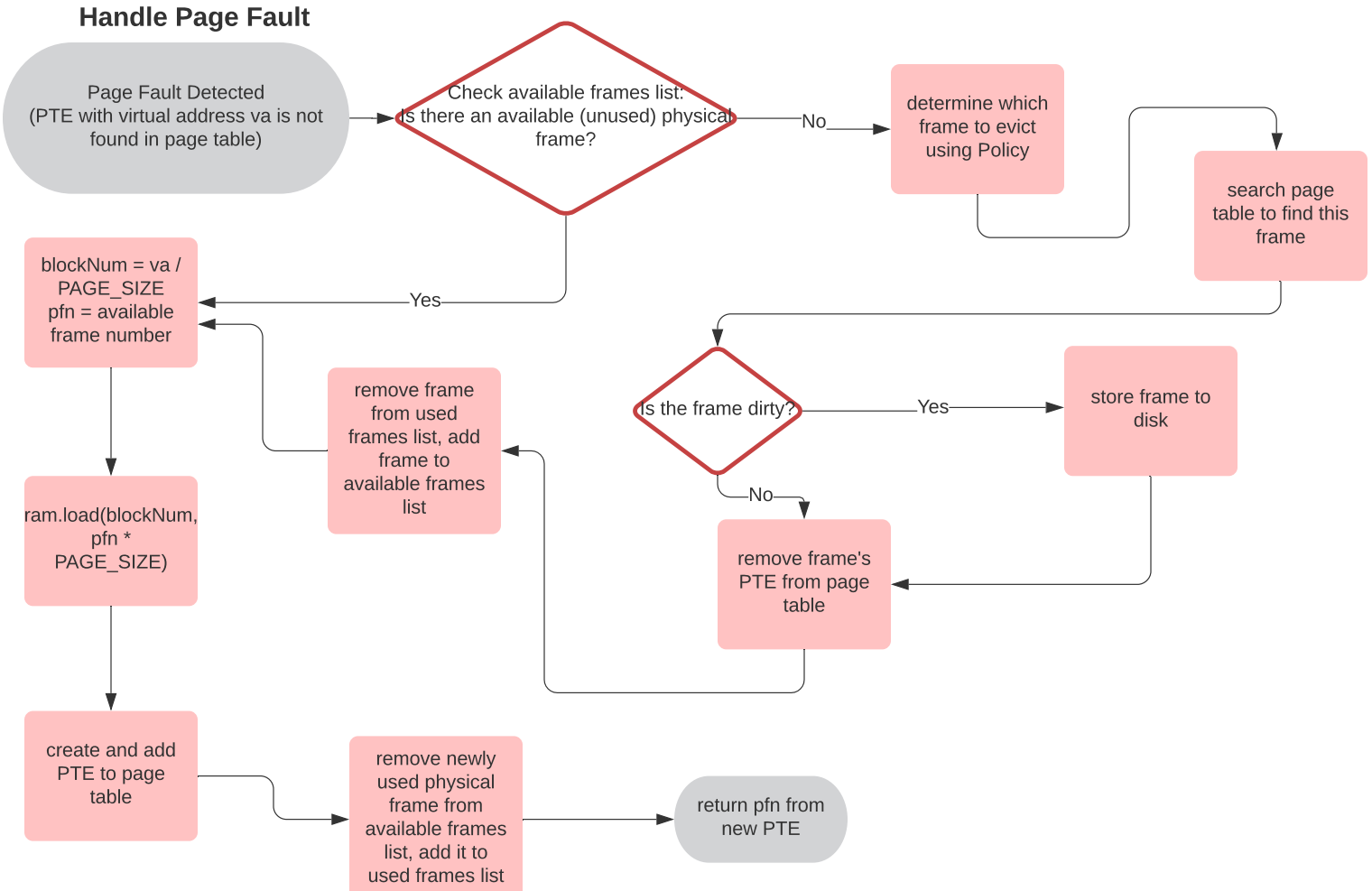
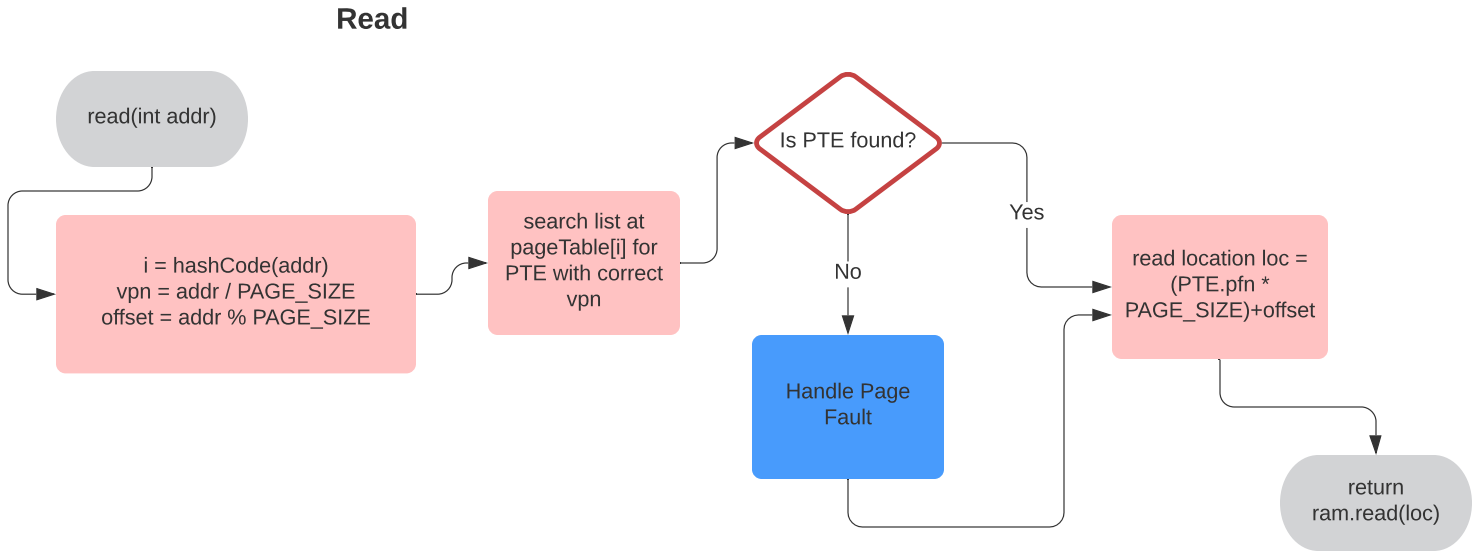
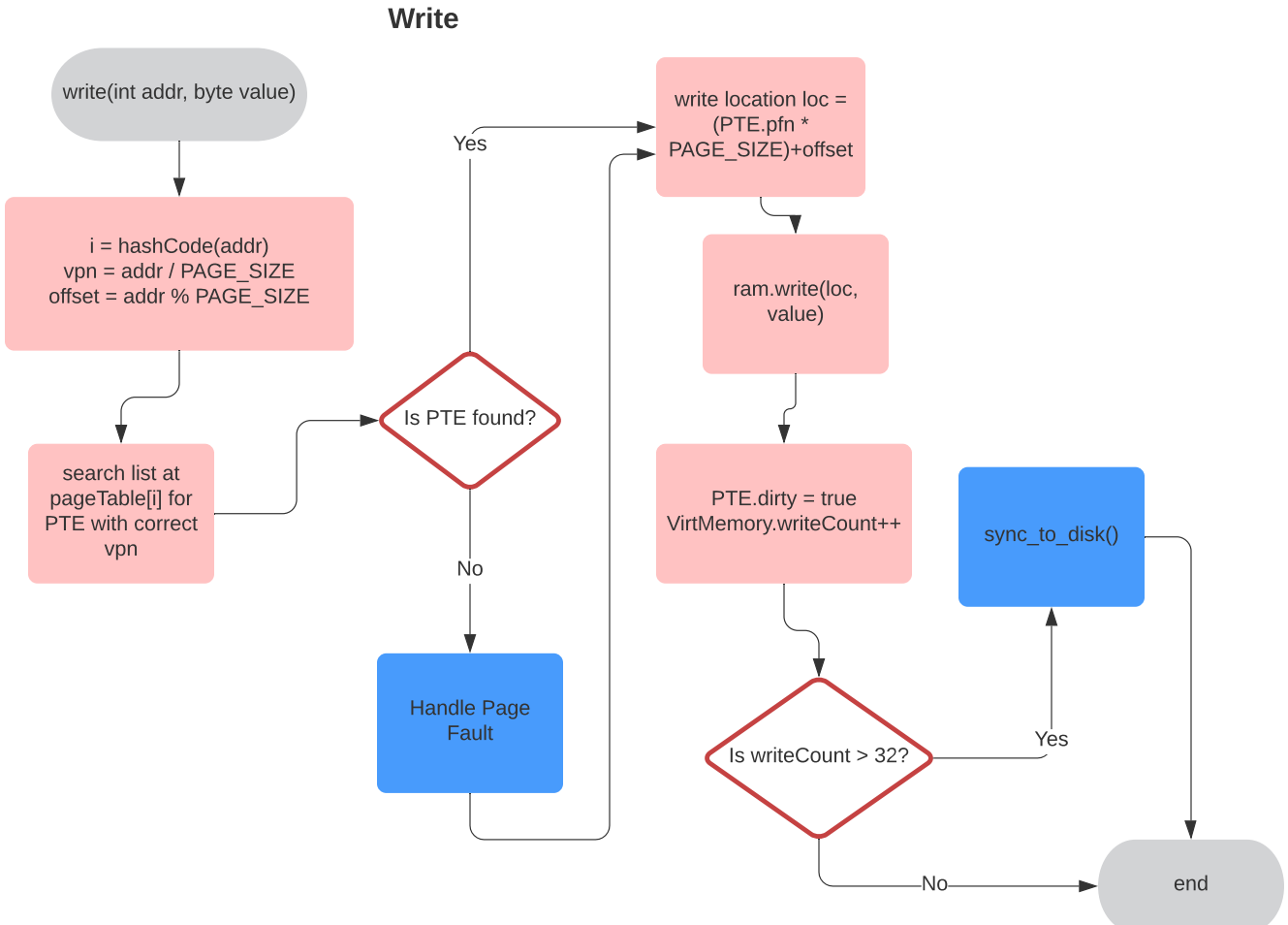
Address Translation

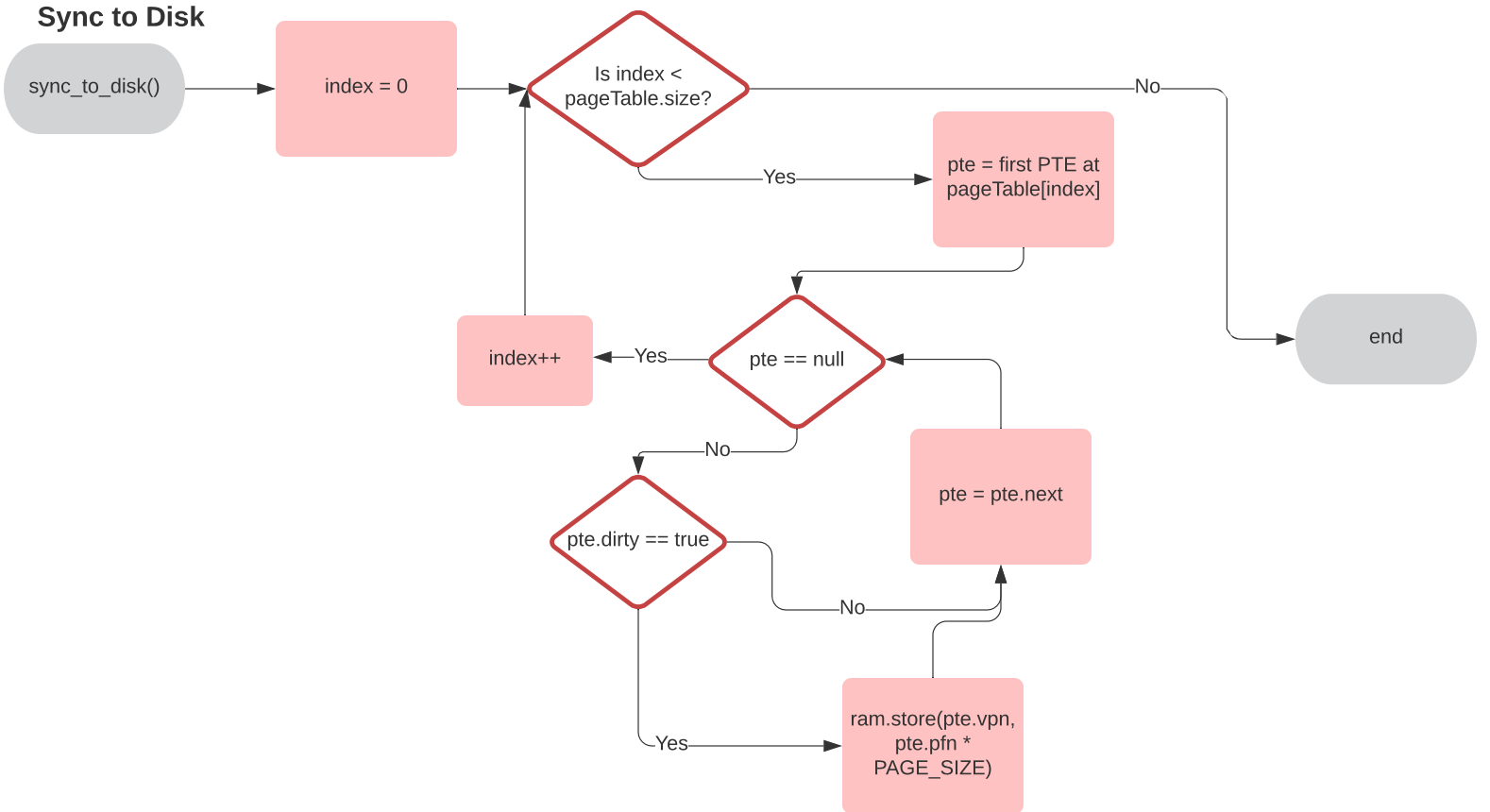


Handle Page Fault flowchart is on next page


Handle Page Fault
Page Fault Detected (PTE with virtual address va is not found in page table)
Check available frames list: Is there an available (unused) physical frame?
No
determine which frame to evict using Policy
search page table to find this frame
Yes
blockNum = va / PAGE_SIZE
pfn = available frame number
Is the frame dirty?
Yes
store frame to disk
No
remove frame from used frames list, add frame to available frames list
ram.load(blockNum, pfn * PAGE_SIZE)
remove frame's PTE from page table
create and add PTE to page table
remove newly used physical frame from available frames list, add it to used frames list
return pfn from new PTE


Read
read(int addr)
i = hashCode(addr)
vpn = addr / PAGE_SIZE
offset = addr % PAGE_SIZE
search list at pageTable[i] for PTE with correct vpn
Is PTE found?
Yes
No
Handle Page Fault
read location loc = (PTE.pfn * PAGE_SIZE)+offset
return ram.read(loc)


Write
write(int addr, byte value)
i = hashCode(addr)
vpn = addr / PAGE_SIZE
offset = addr % PAGE_SIZE
search list at pageTable[i] for PTE with correct vpn
Is PTE found?
Yes
No
Handle Page Fault
write location loc = (PTE.pfn * PAGE_SIZE)+offset
ram.write(loc, value)
PTE.dirty = true
VirtMemory.writeCount++
Is writeCount > 32?
Yes
sync_to_disk()
No
end


Sync to Disk
sync_to_disk()
index = 0
Is index < pageTable.size?
No
Yes
pte = first PTE at pageTable[index]
end
index++
Yes
pte == null
No
pte = pte.next
pte.dirty == true
No
Yes
ram.store(pte.vpn, pte.pfn * PAGE_SIZE)