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To describe paging we must first go back to pages

Memory

Virtual Memory

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Hardware is designed so copying pages in and out of memory from disk is as efficient as possible

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A virtual address is a per-process fictional address

The user process sees only the virtual addresses: the system will translate them on the fly into physical addresses

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Under the entry for page 3 in the page table for this process we might find the number 7, meaning physical page 7

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So virtual address 12298 **in this process** refers to physical byte $7 \times 4096 + 10 = 28682$

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And then the same virtual address 12298 **in this process** refers to physical byte $42 \times 4096 + 10 = 172042$

The *same* virtual address in different processes is mapped to *different* physical addresses

We use pages, of course, to make this translation manageable

Memory

Virtual Memory

The table only contains entries for pages that are actually in use by that process: this keeps the tables to a reasonable size

V page	P page
3	7
4	9123
5	121
10	1232
etc.	

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Note: page tables contain page *mappings*, not pages

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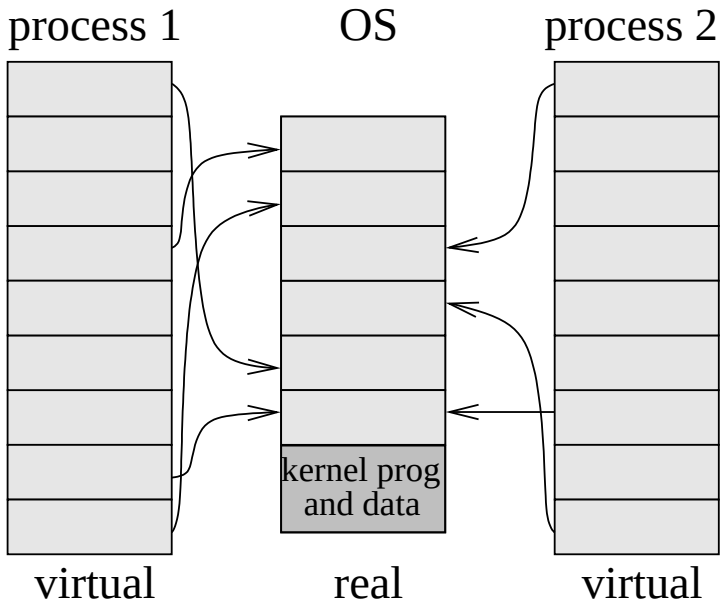
Note: though still called “tables”, in modern OSs they are likely to be more sophisticated datastructures, such as trees

Memory

Virtual Memory



Every process gets its own complete and separate address space, mapped into the physical address space

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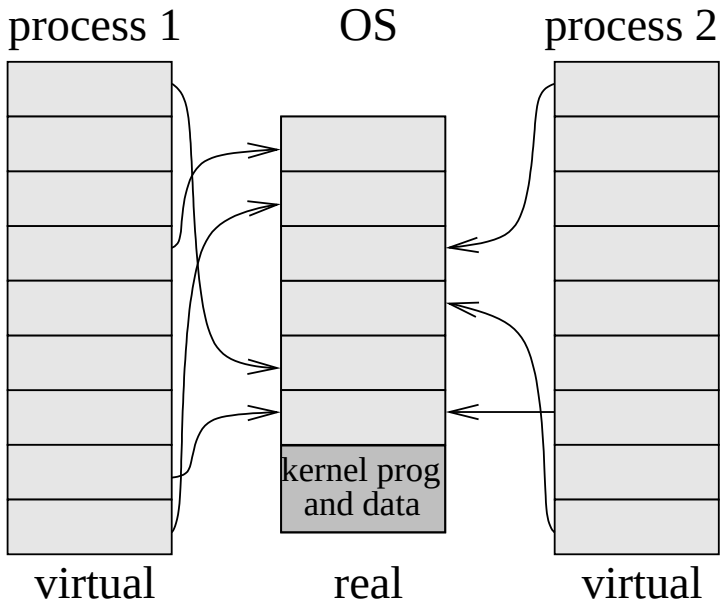

Every process gets its own complete and separate address space, mapped into the physical address space

Even for the same userid: this is usually what you want, protection of one process from another