Process Swapping in UNIX V6

Lions' commentary chapter 14 in detail

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- small device with 16 MB RAM and a Hard disc

WL-HDD (www.asus.com)

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$\Rightarrow$ use virtual memory

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types of virtual memory

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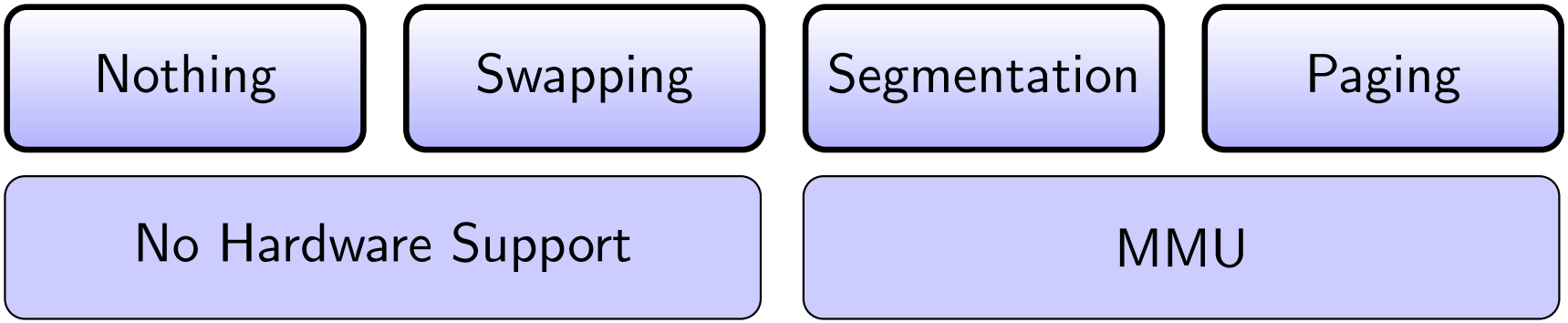
Nothing | Swapping | Segmentation | Paging

types of virtual memory



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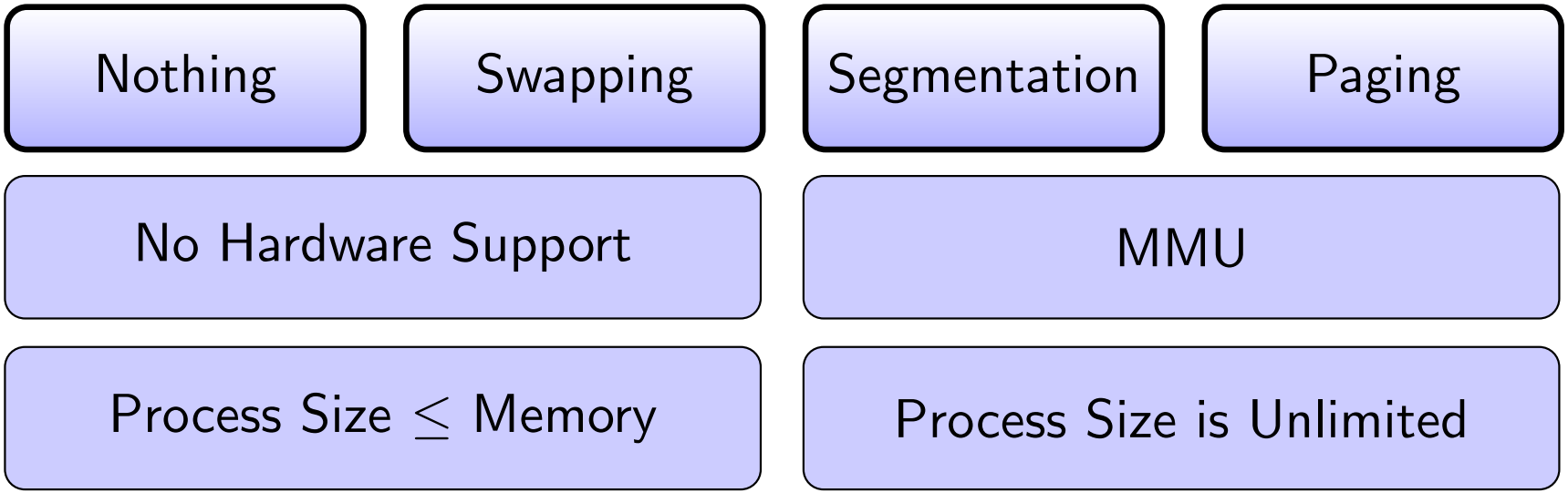

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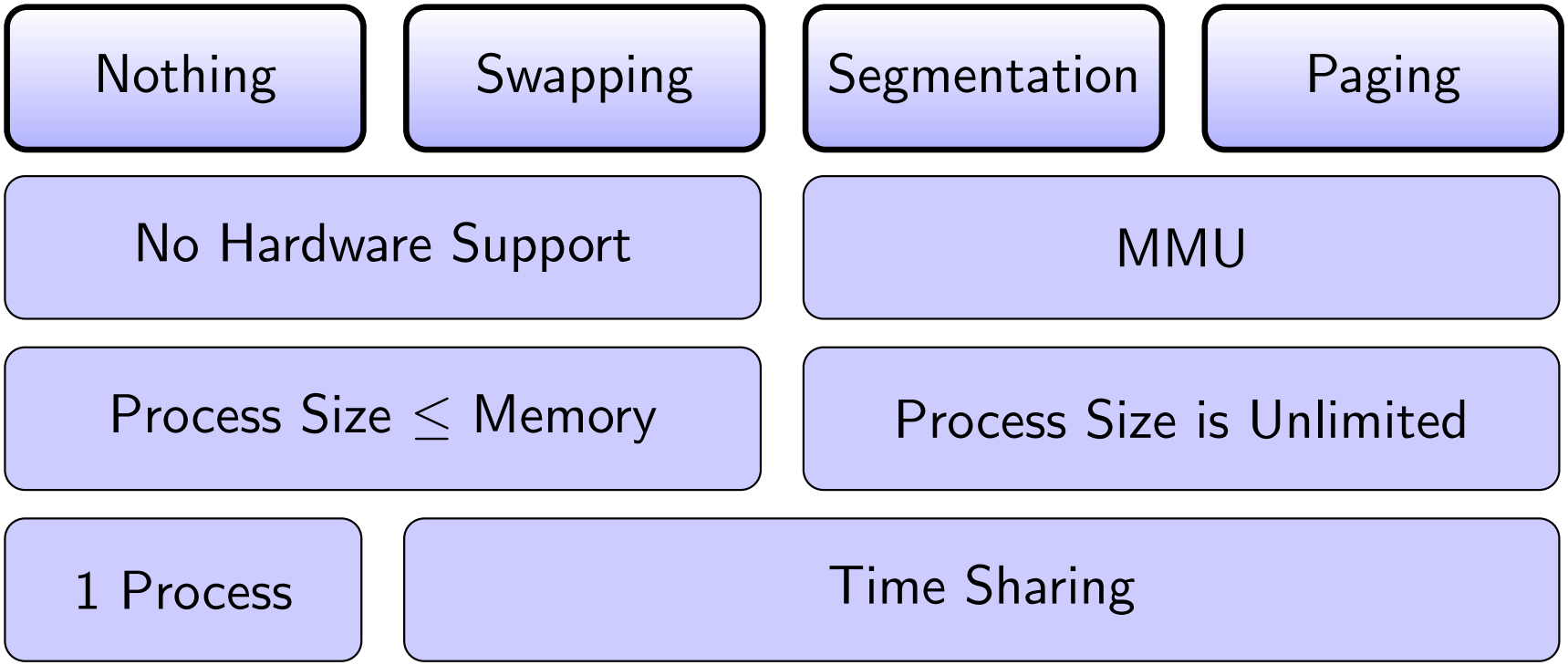

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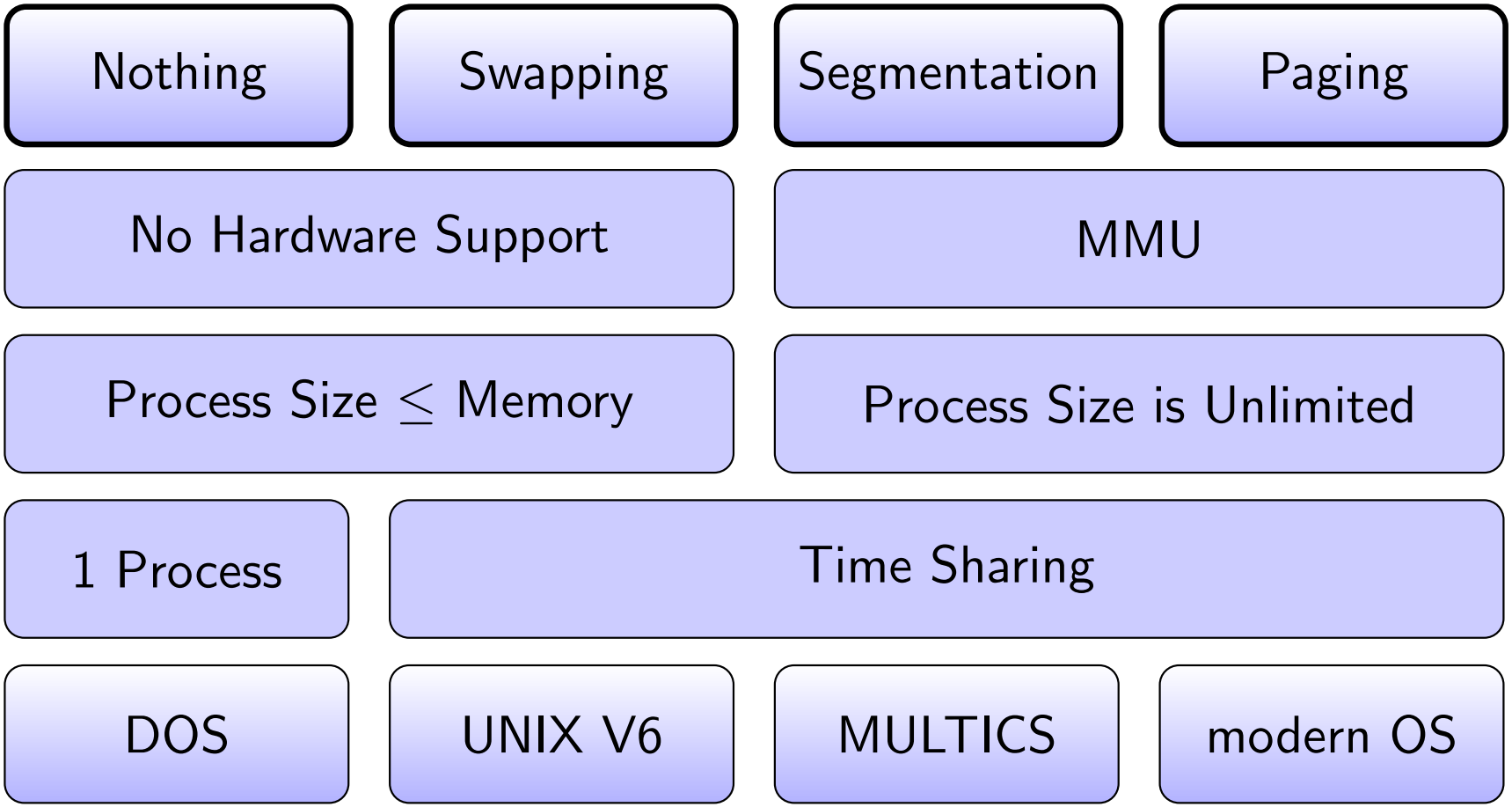

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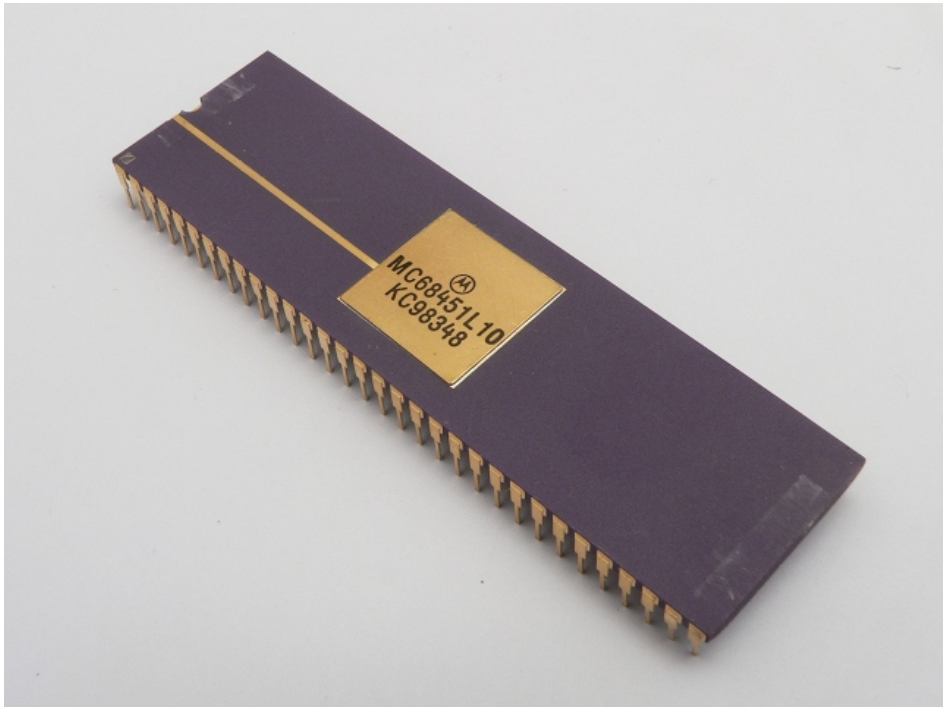
no special hardware	MMU

MMU - Memory Management Unit

- paging needs a MMU
- integrated in modern CPU such as ARM, IA-32, MIPS
- basic operation of paging is defined by the MMU



www.wikipedia.org

OS tasks in a paging system

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- after termination of a process
  - free frames in RAM
  - free pages on swap

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- creation of a process
  - swap new process out if it doesn't fit in RAM
- process size is increased
  - swap process out if it don't fit in RAM anymore
- swapper is triggered to do something
  - swap oldest process in (if enough RAM is available)
  - otherwise swap an inactive process out

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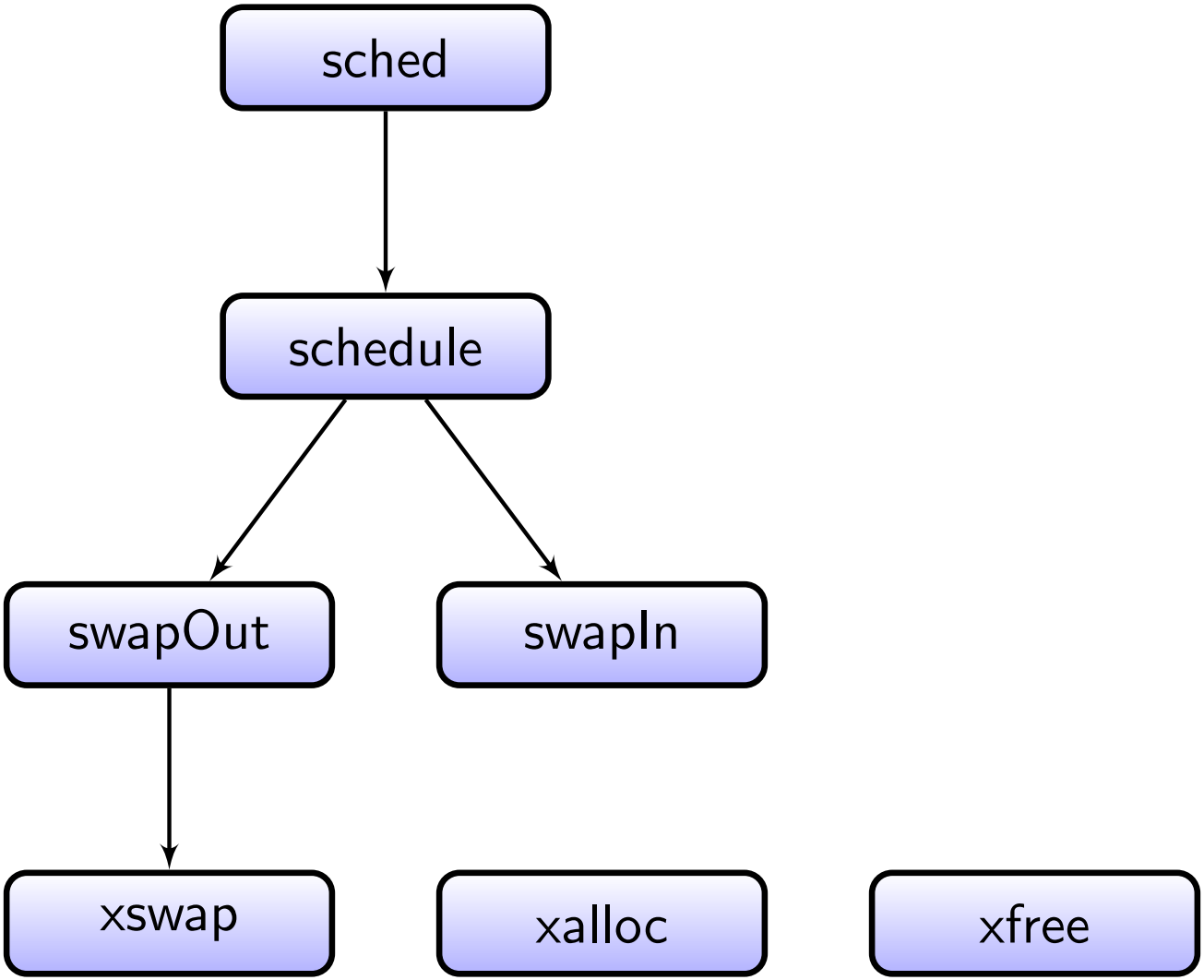
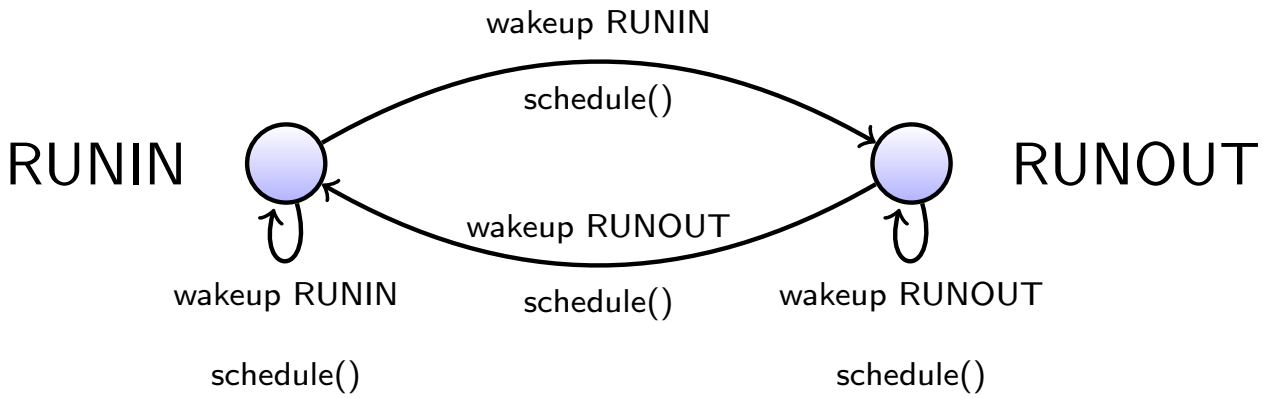
- generated documentation with Doxygen

call graph



sched - waiting for changes



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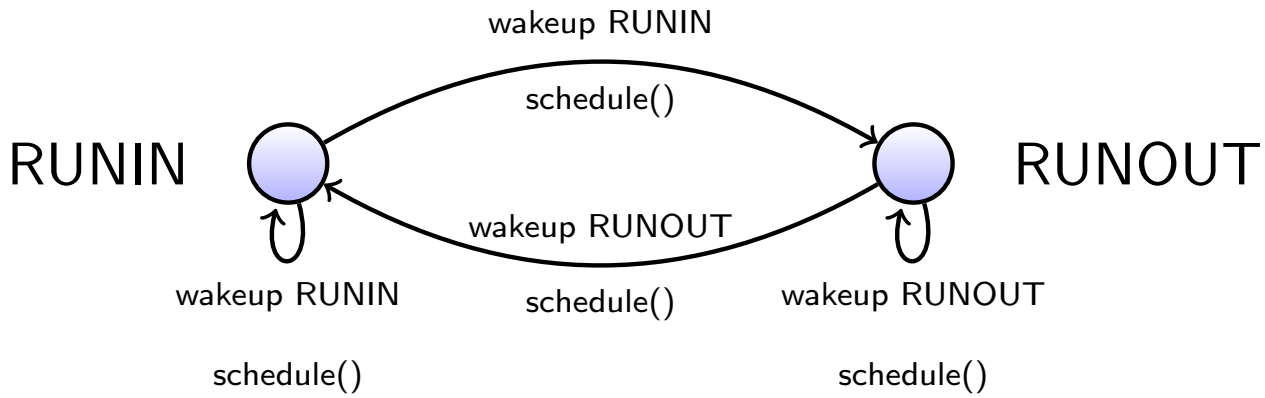
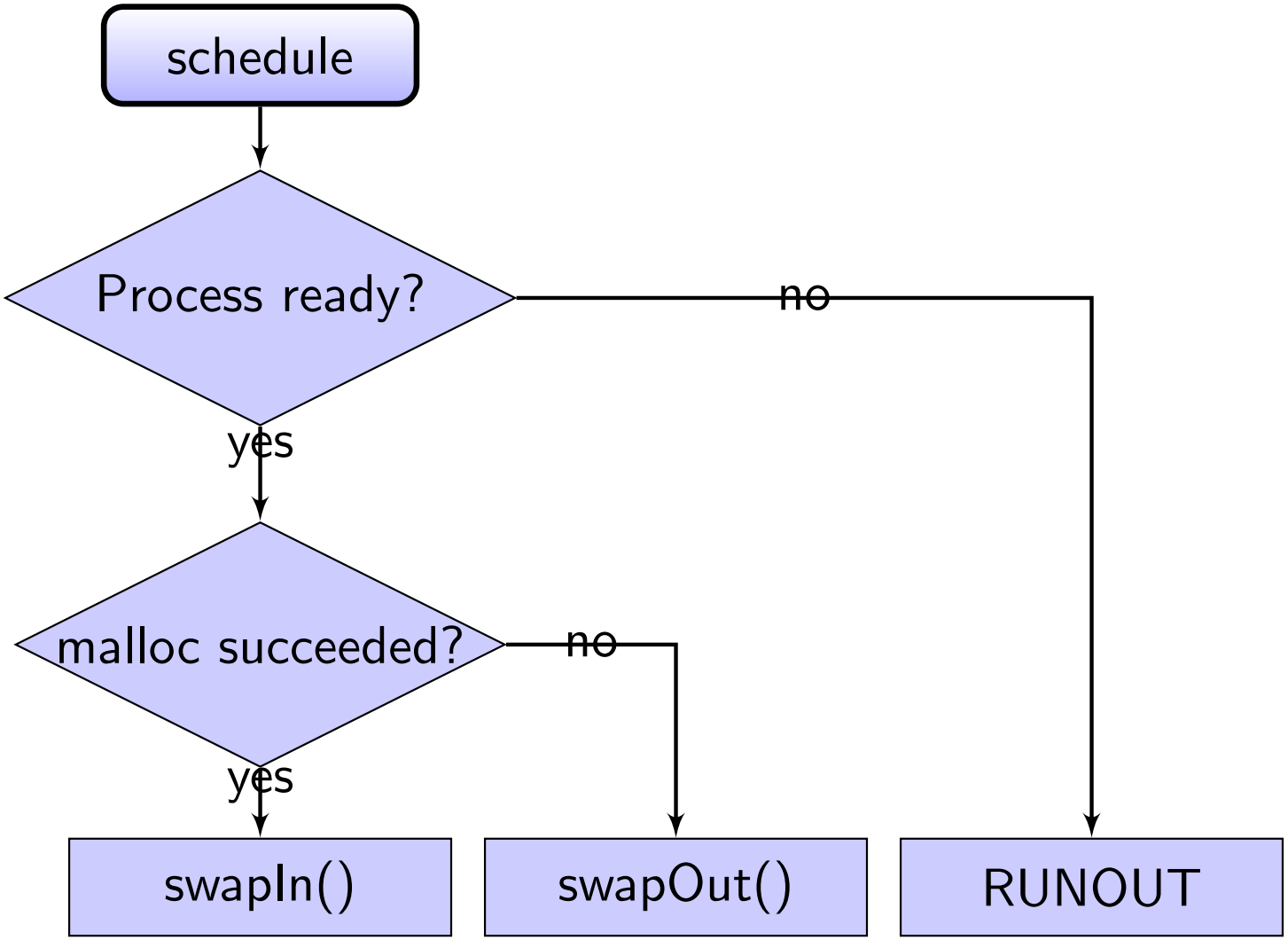
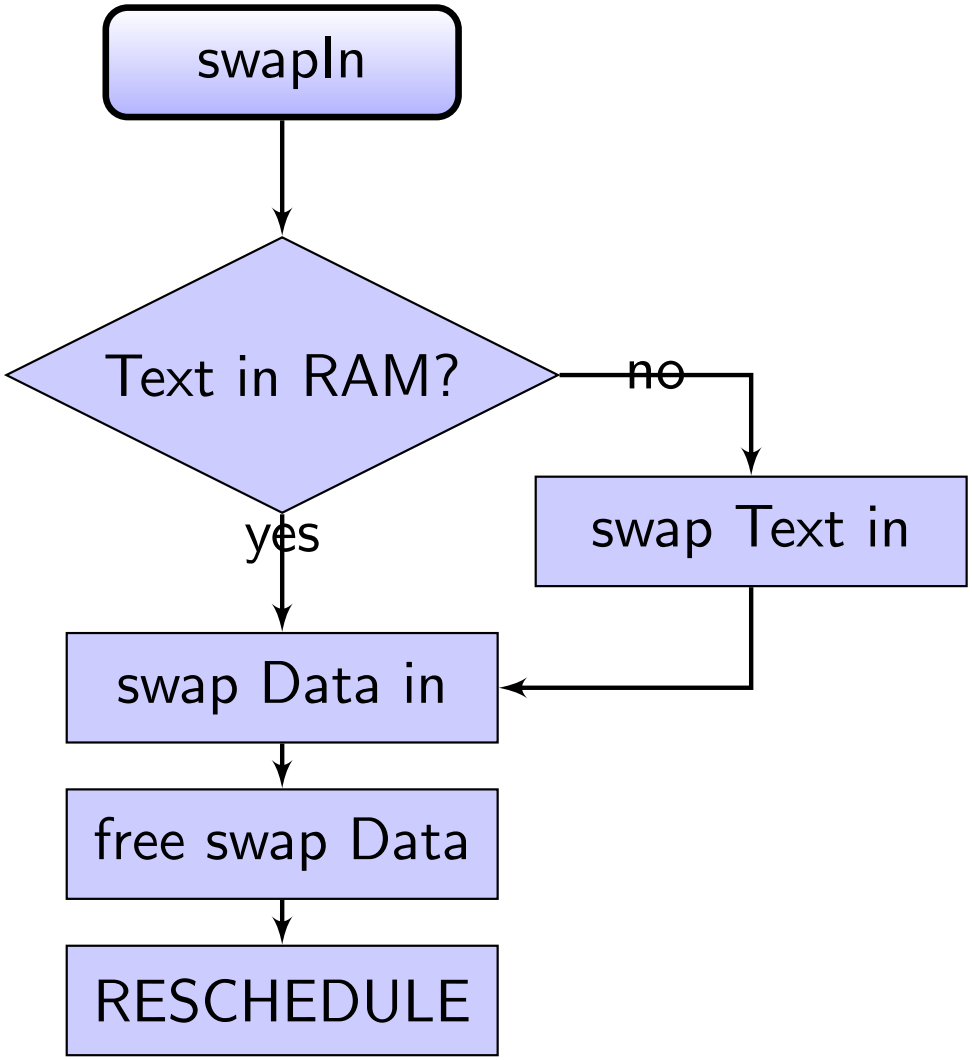


- schedule is looped until it returns something else than RESCHEDULE
  - RUNOUT: no swapped process is ready to run
  - RUNIN: process can't yet be swapped in

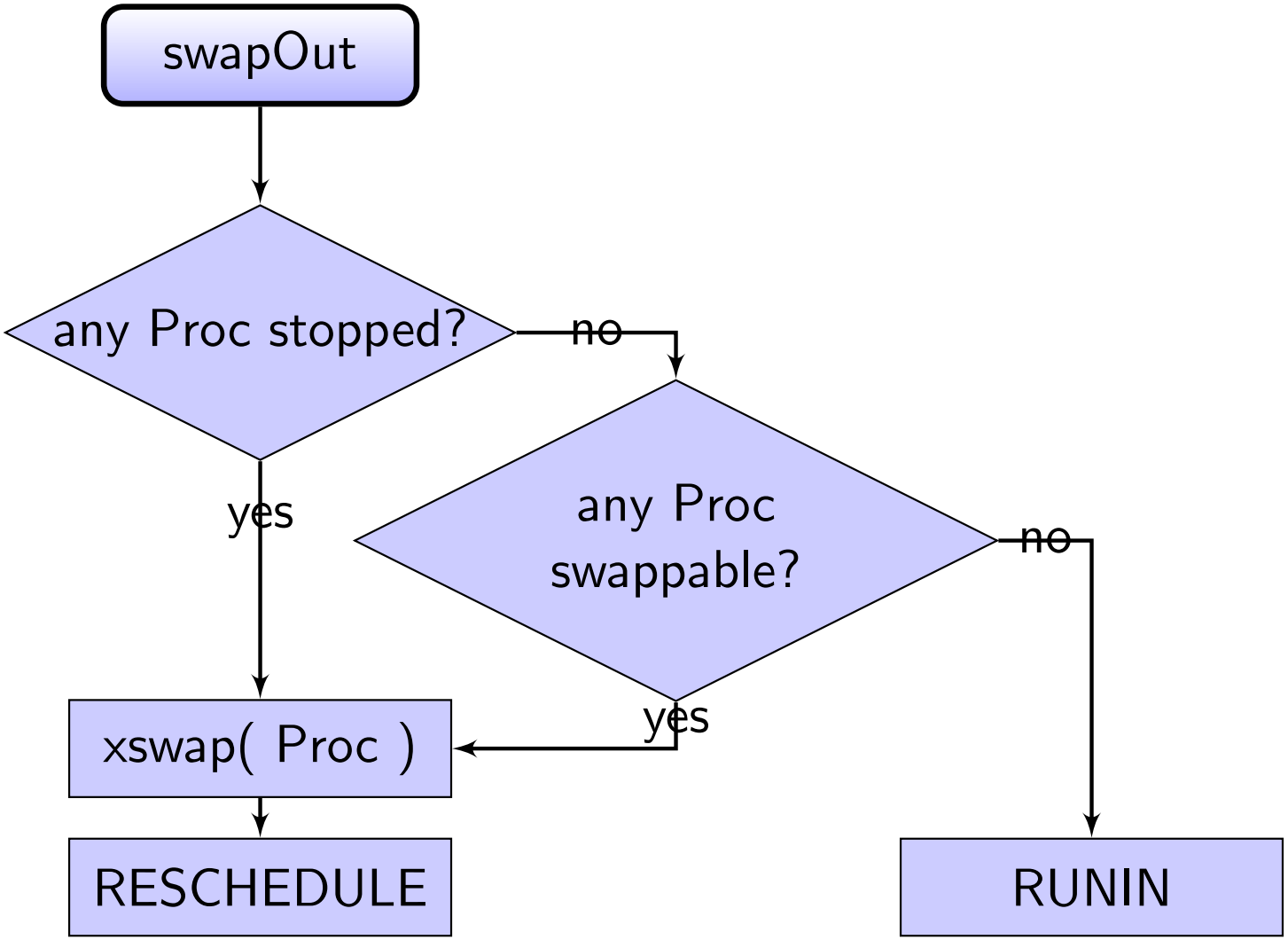
sched : schedule - process swapper



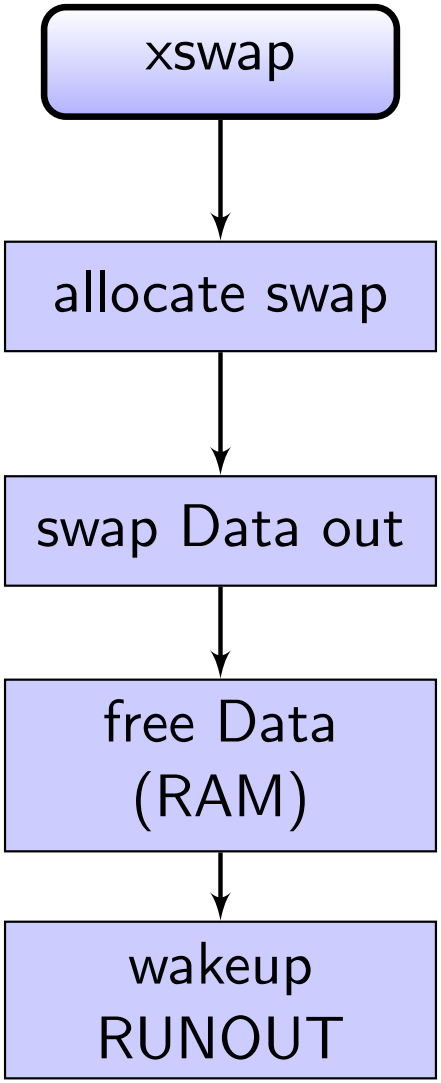
sched : schedule : swapIn



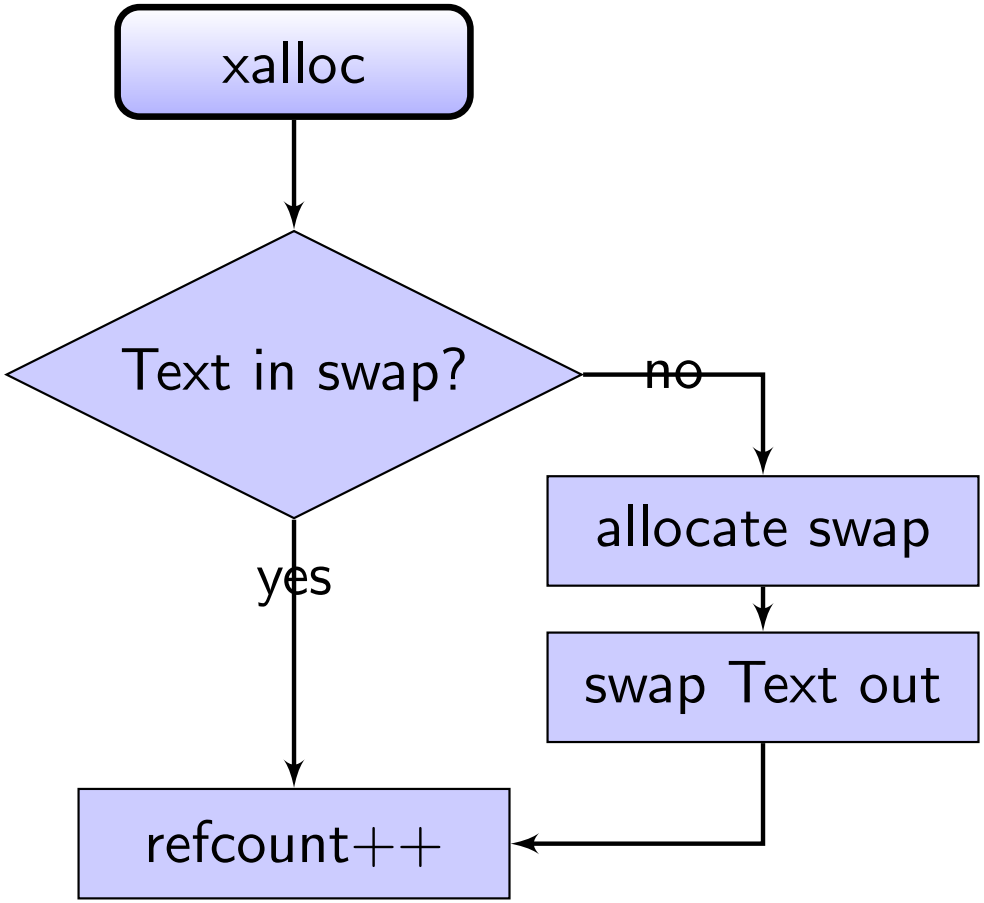
sched : schedule : swapOut



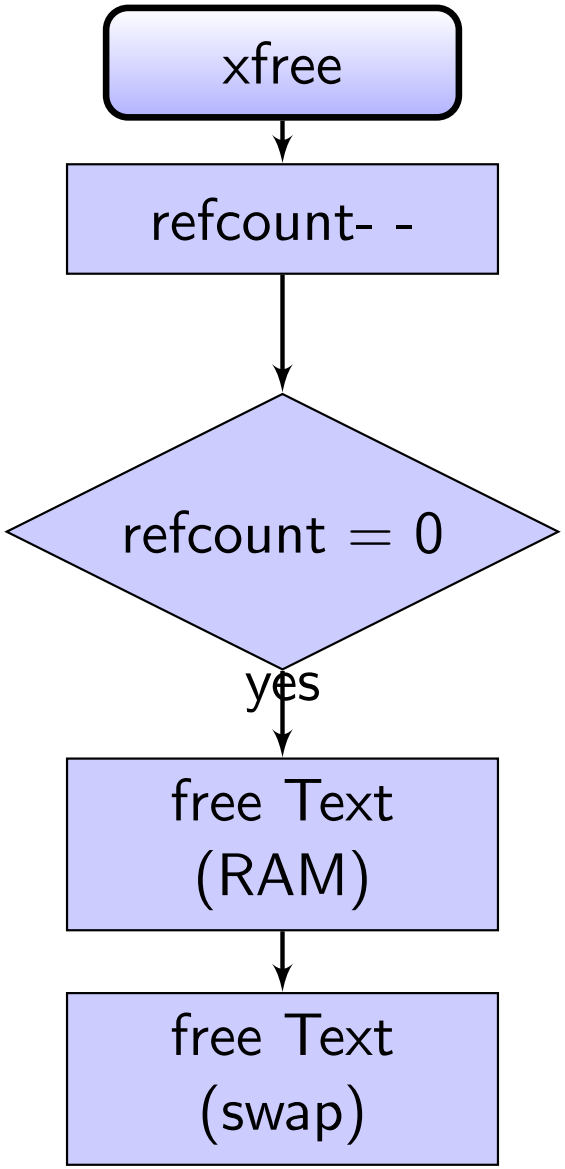
sched : schedule : swapOut : xswap - swap a process out



xalloc - copy text from disc to swap



xfree - remove link to text



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- write small subroutines for specific functionality
- use meaningful variable names

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- don't use goto (at most for exceptions)
- write small subroutines for specific functionality
- use meaningful variable names
- use an ANSI C compiler
  - don't optimize (let the compiler do it)
  - use strong typing
  - define a interface (headerfile) to the implementation

about

- find the slides, handout, refactored source and more on `http://n.ethz.ch/~ursf/`