CHEAT SHEET

Eric Yoon - CPSC 323 Final Cheat Sheet

good luck :)

File tables

- **File descriptor table** and **open file table** are two different things

Processes

- Fork: creates a new process that is duplicate to the current process
  - *file descriptor table is copied over, but open file table is not copied, so file descriptors will be the same, but you have to open files again*
- Pipe: creates two file descriptors (read and write)
- Dup: overwrites file descriptor with lowest-available file descriptor
- Dup2: overwrites file descriptor with specified file descriptor
- Execvp: overwrites entire process with the code in the provided file

Context switch

- The currently active page table is swapped
- Registers are swapped
- Physical memory is not wiped—physical memory is always full of jumbled pages from various processes

Sharing data between processes

- Signals (like SIGSEGV)
- mmap

Virtual memory

- Why virtual memory?
  - You want each process to think it has the entire memory
  - Memory needs to be shared between 100s of processes
- Why pages?
  - Pages allow you to only use as much physical memory as you need (in chunks)
- What use radix tree/multi-level page tables?
  - Multi-level requires less memory—you don't have to have an entry for every single memory address, instead 2nd, 3rd, or 4th-level page tables can be missing if no address is needed for it
  - However, they take more memory accesses to find the actual physical address

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Parameter	Description
Fundamental parameters	
$S = 2^s$	Number of sets
E	Number of lines per set
$B = 2^b$	Block size (bytes)
$m = \log_2(M)$	Number of physical (main memory) address bits
Derived quantities	
$M = 2^m$	Maximum number of unique memory addresses
$s = \log_2(S)$	Number of *set index bits*
$b = \log_2(B)$	Number of *block offset bits*
$t = m - (s + b)$	Number of *tag bits*
$C = B \times E \times S$	Cache size (bytes), not including overhead such as the valid and tag bits

Multiple-byte units v・t・e

Decimal				Binary					
Value		Metric		Value		IEC		Memory	
1000	10^3	kB	kilobyte	1024	2^{10}	KiB	kibibyte	KB	kilobyte
1000^2	10^6	MB	megabyte	1024^2	2^{20}	MiB	mebibyte	MB	megabyte
1000^3	10^9	GB	gigabyte	1024^3	2^{30}	GiB	gibibyte	GB	gigabyte
1000^4	10^{12}	TB	terabyte	1024^4	2^{40}	TiB	tebibyte	TB	terabyte
1000^5	10^{15}	PB	petabyte	1024^5	2^{50}	PiB	pebibyte	–	
1000^6	10^{18}	EB	exabyte	1024^6	2^{60}	EiB	exbibyte	–	
1000^7	10^{21}	ZB	zettabyte	1024^7	2^{70}	ZiB	zebibyte	–	
1000^8	10^{24}	YB	yottabyte	1024^8	2^{80}	YiB	yobibyte	–	
1000^9	10^{27}	RB	ronnabyte	1024^9	2^{90}	–		–	
1000^{10}	10^{30}	QB	quettabyte	1024^{10}	2^{100}	–		–	

Orders of magnitude of data

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