



















User

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In Practice Today: Virtual Memory

- Indirect memory access
 - Memory access with a virtual address which needs to be translated into physical address





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	Some Common Signals and Their Defaults							
ſ	ID	Name	Default Action	Corresponding Event				
	2	SIGINT	Terminate	Interrupt from keyboard (ctl-c)				
	9	SIGKILL	Terminate	Kill program (cannot override or ignore)				
	11	SIGSEGV	Terminate & Dump	Segmentation violation				
	14	SIGALRM	Terminate	Timer signal				
	17	SIGCHLD	Ignore	Child stopped or terminated				
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Process Groups

- Every process belongs to exactly one process group
- Can send signal to an entire group
- getpgrp() Return process group of current process
- setpgid() Change process group of a process

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Sending Signals with kill Program

 kill program sends arbitrary signal to a process or process group 	linux> ./forks 16 linux> Child1: pid=24818 pgrp=24817 Child2: pid=24819 pgrp=24817 linux> ps PID TTY TIME CMD 24788 pts/2 00:00:00 tcsh 24818 pts/2 00:00:00 tcsh
 Examples kill -9 24818 Send SIGKILL to process 24818 kill -9 -24817 Send SIGKILL to Send SIGKILL to S	24819 pts/2 00:00:02 forks 24820 pts/2 00:00:02 forks 24820 pts/2 00:00:00 ps linux> kill -9 -24817 linux> ps PID TTY TIME CMD 24788 pts/2 00:00:00 tcsh 24823 pts/2 00:00:00 ps linux>
 Send SIGNILL to every process in 9/7/2018 process group 24817. 	CSC 2/456 38



Example of ctrl-c and ctrl-z

linux> ./forks	17				
Child: pid=24868 pgrp=24867					
Parent: pid=24867 pgrp=24867					
<typed ctrl-z=""></typed>					
Suspended					
linux> ps a					
PID TTY	STAT	TIME	COMMAND		
24788 pts/2	S	0:00	-usr/local/bin/tcsh	-i	
24867 pts/2	Т	0:01	./forks 17		
24868 pts/2	Т	0:01	./forks 17		
24869 pts/2	R	0:00	ps a		
bass> fg					
./forks 17					
<typed ctrl-c=""></typed>					
linux> ps a					
PID TTY	STAT	TIME	COMMAND		
24788 pts/2	S	0:00	-usr/local/bin/tcsh	-i	
24870 pts/2	R	0:00	ps a		
24870 pts/2	R	0:00	ps a		



Signal Handling Example							
<pre>void int_handler(int sig) { printf("Process %d received signa getpid(), sig); exit(0); }</pre>	ıl %d\n",						
<pre>void fork13() { pid_t pid[N]; int i, child_status; signal(SIGINT, int_handler); }</pre>	<pre>linux> //forks 13 Killing process 24973 Killing process 24974 Killing process 24975 Killing process 24976 Killing process 24977 Process 24977 received signal 2 Child 24977 terminated with exit status 0 Process 24975 received signal 2 Child 24975 terminated with exit status 0 Process 24975 received signal 2 Child 24975 terminated with exit status 0 Process 24974 received signal 2 Child 24974 terminated with exit status 0 Process 24975 received signal 2 Child 24974 terminated with exit status 0 Process 24974 received signal 2 Child 24974 terminated with exit status 0 Process 24973 received signal 2 Child 24974 terminated with exit status 0 Process 24973 received signal 2 Child 24974 terminated with exit status 0 Process 24973 received signal 2</pre>						





A Program That Reacts to Externally Generated Events (ctrl-c)

















