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Interrupts Processing of TRAP instructions is similar to interrupts, so worth mentioning here: Very useful to have a way to interrupt current processing when an unexpected or don't-know-when event happens — error occurs (e.g., invalid operation), I/O operation completes. On interrupt, goal is to save enough of current state to allow us to restart current activity later: Save old value of program counter. Disable interrupts. Transfer control to fixed location ("interrupt handler" or "interrupt vector") — normally o/s code that saves other registers, re-enables interrupts, decides what to do next, etc.

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Example: System Calls in MIPS

- MIPS instruction set includes syscall instruction that generate a system-call exception. MIPS interrupts/exceptions use special-purpose registers to hold type of exception and address of instruction causing exception. Before issuing syscall program puts value indicating which service it wants in register \$v0. Parameters for system call are in other registers (can be different ones for different calls).
- Interrupt handler for system calls looks at \$v0 to figure out what service is requested, other registers for other parameters.
- When done, it uses rfe instruction to restore calling program's environment, then returns to caller using value from EPC register.

Example: System Calls in MIPS/SPIM

SPIM simulator — a primitive o/s! — defines a short list of system calls.
 Example code fragment:

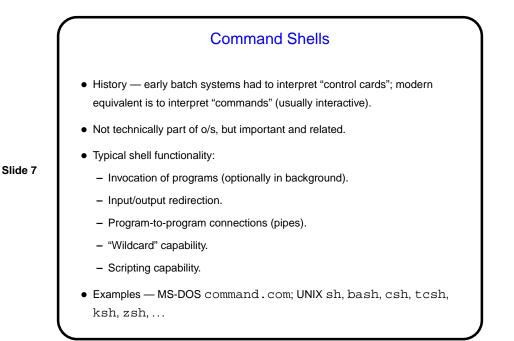
la \$a0, hello

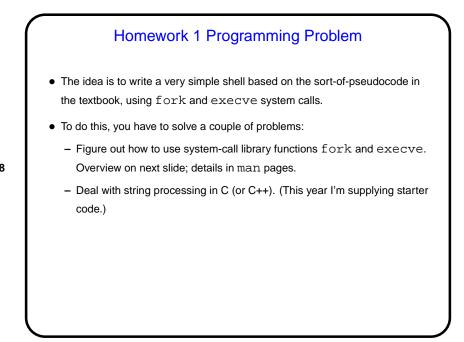
.data

li \$v0, 4 # "print string" syscall
....

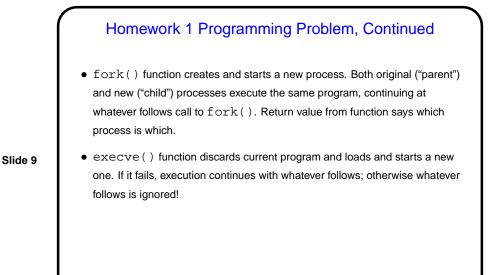
hello: .asciiz "hello, world!\n";

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Compiler(s) on the Classroom/Lab Machines • For the homework you will be writing a C or C++ program. I will test with the appropriate GNU compiler on the lab machines, so you should probably do so too. • For what it's worth, the current (and just-previous) "build" running on the classroom/lab machines includes multiple versions of gcc. If you're using one of the non-default ones (perhaps because it's required for some other course, such as anything Dr. Lewis teaches using C++), it would be helpful to tell me so when you turn something in. More information about all of this on request.

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