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#       Lecture 16 Demo Program 1, Hex Number Conversion
#       Converts a Decimal Number to Its Equivalent Hex Value and
#       prints out hexadecimal number to console.
#
#       $t0 - Loop counter
#       $a0 - Holds each hex digit as analyzed
#       $t2 - Holds number input from keyboard

        .text
main:   la $a0,prompt   # Load print out of prompt sequence
        li $v0,4        # Output prompt to enter decimal number
        syscall
        li $v0,5        # Read integer to convert to hex
        syscall
        move $t1,$v0
        la $a0,answer   # Output answer header
        li $v0,4
        syscall
        move $t0,$0     # Clear counter

        li $v0,11       # Load number of syscall (11) into $v0
elim:   rol $t1,$t1,4   # Left rotate left digit to right-most position

        and $a0,$t1,0xf # "Mask off" left-most digit
        bgtz $a0,num    # If a non-zero go to character         conversion routine
        addi $t0,$t0,1  # Since character = 0, increment counter
        beq $t0,8,zero  # If 8 zeroes, loop done; go to print
        j elim          # Get next character
loop:   rol $t1,$t1,4   # Left rotate left digit to right-most position
        and $a0,$t1,0xf # "Mask off" left-most digit
num:    ble $a0,9,conv  # Go to conv routine directly if hex # 0-9
        add $a0,$a0,7   # Add 7 because hex number is a-f
conv:   add $a0,$a0,48  # Convert number to ASCII
        syscall         # Output ASCII representation of hex number
        addi $t0,$t0,1  # Increment counter
        blt $t0,8,loop  # If analysis not complete, do loop again
        j next          # Analysis complete; go to print routine

zero:   li $a0,0x30     # If number was 0, put 0 in print buffer
        syscall

next:   li $a0,0x0a     # Print out carriage return for neatness
        syscall
        la $a0,comp     # Convert another number to hex?
        li $v0,4
        syscall
        li $v0,11       #
        li $a0,0x0a     # Output CR/LF
        syscall         #
        li $v0,12       # Input answer (y = "Yes")
        syscall
        beq $v0,0x79,main  # If yes, go back to start of program
        li $v0,10       # End program
        syscall

        .data
prompt: .asciiz "Enter decimal number (8 digits, maximum): "
answer: .asciiz "Hexadecimal number is 0x"
comp:   .asciiz "Input another number(y/n)?"

#       End of file Lecture 16 Demo Program 1
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