❖ Problem Set 8:

Problem Set due Jul 31, 2023 20:06 PDT Completed

Consider the following C code and several possible assembly language translations:

```
// C Code
void strcpy(char dst[], char src[]){
  int i = 0;
  do {
    dst[i] = src[i];
  } while (src[i++]);
}
```

Consider the following C code and several possible assembly language translations. Assume dst[] and src[] are passed in a0 and a1, and i is stored in s2.

```
strcpy1:
    addi sp, sp, -4
        sw s2, 0(sp)
        addi s2, zero, 0

loop1:
    lw t1, s2(a1)
    sw t1, s2(a0)
    beq t1, zero, done1
    addi s2, s2, 1
    j loop1

done1:
    lw s2, 0(sp)
    addi sp, sp, 4
    jr ra


strcpy2:
    addi s2, zero, 0
loop2:
    add t1, s2, a1
    add t2, s2, a0
    mv t2, t1
    beq t1, zero, done2
    addi s2, s2, 1
    j loop2

done2:
    jr ra


strcpy3:
    addi sp, sp, -4
        sw s2, 0(sp)
        addi s2, s2, 0

loop3:
    add t1, s2, a1
    add t2, s2, a0
    mv t2, t1
    beq t1, zero, done3
    addi s2, s2, 1
    j loop3

done3:
    addi sp, sp, 4
    jr ra
```

```
strcpy4:
    addi sp, sp, -4
        sw s2, 0(sp)
        addi s2, zero, 0

loop4:
    add t0, s2, a1
    lb t1, 0(t0)
    add t2, s2, a0
    sb t1, 0(t2)
    addi s2, s2, 1
    beq t1, zero, done4
    j loop4

done4:
    lw s2, 0(sp)
    addi sp, sp, 4
    jr ra
```

C to Assembly Language

1/1 point (graded)

Which is the simplest correct implementation of the strcpy function?

- ○ strcpy1
- ○ strcpy2
- ○ strcpy3
- ◉ strcpy4

✔

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Translate the following RISC-V assembly language code to machine language:

```
loop:
    beq s0, s1, done
    addi s0, s0, 1
    j loop
done:
```

Express each machine language word in hexadecimal with no leading 0x or other characters (e.g. 02A2E313).

beq

1/1 point (graded)

Write the machine language for the first instruction: beq s0, s1, done

00940663 ✔

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addi

1/1 point (graded)

00140413 ✔

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j

1/1 point (graded)

Write the machine language for the third instruction: j loop

FF9FF06F ✔

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Problem Set due Jul 31, 2023 20:06 PDT Completed

Translate the following machine language code to RISC-V assembly language:

08042283
40B553B3

Machine Language 1

1/1 point (graded)

Which of the following assembly language instructions corresponds to 08042283?

- lb t0, 128(s0)
- lb s0, 256(t0)
- lb t0, 256(s0)
- **lw t0, 128(s0)** ✔
- addi s0, t0, 256

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Machine Language 2

1/1 point (graded)

Which of the following assembly language instructions corresponds to 40B553B3?

- srl t2, a0, a1
- **sra t2, a0, a1** ✔
- sub a0, a1, t0
- sub t2, a1, a0

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Problem Set due Jul 31, 2023 20:06 PDT Completed

Consider the following assembly language program:

```
funct:
        lw t0, 0(a0)
        lw t1, 4(a0)
        blt t0, t1, else
        addi a0, zero, 0
        ret
else:
        addi sp, sp, -12
        sw t0, 4(sp)
        addi t1, t1, -1
        sw t1, 8(sp)
        sw ra, 0(sp)
        addi a0, sp, 4
        jal funct
        lw ra, 0(sp)
        addi sp, sp, 12
        addi a0, a0, 3
        ret

main:
        addi sp, sp, -12
        addi t0, zero, 2
        sw t0, 4(sp)
        addi t0, zero, 6
        sw t0, 8(sp)
        sw ra, 0(sp)
        addi a0, sp, 4
        jal funct
        addi a0, a0, 5
        lw ra, 0(sp)
        addi sp, sp, 12
        ret
```

Assembly Language Operation

1/1 point (graded)

Suppose you call main. What value is in a0 when main returns?

17 ✔

17

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