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CA Lecture 4 Quiz

- Implement the following program in C and in RISC-V!
- We will not compile or run your code – you will be graded on understanding the concepts!
- Be sure to **SAVE** the PDF. Copy the code to another editor before closing the PDF. Close and open the PDF to see if the contents of the form were saved.
- Then submit on Gradescope: https://www.gradescope.com/courses/77872

```c
#include <libc.h>
int main(){

    /* x12 points to an array of chars.
    You may change x12 */
    char x12[] = {4, -3, 3, 6, -4}; /* Example only */
    /* x13 holds the size of the array x12.
    Could be 0. You may change x13. */
    int x13 = sizeof(x12);

    /* in the end, x10 should hold the sum of the
    positive numbers in x12 */
    int x10 = 0;
    /* in the end, x11 should hold the sum of the
    absolute values of the negative numbers in x12 */
    int x11 = 0;

    /* Implement the body of the algorithm in C */


    /* Don't implement the rest: */
    printf(" %d  %d  \n", x10, x11);
    /* The example would print: "13 7" */
    return 0;
}
```

```asm
    # Assume x12 has the pointer to the array already.
    # You may change x12.

    # Assume x13 has the size of the array already.
    # x13 can be 0. You may change x13.

    add     x10, x0, x0     # x10 = 0
    add     x11, x0, x0     # x11 = 0

loop:

test:

end:
```

Implement in C

```c
#include <libc.h>
int main(){

  /* x12 points to an array of chars.
  You may change x12 */
  char x12[] = {4, -3, 3, 6, -4}; /* Example only */
  /* x13 holds the size of the array x12.
  Could be 0. You may change x13. */
  int x13 = sizeof(x12);

  /* in the end, x10 should hold the sum of the
  positive numbers in x12 */
  int x10 = 0;
  /* in the end, x11 should hold the sum of the
  absolute values of the negative numbers in x12 */
  int x11 = 0;

  /* Implement the body of the algorithm in C */


  /* Don't implement the rest: */
  printf(" %d  %d  \n", x10, x11);
  /* The example would print: "13 7" */
  return 0;
}
```

Implement in RISC-V

```asm
  # Assume x12 has the pointer to the array already.
  # You may change x12.

  # Assume x13 has the size of the array already.
  # x13 can be 0. You may change x13.

  add  x10, x0, x0  # x10 = 0
  add  x11, x0, x0  # x11 = 0


loop:



test:


end:



  # x10 and x11 should have the correct values at the end
  # see the C comments for x10 and x11!
```

RISC-V Instructions

```asm
beq   x1, x2, label # if(x1==x2) goto label
blt   x1, x2, label # if(x1< x2) goto label

add   x1, x2, x3    # x1 = x2 + x3
sub   x1, x2, x3    # x1 = x2 - x3

lb    x1, 0(x2)     # x1 = *(x2+0)

bne   x1, x2, label # if(x1!=x2) goto label
bge   x1, x2, label # if(x1>=x2) goto label

addi  x1, x2, 123   # x1 = x2 + 123
addi  x1, x2, -123  # x1 = x2 – 123

j     label         # goto label
```