Universität Rostock

Traditio et Innovatio

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Computer Organization

Assembler Practice Tasks 1

1 Warmup – Hello World

Open and execute the file `HelloWorld.txt` in RARS and check the results in the console. Afterwards, change the printed string to "Hello World!".

2 First Arithmetics – Addition

Complete the following program, which should read the global variables `A` and `B`, store their sum in `C`, and print the result using a syscall. Save all in the File `Addition.txt` and simulate it with RARS.

```
.data
A:   .word    1       # int A = 1;
B:   .word    2       # int B = 2;
C:   .word    0       # int C = 0;

.text
main:
lw      t0, A         # Load A

li      a7, 1         # syscall 1 = print_int
lw      a0, C         # load variable C
ecall                 # print C

li      a7,10         # terminate syscall
ecall
```

3 First Loop – Sum

Implement a program to calculate the value of $\sum_{i=1}^{N} i$ and store the result in global variable SUM. Store the resulting program in the file Sum.txt and simulate it with RARS.

```
.data
N:      .word    1000   # int N = 1000;
SUM:    .word    0      # int SUM = 0;

.text
main:
...
li      a7,10          # terminate syscall
ecall
```

4 More Sophisticated Loop – Fibonacci

Calculate the corresponding Fibonacci number ($n_1 = 1; n_2 = 1; n_3 = 2$) of the global variable N in an iterative loop and print the result onto the console. Store the resulting program in file Fibonacci.txt and simulate it with RARS.

```
.data
N:   .word    10    # int N = 10;

.text
main:
...
li      a7,10         # terminate syscall
ecall
```

5 Work with Arrays – strlen

Calculate the length of the null-terminated string, which is stored in variable STR and print it to the console. Store the resulting program in strlen.txt and simulate it with RARS.

```
.data
STR:      .asciz "ABCD"

.text
main:
la t0, STR             # Load Address of STR
...
li      a7,10          # terminate syscall
ecall
```

6 More Sophisticated Array Manipulation – atoi

Implement a program to convert to the string `STR` into an integer value and store it in variable `R` and simulate it with RARS.

```
.data
STR: .asciz "12345678"
R:   .word   0

.text
main:
la t0, STR # Load Address of STR
...
li     a7,10    # terminate syscall
ecall
```