CS Basics - Exercises
Procedures in Assembler

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1 Shifts and boolean functions

Exercise 1 *Write an assembler file, where you put 20h in the RAX. Then you divide this number each time by two. Each time you increase the counter RCX (originally initialised to 0).*

Loop until RAX contains zero.

RCX should contain the logarithm of the value in RAX at the beginning.

Terminate your program, such that the logarithm is the return value and can be inspected with

```
$ echo $?
```

2 Compute Binary-Logarithms

Exercise 2 *To solve this exercise, you should re-use pieces of the* `hexdump` *example from the lecture.*

The overall goal is to change the hexdump example to take as input one number in hexadecimal on the standard input. The output should then be the logarithm of this number (on the standard output), also in hexadecimal.

- *In a first version, take the input characters from the data section and write the result in a register (use the debugger to check the result)*

  Given this, you need to implement logic that takes RBX chars from memory as a string of chars and transforms them into a number in RAX.

- *In a second version, you will use the code provided in the hexdump example to read the number from the standard input. For easy programming, we will only look at numbers with 4 decimal digits (some of them can be 0). The program should work like this:*

```
> myprogram
1234
```

The logarithm is written into a register (check it inside the debugger or return it as the exit status from your program).

- *Write a division for transforming a number in a register in a string. You will need a three bytes string buffer in the data section for the result. Use addition (+30h transforms a digit 9 for instance into a character '9') to create characters. Use integer division DIV (RAX is divided by the operand and result goes into RAX (result) and RDX (remainder)).*
- *Finally, you will output the content of the result register out to the standard output.*
- *Modify your program to accept any number.*