# LAB. 3

Objectives

- Implementation of recursive algorithms in hardware;

- Synthesis and implementation of hierarchical finite state machines.

Task

Implement a circuit which calculates the greatest common divisor (GCD) of two positive integers (that might range from 1 to 99) using a recursive algorithm. The operands are specified with the aid of keyboard and the result has to be displayed on a VGA monitor screen as shown on figure below.
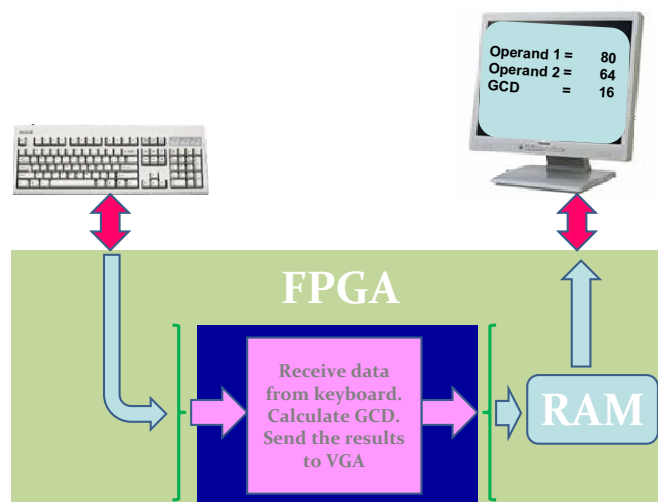

Details

1. As a start point, use your project from Lab. 2. The block which calculates GCD must have the same external interface as arithmetical block in Lab. 2.

2. Calculate GCD of two positive operands *A* and *B* using the recursive algorithm illustrated on figure below. The algorithm is composed of two modules:

Z0 – main module which describes recursive Euclid's algorithm and whose pseudo-code is the following:

```
unsigned RGCD (unsigned A, unsigned B)
{
        if (B = 0)
                return A;
        else if (B > A)
                return RGCD(B, A);
        else
                return RGCD(B, A%B);
}
```

Z1 – auxiliary module, which calculates the rest of division of *A* by *B*.

Iouliia Skliarova – DETI-UA
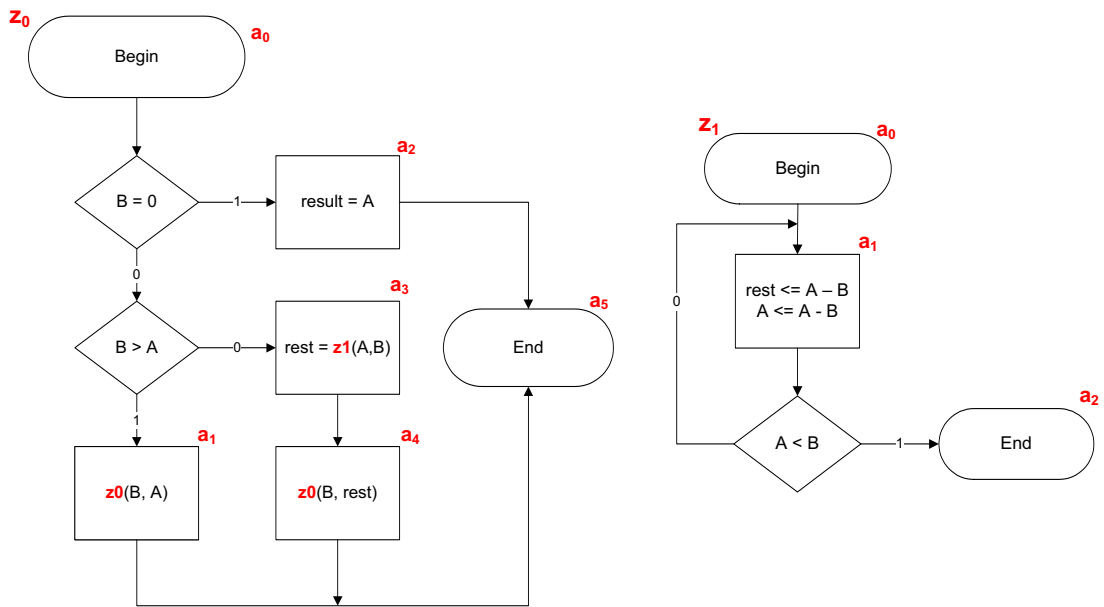
3. Use hierarchical finite state machine (HFSM) to implement both modules.

4. Test your circuit on the prototyping board.