

# Assignment

- Design a Microprocessor that can do the following operations
  - Add, subtract, multiply, divide, AND, OR, XOR
    - The operands will be given as memory locations
    - The output will be dumped in a memory location specified by input
  - Contains a parameterizable memory
    - Both width and size of the memory can be parameterized
    - The size of the memory will be given as the required number of bits
  - Read a value from memory and write it to output
  - Write a value directly to a memory location
  - Gives 1 on an output pin when given an invalid operation code

# Assignment

```
module mcu #(
    parameter op_sz = 32,
    parameter mem_sz,
) (
    input wire  clk, reset
    input wire [mem_sz-1 : 0] op0,
    input wire [op_sz-1 : 0] op1,
    input wire [mem_sz-1 : 0] op2,
    input wire [3:0] op,
    output wire [op_sz-1 : 0] out,
    output wire op_err
    //, output wire op_done
);
endmodule
```

# Assignment

- BONUS

- Implement the multiplier such that it is a sequential circuit that gives the output after several clock cycles
- Implement shift left, logical shift right, and arithmetic shift right as well
  - Implement them as sequential circuits that take the input and produce the output after a number of clock cycles (each clock cycle they shift by one)
- The signal op\_done gives 1 for 1 clock cycle when the operations are done