# MIPS PROCESSOR (COAL PROJECT)

NAMES: FAIZAN SAFDAR ALI, AHSAN PERVAIZ

ROLL NUMBERS: 17100152, 17100078

## OVERVIEW:

MIPS processor is a CISC architecture with very less and low level complicated commands. These commands are very simple and general use only like add, subtract and add etc. MIPS has very simple processor with few ALU’s, MUXES and logic gates etc. Following are the main components which we implemented in this project:

## PC:

PC (Program counter) is one of the main components of the MIPS architecture. PC determines which command is to run next. PC consists of a register and the adder to take PC to the next command. PC directly gets the main clock and adds and stores the added value inside the register.

## INSTRUCTION MEMORY:

Instruction memory is also a main part of the processor. It consist of ROM’s the number of ROM’s to use depends upon the number of bits of PC and the select lines of one ROM eg. If there are 8 lines for one ROM and PC is of 32 bit then 4 of them will be used.

## REGISTER FILE:

Register files consist of all the registers. In our project we made 32 registers with 32 bits. Every register is made of D flip flops. We had 8 bit flip flop so we concatenated 4 of them to make one 32 bit register. Then we made 32 of them. We had to make a MUX and a decoder to select from them and to write on them.

## ALU:

ALU is the main heart of the processor. All the operations are done using ALU. ALU does all add, subtract and other operations depending upon the select lines coming from the function part.

## FUNCTION/CU:

Control unit is the one which translates op code to determine which type of the instruction is coming from the instruction memory. Function part is the one which determines the select lines of the ALU. Function part also determines if there is branch, jump or jump register in the instruction.

## MUXES:

MUXES are generally used to select from different inputs and outputs. One is to select from Data memory and ALU. Also from sign extension and register output etc. All of these are selected using the MUXES.

## DATA MEMORY:

Data memory consists of RAM and the tri state buffers. As the input and output lines of the RAM are same so we had to use tri state buffers to select if we have to write or read from the RAM.