Design of Top Level (CPU)

CPU components

1- Internal memory " RAM "
2- Program counter " PC "
3- Instructions register " IR "
4- Sequencer (consists of a counter and a decoder)
5- Data register " DR "
6- Arithmetic logical control unit " ALU"
7- Accumulator " AC "

Project Files

- (cpu.v) Has the implementation code of the top level module and it implements the control of (fetching, decoding, getting effective address, MRI and RRI).
- (instances.v) Has the instances used in (cpu.v) and it is included inside the (module CPU) in (cpu.v)
- (memory.v) Has the implementation code of the memory used.
- (memory.mem) Initialization file for the memory in (memory.v).
- (register12.v) Has the implementation of a 12-bit register used for (AR and PC).
- (register16.v) Has the implementation of 1 16-bit register used for (AC, DR and IR).
- (alu.v) Has the implementation code of an ALU that performs (ADD and AND) operations.
- (sequencer.v) Has the implementation code of the two modules (Counter and Decoder) that forms a sequencer that is used in controlling the flow in (cpu.v).
- (cpu_tb.v) Generates a sample testbench for the CPU using the code below.

Location	Operation code	
000	200D	LDA 00D
001	7004	SZA
002	4005	BUN 005
003	7800	CLA
004	7001	HLT
005	7200	CMA
006	7020	INC
007	300F	STA 00F
008	7800	CLA
009	200E	ADD 00E
00A	600F	ISZ 00F

00B	4009	BUN 009
00C	7001	HLT
00D	0004	4
00E	0005	5