The control unit serves as the central intelligence of our CPU design, acting as the pivotal module that orchestrates the various operations within the processor. At the core of this module lies the ControlUnit entity, taking essential input signals such as Clock, Reset, opcode, RegDst, ALUSrc, MemtoReg, MemWrite, MemRead, ALUOp, RegWrite, Branch, Jump, funct, pc\_load, and PC\_Store.

In aligning with the standard MIPS architecture, we have implemented familiar control signals such as Clock, RegDst, ALUSrc, MemtoReg, MemWrite, MemRead, ALUOp, RegWrite, Branch, Jump, and funct. These signals are crucial for directing the flow of data and control within the CPU.

Additionally, we have introduced new signals to tailor our design for specific functionalities:

Reset Signal:

The Reset signal serves as a mechanism to reset the control unit, initiating a no-operation (nop) instruction. This feature ensures a controlled start or restart of the CPU, enhancing the robustness and reliability of the system.

Pc\_load Signal:

The Pc\_load signal plays a pivotal role in the program counter's behavior. When activated, it disables the program counter from updating, effectively holding its current value. This functionality is useful in scenarios where a specific program counter value needs to be retained without progression.

PC\_Store Signal:

The PC\_Store signal is a unique addition designed to interact with the register file. Its purpose is to enable the register associated with register 31 to store a specific value. This value corresponds to the current program counter value that we intend to preserve. This feature allows for strategic storage of program counter values for future reference or manipulation.

By incorporating these new signals, our control unit not only adheres to established MIPS standards but also offers a level of customization that enhances the adaptability and efficiency of our CPU design. The combination of standard and bespoke control signals ensures a versatile and finely-tuned control mechanism, making our CPU well-suited for a variety of computing tasks.