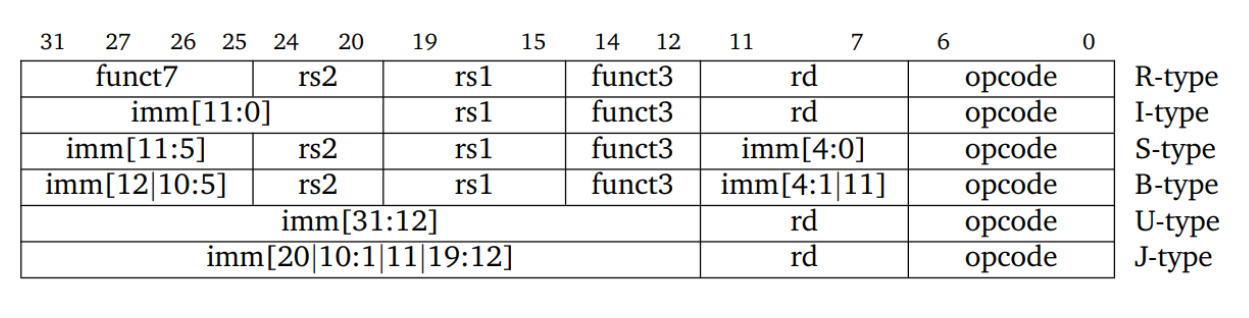
As you can see, we have added a new controller signal and expanded to a 4 to 1 multiplexer.  




Figure : Modified Datapath

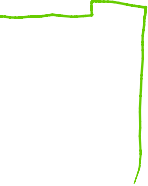
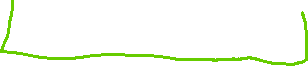


Figure : RISC-V Instruction Types

After designing the controller, we need to design the combinational controller since it’s single cycle RISC-V about which we are talking.



A diagram of a chemical formula

AI-generated content may be incorrect.



Figure : ALU Opcode Table

Now we need to implement the RISC-V assembly code for the desired program:

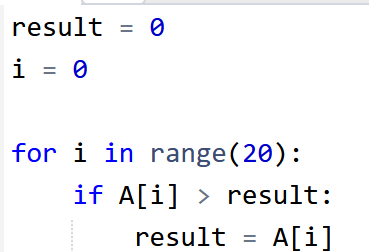
  




Figure : Algorithm

According to this algorithm we can write the RISC-V assembly code of this program as follows:

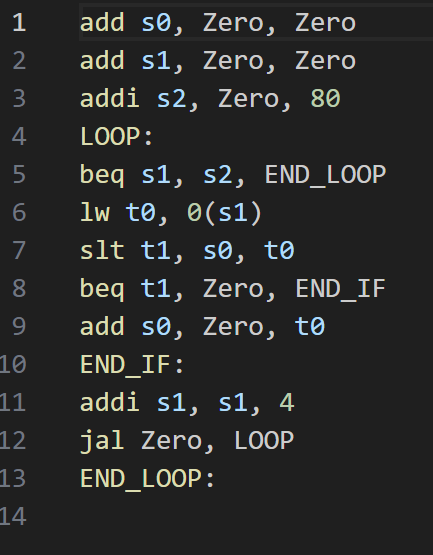


Figure : Assembly Code

Following is the resulted assembled machine code of this program in hex format:

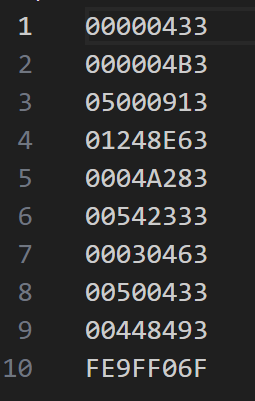


Figure : Hex Machine Code

We need to specify the 20 numbers in our program in “data.mem” file in 80 lines each representing a byte (8 bits).

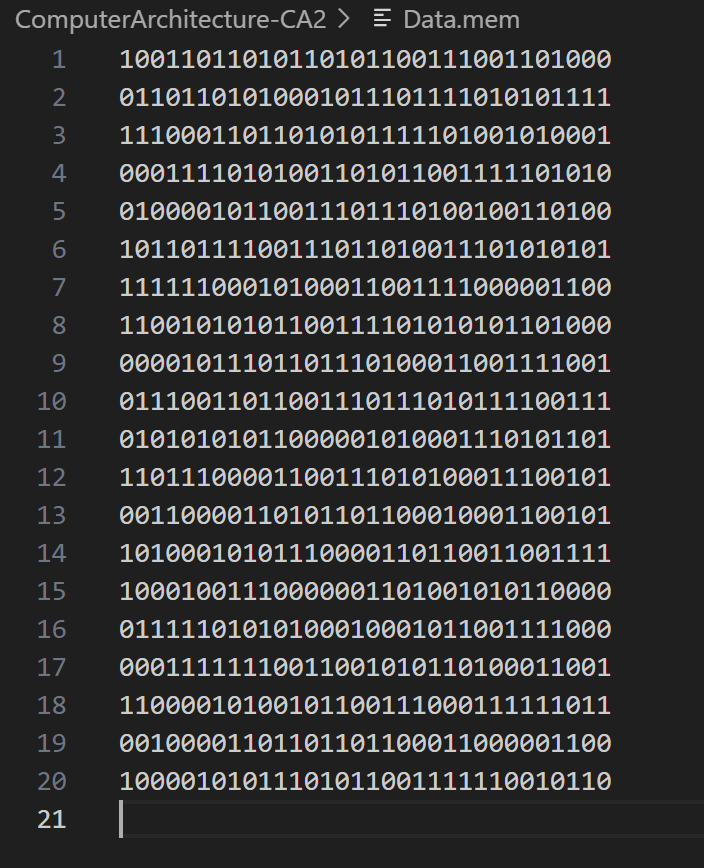


Figure : The twenty 32bit numbers given

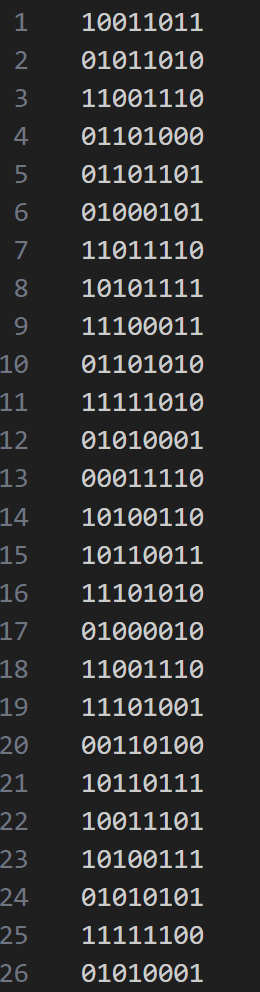


Figure : Twenty numbers in 80 lines of 8bit numbers.