**CLC – Instruction Format**

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CST-307: Introduction to Computer Architecture

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**4-Bit Instruction Set**

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| Type | Op Code | Mnemonics | Description |
| Data Transfer | 0000 | Mov B, A | Move contents from A to B |
| 0001 | Ldi A, Src | Load an immediate value Src to A |
| 0010 | Ld A, mem | Load from an address into A |
| 0011 | Lshift D, 8 | Shift D by eight bits left to store a value in the MSB space |
| Arithmetic | 0100 | Add B, A, mem | Adds value at mem to A and stores the sum in B |
| 0101 | Addi B, A, Src | Adds immediate value Src to A and stores the sum in B |
| 0110 | Sub B, A, mem | Subtracts mem from A and stores the difference in B |
| 0111 | Subi B, A, Src | Subtracts immediate value Src from A and stores the difference in B |
| Logical | 1000 | And A, B | Returns true if A and B are true |
| 1001 | Or A, B | Returns true if either A or B are true |
| 1010 | Not A | Returns true if A is false |
| Transfer of control | 1011 | Jump label | Unconditionally jump to instruction address at label |
| 1100 | Jlt B, A, label | Jump to instruction address at label if B is less than A |
| 1101 | Jgt label | Jump to instruction address at label if B is greater than A |
| 1110 | Jet B, A, label | Jump to instruction address at label if B is equal to A |
| Input/Output | 1111 | Out D | Sends the data at address D to an external device. |

2^4 = 16 instructions

2^8 = 256 instructions

Opcode is binary ex. 0010

**CODE**

Main:

Ldi A, $2 # Load 2 into register A

Ldi B, $4 # Load 4 into register B

Sub B, B, A # Subtract A from B and store the result into register B

Jlt B, A, lessOut # If B is less than A then jump to the label lessOut

lessOut:

Ld D, A # Load A into register D

Lshift D, 8 # Shifts the bits left in D by 8 bits

Out D # Outputs the data in D

**Responsibilities completed by each team member:**

We both collaborated on everything within this project. On October 28th, we began working on the instruction set together over a Zoom call. We then worked on it more together within the class on November 2nd and finished the instruction set. We then worked on the pseudo-code and went into office hours to ask about it on November 3rd. We finished the code after office hours.