4.1.1 Execute Stage with LMC

This topic requires knowledge of the Little Man Computer instruction set (Topic 1.2.4)

During the fetch and decode stages, the instruction has already been loaded into the CIR and decoded by the Control Unit. The following examples show what happens during the execute stage when executing different LMC instructions.

Example LDA num1

In this example the address `num1` refers to memory location 101.

- The value 101 is stored in the MAR.
- 101 is sent down the address bus.
- A read signal is sent down the control bus.
- The data stored in memory location 101 is transferred from main memory along the data bus and stored in the MDR.
- The contents of the MDR are copied to the ACC.

Example ADD num1

In this example the address `num1` refers to memory location 101.

- The value 101 is stored in the MAR.
- 101 is sent down the address bus.
- A read signal is sent down the control bus.
- The data stored in memory location 101 is sent down the data bus and stored in the MDR.
- The data in the MDR and the value in the ACC are passed to the ALU, which performs the addition.
- The result produced by the ALU is stored in the ACC.

Example BRP loop

In this example loop refers to a label named loop.

- The value in the ACC is checked to see if it is positive (or zero).
- If the value in the ACC is positive or zero, the PC is changed to the address of the loop label.
- If the value in the ACC is negative, the PC is not changed by the BRP instruction and the next instruction in sequence is fetched.

Changing the PC causes the next instruction to be fetched from the address of the loop label rather than the instruction immediately following the BRP instruction