3.1. Comparison and Conditions

- Conditional jump was introduced to handle conditional routing in the processor.
- CMP (compare) instruction subtracts the source operand from the destination operand and updates the flags without changing either operand.
- CMP allows checking various conditions (equal, greater, smaller) based on flags such as Zero Flag (ZF), Carry Flag (CF), Sign Flag (SF), and Overflow Flag (OF).
- CMP is mainly used with conditional jumps like JA (Jump if Above), JB (Jump if Below), JG (Jump if Greater), JL (Jump if Less) for unsigned and signed number comparisons.

Unsigned Comparisons:

- Unsigned numbers are compared based on magnitude only (0 to 65535).
- CMP subtracts unsigned numbers and sets the relevant flags for comparison.
- For example:
  - UDEST = USRC: ZF = 1 (Equal)
  - UDEST < USRC: CF = 1 (Destination smaller)
  - UDEST >= USRC: CF = 0 (Destination greater or equal)
  - UDEST > USRC: ZF = 0 and CF = 0 (Destination greater)

Signed Comparisons:

- Signed numbers are represented using two's complement, affecting comparisons.
- CMP subtracts signed numbers and sets flags, considering the sign.
- For example:
  - SDEST < SSRC: SF != OF (Destination smaller)
  - SDEST >= SSRC: SF = OF (Destination greater or equal)

- SDEST > SSRC: ZF = 0 and SF = OF (Destination greater)

Summary of Key Flags:

- ZF (Zero Flag): Set when both operands are equal.
- CF (Carry Flag): Set when there is a borrow (destination smaller in unsigned comparison).
- SF (Sign Flag): Indicates the sign of the result in signed comparisons.
- OF (Overflow Flag): Indicates unexpected sign change in signed comparisons.