Machine Architectures – SP

- Memory
- Registers
- Data formats
- Instruction formats
- Addressing modes
- Instruction Set
- I/O.

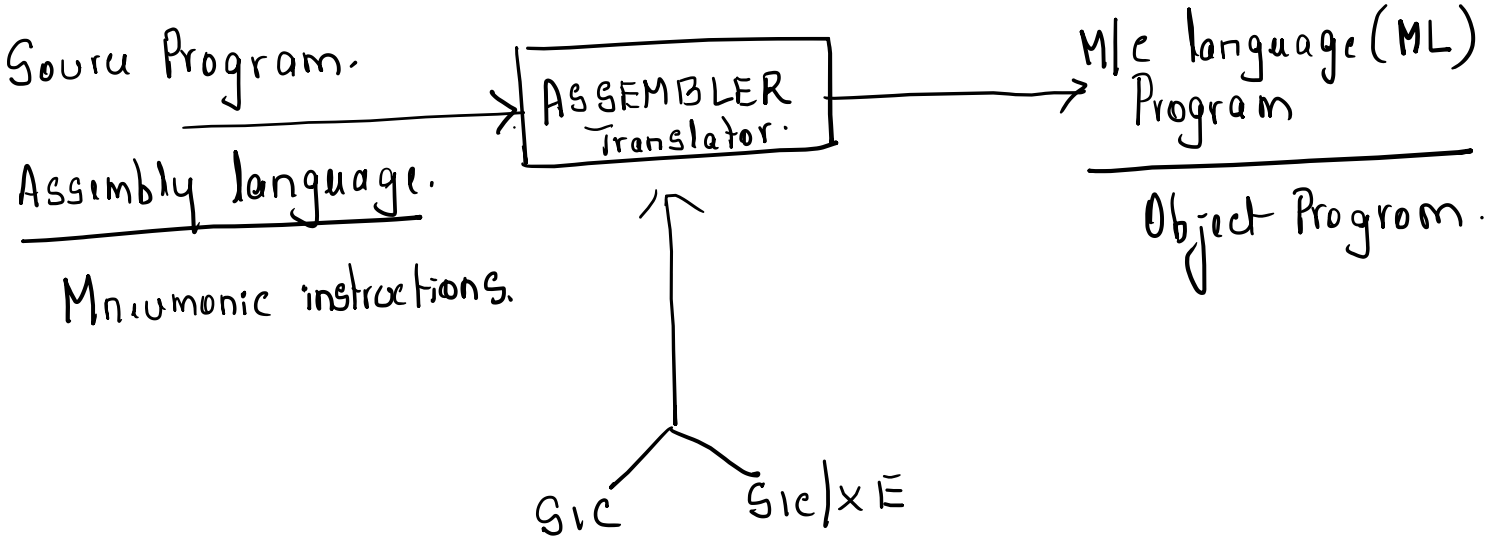
SIC → RISC
- Ultra SPARC.
- Power PC.
- Cray T3E

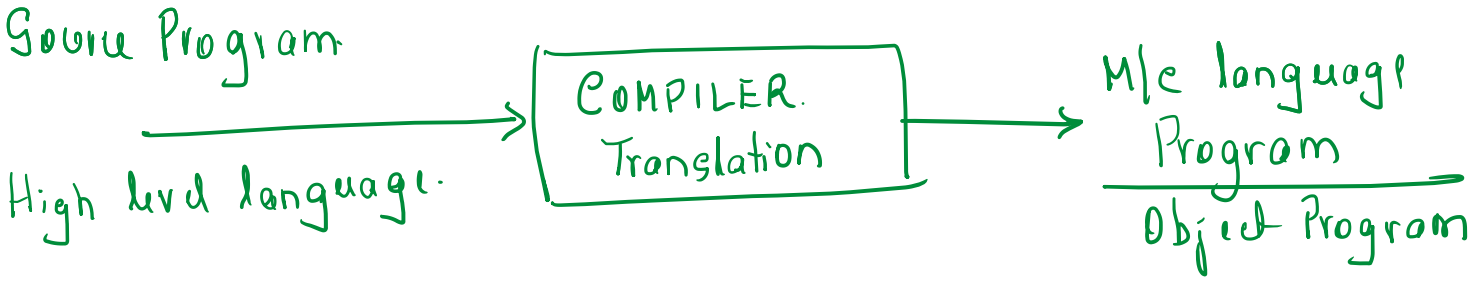
SIC/XE → CISC.
- VAX
- Pentium Pro.

Reading Assignment.

ASSEMBLER

Translator.





```
COPY     START   1000        COPY FILE FROM INPUT TO OUTPUT
FIRST    STL     RETADR      SAVE RETURN ADDRESS
CLOOP    JSUB    RDREC       READ INPUT RECORD
         LDA     LENGTH      TEST FOR EOF (LENGTH = 0)
         COMP    ZERO
         JEQ     ENDFIL      EXIT IF EOF FOUND
         JSUB    WRREC       WRITE OUTPUT RECORD
         J       CLOOP       LOOP
ENDFIL   LDA     EOF         INSERT END OF FILE MARKER
         STA     BUFFER
         LDA     THREE       SET LENGTH = 3
         STA     LENGTH
         JSUB    WRREC       WRITE EOF
         LDL     RETADR      GET RETURN ADDRESS
         RSUB                RETURN TO CALLER
EOF      BYTE    C'EOF'
THREE    WORD    3
ZERO     WORD    0
RETADR   RESW    1
LENGTH   RESW    1           LENGTH OF RECORD
BUFFER   RESB    4096        4096-BYTE BUFFER AREA
.
.        SUBROUTINE TO READ RECORD INTO BUFFER
.
RDREC    LDX     ZERO        CLEAR LOOP COUNTER
         LDA     ZERO        CLEAR A TO ZERO
RLOOP    TD      INPUT       TEST INPUT DEVICE
         JEQ     RLOOP       LOOP UNTIL READY
         RD      INPUT       READ CHARACTER INTO REGISTER A
         COMP    ZERO        TEST FOR END OF RECORD (X'00')
         JEQ     EXIT        EXIT LOOP IF EOR
         STCH    BUFFER,X    STORE CHARACTER IN BUFFER
         TIX     MAXLEN      LOOP UNLESS MAX LENGTH
         JLT     RLOOP         HAS BEEN REACHED
EXIT     STX     LENGTH      SAVE RECORD LENGTH
         RSUB                RETURN TO CALLER
INPUT    BYTE    X'F1'       CODE FOR INPUT DEVICE
MAXLEN   WORD    4096
.
.        SUBROUTINE TO WRITE RECORD FROM BUFFER
.
WRREC    LDX     ZERO        CLEAR LOOP COUNTER
WLOOP    TD      OUTPUT      TEST OUTPUT DEVICE
         JEQ     WLOOP       LOOP UNTIL READY
         LDCH    BUFFER,X    GET CHARACTER FROM BUFFER
         WD      OUTPUT      WRITE CHARACTER
         TIX     LENGTH      LOOP UNTIL ALL CHARACTERS
         JLT     WLOOP         HAVE BEEN WRITTEN
         RSUB                RETURN TO CALLER
OUTPUT   BYTE    X'05'       CODE FOR OUTPUT DEVICE
         END     FIRST
```

Figure 2.1 Example of a SIC assembler language program.