

1. programming with C language:

sum=0;

sum\_1=0;

temp=19;

temp\_1=20;

mul=-13;

loop :sum=sum+temp;

temp=temp-2;

if temp>=0 goto loop;

sum=sum\*mul;

sum SHR 2bit

loop :sum\_1=sum\_1+temp\_1;

temp\_1=temp\_1-1;

if temp\_1>=0 goto loop;

sum=sum AND sum\_1;

end

sum=146

1. Assume in the memory:

**sum** is stored at location A5,

**temp** is stored at location A6,

**sum\_1** is stored at location A7,

**temp\_1** is stored at location A8,

the contents of location A0 is **0**,

the contents of location A1 is **1,**

the contents of location A2 is **1910=001316. 有符号**

the contents of location A3 is **2010=001416** 16位**补码**

the contents of location A4 **is -1310=FFF316**

We can translate the above C language program with the instructions listed in **Table 1** into the instruction program as shown in **Table 2**.

Table 2 Example of a program to sum from 1 to 100

|  |  |  |  |
| --- | --- | --- | --- |
| Program with C | Program with instructions | Contents of Memory (RAM) in HEX | |
| Address | Contents |
| sum=0; | LOAD A0 | 00 | 02A0 |
| STORE A5 | 01 | 01A5 |
| temp=19; | LOAD A2 | 02 | 02A2 |
| STORE A6 | 03 | 01A6 |
| sum\_1=0; | LOAD A0 | 04 | 02A0 |
| STORE A7 | 05 | 01A7 |
| temp\_1=20; | LOAD A3 | 06 | 02A3 |
| STORE A8 | 07 | 01A8 |
| loop :sum=sum+temp; | LOOP:LOAD A5 | 08 (so LOOP=08) | 02A5 |
| ADD A6 | 09 | 03A6 |
| STORE A5 | 0A | 01A5 |
| temp=temp-2; | LOAD A6 | 0B | 02A6 |
| SUB A1 | 0C | 04A1 |
| SUB A1 | 0D | 04A1 |
| STORE A6 | 0E | 01A6 |
| if temp>=0 goto loop; | JMPGEZ LOOP | 0F | 0508 |
| sum=sum\*mul  sum SHR 2bit | LOAD A5 | 10 | 02A5 |
| MPY A4 | 11 | 08A4 |
| SHR | 12 | 0D00 |
| SHR | 13 | 0D00 |
| STORE A5 | 14 | 01A5 |
| loop :sum\_1=sum\_1+temp\_1; | LOOP:LOAD A7 | 15(so LOOP\_1=15) | 02A7 |
| ADD A8 | 16 | 03A8 |
| STORE A7 | 17 | 01A7 |
| temp\_1=temp\_1-1 | LOAD A8 | 18 | 02A8 |
| SUB A1 | 19 | 04A1 |
| STORE A8 | 1A | 01A8 |
| if temp\_1>=0 goto loop; | JMPGEZ LOOP | 1B | 0515 |
| sum=sum AND sum\_1; | LOAD A5 | 1C | 02A5 |
| AND A7 | 1D | 0AA7 |
| STORE A5 | 1E | 01A5 |
| end | HALT | 1F | 0700 |
|  |  | 20 |  |
|  |  | ….. | ….. |
|  |  | A0 | 0000 |
|  |  | A1 | 0001 |
|  |  | A2 | 0013 |
|  |  | A3 | 0014 |
|  |  | A4 | FFF3 |
|  |  | A5 |  |
|  |  | A6 |  |
|  |  | A7 |  |
|  |  | A8 |  |

30

59

87

114

140

165

189

212

234