**Exercises**

1. **The program starts from completing the source code (source code) to produce the final execution result, what are the three periods (hierarchies)? What did each period do?**

**2 Please try to explain the program compilation period (compile time)What are the main tasks included? Why does a program have to go through this stage before it can be executed?**

**3 Please try to explain the program linking period (link time)What are the main tasks included? Why does a program have to go through this stage before it can be executed?**

**4 Try to explain the hardware architecture for executing commands, and what hardware components are included? What kind of work are they responsible for?**

**5 Briefly describe the full execution cycle of each command, what phases should it include, and what does each phase do?**

**6 The basic unit of program execution is the command, what two elements are the main elements of the command?**

**7 If the format of general instructions is divided according to the number of operones they contain, they can be roughly divided into four-operand instructions, three-operand instructions, two-operand instructions, single-operand instructions, and zero-operand instructions. Please describe the roles of each of these five command formats and how the commands work.**

**8 For a machine with 32 general-purpose registers, how many bits does it take to represent two input registers and one output register?**

**9 Using the stacked structure, the diagram illustrates the process of generating post-post representations in the following two formulas:**

(a) A / B – C + D \* E + F \* G

(b) A \* B \* C + D / E – F / G

**10 Try to describe the similarities and differences between base addressing and indexing.**

**11 What is the biggest difference between direct and indirect addressing? For these two addressing instructions, how many memory accesses are required to extract the value that actually participates in the operation from the operator to the processor's register? How many times are there any accesses to the main memory?**

**12 What is the base addressing method (base addressing）？ Why is it often used for array access? Please give oneAn example of a 32-bit instruction illustrates this addressing pattern.**

**13 What types of commands should a command set contain to be complete? And briefly describe the computational content of each instruction.**

**14 Explanation of terms: What is an assembler (assembler), compiler (compiler) and the link editor (linkage editor)**

**15 Try to list the encoding principles of the three commands and briefly explain the design philosophy, pros and cons of each encoding method.**