Data structure in communication oriented computer software

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1. Software

Through the software, you can move the first personal computer. Let's look at the significance and development process.

1.1 Machine language and program

In order to move the computer, only hardware that I have seen in the previous chapter is insufficient, software has become necessary. In play a central role those programs among this software, it is what you have previously described the operation performed by the computer in.

Description of the program, needed in order to finally move the computer, it is common to have been converted to binary numeric code called machine language (also machine language called). The machine language because it corresponds to a command incorporated in the CPU, humans and has become one difficult to understand intuitively. In the early personal computer, while looking at the instruction code table of the CPU, but the user had to enter by hand, So too for inefficient, have been a variety of ingenuity.

1.2 Programming language and start-up program

When the power is turned on to the computer, check whether the memory (software) and the CPU to work properly, the user will need to work to create an environment to be available. The startup program was devised in order to perform this task automatically. To a specific location in the main storage device, it is also possible to place the program for performing this process, as the program always after power is executed, it is not then have to pass control to the next program. Or news current of the abnormality of the hardware to ring the chime when the power is turned on in the personal computer, to or carried out a check of the memory is the work of this start-up program.

In the early personal computer, users had been to create a program in machine language,

because the machine language is difficult too understand, it was difficult to create a program. So, by transplanting a programming language that was being used at that time large-scale computers and minicomputers to personal computers, it is now possible to create a program in a language close to natural language. FORTRAN, a programming language such as COBOL, for translating the program into machine language is installed in your PC and power on the PC, are now available to automatically specific programming Gensei of translation program, the personal computer one of the solutions, it was considered for the creation program.

1.3 Application software and operating system

PC now gradually is also used in the practical aspects, also the peripheral devices such as auxiliary storage device or printer comes widespread, it has been born a new needs. Control of peripheral devices, processing such as recording and management of programs and data to the auxiliary storage device, which if you can easily the procedure is managed by the collective because it is carried out in common also in the program, it was that. Thus it is the operating system was born.As initially it was called DOS (Disk Operating system), but was designed to manage only resources such as a flexible disk, a hard disk, progressively memory, CPU, screen drawing, also a network such as the resources for the entire personal computer enabled and now it manages, it has become to have a function comparable to the operating system that has been adopted in the former large-scale computers and workstations.

It is this operating system is application software to run under the control of. As in the application software, not the software to manage the computer itself, is a word processor software, the purpose of a user like a spreadsheet software, applications, software used for the business. PC word processor, spreadsheet, including the ones for the business, such as database, image, communication, games, for a particular business look like (accounting, etc.) and various other applications software distribution, the user that he is using Buy application software for the operating system, it has come to use.

The software as shown in Figure 3.1 roughly consists of basic software and application software. The basic software that is function to control the ① personal computer itself, the execution of the program, control of input and output, there is a language processor, etc. necessary to translate the operating system, further ② program for management of data.

Language processor has a huge variety exists all over the world but, as typical, C, BASIC, PASCAL, assembler, FORTRAN, there is such as COBOL. ③ utility (service) program is necessary in order to continue to generate a software (program), library, classification annexation, debugger,

and is configured from the linker, and so on.

① payroll management to application software, such as personnel management, I am what their users was developed to say that the user program. In addition, for the search ② information, it is a general purpose software that was developed its own suppliers such as statistical.

In addition, recently, is capable of personal computer communication using LAN or modem in this case, it does not need to say that the communication software is required.

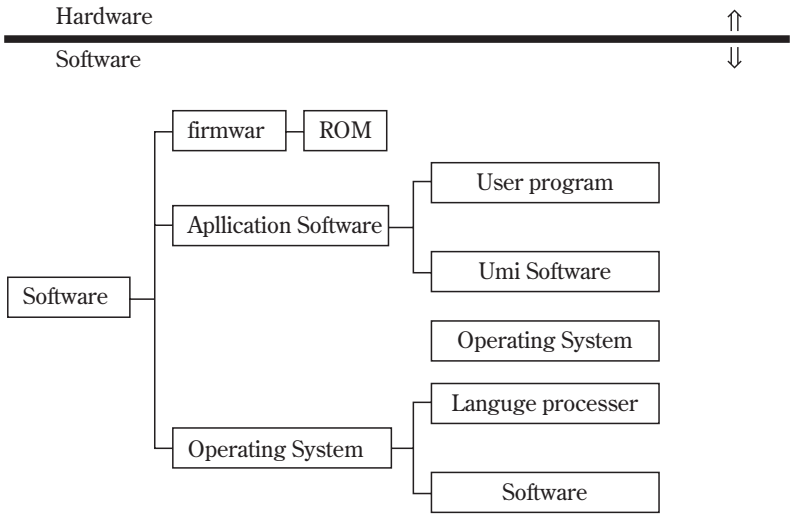


Figure 1.3.1 Catogory of Software

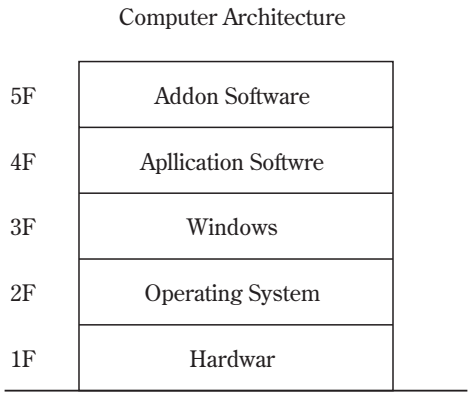


Figure 1.3.2 Operationg System Architecture Layer

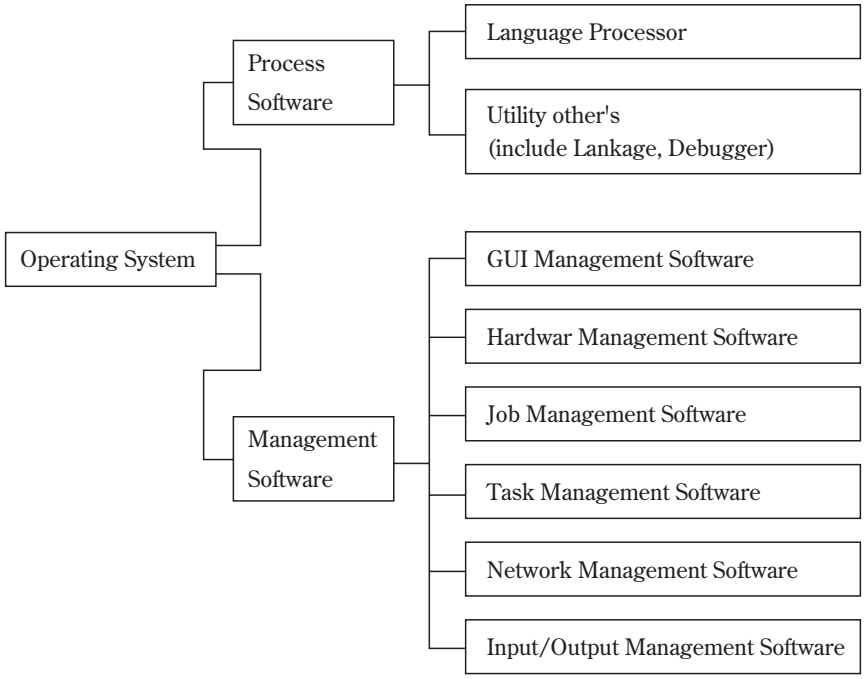


Figure 1.3.3　Basic Configuration in Operating System

2.1　Data

The basic data of the personal computer has been expressed in binary number. And in this binary number, including the numerical value I represent all of the information such as a character. First, there is simply a call you as follows: Regardless of such meaning of the data.

（1）classification by the simple number of lines (the bit length)

① bit　：One line of binary number

② byte ：8-bit length of the data I referred to as 1 byte.

③ word：2 bytes or, it called the one word the 4-byte length of the data.

Usually, the personal computer will has not been designed to such operation instruction to process this word to the unit. (Figure 2.1)

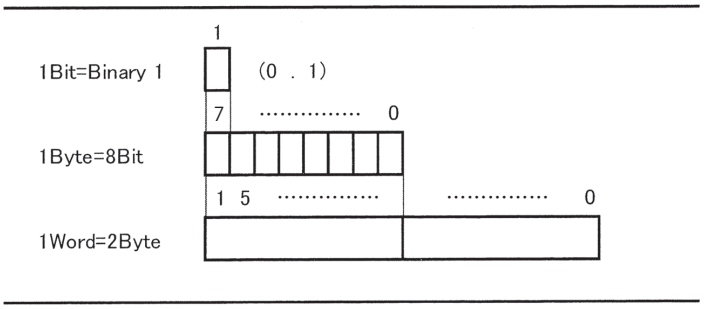


Figure 2.1 Bit byte word

(2) Classification by meaning to have the data (type)

When roughly the personal computer of data is divided into numeric data and non-numeric data. Numeric data is divided fixed-point, floating-point. In addition there is a distinction by the precision, the non-numeric data characters, there is a logical value, and a pointer. (Figure 2.2)

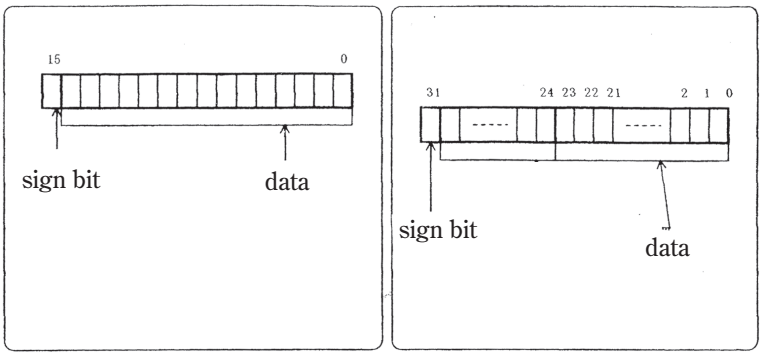


Figure 2.2 Fixed-point and floating-point

① numerical data

Fixed point：Integer type and is also called, is treated as a simple binary number.

The number that can be represented, when there is a decimal point to the right, it is from -32768 2-byte format to 32767.

Floating point：Unlike fixed-point, it is possible to represent the value of a wide range.

A number is divided into mantissa and exponent to represent each at a fixed point.

② non-numeric data

character：1-byte length, and representation is allowed to correspond to one of the characters

and one-byte bit pattern character.

Logic：It represents the authenticity of such a result of the logic operation. Normally, we use 1 byte. False is represented hexadecimal, and then the rest and true.

Pointer：It will show the address of the memory in the 2-byte or 4-byte data. You use such a list, which will be described later.

2.2 data with a structure

Consisting of a combination of the basic data, there are data with a complex structure.

(1) Sequence

Data of the same type is what you have arranged linearly a. (Figure 2.3)

(1)	(2)	(3)	(4)	(5)	…	(N)	…	(10)

Figure 2.3 The concept of array

(2) Multi-dimensional array

In the same sense as the array is a sequence of data to the plane and three-dimensional image. However, the data in memory rather than in fact arranged in a plane or three-dimensional, and successively assigned to no memory by a suitable treatment. (Figure 2.4)

(a) Two-dimensional array

A

(1.1)	(1.2)	(1.3)	(1.4)	(1.5)
(2.1)	(2.2)			
⋮	⋮		(I.J)	
(4.1)				(4.5)

(b) Three-dimensional array

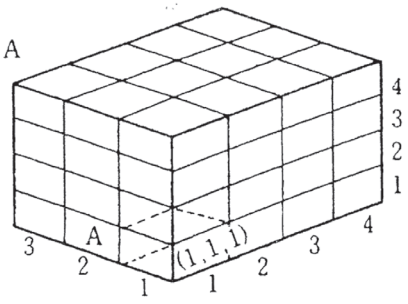


Figure 2.4 The concept of multi-dimensional array

(3) List

It is what led to the image manner in combination of one or more basic data evening and one

pointer. (Figure 2.5)

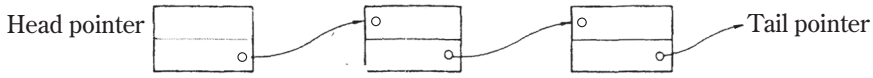
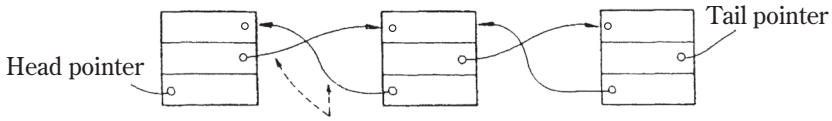


Figure 2.5 List and pointers

(4) A list of complex structures

It is the same as the list but it is some of the more than one pointer. (Figure 2.6)

(a) Bidirectional list



(b) Dendritic list

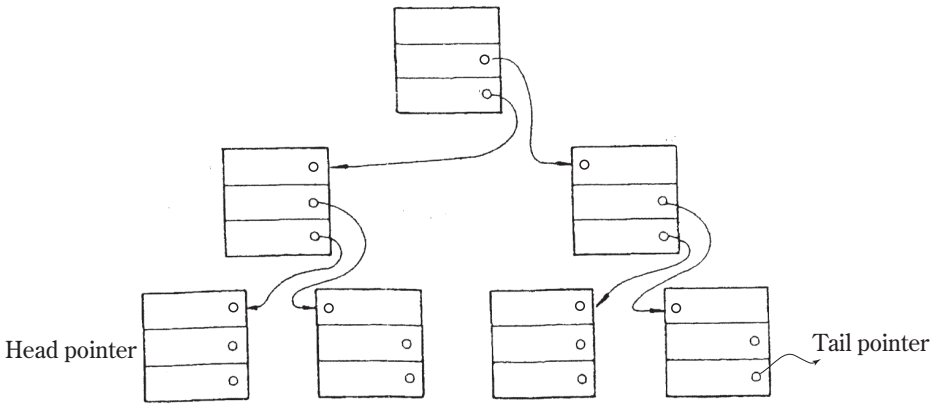


Figure 2.6 Complex list

(5) Structure

It is those grouped together by arranging a plurality of basic data. (Figure 2.7)

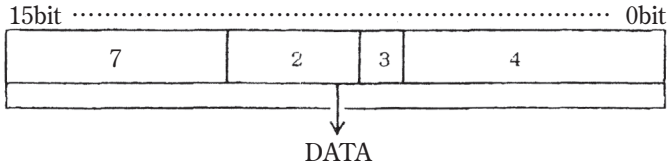


Figure 2.7 Concept of structure

(6) Hardware construction of intelligent simulator

The outline of the tested intelligent simulator is shown in Figure 2.8. It can be connected to personal computer.

Figure 2.8 Outline of the intelligent simulator

The hardware construction Input section