

# 4

## Programming and languages

### Start-up

#### Task 1

Can you identify these programming languages?

a

```
/* this program finds the minimum of two integers */

#include <stdio.h>

main()
{
    int j,k,m;
    printf("Input two integers: ");
    scanf("%d%d",&j,&k);
    m=min(j,k);

    printf("\n%d is the minimum of %d and %d\n\n",
          m,j,k);
}
```

b

```
1740 REM ****
1750 REM Capture alarm data
1760 REM ****
1770CLS
1780SCREEN 1
1790COLOR BACK,PALL
1800LOCATE 1,1
1810INPUT "Alarm time: ",AT$,
1820AC$=MID$(AT$,3,1)
1830AH$=MID$(AT$,1,2)
1840AM$=MID$(AT$,4,2)
1850IF AC$<>;GOTO 1770
1860IF LEN(AT$)<>5GOTO 1770
1870AH%=VAL(AH$)
1880AM%=VAL(AM$)
1890IF AH%>23GOTO 1770
1900IF AM%>59GOTO 1770
1910LOCATE 2,1
1920INPUT "Alarm text: ",ATEXT$,
1930IF LEN(ATEXT$)>30THEN GOTO 1910
1940ASW%=1
1950LSET FAHS=MKIS(AH%)
1960LSET FAMS=MKIS(AM%)
1970LSET FATEXT$=ATEXT$
1980LSET FASW$=MKIS((ASW%))
1990PUT f2,1
2000CLS
2010GOTO 2720
```

c

```
092900 B700-CONVERT-R80-DATE SECTION.
093000*
093100* IF CREDIT HAS NOT BEEN GIVEN ON A TRANSACTION, THE
093200* DATE USED IS THE TRANSACTION DATE. THIS SECTION
093300* CONVERTS THE TRANSACTION DATE TO A NUMBER OF DAYS
093400* SINCE 1900, PUTTING THE RESULT IN WS-CALC-DATE
093500*
093600 B700-010.
093700*
093800 MOVE R80-DTTRAN TO WS-DATE-N,
093900 MOVE WS-DATE-X TO FLD-AREA.
094000 MOVE NORM-MDY-INPUT TO NO1-USER-FIELDS.
094100 MOVE ZEROS TO NORMALIZER-BUFFER
094200 NO1-NBR-INTS.
094300 CALL 'X2XEFTB' USING THAB
094400 NO1-ARG-LIST
094500 FLD-AREA.
094600 NORMALIZER-BUFFER.
094700 IF NO1-RTN-CODE NOT EQUAL TO ZEROS
094800 DISPLAY 'B200-DATE CONVERSION FAIL',CODE,
094900 NO1-RTN-CODE.
095000 MOVE DAYS-SINCE-1900 TO WS-CALC-DATE.
095100*
095200 B700-090.
095300*
095400 EXIT.
```

## Reading

### Task 2

Before reading the text, try to fill in the gaps in these sentences.

- 1 A \_\_\_\_\_ is a program written in one of the high-level languages.
- 2 A program written in a high-level language must be interpreted into \_\_\_\_\_ before the computer will read and process it.
- 3 A program designed to perform a specific task is called an \_\_\_\_\_.
- 4 The \_\_\_\_\_ or \_\_\_\_\_ is the program produced when the original program has been converted into machine code.
- 5 A \_\_\_\_\_ is a program that converts a high-level language into machine code.
- 6 The systems program which fetches required systems routines and links them to the object module is known as the \_\_\_\_\_.
- 7 The \_\_\_\_\_ is the program directly executable by the computer.

Now read the text to check your answers.

## Programs and programming languages

Computers can deal with different kinds of problems if they are given the right instructions for what to do. Instructions are first written in one of the high-level languages, e.g. FORTRAN, COBOL, ALGOL, PL/I, PASCAL, BASIC, or C, depending on the type of problem to be solved. A program

5 written in one of these languages is often called a source program, and it cannot be directly processed by the computer until it has been compiled, which means interpreted into machine code. Usually a single instruction written in a high-level language, when transformed into machine code, results in several instructions. Here is a brief description of some of the

10 many high-level languages:

**FORTRAN** acronym for FORmula TRANslator. This language is used for solving scientific and mathematical problems. It consists of algebraic formulae and English phrases. It was first introduced in the United States in 1954.

15 **COBOL** acronym for COmmon Business-Oriented Language. This language is used for commercial purposes. COBOL, which is written using English statements, deals with problems that do not involve a lot of mathematical calculations. It was first introduced in 1959.

**ALGOL** acronym for ALGOrithmic Language. Originally called IAL, 20 which means International Algebraic Language. It is used for mathematical and scientific purposes. ALGOL was first introduced in Europe in 1960.

◀ **PL/I** Programming Language I. Developed in 1964 to combine features of COBOL and ALGOL. Consequently, it is used for data processing as well as scientific applications.

**BASIC** acronym for Beginner's All-purpose Symbolic Instruction Code. Developed in 1965 at Dartmouth College in the United States for use by students who require a simple language to begin programming.

**C** developed in the 1970s to support the UNIX operating system. C is a highly portable general-purpose language.

Other such languages are APL (developed in 1962), PASCAL (named after Blaise Pascal and developed in 1971), and LISP and PROLOG, both of which are used for work in artificial intelligence. LOGO is a development of LISP which has been used to develop computer-based training (CBT) packages.

When a program written in one of these high-level languages is designed to do a specific type of work such as calculate a company's payroll or calculate the stress factor on a roof, it is called an applications program. Institutions either purchase these programs as packages or commission their own programmers to write them to meet the specifications of the users.

The program produced after the source program has been converted into machine code is referred to as an object program or object module. This is done by a computer program called the compiler, which is unique for each computer. Consequently, a computer needs its own compiler for the various high-level languages if it is expected to accept programs written in those languages. For example, in order that an IBM RS/6000 may process a program in FORTRAN, it needs to have a compiler that would understand that particular model and the FORTRAN language as well.

The compiler is a systems program which may be written in any language, but the computer's operating system is a true systems program which controls the central processing unit (CPU), the input, the output, and the secondary memory devices. Another systems program is the linkage editor, which fetches required systems routines and links them to the object module (the source program in machine code). The resulting program is then called the load module, which is the program directly executable by the computer. Although systems programs are part of the software, they are usually provided by the manufacturer of the machine.

Unlike systems programs, software packages are sold by various vendors and not necessarily by the computer manufacturer. They are a set of programs designed to perform certain applications which conform to the particular specifications of the user. Payroll is an example of such a package which allows the user to input data – hours worked, pay rates, special deductions, names of employees – and get salary calculations as output. These packages are coded in machine language (0s and 1s) on magnetic tapes or disks which can be purchased, leased, or rented by users who choose the package that most closely corresponds to their needs. ■

## ► **Vocabulary**

payroll (l. 62) – list of employees and the amount of money to be paid to each of them

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**Task 3**

These are answers to questions about the text. Write the questions.

- 1 No, it is quite wordy so it is used for commercial purposes.
- 2 To support the UNIX operating system.
- 3 An applications program.
- 4 It is done by the compiler.
- 5 It fetches required systems routines and links them to the object module.
- 6 No, they are also sold by other vendors.

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**Task 4**

Summarize the information on different high-level computer languages by completing the table below.

Language	Developed	Function	Characteristic
FORTRAN			
	1959		
		mathematical and scientific purposes	
			combines features of COBOL and ALGOL
BASIC			
		to support Unix operating system	
	1962		

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**Task 5**

Find the passages in the text where the following ideas are expressed. Give the line references.

line

- 1 l. \_\_\_\_ Systems programs control the work of the computer system.
- 2 l. \_\_\_\_ Software packages are not always sold by the manufacturer.
- 3 l. \_\_\_\_ Usually, every high-level instruction translates into many more in machine code.
- 4 l. \_\_\_\_ Systems programs are usually provided by the manufacturer.
- 5 l. \_\_\_\_ Programmers may be required to write software for their employers.

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**Task 6**

Using the line reference given, look back in the text and find the reference for the words in *italics*.

- 1 if *they* are given the right (line 1)
- 2 *it* cannot be directly processed (line 5)
- 3 *it* is called an applications program (line 38)
- 4 commission *their* own programmers (line 40)
- 5 to write *them* to meet (line 40)
- 6 *that* would understand (line 48)
- 7 *which* controls the central (line 51)
- 8 links *them* to the object (line 54)
- 9 *They* are a set of programs (line 60)
- 10 *which* can be purchased (line 66)

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**Task 7**

Using the line references given, refer back to the text and find words or phrases that have a similar meaning to:

- 1 converted (lines 5–10)
- 2 give the responsibility to (lines 35–40)
- 3 brings (lines 50–55)
- 4 are compatible with (lines 60–65)
- 5 matches (lines 65–67)

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**Task 8**

Choose the correct word to complete each sentence. You may have to change some words slightly.

- 1 *instruction, instruct, instructed, instructor*
  - a Our maths \_\_\_\_\_ explained to us the principles of binary arithmetic.
  - b We were \_\_\_\_\_ to document our programs very carefully.
  - c Both \_\_\_\_\_ and data have to be changed to machine code before the computer can operate on them.
- 2 *compilation, compiler, compile, compiled*
  - a Our university computer does not have a PASCAL \_\_\_\_\_.
  - b Usually, a programmer \_\_\_\_\_ his program before he puts in the data.
  - c A source program cannot be directly processed by the computer until it has been \_\_\_\_\_.
- 3 *result, results, resulting*
  - a The linkage editor links systems routines to the object module. The \_\_\_\_\_ program, referred to as the load module, is directly executable by the computer.
  - b The \_\_\_\_\_ of these mathematical operations were obtained from the university mainframe and not from my micro.