LAB 7: SELECTION OR DECISION

OBJECTIVES FOR STUDENTS

1. Use selection control structure.
   [*Menggunakan struktur kawalan pilihan.*]

2. Use the `if` selection control structure.
   [*Menggunakan struktur kawalan pilihan* `if`.]

3. Use the `if...else` selection control structure.
   [*Menggunakan struktur kawalan pilihan* `if...else`.]

4. Use the `switch` selection control structure.
   [*Menggunakan struktur kawalan pilihan* `switch`.]

ASSUMPTIONS

1. Students have knowledge to assess relational and logical Boolean operations.
   [*Pelajar mempunyai pengetahuan untuk menilai operasi Boolean berbentuk hubungan dan logik.*]

2. Students have knowledge to form input/output statements.
   [*Pelajar mempunyai pengetahuan untuk membina kenyataan input/output.*]

3. Students have knowledge to form increment/decrement operators.
   [*Pelajar mempunyai pengetahuan untuk membina operasi tokok/susut.*]

LAB EXERCISES

EXERCISE 1:
[*LATIHAN 1*]

1. Given the following declarations, evaluate the expression below and assign `true` or `false` value for each expression.
   [*Diberi pengisytiharan berikut, selesaikan ungkapan di bawah serta berikan nilai* `true` *atau* `false` *untuk setiap ungkapan.*]

```
bool found = true;
bool flag = false;
int number = 5;
int xint = 12;
int yint =100;
double xdouble = 50.3;
```

```
double ydouble = 1.3;
char ch = 'D';
```

i. `!found`
ii. `!number`
iii. `(number >= xint) && (number<=yint)`
iv. `(found || flag)`
v. `(xint != yint)`
vi. `(ydouble * 10) <= xdouble`
vii. `'A'<= ch && ch<='Z'`
viii. `number-5 == xint) && !flag`

2. Write a C expression for each the following conditions.
[*Tuliskan ungkapan C bagi setiap syarat berikut*:]

i. Number greater than 1 and smaller than 9.
[*Nombor lebih besar daripada 1 tetapi lebih kecil daripada 9.*]

ii. Variable `ch` not character ‘q’ or ‘k’.
[*Pembolehubah ch bukan huruf ‘q’ atau ‘k’.*]

iii. Number between 1 to 9 but not number 5.
[*Nombor adalah di antara 1 hingga 9 tetapi bukan nombor 5.*]

iv. Not the number between 1 to 9.
[*Nombor bukan di antara 1 hingga 9.*]

EXERCISE 2:
[*LATIHAN 2*]

1. Download Program 7.1. Study the code and run the program.
[*Muat turun Program 7.1. Fahamkan aturcara tersebut dan laksanakannya.*]

```
1   //Program 7.1
2   #include <stdio.h>
3   #include <conio.h>
4
5   int main(){
6      double mark;
7
8      printf ("Enter your mark: ");
9      scanf ("%lf", &mark);
10
11     if (mark >= 30)
12        printf ("TEST 1 -> Pass\n");
13     if (mark < 30)
14        printf ("TEST 1 -> Fail\n");
15
16     getch();
17     return 0;
18  }
```

i. Explain the function or objective of the program.
[*Terangkan fungsi atau objektif aturcara*.]

ii. Change the usage of the 2 if statements (Line 11 and Line 13) to an `if..else` statement.
[*Tukarkan penggunaan 2 kenyataan if (Baris 11 dan Baris 13) kepada kenyataan* `if..else`.]

iii. Show the difference between the usage of the 2 `if` statements and the `if..else` statement using a flowchart.
[*Tunjukkan perbezaan penggunaan 2 kenyataan* if *dan* `if..else` *dengan menggunakan carta alir*.]

2. Download Program 7.2. The program requests the user to input Test 1 mark. Contribution to the final mark will be calculated if the Test 1 mark is greater than or equal to 30%, and if the mark is less than 30% the student is required to re-sit the test. The contribution is 20% of Test 1 mark to the final mark.
[*Muat turun Program 7.2. Program tersebut meminta pengguna memasukkan markah Test 1. Sumbangan kepada markah akhir akan dikira jika markah Test 1 yang dimasukkan adalah lebih besar atau sama dengan 30%, dan jika kurang daripada 30% pelajar perlu menduduki Test 1 sekali lagi. Test 1 memberi sumbangan 20% kepada markah akhir*.]

```
1  //Program 7.2
2  #include <stdio.h>
3  #include <conio.h>
4
5  int main(){
6  double mark, final20p=0;
7
8     printf ("Enter your mark: ");
9     scanf ("%lf", &mark);
10
11    if (mark >= 30)
12       printf ("TEST 1 -> Pass\n");
13       final20p = ((20.0/100.0) * mark);
14            printf ("Contribution to final mark %d”,
15 final20p);
16    if (mark < 30)
17       printf ("TEST 1 -> Fail\n");
18       printf ("Please re-sit TEST 1\n");
19    getch();
20    return 0;
21 }
```

i. Identify the logic errors from the program.
[*Kenal pasti ralat logik dari program tersebut*.]

ii. Correct the logic errors.
[*Betulkan ralat logik tersebut*.]

EXERCISE 3:
[*LATIHAN 3*]

1. Download Program 7.3. Study the code and run the program.
[*Muat turun Program 7.3. Fahamkan aturcara tersebut dan laksanakannya.*]

```
1   //Program 7.3
2   #include <stdio.h>
3   #include <conio.h>
4
5   int main(){
6        double mark;
7
8      print ("Enter your mark");
9      scanf ("%lf", &mark);
10
11     if (mark >=75)
12        printf ("Your score: A\n");
13     if ((mark <75)&& (mark>=60))
14        printf ("Your score: B\n");
15     if ((mark <60)&& (mark>=45))
16        printf ("Your score: C\n");
17     if ((mark <45)&& (mark>=30))
18        printf ("Your score: D\n");
19     if (mark <30)
20        printf ("Your score: E\n");
21     getch();
22     return 0;
23  }
```

   i. Explain the function or objective of the program.
   [*Terangkan fungsi atau objektif aturcara tersebut.*]

   ii. Draw a flowchart for the program.
   [*Lukiskan carta alir untuk program ini.*]

   iii. Given the input `mark` = 90.6, identify which `if` statement will be evaluated and what are the results of the evaluated expression.
   [*Diberi input `mark` = 90.6, kenal pasti garis kenyataan `if` yang akan dinilai dan keputusan penilaian ungkapan tersebut.*]

2. Download Program 7.4. Study the code and run the program.
[*Muat turun Program 7.4. Fahamkan aturcara tersebut dan laksanakannya.*]

```
1   //Program 7.4
2   #include <stdio.h>
3   #include <conio.h>
4
5   int main(){
6      double mark;
7
8    print ("Enter your mark");
9      scanf ("%lf", &mark);
```

```
10
11  if (mark >=75)
12       printf ("Your score: A\n");
13  else if ((mark <75)&& (mark>=60))
14       printf ("Your score: B\n");
15  else if ((mark <60)&& (mark>=45))
16       printf ("Your score: C\n");
17  else if ((mark <45)&& (mark>=30))
18       printf ("Your score: D\n");
19  else if (mark <30)
20       printf ("Your score: E\n");
21  getch();
22     return 0;
23  }
```

i. Draw a flowchart for the program.
[*Lukiskan carta alir untuk aturcara ini*.]

ii. Given the input `mark` = 90.6, identify which `if` statement will be evaluated and what are the results of the evaluated expression.
[*Diberi input* `mark = 90.6`, *kenal pasti garis kenyataan* `if` *yang akan dinilai dan keputuan penilaian ungkapan tersebut*.]

iii. Explain the difference between the `if` statement in Program 7.3 with the `if..else..if` statement in Program 7.4.
[*Jelaskan perbezaan kenyataan* if *dalam Program 7.3 dan kenyataan* `if..else..if` *dalam Program 7.4*.]

EXERCISE 4:
[*LATIHAN 4*]

1. Given a selection control structure with `switch` in Program 7.5.
[*Diberikan struktur kawalan pilihan* `switch` *dalam Program 7.5*.]

```
1   //Program 7.5
2   #include <studio.h>
3   #include <conio.h>
4
5   int main(){
6     int choice;
7
8   printf("What flavor ice cream do you want?\n");
9   printf("Enter 1 for chocolate\n");
10  printf("Enter 2 for vanilla\n");
11  printf("Enter 3 for strawberry\n");
12  printf("Enter 4 for Yam\n");
13  printf("Enter your choice: \n");
14  scanf("%d", &choice);
15
16  switch (choice) {
17   case 1:
```

```
18      printf("Chocolate, Muhammad's favorite.\n");
19      break;
20    case 2:
21      printf("Vanilla, Ismael's favorite\n");
22      break;
23    case 3:
24      printf("Strawberry, Adibah's favorite\n");
25      break;
26    case 4:
27      printf("Yam, Munirah's favorite\n");
28      break;
29    default:
30      printf("We don't have any\n");
31      printf("Make another selection\n");}
32
33  getch();
34  return 0;
35  }
```

i. Draw a flowchart for the program.
[*Lukiskan carta alir untuk aturcara ini*.]

ii. Based on the flowchart rewrite Program 7.5 using selection control structure with `if..else..if`.
[*Berdasarkan carta alir yang dilukis, tulis semula Program 7.5 dengan menggunakan struktur kawalan pilihan* `if..else..if`.]

iii. Compare the original Program 7.5 and the program from answer ii. Which selection control structure is easy to read?
[*Bandingkan Program 7.5 asal dan aturcara dari jawapan ii. Struktur kawalan pilihan yang manakah lebih mudah untuk dibaca?*]

EXERCISE 5:
[*LATIHAN 5*]

1. Given flowchart in Figure 7.1, write a C program.
[*Diberikan carta alir di* Rajah 7.1, *tuliskan aturcara C.*]

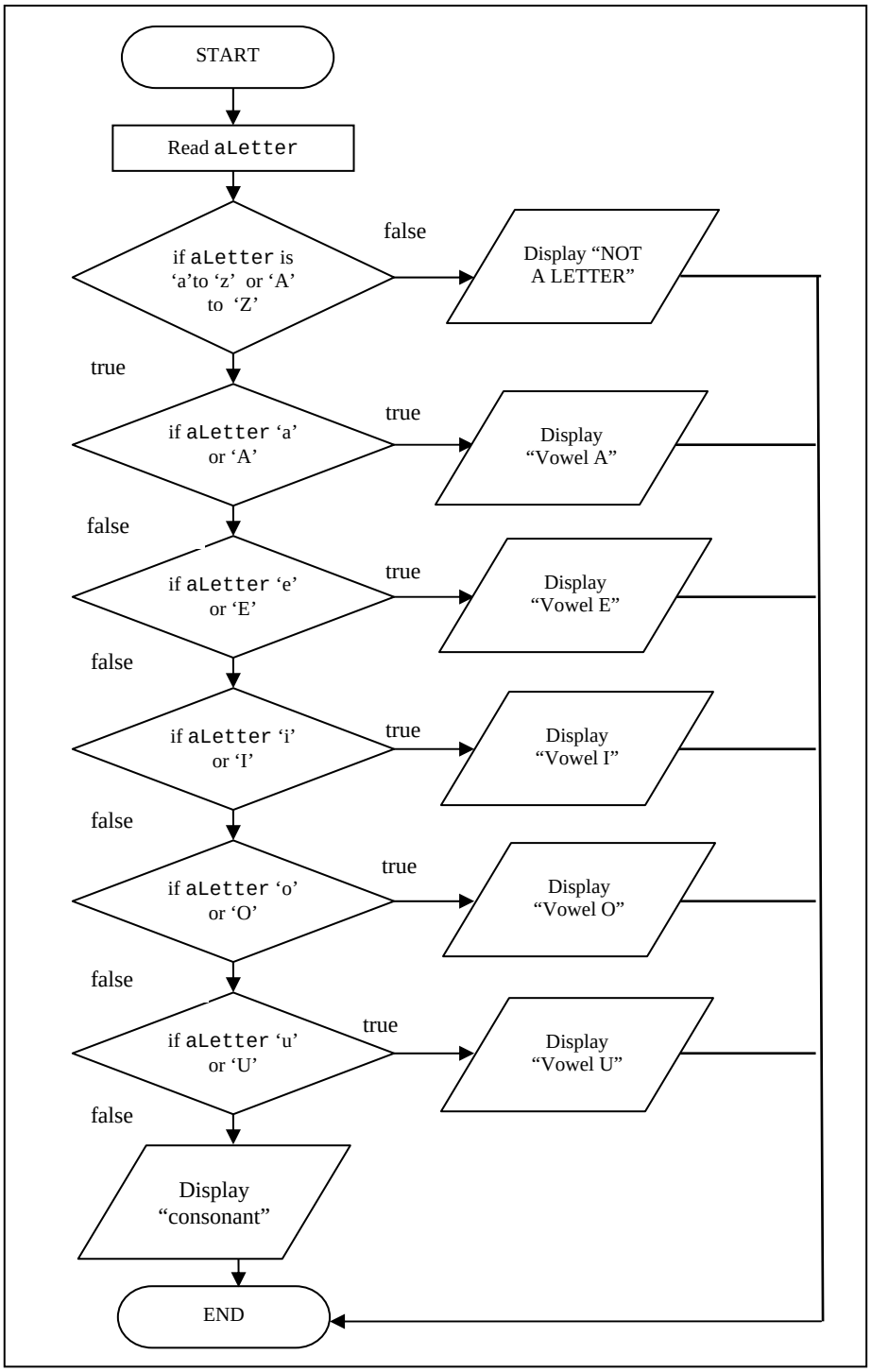

Figure 7.1

EXERCISE 6:
[*LATIHAN 6*]

1. Write a complete C program to identify the grade for the subject C Programming Techniques (SCP1103) based on the assessments as listed in Table 7.1. The input for this program is the 5 assessment marks. The full mark for each assessment is 100%. The final mark for this subject will be calculated based on the 5 assessments input mark. Based on this final mark the program will assign a grade. The grade scales are as tabulated in Table 7.2.
[*Tuliskan aturcara C lengkap untuk mengenal pasti gred bagi subjek Teknik Pengaturcaraan C (SCP1103) berdasarkan penilaian yang disenaraikan di Jadual 7.1. Input untuk aturcara ini ialah markah bagi 5 penilaian. Markah penuh untuk setiap penilaian ialah 100%. Markah akhir untuk subjek ini dikira berdasarkan 5 masukan markah penilaian tersebut. Markah ujian akhir ini akan digunakan untuk menentukan gred. Skala gred dijadualkan di Jadual 7.2.*]

Table 7.1: Assessment Items

Assessments	**Percentage (%)**
Test 1	20
Assignments	30
Quiz	10
Lab works	10
Final Exam	30
Total	**100**

Table 7.2: Grade Scale

Assessments	**Percentage (%)**
A+	90-100
A	80-89
A-	75-79
B+	70-74
B	65-69
B-	60-64
C+	55-59
C	50-54
C-	45-49
D+	40-44
D	35-39
D-	30-34
E	00-29

EXERCISE 7:
[*LATIHAN 7*]

1. Write a C program to compute bill payment of electrical consumption for different users. In order to promote saving, Tenaga National Berhad (TNB) charge a lower rate to users with lower consumption as shown in Table 7.3. Figure 7.2(a) and Figure 7.2(b) show a design of flowchart to solve this problem.
[*Tuliskan satu aturcara C yang akan mengira jumlah bayaran bil penggunaan elektrik bagi setiap pengguna. Untuk menggalakkan penjimatan, pihak Tenaga National Berhad (TNB) mengenakan kadar bayaran lebih rendah kepada pengguna bagi penggunaan yang minima seperti di Jadual 7.3. Rajah 7.2(a) and Rajah 7.2(b) menunjukkan carta alir untuk menyelesaikan masalah ini*.]

Table 7.3: New Rate

User Code [*Kod Pengguna*]	**User Type [*Jenis Pengguna*]**	**First Rate [*Kadar Pertama*]**	**Second Rate [*Kadar Kedua*]**
R	Household [*Rumah Tangga*]	0.10 for first 500 unit	0.25 for the following units
P	Office [*Pejabat*]	0.25 for first 1000 unit	0.50 for the following units
K	Factory [*Kilang*]	0.50 for first 1500 unit	0.75 for the following units

The following choice is used to identify the type of user.
[*Tentukan jenis pengguna melalui pilihan berikut*.]

```
User Code:
      1. Household
      2. Office
      3. Factory
      4. Program End
Choice:_
```

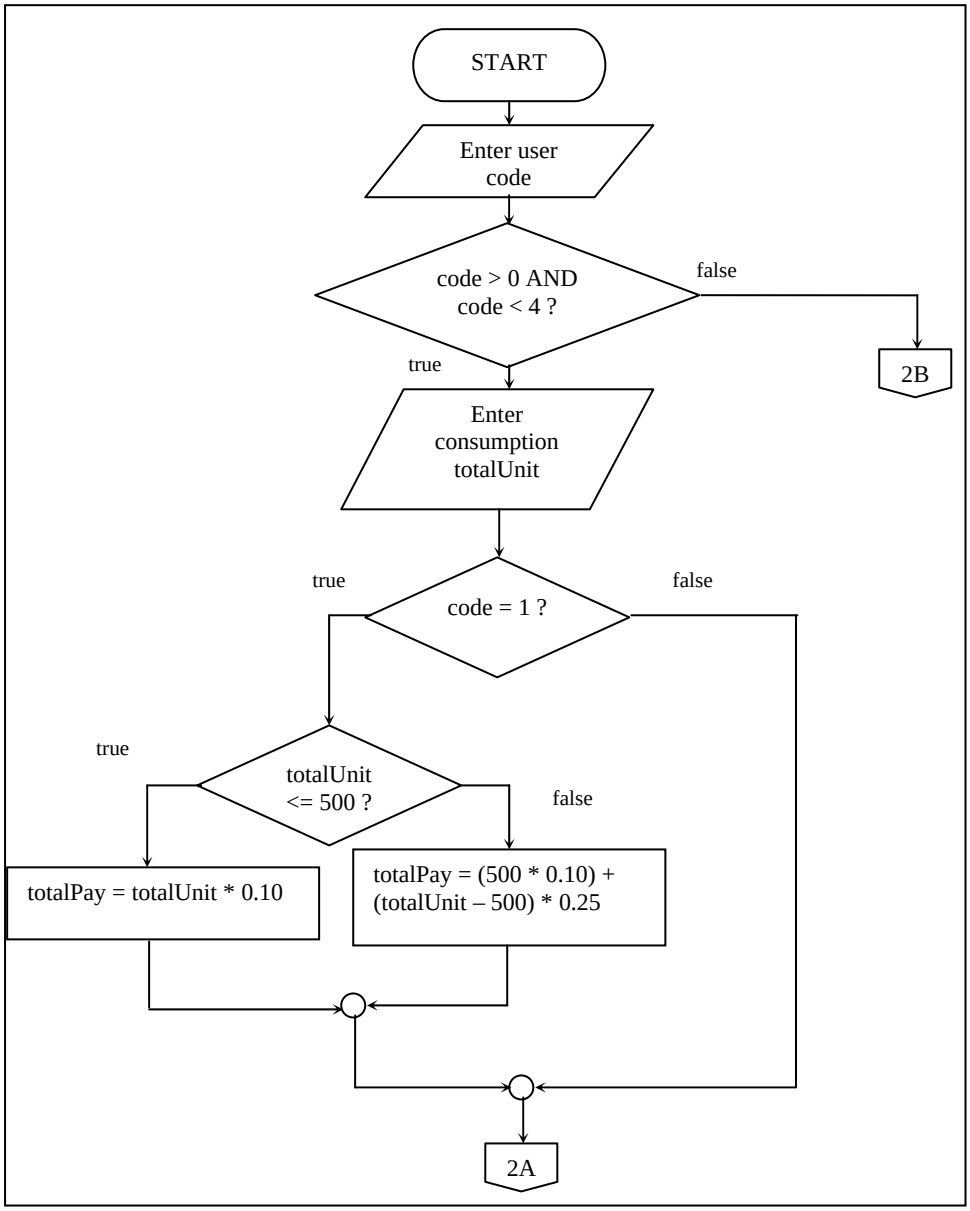

Figure 7.2(a): Flow Chart Part I

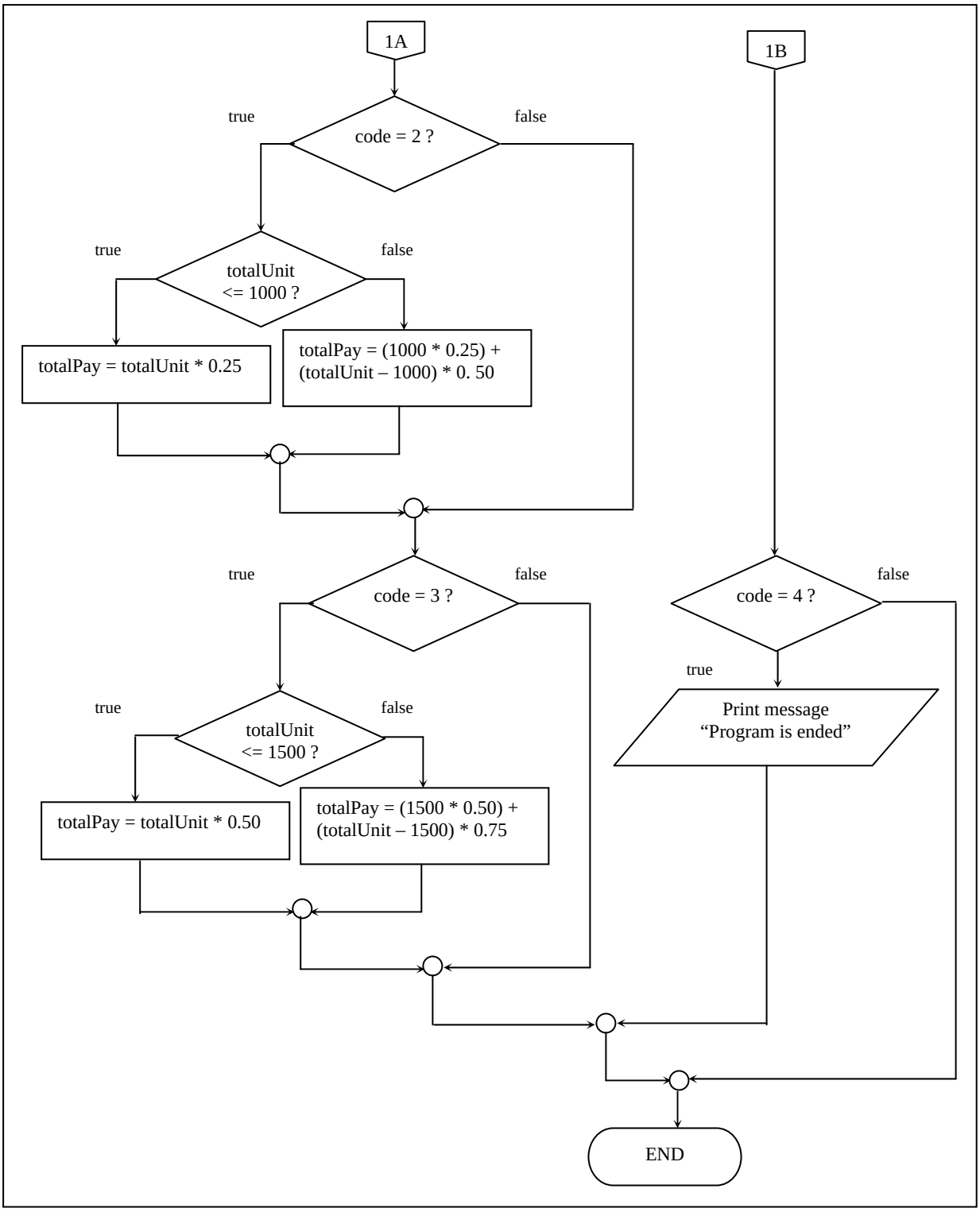

Figure 7.2(b): Flow Chart Part II