

Solved problem with discussion

Problem 1-1 An automobile service outlet charges its customers for the parts it uses to repair customer vehicles and for the labor required for the repair. The labor charge is \$44 per hour. Write a C++ program that prompts the user to enter the total cost of parts for a customer and the number of hours of labor required for the repair. Assume the total cost of parts and the number of hours are integers. The program should display the cost of the parts, the charge for labor, and the total charge for the repair (the sum of the cost of parts and labor).

Discussion of Problem

1.1To solve this problem, we first design a high-level solution using pseudocode. Pseudocode (literally, "false code") describes program design using English. Pseudocode avoids the syntax of a programming language and, instead, emphasizes the design of the problem solution. There is no standard form of pseudocode you make up your own rules. The only guideline is that the meaning of the pseudocode should be clear to anyone reading it.

Pseudocode for Problem 1.1:

Obtain the input data from the user.

Calculate the labor and total charges.

Display the results.

The pseudocode does not specify the variables to use, or how to obtain the input data, calculate the charges, or display the results. We shall fill in these details when we code the program. At this point in the solution design, the pseudocode specifies what the program must do and the order in which the program must do it.

The Program prb1-1.cpp

Before considering the code, we select the variables necessary to solve our problem. The user is to input two numbers, the cost of parts and the number of hours worked. Therefore, we declare a variable for each of these quantities. Suppose we call these variables `parts` and `hours`. Because the program must calculate the labor charge and the total charge of the repair, we also declare the variables `labor` and `total`. What range of values can these variables assume? The largest number the program will produce is the total cost of the repair. The total cost should not exceed the largest possible value for an integer variable, at least 32767 (if `int` variables are two bytes) or over 2 billion (if `int` variables are four bytes.) Therefore, we declare all four of the variables as type `int`.

Following is the program code that solves our problem.

```
// This program calculates the total charge for parts and labor

#include <iostream>
#include <iomanip>
using namespace std;
int main()
{
```

```

const int HOURLY_RATE = 44;

int parts,           // Cost of parts
    hours,          // Number of hours worked
    labor,          // Labor charge
    total;          // Total charge to customer

// Obtain the input data

cout << "Enter the cost of parts: ";
cin >> parts;
cout << endl;

cout << "Enter the number of hours worked: ";
cin >> hours;
cout << endl;

// Do the calculations

labor = HOURLY_RATE * hours;
total = parts + labor;

// Display the results

cout << "Cost of parts: " << setw(5) << parts << endl;
cout << "Labor charge: " << setw(6) << labor << endl;
cout << "-----" << endl;
cout << "Total charge: " << setw(6) << total << endl;

return 0;
}

```

Program Output

```

Enter the cost of parts: 239
Enter the number of hours worked: 2
Cost of parts:    239
Labor charge:    88
-----
Total charge:    327

```

Programming Problems

1. Write a program that asks the user to enter the dollar amount of the opening balance of an account, the dollar amount of deposits to the account, and the dollar amount of withdrawals from the account during the past month. The program should then display the closing balance (opening balance plus deposits minus withdrawals) in the account.
2. Write a program that asks the user to enter the integer lengths (in centimeters) of the dimensions of a box that will hold gum drops. The program should then display the volume of the box (the product of the three dimensions) in cubic centimeters.
3. Write a program that asks the user to enter the duration of a baseball game by first asking for the number of hours and then asking for the number of minutes. The program should display the total number of minutes that the game lasted.