

The High Adventure Travel Agency offers four vacation packages for thrill-seeking customers. The rates and options vary for each package. You've been asked to write a program to calculate and itemize the charges for each package, described as follows:

Devil's Courthouse Adventure Weekend: An action-packed three-day weekend spent camping, rock climbing, and rapelling at Devil's Courthouse, North Carolina. This getaway is for novices and experts alike. Optional climbing instruction is available to beginners at a low price. Camping equipment rental is also available opvright laws

Rates and is provided solely for the use of instructors in teaching
Base Charge:
Climbing Instruction:
Will destroy the integrity of the work and is not permitted.
Equipment Rental:

\$40/day per person

Scuba Bahama: A week-long cruise to the Bahamas with 3 days of scuba diving. Those with prior experience may dive right in, while beginners should choose to take optional, but very affordable lessons.

Rates

Base Charge: \$1000 per person Scuba Instruction: \$100 per person

Sky Dive Colorado: Four thrilling days with expert sky-diving instructors in Colorado Springs, Colorado. For lodging, you may choose either the Wilderness Lodge or the Luxury Inn. (Instruction is included for all members of the party.)

Rates

Base Charge: \$400 per person
Lodging at Wilderness Lodge: \$65/day per person
Lodging at Luxury Inn: \$120/day per person

Barron Cliff Spelunk: Eight days spent hiking and exploring caves in the Barron Cliff Wilderness Area, Tennessee. Camping equipment rental is available.

Rates

Base Charge: \$700 per person Equipment Rental: \$40/day per person



NOTE: A 10 percent discount on the base charges of any package is given for a party of five or more.

Variables

Table 1 lists constant variables that will be defined globally. All these variables will be defined near the top of the program to make modifications easier (in the event the rates change).

Table 1 Global constants

Variable	Description
CLIMB_RATE = 350.0	A double. Holds base rate of Devil's Courthouse Adventure Weekend package.
SCUBA_RATE = 1000.0	A double. Holds base rate of Scuba Bahamas package.
SKY_DIVE_RATE = 400.0	A double. Holds base rate of Sky Dive Colorado package.
CAVE_RATE = 700.0	A double. Holds base rate of Barron Cliff Spelunk package.
CLIMB_INSTRUCT = 100.0	A double. Holds charge for rock climbing instruction.
SCUBA_INSTRUCT = 100.0	A double. Holds charge for scuba instruction.
DAILY_CAMP_RENTAL = 40.0	A double. Holds daily charge, per person, for camping
DAY_LODGE_11s = r65; Qed solely their courses and ass	A double Holds daily cost of lodging option 1 of Sky Dive Colorado package (Wilderness Lodge.) A double Holds daily cost of lodging option 2 of Sky Dive Colorado package (Luxury Inn.)

Functions

Table 2 lists the functions used in the program.

Table 2 Functions

Function Name	Description
main	Calls the menu function and dispatches program control to the appropriate function, based on the user's choice of packages.
menu	Displays a menu listing the vacation packages. Allows the user to enter a selection, which is returned to the main function.
climbing	Asks the user for data necessary to calculate charges for the Devil's Courthouse Adventure Weekend package.
scuba	Asks the user for data necessary to calculate charges for the Scuba Bahamas package.
skyDive	Asks the user for data necessary to calculate charges for the Sky Dive Colorado package.
spelunk	Asks the user for data necessary to calculate charges for the Barron Cliff Spelunk package.

Program Design

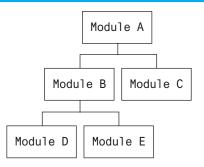
In modular programs, hierarchy charts are used to show the relationship between modules, or functions. For example, assume an application has five modules: Module A, Module B, Module C, Module D, and Module E. The relationship between the modules is

```
Module A calls Module B and Module C.

Module B calls Module D and Module F.
```

These relationships are shown in the hierarchy chart in Figure 1.

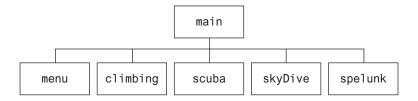
Figure 1 Hierarchy chart



This work is protected by United States copyright laws Notice the hierarchy chart does not reveal details about the algorithm or specify when the modules are to be called. Instead, it reveals the relationship between the modules.

Figure 2 shows a hierarchy chart for the High Adventure Travel Agency program. will destroy the integrity of the work and is not permitted.

Figure 2 Hierarchy chart for the High Adventure Travel Agency program



The menu that is displayed should list the four vacation packages, plus a fifth option that exits the program. When the user chooses one of the vacation packages, a function is called that asks questions, such as how many people will be going on the trip, and calculates the charges for that particular package. This process repeats until the user chooses to exit the program.

Here is the pseudocode for each of the program's functions:

```
Main Function

Call Menu Function

Do While user does not enter 5

Switch (User Input)

Case 1: Call Climbing Function.

Case 2: Call Scuba Function.
```

```
Case 3: Call SkyDive Function.
            Case 4: Call Spelunk Function.
        End Switch.
    End Do-While.
End of Main Function.
Climbing Function:
    Input number in party needing instruction.
    Input number of advanced climbers in party.
    Input number in party renting equipment.
    Calculate base charges.
    Calculate discount.
    Calculate cost of instruction.
    Calculate cost of equipment rental.
    Calculate total charges.
    Calculate minimum required deposit.
    Display results.
End of Climbing Function.
Scuba Function:
    Input number in party needing instruction.
    Input number of advanced scuba divers in party.
    Calculate base charges.
    Calculate discount.
    Calculate cost of einstruction States copyright laws
   Calculate total charges he use of instructors in teaching
   Calculate minimum required deposit arning. Dissemination
    Display results tof this work (including on the World Wide Web)
End of Scuba Function grity of the work and is not permitted.
SkyDive Function:
    Input number in party.
    Calculate base charges.
    Calculate discount.
    Input number in party staying at Wilderness Lodge.
    Input number in party staying at Luxury Inn.
    Calculate lodging charges.
    Calculate total charges.
    Calculate minimum required deposit.
    Display results.
End of SkyDive Function.
Spelunk Function:
    Input number in party.
    Input number in party renting equipment.
    Calculate base charges.
    Calculate discount.
    Calculate cost of equipment rental.
    Calculate total charges.
    Calculate minimum required deposit.
    Display results.
End of Spelunk Function.
```

Program CS2-1 lists the C++ code.

Program CS2-1

```
// This program will assist the High Adventure Travel Agency
 2 // in calculating the costs of their 4 major vacation packages.
    #include <iostream>
 4 #include <iomanip>
 5 using namespace std;
 6
 7 // Constants for the charges.
8 const double CLIMB_RATE = 350.0; // Base rate - Devil's Courthouse

9 const double SCUBA_RATE = 1000.0; // Base rate - Bahamas

10 const double SKY_DIVE_RATE = 400.0; // Base rate - Sky diving

11 const double CAVE_RATE = 700.0; // Base rate - Spelunking
12 const double CLIMB_INSTRUCT = 100.0; // Climbing instruction
13 const double SCUBA_INSTRUCT = 100.0; // Scuba instruction
14 const double DAILY_CAMP_RENTAL = 40.0; // Daily camping equipment rental
15 const double DAY_LODGE_1 = 65.0; // Lodging option (sky diving)
16 const double DAY_LODGE_2 = 120.0;
                                                 // Lodging option (sky diving)
17
18 // Function prototypes
19 void climbing();
20 void scuba();
21 void skyDive();
void spelunk():

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    int main(i) courses and assessing student learning. Dissemination
25
            or sale of any part of this work (including on the World Wide Web)
26
         intviselect tonthe integrity of the work and is not permitted.
27
28
29
         cout << fixed << showpoint << setprecision(2);</pre>
30
         do
31
         {
32
              selection = menu();
33
              switch(selection)
34
              {
35
                  case 1 : climbing();
36
                             break;
37
                  case 2 : scuba();
38
                             break;
39
                  case 3 : skyDive();
40
                             break;
41
                   case 4 : spelunk();
42
                             break;
43
                  case 5 : cout << "Exiting program.\n\n";</pre>
44
              }
45
         } while (selection != 5);
46
         return 0:
47
    }
48
49
50 // Definition of function menu.
    // Displays the main menu and asks the user to select
    // an option. Returns an integer in the range 1-5.
                                                                               (program continues)
```

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Program CS2-1 (continued) 54 55 int menu() 56 { 57 int choice; 58 cout << "High Adventure Travel Agency\n";</pre> 59 60 cout << "----\n"; 61 cout << "1) Devil's Courthouse Adventure Weekend\n";</pre> 62 cout << "2) Scuba Bahama\n";</pre> 63 cout << "3) Sky Dive Colorado\n";</pre> 64 cout << "4) Barron Cliff Spelunk\n";</pre> 65 cout << "5) Exit Program\n\n";</pre> 66 cout << "Enter 1, 2, 3, 4, or 5: "; 67 cin >> choice: 68 while (choice < 1 || choice > 5) // Validate input 69 70 cout << "Invalid Selection. Enter 1, 2, 3, 4, or 5: ";</pre> 71 cin >> choice: 72 } 73 return choice; 74 } 75 76 //**** Ihis work is protected by United States copyright laws // Definition provided and ly function use of instructors in teaching 77 // This Trunctions calculates the charges for the Dissemination // Devi P's Courthouse Adventure Weekend package the World Wide Web) 79 81 82 void climbing() 83 84 int beginners, // Those needing instruction 85 advanced, // Those not needing instruction needEquip; // Those renting camping equipment 86 87 double baseCharges, // Base charges // Total charges 88 charges, instruction, // Cost of instruction 89 90 equipment, // Cost of equipment rental 91 discount = 0, // Discount 92 // Required deposit deposit; 93 cout << "\nDevil's Courthouse Adventure Weekend\n";</pre> 94 95 cout << "----\n"; 96 cout << "How many will be going who need an instructor? ";</pre> 97 cin >> beginners; 98 cout << "How many advanced climbers will be going? ";</pre> 99 cin >> advanced; 100 cout << "How many will rent camping equipment? ";</pre> 101 cin >> needEquip; 102 // Calculate base charges.

baseCharges = (beginners + advanced) * CLIMB_RATE;

charges = baseCharges;

```
105
         // Calculate 10% discount for 5 or more.
106
         if ((beginners + advanced) > 4)
107
108
             discount = (charges * .1);
109
             charges -= discount;
110
         // Add cost of instruction.
111
         instruction = beginners * CLIMB INSTRUCT;
112
113
         charges += instruction;
114
         // Add cost of camping equipment rental
115
         equipment = needEquip * DAILY_CAMP_RENTAL * 4;
116
         charges += equipment;
117
         // Calculate required deposit.
118
         deposit = charges / 2.0;
119
         cout << "Number in party: " << (beginners + advanced);</pre>
120
         cout << endl;
121
         cout << "Base charges: $" << baseCharges << endl;</pre>
         cout << "Instruction cost: $" << instruction << endl;</pre>
122
123
         cout << "Equipment Rental: $" << equipment << endl;</pre>
124
         cout << "Discount: $" << discount << endl;</pre>
125
         cout << "Total Charges: $" << charges << endl;</pre>
         cout << "Required Deposit: $" << deposit << endl << endl;</pre>
126
127 }
128
129 //****This work is protected by United States copyright laws
    // Definition of scuba function use of instructors in teaching
130
    // This function calculates the charges for the Dissemination
    // Scuba Bahama package.
132
133
           will destroy the integrity of the work and is not permitted.
134
135
    void scuba()
136
    {
137
         int
                               // Those needing instruction
                beginners,
138
                advanced;
                              // Those not needing instruction
139
         double baseCharges, // Base charges
140
                               // Total charges
                charges,
                              // Cost of instruction
141
                instruction,
142
                discount = 0, // Discount
143
                               // Required deposit
                deposit;
144
145
         cout << "\nScuba Bahama\n";</pre>
146
         cout << "----\n":
147
         cout << "How many will be going who need an instructor? ";</pre>
148
         cin >> beginners;
         cout << "How many advanced scuba divers will be going? ";</pre>
149
150
         cin >> advanced;
151
         // Calculate base charges.
152
         baseCharges = (beginners + advanced) * SCUBA_RATE;
153
         charges = baseCharges;
                                                                      (program continues)
```

182 {

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int

party,

lodge1,

lodge2;

charges,

lodging,

// Calculate base charges.

charges = baseCharges;

deposit;

cin >> party;

if (party > 4)

{

}

double baseCharges, // Base charges

cout << "\nSky Dive Colorado\n";</pre>

cout << "How many will be going? ";</pre>

baseCharges = party * SKY_DIVE_RATE;

discount = (charges * .1);

charges -= discount;

// Calculate 10% discount for 5 or more.

discount = 0, // Discount

cout << "----\n";

Program CS2-1 (continued) 154 // Calculate 10% discount for 5 or more. 155 if ((beginners + advanced) > 4) 156 { 157 discount = (charges * .1); 158 charges -= discount; 159 160 // Add cost of instruction. 161 instruction = beginners * SCUBA_INSTRUCT; 162 charges += instruction; 163 164 // Calculate required deposit. 165 deposit = charges / 2.0; 166 cout << "Number in party: " << (beginners + advanced);</pre> 167 cout << endl;</pre> 168 cout << "Base charges: \$" << baseCharges << endl;</pre> cout << "Instruction cost: \$" << instruction << endl;</pre> 169 cout << "Discount: \$" << discount << endl;</pre> 170 cout << "Total Charges: \$" << charges << endl;</pre> 171 cout << "Required Deposit: \$" << deposit << endl << endl;</pre> 172 173 } 174 175 // Definition of skypive function. // This afunction calculates the charges for the reaching 177 // Sky Dive Colorado packagessing student learning. Dissemination 178 179 will destroy the integrity of the work and is not permitted. 180 181 void skyDive()

// Number in party

// Total charges

// Cost of lodging

// Required deposit

// Number at 1st lodging choice

// Number at 2nd lodging choice

```
205
          // Calculate lodging costs.
206
          cout << "How many will stay at Wilderness Lodge? ";</pre>
207
          cin >> lodge1;
208
          cout << "How many will stay at Luxury Inn? ";</pre>
209
          cin >> lodge2:
210
          lodging = (lodge1 * DAY_LODGE_1) + (lodge2 * DAY_LODGE_2);
211
          charges += lodging;
212
213
          // Calculate required deposit.
214
          deposit = charges / 2.0;
215
          cout << "Number in party: " << party << endl;</pre>
          cout << "Base charges: $" << baseCharges << endl;</pre>
216
          cout << "Lodging: $" << lodging << endl;</pre>
217
          cout << "Discount: $" << discount << endl;</pre>
218
219
          cout << "Total Charges: $" << charges << endl;</pre>
          cout << "Required Deposit: $" << deposit << endl << endl;</pre>
220
221
     }
222
223
224
     // Definition of spelunk function.
225
     // This function calculates the charges for the
226
     // Barron Cliff Spelunk package.
     //********
227
228
229
     void spellynk() k is protected by United States copyright laws
          and is provided solely for the use of instructors in teaching intheir party, and assess Number in party in Dissemination needEquip; 1/ Those renting camping equipment double basecharges, 1/ Base charges will define integrity Total charges is not permitted.
230
231
232
233
234
235
                  equipment,
                                 // Cost of equipment rental
                  discount = 0, // Discount
236
237
                                   // Required deposit
                  deposit;
238
239
          cout << "\nBarron Cliff Spelunk Weekend\n";</pre>
240
          cout << "----\n":
241
          cout << "How many will be going? ";</pre>
242
          cin >> party;
243
          cout << "How many will rent camping equipment? ";</pre>
244
          cin >> needEquip;
245
          // Calculate base charges.
246
          baseCharges = party * CAVE_RATE;
247
          charges = baseCharges;
248
          // Calculate 10% discount for 5 or more.
249
          if (party > 4)
250
          {
251
               discount = (charges * .1);
252
               charges -= discount;
253
254
          // Add cost of camping equipment rental
255
          equipment = needEquip * DAILY_CAMP_RENTAL * 4;
256
          charges += equipment;
257
```

(program continues)

Enter 1, 2, 3, 4, or 5: 2 [Enter]

```
Program CS2-1
                    (continued)
258
         // Calculate required deposit.
259
         deposit = charges / 2.0;
         cout << "Number in party: " << party << endl;</pre>
260
         cout << "Base charges: $" << baseCharges << endl;</pre>
261
262
         cout << "Equipment Rental: $" << equipment << endl;</pre>
         cout << "Discount: $" << discount << endl;</pre>
263
264
         cout << "Total Charges: $" << charges << endl;</pre>
265
         cout << "Required Deposit: $" << deposit << endl << endl;</pre>
266 }
Program Output with Example Input Shown in Bold
High Adventure Travel Agency
-----
1) Devil's Courthouse Adventure Weekend
2) Scuba Bahama
3) Sky Dive Colorado
4) Barron Cliff Spelunk
5) Exit Program
Enter 1, 2, 3, 4, or 5: 1 (Enter)
            This work is protected by United States copyright laws
Devil's Courthouse Adventure Weekend e use of instructors in teaching
their courses and assessing student learning. Dissemination
How many will be going who need an instructor? 3 Enter World Wide Web)
How many advanced climbers will be going? 2 Enter) shot permitted.
How many will rent camping equipment? 3 [Enter]
Number in party: 5
Base charges: $1750.00
Instruction cost: $300.00
Equipment Rental: $480.00
Discount: $175.00
Total Charges: $2355.00
Required Deposit: $1177.50
High Adventure Travel Agency
-----
1) Devil's Courthouse Adventure Weekend
2) Scuba Bahama
3) Sky Dive Colorado
4) Barron Cliff Spelunk
5) Exit Program
```

```
Scuba Bahama
How many will be going who need an instructor? 4 Enter
How many advanced scuba divers will be going? 0 Enter
Number in party: 4
Base charges: $4000.00
Instruction cost: $400.00
Discount: $0.00
Total Charges: $4400.00
Required Deposit: $2200.00
High Adventure Travel Agency
1) Devil's Courthouse Adventure Weekend
2) Scuba Bahama
3) Sky Dive Colorado
4) Barron Cliff Spelunk
5) Exit Program
Enter 1, 2, 3, 4, or 5: 3 (Enter)
Sky Dive Coloradoork is protected by United States copyright laws
and is provided solely for the use of instructors in teaching
How many will be going? 8 Enter essing student learning. Dissemination
How many will stay at Wilderness Lodge? 4 (Enter) on the World Wide Web)
How many will stay at Luxury inn? 4 Enter k and is not permitted.
Number in party: 8
Base charges: $3200.00
Lodging: $740.00
Discount: $320.00
Total Charges: $3620.00
Required Deposit: $1810.00
High Adventure Travel Agency
1) Devil's Courthouse Adventure Weekend
2) Scuba Bahama
3) Sky Dive Colorado
4) Barron Cliff Spelunk
5) Exit Program
Enter 1, 2, 3, 4, or 5: 4 Enter
                                                              (program output continues)
```

Program CS2-1 (continued)

Barron Cliff Spelunk Weekend

How many will be going? 6 Enter

How many will rent camping equipment? 2 Enter

Number in party: 6 Base charges: \$4200.00 Equipment Rental: \$320.00

Discount: \$420.00 Total Charges: \$4100.00 Required Deposit: \$2050.00

High Adventure Travel Agency

- 1) Devil's Courthouse Adventure Weekend
- 2) Scuba Bahama
- 3) Sky Dive Colorado
- 4) Barron Cliff Spelunk
- 5) Exit Program

Enter 1, 2, 3his4, work 5:p5 Enter d by United States copyright laws

Exiting program is provided solely for the use of instructors in teaching their courses and assessing student learning. Dissemination

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