Programming Logic and Design, Comprehensive (8th Edition)

Problem

a. Draw the hierarchy chart and then plan the logic for a program that calculates a person's body mass index (BMI). BMI is a statistical measure that compares a person's weight and height. The program uses three modules. The first prompts a user for and accepts the user's height in inches. The second module accepts the user's weight in pounds and converts the user's height to meters and weight to kilograms. Then, it calculates BMI as weight in kilograms divided by height in meters squared, and displays the results. There are 2.54 centimeters in an inch, 100 centimeters in a meter, 453.59 grams in a pound, and 1,000 grams in a kilogram. Use named constants whenever you think they are appropriate. The last module displays the message End of job.

b. Revise the BMI-determining program to execute continuously until the user enters 0 for the height in inches.

Step-by-step solution

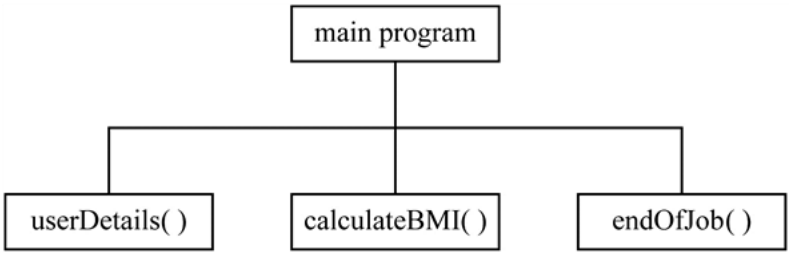
Step 1 of 20

a.

Hierarchy chart:

The Hierarchy chart explains only the how many modules are exist in this program and which modules call others.

The hierarchy chart for the person's body mass index calculation program is shown below:



In the above hierarchy chart,

• The main program calls the three modules such as "userDetails()", "calculateBMI()", and "endOfJob()".

o The userDetails() module gets the user height in inches.

o The calculateBMI() module gets the user weight in pounds, convert the height and weight, and finally calculate and display the user's body mass index.

o The endOfJob() module end the process.

Comment

The Flowchart for person's body mass index calc

Comment

Step 3 of 20

The Flowchart for userDetails() module is given below:

Comment

Step 4 of 20

The Flowchart for calculateBMI() module is given below:

Comment

Step 5 of 20

The Flowchart for endOfJob() module is given below:

Comment

Step 6 of 20

Pseudo code:

The pseudo code for person's body mass index calculation program:

The following pseudo code describes the main program:

```
start
Declarations
num htInches
num wtPounds
num htMeters
num wtKilos
num bmi
num CM_IN_I = 2.54
num CM_IN_M = 100
num G_IN_POUND = 453.59
num G_IN_KG = 1000
string height = "Enter user height (inches): "
string weight = "Enter user weight (pounds): "
string END = "End of Job"
userDetails()
calculateBMI()
```

Comment

Step 7 of 20

The following pseudo code describes the userDetails() module:

userDetails()

output height

input htInches

return

Comment

Step 8 of 20

The following pseudo code describes the calculateBMI() module:

calculateBMI()

output weight

input wtPounds

htMeters = htInches * CM_IN_I / CM_IN_M

wtKilos = wtPounds * G_IN_P / G_IN_KG

bmi = wtKilos / (htMeters * htMeters)

output bmi

return

Comment

Step 9 of 20

The following pseudo code describes the endOfJob() module:

endOfJob()

output END

return

Comment

Step 10 of 20

Explanation for above flowchart and pseudo code:

• Start the pseudo code with “start” keyword.

• Declare the integer variables using the “num” keyword such as “htInches”, “wtPounds”, “htMeters”, “wtKilos”, “bmi”, “CM_IN_I”, “CM_IN_M”, “G_IN_P”, “G_IN_KG” and string variables using “string” keyword such as “height”, “weight”, and “END”.

• Call userDetails() module.

o In userDetails() modules,

• Prompt to get the user height input.

• Call calculateBMI() module.

o In calculateBMI() modules,

• Prompt to get the user weight input.

• Calculate the BMI by using the formula "wtKilos / (htMeters * htMeters);"

• Display the calculated BMI.

• Call endOfJob() module.

o In endOfJob() modules,

• Display the end of job message.

• Stop the process.

Comment

Step 11 of 20

b.

Hierarchy chart:

Modified program for person's body mass index calculation is given below:

The hierarchy chart for the person's body mass index calculation program is shown below:

In the above hierarchy chart,

• The main program calls the three modules such as "userDetails()", "calculateBMI()", and "endOfJob()".

o The userDetails() module gets the user height in inches.

o The calculateBMI() module gets the user weight in pounds, convert the height and weight, and finally calculate and display the user's body mass index.

o The endOfJob() module end the process.

Comment

Step 12 of 20

Modified Logic design for person's body mass index calculation program:

The Flowchart for modified person's body mass index calculation program is given below:

Comment

Step 13 of 20

The Flowchart for userDetails() module is given below:

Comment

Step 14 of 20

The Flowchart for calculateBMI() module is given below:

Comment

The Flowchart for endOfJob() module is given be

Comment

Step 16 of 20

Modified Pseudo code:

The pseudo code for person's body mass index calculation program:

The following pseudo code describes the main program:

```
start
Declarations
num htInches
num wtPounds
num htMeters
num wtKilos
num bmi
num CM_IN_I = 2.54
num CM_IN_M = 100
num G_IN_POUND = 453.59
num G_IN_KG = 1000
string height = "Enter user height (inches): "
string weight = "Enter user weight (pounds): "
string END = "End of Job"
userDetails()
//Modified code that code executes until height is not //equal to 0
while htInches <> 0
calculateBMI()
endwhile
endOfJob()
stop
```

Comment

Step 17 of 20

The following pseudo code describes the userDetails() module:

```
userDetails()
output height
input htInches
return
```

Comment

Step 18 of 20

The following pseudo code describes the calculateBMI() module:

```
calculateBMI()
```

htMeters = htInches * CM_IN_I / CM_IN_M

wtKilos = wtPounds * G_IN_P / G_IN_KG

bmi = wtKilos / (htMeters * htMeters)

output bmi

//Get the user input for height

output height

input htInches

return

Comment

Step 19 of 20

The following pseudo code describes the endOfJob() module:

endOfJob()

output END

return

Comment

Step 20 of 20

Explanation for above flowchart and pseudo code:

• Start the pseudo code with “start” keyword.

• Declare the integer variables using the “num” keyword such as “htInches”, “wtPounds”, “htMeters”, “wtKilos”, “bmi”, “CM_IN_I”, “CM_IN_M”, “G_IN_P”, “G_IN_KG” and string variables using “string” keyword such as “height”, “weight”, and “END”.

• Call userDetails() module.

o In userDetails() modules,

• Prompt to get the user height input.

• Loop executes until the height is not equal to 0. If yes, call calculateBMI() module.

o In calculateBMI() modules,

• Prompt to get the user weight input.

• Convert the height into meters by using formula “htInches * CM_IN_I / CM_IN_M” and weight into kilograms by using the formula “wtPounds * G_IN_P / G_IN_KG”.

• Calculate the BMI by using the formula “wtKilos / (htMeters * htMeters)”.

• Display the calculated BMI.

• Prompt to get the user height input.

• If No, call endOfJob() module.

o In endOfJob() modules,

• Display the end of job message.

• Stop the process.

Comment

Was this solution helpful? 9 0

Chapter 2, Problem 7RQ

Which of the following is a term used as a synonym for module in some programming languages? a. method b. procedure c. both...

See solution

Chapter 2, Problem 6PE

A variable's data type describes all of the following except _____. a. what values the variable can hold b. how the...

See solution

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