**Design**

**Problem Description (provided by Professor):**

When cargo is being dropped to remote locations, it is strapped to a parachute and then released.  If the parachute is not large enough, the contents of the cargo can be smashed and broken.  Ideally, a fall between 14 and 15 feet per second will result in a "soft" landing without damage to cargo.  This also works for smaller objects as well.

In order to demonstrate this, you will construct a computer program where the user enters the weight of the cargo in ounces, and then has five tries to get the size of parachute to be adequate in order to have the cargo drop at a rate between 14 and 15 feet per second.  If the chute is too big, then the rate of descent is too slow and that won't work.  If the chute is not big enough, it hits the ground with a SPLAT!!!

The user enters the size of the cargo in ounces.  Then the user has five tries at entering the correct size of the chute.  Each time a chute size is entered, the user computes and displays the rate of descent.  If the rate of descent is between 14 and 15 feet per second (inclusive) then the program stops.  If the user does not enter a good chute size, then the appropriate message is displayed and the user tries again.  After five attempts the program stops.

**Identifier Dictionary:**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Identifier | Category | Data Type | Value | Description |
| GRAVITY | Constant | float | 442.2 | Gravity number used in calculating FPS |
| SPEED | Constant | int | 16 | Speed used in calculating FPS |
| NUMBER\_OF\_TRIES | Constant | int | 5 | Number of tries the user gets |
| MIN\_SPEED | Constant | int | 14 | The minimum speed your cargo falls |
| MAX\_SPEED | Constant | int | 15 | The maximum speed your cargo falls |
|  |  |  |  |  |
| weight | Variable | float | User | Weight of cargo in ounces |
| size | Variable | int | User | Size of the parachute in square feet |
|  |  |  |  |  |
| fps | Variable | float | Calculation | Rate of fall in feet per second |
|  |  |  |  |  |

Algorithm:

Main():

This program will take the user’s weight of cargo and the parachute size and calculate the rate of fall in feet per second to see if it falls correctly to the ground.

1. The user will be prompted to enter a value for the weight of the cargo in ounces.
   1. There will be an error check here to make sure the value is positive.
   2. If the number is not positive, the user will try again.
2. The value will be stored as variable “weight”.
3. The number of tries will be displayed on the next line -(try attempts 1 through 5).
4. The user will be prompted to enter a value for the size of the parachute in square feet.
   1. There will be an error check here to make sure the value is positive.
   2. If the number is not positive, the user will try again.
5. The value will be stored as variable “size”.
6. The rate of fall in feet per second will be calculated using the user’s weight and size.
7. The value will be stored as variable “fps”.
8. FPS will be displayed as text: “Falling at \_\_\_\_\_\_\_ per feet/sec”.
9. If the FPS is between 14 and 15, it will display that the descent is perfect.
10. If the FPS is higher than 15, the cargo will “SPLAT” and the user will try again.
11. If the FPS is lower than 14, the cargo will “DRIFT” and the user will try again.
12. The program will stop after 5 attempts.

Functions():

* GetCargo: Determines whether the number of cargo is a positive number
  + Returns a positive number for cargo
  + Returns an error message to input a positive number
* GetChuteSize: Determines whether the number for the parachute size is a positive number
  + Returns a positive number for the parachute size
  + Returns an error message to input a positive number
  + The parameter passed to the function is the “try number” which is between 1 and 5.
* ComputeFPS: Determines the rate of descent
  + Returns the speed.
  + The parameter passed to it are the weight of the cargo and the size of the parachute
  + Formula: rate of fall in feet per second is fps = (442.2 \* sqrt (X / 16 )) / Y;
    - Where X is the weight of the cargo in ounces and Y is the size of the parachute in square feet.

Work Log

|  |  |  |
| --- | --- | --- |
| Date: | Time: | Task: |
| 10/8/2015 | 1 hour | Coding |
| 10/11/2015 | 2 hours | Design, Algorithm & Coding |
| 10/12/2015 | 2 hours | Design, Coding, Debugging |
| 10/15/2015 | 2 hours | Debugging and Summary |

Summary

This program was pretty straight forward. I had some trouble getting the “number of tries” to print correctly with a for-loop so I changed it to a while-loop. It was still printing twice. I had an infinite loop for the parachute size. I also added more constant variables to make the code easier to read. Overall, I really do not like working in Gargamel but this is how it must be.

You get 5 chances to land your cargo safely. Good Luck!

Enter the weight of cargo in ounces, please: 34

Try: 1

Enter the parachute size in square feet, please: 0

Enter a positive number for the parachute size in square feet, please: 23

Falling at 28.027

SPLAT! We're going to need a bigger chute. Please try again.

Try: 2

Enter the parachute size in square feet, please: 40

Falling at 16.115

SPLAT! We're going to need a bigger chute. Please try again.

Try: 3

Enter the parachute size in square feet, please: 50

Falling at 12.892

DRIFTING AWAY! The parachute is too big. Please try again

Try: 4

Enter the parachute size in square feet, please: 45

Falling at 14.325

NICE LANDING!!! You won the game!

12:04:12:jcapaz@MathCSProd01:~/cs3335/HW3$

You get 5 chances to land your cargo safely. Good Luck!

Enter the weight of cargo in ounces, please: 120

Try: 1

Enter the parachute size in square feet, please: 90

Falling at 13.456

DRIFTING AWAY! The parachute is too big. Please try again

Try: 2

Enter the parachute size in square feet, please: 80

Falling at 15.138

SPLAT! We're going to need a bigger chute. Please try again.

Try: 3

Enter the parachute size in square feet, please: -85

Enter a positive number for the parachute size in square feet, please: 85

Falling at 14.247

NICE LANDING!!! You won the game!

12:07:30:jcapaz@MathCSProd01:~/cs3335/HW3$

You get 5 chances to land your cargo safely. Good Luck!

Enter the weight of cargo in ounces, please: 1000

Try: 1

Enter the parachute size in square feet, please: 100

Falling at 34.959

SPLAT! We're going to need a bigger chute. Please try again.

Try: 2

Enter the parachute size in square feet, please: 0

Enter a positive number for the parachute size in square feet, please: 300

Falling at 11.653

DRIFTING AWAY! The parachute is too big. Please try again

Try: 3

Enter the parachute size in square feet, please: 250

Falling at 13.984

DRIFTING AWAY! The parachute is too big. Please try again

Try: 4

Enter the parachute size in square feet, please: 240

Falling at 14.566

NICE LANDING!!! You won the game!

12:08:25:jcapaz@MathCSProd01:~/cs3335/HW3$