Ray Wenderlich para mim 7 de ago

José, welcome back to the **raywenderlich.com iOS Apprentice Email Course**!

Last time, I mentioned that there are other ways to calculate the difference between `currentValue` and `targetValue` as a positive number. The above algorithm works well but it is eight lines of code. I think we can come up with a simpler approach that takes up fewer lines.

> **Note:** Prefer learning via video? You might like to check out videos #22-23 and #25-26 of the free video version of this course, which correspond to this email.

A New Algorithm

The new algorithm goes like this:

1. **Subtract the target value from the slider's value.**
2. **If the result is a negative number, then multiply it by -1 to make it a positive number.**

Here you no longer avoid the negative number since computers can work just fine with negative numbers. You simply turn it into a positive number.

And now it's time for a challenge! Try converting the above algorithm into source code.

Hint: the English description of the algorithm contains the words "if" and "then", which is a pretty good indication you'll have to use an `if` statement.

> **Challenge:** If you haven't already, stop reading this email and try writing the source code for the above algorithm. If you'd like to compare what you wrote with ours, stop by the discussion thread on our forums. We'd love to see what you came up with! :]

Use the new algorithm

Ready to try out the code you just wrote? Great!

To start, open up the Bull's Eye project where you left it off last time (or download the starter project from the corresponding forum discussion thread).

Open **ViewController.swift**, and replace the old stuff at the top of `showAlert()` as follows:

```
@IBAction func showAlert() {
  var difference = currentValue - targetValue
  if difference < 0 {
    difference = difference * -1
  }

  let message = . . .
}
```

When you run this new version of the app (try it!), it should work exactly the same as before. The result of the computation does not change, only the technique you used changed.

Another variation

The final alternative algorithm I want to show you uses a function.

You've already seen functions a few times before: you used `arc4random_uniform()` when you made random numbers and `lroundf()` for rounding off the slider's decimals.

To make sure a number is always positive, you can use the `abs()` function.

If you took math in school you might remember the term "absolute value", which is the value of a number without regard to its sign.

That's exactly what you need here, and the standard library contains a convenient function for it, which allows you to reduce this entire algorithm down to a single line of code:

```
let difference = abs(targetValue - currentValue)
```

It really doesn't matter whether you subtract `currentValue` from `targetValue` or the other way around. If the number is negative, `abs()` turns it positive. It's a handy function to remember.

➤ Make the change to `showAlert()` and try it out:

```
@IBAction func showAlert() {
  let difference = abs(targetValue - currentValue)

  let message = . . .
}
```

It doesn't get much simpler than that!

What's the score?

Now that you know how far off the slider is from the target, calculating the player's score for each round is easy.

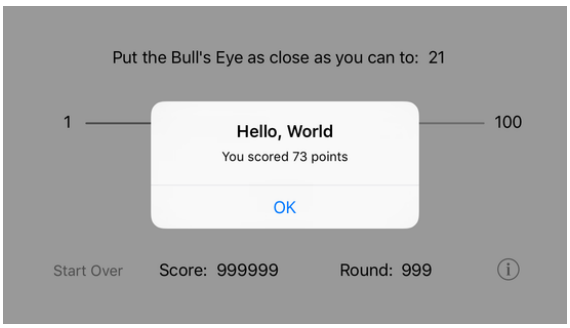
➤ Change `showAlert()` to:

```
@IBAction func showAlert() {
  let difference = abs(targetValue - currentValue)
  let points = 100 - difference

  let message = "You scored \(points) points"
  . . .
}
```

The maximum score you can get is 100 points if you put the slider right on the target and the difference is zero. The further away from the target you are, the fewer points you earn.

➤ Run the app and score some points!



The total score

In this game, you want to show the player's total score on the screen. After every round, the app should add the newly scored points to the total and then update the score label.

Store the total score

Because the game needs to keep the total score around for a long time, you will need an instance variable.

➤ Add a new `score` instance variable to **ViewController.swift**:

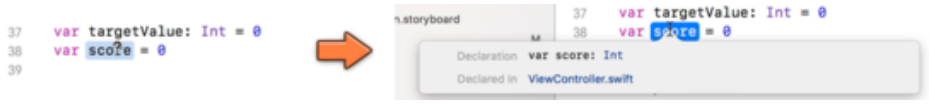
```
class ViewController: UIViewController {

  var currentValue: Int = 0
  var targetValue: Int = 0
  var score = 0               // add this line
```

Did you notice that? Unlike the other two instance variables, you did not state that `score` is an `Int`!

If you don't specify a data type, Swift uses **type inference** to figure out what type you meant. Because 0 is a whole number, Swift assumes that `score` should be an integer, and therefore automatically gives it the type `Int`. Handy!

> **Note**: If you are not sure about the inferred type of a variable, there is an easy way to find out. Simply hold down the **Alt** key and hover your cursor over the variable in question. The variable will be highlighted in blue and your cursor will turn into a question mark. Now, click on the variable and you will get a handy pop up which tells you the type of the variable as well as the source file in which the variable was declared.



In fact, now that you know about type inference, you don't need to specify `Int` for the other instance variables either:

```
  var currentValue = 0
  var targetValue = 0
```

➤ Make the above changes.

Thanks to type inference, you only have to list the name of the data type when you're not giving the variable an initial value. But most of the time, you can safely make Swift guess at the type.

I think type inference is pretty sweet! It will definitely save you some, uh, typing (in more ways than one!).

Update the total score

Now `showAlert()` can be amended to update this `score` variable.

➤ Make the following changes:

```
@IBAction func showAlert() {
  let difference = abs(targetValue - currentValue)
  let points = 100 - difference

  score += points        // add this line

  let message = "You scored \(points) points"
  . . .
}
```

Nothing too shocking here. You just added the following line:

```
score += points
```

This adds the points that the user scored in this round to the total score. You could also have written it like this:

```
score = score + points
```

Personally, I prefer the shorthand `+=` version, but either one is okay. Both accomplish exactly the same thing.

Display the score

In order to show your current score, you're going to do exactly the same thing that you did for the target label: hook up the score label to an outlet and put the score value into the label's `text` property.

Add this line to **ViewController.swift**:

```
@IBOutlet weak var scoreLabel: UILabel!
```

Then you connect the relevant label on the storyboard (the one that says 999999) to the new `scoreLabel` outlet.

Unsure how to connect the outlet? There are several ways to make connections from user interface objects to the view controller's outlets:

- Control-click on the object to get a context-sensitive popup menu. Then drag from New Referencing Outlet to View Controller (you did this with the slider).
- Go to the Connections Inspector for the label. Drag from New Referencing Outlet to View Controller (you did this with the target label).
- Control-drag **from** View Controller to the label (give this one a try now) - doing it the other way, Control-dragging from the label to the view controller, won't work.

There is more than one way to skin a cat, or, connect outlets :]

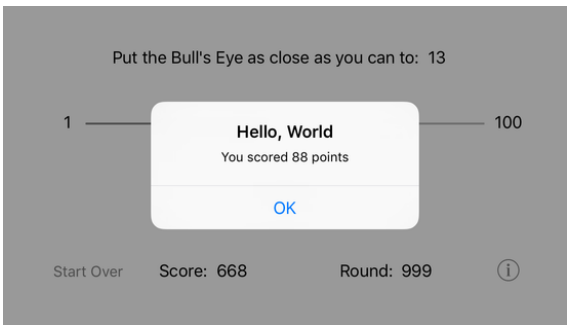
Great, that gives you a `scoreLabel` outlet that you can use to display the score. Now where in the code can you do that? In `updateLabels()`, of course.

➤ Back in **ViewController.swift**, change `updateLabels()` to the following:

```
func updateLabels() {
  targetLabel.text = String(targetValue)
  scoreLabel.text = String(score)     // add this line
}
```

Nothing new here. You convert the score – which is an `Int` – into a `String` and then pass that string to the label's `text` property. In response to that, the label will redraw itself with the new score.

➤ Run the app and verify that the points for this round are added to the total score label whenever you tap the button.



One more round…

Speaking of rounds, you also have to increment the round number each time the player starts a new round.

And that leads me to your next challenge - wow, two in one email! :]

Your challenge is to keep track of the current round number (starting at 1) and increment it when a new round starts. Display the current round number in the corresponding label.

I may be throwing you into the deep end here, but if you've been able to follow the instructions so far, then you've already seen all the pieces you will need to pull this off. Good luck!

> **Challenge:** If you haven't already, stop reading this email and try keeping track of (and displaying) the current round. If you'd like to compare what you wrote with ours, stop by the discussion thread on our forums. We'd love to see what you came up with! :]

You're making great progress, well done!

- Ray