iOS Dev Accelerator
Week 3 Day 4

- Transforms
- WebView
- Regex and input validation
- Swift Extensions
- Working with git in teams

Transforms

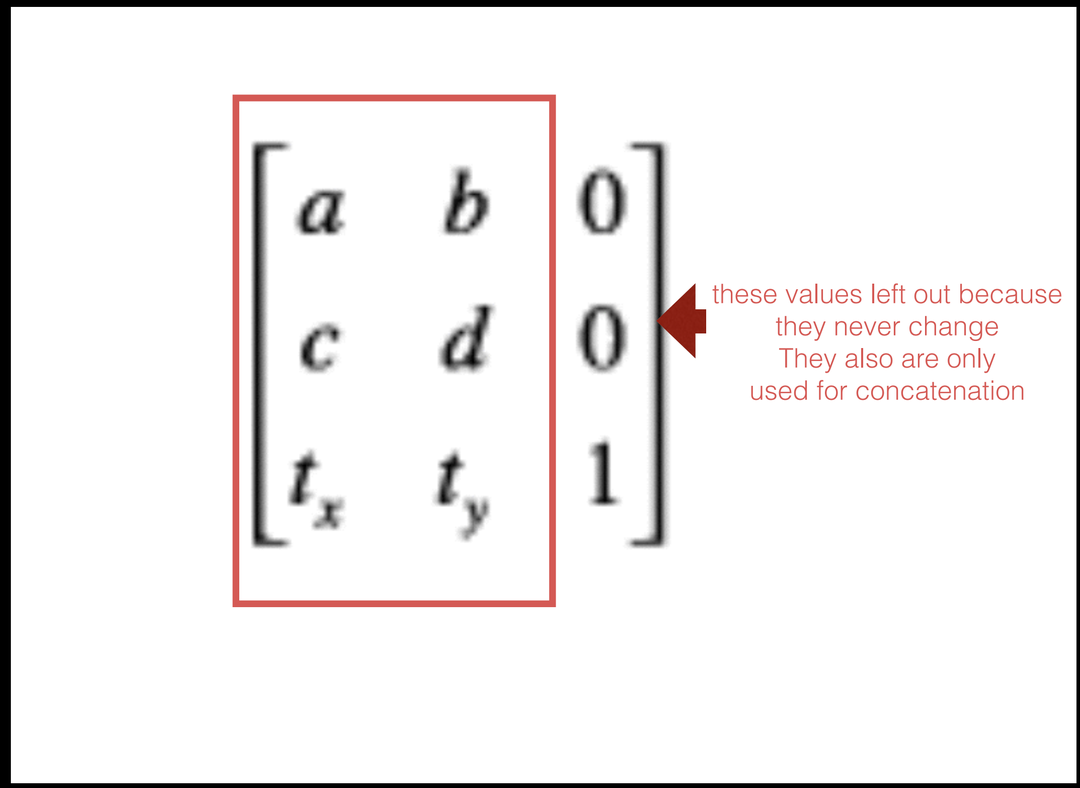
Transform

- Transforms can be applied to views and layers to translate (move), scale, rotate, and make a number of other changes to themselves.
- Every view has a .transform property which has a type of CGAffineTransform. Its a struct.
- Transforms are represented my matrices.
- You can think of them as two dimensional array of numbers.

CGAffineTransform structure:

```
struct CGAffineTransform {
    CGFloat a;
    CGFloat b;
    CGFloat c;
    CGFloat d;
    CGFloat tx;
    CGFloat ty;
};
```

The data structure
we use to represent it



An actual affine transformation matrix

Identity Matrix

- Every view (and layer) starts out with their transform set to the identity matrix:

$$\begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

- If a view's transform is set to the identity matrix, then we know no transforms have been applied to it.
- For a view that has a transform that is set to the identity matrix, the view will be drawn based only on its frame & bounds.
- Setting a view's transform back to the identity matrix will undo any transforms applied to it!

Translation

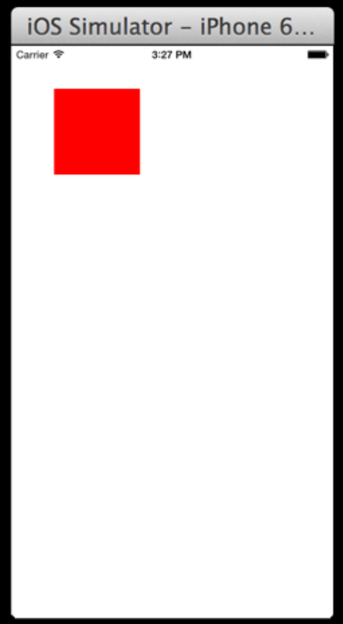
- Translation is just a fancy word for moving.
- If you a translate a view by 10,10 you just moved it 10 to the right and 10 down.
- This is the matrix that represents a translation operation:

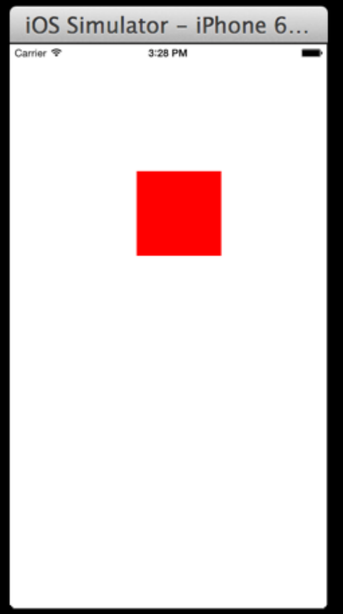
$$\begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ t_x & t_y & 1 \end{bmatrix}$$

- So the equations that CoreGraphics uses to calculate the result are:
  - new X = old x + t_x
  - new Y = old Y + t_y

Translation Example

- CoreGraphics provides relatively simple functions for all the primary transforms.
- Here is an example of using the translation function:





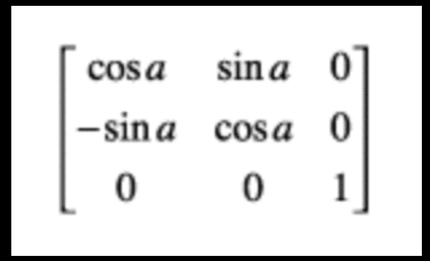

```
var redView = UIView(frame: CGRect(x: 50, y: 50, width: 100, height: 100))
redView.backgroundColor = UIColor.redColor()
self.view.addSubview(redView)
```

```
var redView = UIView(frame: CGRect(x: 50, y: 50, width: 100, height: 100))
redView.backgroundColor = UIColor.redColor()
self.view.addSubview(redView)
redView.transform = CGAffineTransformTranslate(redView.transform, 100, 100)
```

*Applying transforms is cumulative, so doing another translate just adds to the last one

Rotation

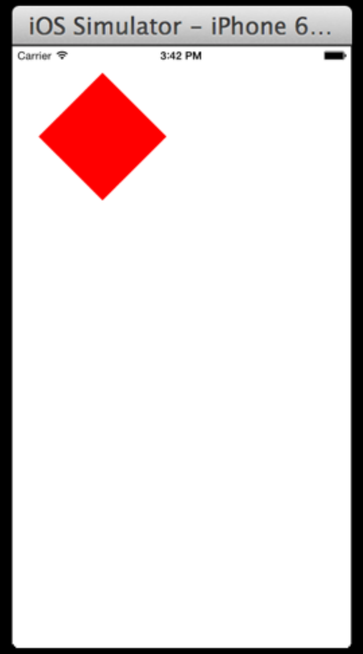
- Rotation is another of the primary transforms you can apply to views and layers.
- CoreGraphics provides the CGAffineTransformRotate() function that takes in two parameters:
  - the existing transform matrix
  - the angle or rotation in radians (Pi * degrees / 180.0)
- This is the matrix that describes rotation operations:



- This means the equations CoreGraphis uses to calculate the results are:
  - new x = old X * cos a - old Y sin a
  - new y = old X *sin a - old Y *cos a
- I hope you were paying attention in high school

Rotation Example

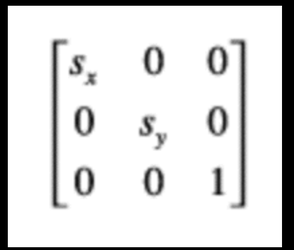
- Here is an example of rotating our red view 45 degrees clockwise




```
var redView = UIView(frame: CGRect(x: 50, y: 50, width: 100, height: 100))
redView.backgroundColor = UIColor.redColor()
self.view.addSubview(redView)
redView.transform = CGAffineTransformRotate(redView.transform, CGFloat(M_PI * 45 / 180.0))
```

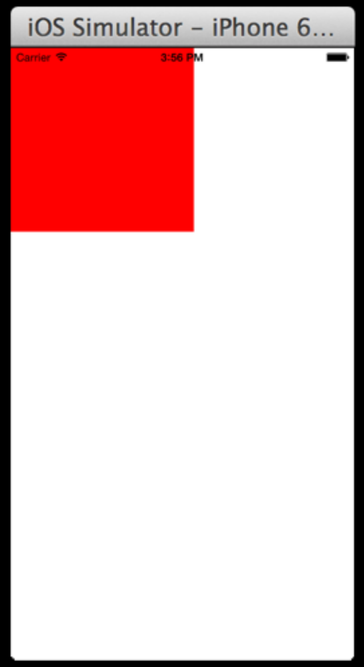
Scaling

- Scaling is another primary transform that is simply changes the size of the view.
- CoreGraphics provides the CGAffineTransformScale function that takes in 3 parameters:
  - the transform matrix we are applying the scale to
  - the factor by which to scale the x-axis
  - the factor by which to scale the y-axis
- Here is the matrix that describes the scaling operation:



Scaling Example

- Here is an example of double our red view's size:




```
var redView = UIView(frame: CGRect(x: 50, y: 50, width: 100, height: 100))
redView.backgroundColor = UIColor.redColor()
self.view.addSubview(redView)
redView.transform = CGAffineTransformScale(redView.transform, 2.0, 2.0)
```

Demo

WKWebView

- “Use the WKWebView class to embed web content in your application”
- The simple workflow of a web view:
    1. add web view to the view hierarchy
    2. send it a request to load web content
- Can have a delegate that tracks loading of content, this will come in handy when we do the ‘in-app’ way of doing OAuth
- It’s sort of like a mini browser in your app, and you can customize it to not allow the users to go back or forward.
- Prior to iOS8, we had to use UIWebView, and it was horrible. It leaked memory every time you used it.

Demo

Regex and Input Validation

Input Validation

- “An app sometimes cannot accept the strings entered in textfields and text views without validating the value first”
- In our Github app, we cant have spaces in user’s search queries. We also don’t want them entering in symbols like = or $.
- So how can we ensure our users input doesn't break our app?

Delegate methods on input views

- The go to methods for text validation are:
  - For UITextField : textFieldShouldEndEditing:
  - For UITextView : textViewShouldEndEditing:
  - For UISearchBar : searchBar:shouldChangeTextInRange:
- These methods are called just before the textview/field is about to resign first responder or for the search bar, when a character is about to be entered.
- Returning false prevents that from happening. So return false when the text isn't valid. Also perhaps pop up an alert view or show some indicator explaining why its invalid.
- So how do we check if the text is valid?

Regex

- Regular Expressions are a pattern-matching standard for text validation.
- The regular expression is a pattern that you compare with the text you are validating.
- Regex’s can be used for finding patterns, replacing text, and extracting substrings in strings.

The simplest Regex

- The most simple regex is just a string. Like “seahawks”.
- The regex “seahawks” will find a match on the string “go seahawks”
- The regex “sea hawks” will not find a match on the string “go seahawks”
- In these two examples, we are only using literal characters. So its basically just running a find operation looking for our regex string.
- There are special reserved characters we can use in regex to make it much more powerful

+ and *

- + is used to match the previous character 1 or more times
- so the regex “sea+” will match sea and seaaaaaaaaaa and seaaaa
- * works the same way, except it matches 0 or more times
- so “sea*” matches seaaaaaa, sea, and also se

(Capturing parens)

- Parentheses are used to create a capturing group.
- Capturing groups capture the text matched by the regex inside the parens and put them into a group that can be referenced together.

? optional

- The question mark makes the preceding token in the regular expression optional.
- So “seahawks?” matches both “seahawks” and “seahawk"
- You can use grouping to make groups optional
- So “sea(hawks)?” matches seahawks and sea

[Character Classes]

- With a character class, sometimes called character set, you can have the regex only match one of several characters.
- If you want to match a t or d you will use [td]
- so “foo[td]” will match “foot” and “food”
- You can use a hypen inside the character classes to specify ranges
- “[0-9]” matches any single number
- You can combine ranges “[0-9a-zA-Z]” will match any regular literal character

[Negating Character Classes]

- Adding a caret after the opening square bracket negates the character class.
- This makes it so the character class matches any character that is NOT in the character class.
- So [^0-9a-zA-Z] will match any non regular literal character.
- We also need to add \n in that range because that is what is entered into a textfield/view/searchBar when you hit return/done/search. \n is ascii/unicode for end of line.
- Hey I think we can use [^0-9a-zA-Z] in our app!

Regex and iOS

- You can use the NSRegularExpression class to natively use regex in your app.
- You instantiate an instance of NSRegularExpression with your regex pattern, options, and an error pointer:

```
let regex = NSRegularExpression(pattern: "[^0-9a-zA-Z]", options:
    nil, error: nil)
```

Search for matches

- NSRegularExpression has methods for returning the total count of matches, enumerating through each match, returning an array of matches, returning the first match, and the range of the first match.
- In our app we can just use the number of matches method, and if its greater than 0 we know the user typed in something invalid:

```
let regex = NSRegularExpression(pattern: "[^0-9a-zA-Z]", options:
    nil, error: nil)
let match = regex.numberOfMatchesInString(self, options: nil, range:
    NSRange(location:0, length: countElements(self)))
if match > 0 {
    return false
}
return true
```

Demo

Swift Extensions

Extensions

- Extensions add new functionality to pre-existing classes, structs, or enums.
- You can even do this on types you do not have access to the source code.
- Similar to categories in Objective-C, except extensions dont have names.

Things you can add with extensions:

- computed properties
- instance methods
- type methods
- new inits
- subscripts
- nested types
- make an existing type conform to a protocol

Extension Syntax

```
extension SomeType {
    // new functionality to add to SomeType goes
        here
}
```

Demo

Using Git with a Team

Setting up your repo

1. **Don’t use Github’s app!!!!!!**
2. Create your project in Xcode
3. Init a git repo inside it’s directory
4. Setup a .gitignore (more on this in a sec) and place it in the directory
5. Stage & commit everything
6. Setup your remote repo on github, add it as a remote in your local git repo, and then push it up

So what should your .gitignore contain?

.gitignore

- There are a number of files generated by Xcode that you are going to want to put in your .gitignore in order to have a smooth source control experience
- The easiest way to setup your .gitignore file is to go to https://www.gitignore.io and have it generate a Swift .gitignore for you

Getting others on your repo

1. On github, the original owner needs to add all of the team members as collaborators (they now have read/write access)
2. Now the collaborators can clone the repo down to their local machine
3. The clone command automatically hooks up the remote repo as origin
4. Begin working

Git team workflow

1. When you are going to start work on a new feature, create a new branch
2. Do your work in that branch while periodically pulling from master to ensure your code works with the latest changes to master
3. When you are ready to push your changes to master, do one final pull from master to resolve any merge conflicts.
4. Push up to your remote feature branch, and then initiate a pull request to master
5. Have someone review the changes, and then accept or reject the pull request
6. Rinse and repeat

Do your pushing and pulling in Xcode, since Xcode has a great merge tool

Merge Conflicts

- Occasionally the merge process wont go as smoothly as we think it will.
- If you changed the same part of a file on the two branches you are merging, this will be a merge conflict.
- git will tell you theres conflicts in specific files, that the merge failed, and to fix the conflicts and then commit the results.
- Essentially git pauses the merge process until the conflicts are resolved.
- At anytime during a halted merge, you can run git status to see which files are still unresolved.

Resolving conflicts

- There are 2 ways to resolve the conflicts.
- Manually: Open each conflicted file and fix the conflicts line by line.
- Merge Tool: Use a merge tool that lets you choose which file's version of the conflicted code you want. This way is much less error prone. Xcode has a built in merge tool.

Manual Resolution

- Git adds conflict-resolution markers to the files that have conflicts.
- Heres what they will look like when you open them manually:

```
<<<<<<< HEAD
<div id="footer">contact : email.support@github.com</div>
=======
<div id="footer">
  please contact us at support@github.com
</div>
>>>>>>> iss53
```

- The <<<<< HEAD denotes this is the beginning of the code that our local HEAD branch contains.
- The ====== signifies of the end of HEAD's version and the beginning of the branch we are trying to merge from.
- Finally, the >>>>>>iss53 signifies the end of the version of the code branch iss53 had
- Once we get rid of all the conflict markers (<<<<,======,>>>>>) in a file, we are ready to mark this file as resolved.
- Run git add on the file to mark it as resolved. staging the file tells git the conflicts have been resolved.

Merge Tool

- You can use a merge tool for a graphical interface based conflict resolution process
- use the git mergetool command to fire up the appropriate merge tool
- opendiff is the default merge tool if you havent configured git to use a different one.

Xcode's pbxproj and git

- pbxproj is a file that is contained in your Xcode projects
- it manages the file structure of your project
- so anytime a team member adds, removes, or rearranges files in your Xcode project, pbxproj changes
- git cannot automatically merge pbxproj, and sometimes even its merge tool will crash Xcode while you are trying to resolve the merge conflicts
- If that happens, you will have to manually resolve the conflicts by opening the pbxproj and removing the conflict markers yourself

Demo