CS193P - Lecture 16

iPhone Application Development

Audio APIs
Video Playback
Displaying Web Content
Settings

Announcements

- **Final projects** due in 11 days
  - Sunday, June 7, 11:59 pm
  - Submit:
    - Code
    - Power-point slides
    - ReadMe file
- Final project **demos**
  - June 8, from 12:15 - 3:15 pm
  - 2 minute presentation, followed by demo-fair
    - Rapid-fire!!
    - Time limit strictly enforced
  - Apps optionally made available to your classmates

Announcements

- AdWhirl outside after class
  - Free Jamba Juice!
  - Find out how to add advertising into your app

- Meet Eddie & James
  - CS193p alumni
  - Authors of Air Guitar & Shotgun Free

Today’s Topics

- Audio APIs
- Video Playback
- UIWebView
- Settings Bundles

Audio

Uses for Audio

- Sound effects
    - button clicks
    - alert sounds
    - short sounds accompanying user actions
- Arbitrary length sounds (music, podcasts, spoken content)
- Streamed content from web services
- Recording audio

How to do it?

- Could be complex:
  - Potentially multiple simultaneous sources
  - Numerous possible outputs
  - Dynamic events, often out of user’s control
  - Different priorities for seemingly similar actions

- The OS manages the sound system
  - You can ask for behavior, but the OS has control

CoreAudio

- High level, easy to use
  - System Sound API - short sounds
  - AVAudioPlayer class - ObjC, simple API
- Lower level, takes more effort but much more control
  - Audio Toolbox - recording and playback, streaming, full control
  - Audio Units - processing audio
  - OpenAL - 3D positional sound
- Which one you use depends on what you’re trying to do
  - Many of you are fine with System Sounds and AVAudioPlayer

Playing Short Sounds

- “short” means less than 5 seconds
- Very simple API, but has restrictions
    - No looping
    - No volume control
    - Immediate playback
    - Limited set of formats
        - Linear PCM or IMA4
        - .caf, .aif or .wav file

Playing Short Sounds

- Two step process
  - Register the sound, get a “sound ID” in return
  - Play the sound
  - Optionally can get callback when sound finishes playing

```
NSURL *fileURL = ... // url to a file
SystemSoundID myID;

// First register the sound
AudioServicesCreateSystemSoundID ((CFURLRef)fileURL, &myID);

// Then you can play the sound
AudioServicesPlaySystemSound (myID);
```

Playing Short Sounds

- Clean up
  - Dispose of sound ID when you're done
  - Or if you get a memory warning

```
SystemSoundID myID;

// dispose of the previously registered sound
AudioServicesDisposeSystemSoundID (myID);
```

Feel the vibration

- System sound API allows for triggering the phone’s vibration
- Use the special system sound ID kSystemSoundID_Vibrate
    - Does nothing on iPod touch

```
- (void)vibrate {

    // trigger the phone’s vibration
    AudioServicesPlaySystemSound (kSystemSoundID_Vibrate);

}
```

Converting Sounds

- Command line utility to convert sounds

```
/usr/bin/afconvert
```

- Supports wide variety of input and output formats
- See man page for details
- Easily convert sounds to System Sounds formats

```
/usr/bin/afconvert -f aiff -d BEI16 input.mp3 output.aif
```

AVAudioPlayer

- Play longer sounds (> 5 seconds)
- Locally stored files or in-memory (no network streaming)
- Can loop, seek, play, pause
- Provides metering
- Play multiple sounds simultaneously
- Cocoa-style API
    - Initialize with file URL or data
    - Allows for delegate
- Supports many more formats
    - Everything the AudioFile API supports

AVAudioPlayer

- Create from file URL or data

```
AVAudioPlayer *player;

NSString *path = [[NSBundle mainBundle] pathForResource...];
NSURL *url = [NSURL fileURLWithPath:path];

player = [[AVAudioPlayer alloc] initWithContentsOfURL:url];
```

- Simple methods for starting/stopping

```
if (!player.playing) {
    [player play];
} else {
    [player pause];
}
```

AVAudioPlayerDelegate

- Told when playback finishes
- Informed of audio decode errors
- Given hooks for handling interruptions
    - Incoming phone calls

Audio Sessions

- OS needs to know what you’re doing with audio
    - Start playing a game or listening to a podcast, then lock the device...what should happen?
    - If you’re playing a shoot ‘em up game and flip the ringer/silent switch to silent...what should happen?
- Audio Sessions are a way for you to express your audio intent
    - Categories defined to clarify
        - Ambient sound
        - Media playback
        - Recording
        - Playback and record

Default Sessions

- Apps get default session which will
  - mute other sounds when you play yours (e.g. iPod audio)
  - respect the ring/silent switch
  - mute audio when user locks device
- For many apps this is fine, but may not be for yours
  - If so, you need to use Audio Session APIs

Demo

Audio

Audio Toolbox

- Audio File Stream Services & Audio Queue Services
- Supports wider variety of formats
- Finer grained control over playback
  - Streaming audio over network

Audio Toolbox

- Recording audio
  - Audio Queue Services (in a nutshell)
    - Create a queue
    - Define a callback function to receive recorded audio data
    - Start the queue
    - Receive callbacks with recorded data, you have to store it
    - Stop the queue
  - See the "*SpeakHere*" example project in iPhone Dev Center for more details

Audio Units

- For serious audio processing
- Graph-based audio
    - Rate conversion
    - Audio Effects
    - Mixing multiple streams
- Very, very powerful. Same as on Mac OS X

OpenAL

- High level, cross-platform API for 3D audio mixing
  - Great for games
  - Mimics OpenGL conventions

- Models audio in 3D space
  - Buffers: Container for Audio
  - Sources: 3D point emitting Audio
  - Listener: Position where Sources are heard

- More Information: http://www.openal.org/

Video

Playing Video

- Uses for Video:
  - Provide cut-scene animation in a game
  - Stream content from web sites
  - Play local movies

- Play videos from application bundle or remote URL
  - Always full screen
  - Configurable scaling modes
  - Optional controls

- Supports:
  - .mov, .mp4, .m4v, .3gp

MPMoviePlayerController

```
- (id)initWithContentURL:(NSURL *)url;
- (void)play;
- (void)stop;
```

- Properties include:
  - backgroundColor - including clear
  - scalingMode - aspect fit, aspect fill, fill, no scaling
  - movieControlMode - default, volume only, hidden
- Notifications tell you:
  - movie is ready to start playing (may take time to preload)
  - movie playback finished
  - scaling mode changed

Demo

Video

Web

Displaying Web Content

- Web content can be displayed with UIWebView
- Content can be
    - local HTML string
    - local raw data + MIME type
    - remote URL
- Leverages WebKit
    - full WK functionality not currently exposed
    - simple API for loading & navigating
    - delegate for some control
    - limited JavaScript execution support
        - 5 seconds of execution & 10 MB of memory

UIWebView

- UIView subclass, configure in IB or in code
- Feed it data to display

```
- (void)loadHTMLString:(NSString *)string baseURL:(NSURL *)baseURL;

- (void)loadData:(NSData *)data MIMEType:(NSString *)MIMEType
                        textEncodingName:(NSString *)encodingName
                                 baseURL:(NSURL *)baseURL;
```

- Or give it a URL request

```
- (void)loadRequest:(NSURLRequest *)request;
```

- What’s this NSURLRequest?
  - Encapsulates a URL to load and caching policy for fetched data

UIWebView

- Properties and actions you'd expect from a web view

```
 @property BOOL loading;
 @property BOOL canGoBack;
 @property BOOL canGoForward;

- (void)reload;
- (void)stopLoading;
- (void)goBack;
- (void)goForward;
```

- A couple others that are handy

```
@property BOOL scalesPageToFit;
@property BOOL detectsPhoneNumbers;
```

UIWebViewDelegate

- Callbacks for load progress

```
- (void)webViewDidStartLoad:(UIWebView *)webView;
- (void)webViewDidFinishLoad:(UIWebView *)webView;
```

- Error handling

```
- (void)webView:(UIWebView *)webView
        didFailLoadWithError:(NSError *)error;
```

- Navigation management

```
- (BOOL)webView:(UIWebView *)webView
        shouldStartLoadWithRequest:(NSURLRequest *)request
        navigationType:(UIWebViewNavigationType)navigationType;
```

  - navigationType specifies things like link clicked, reload, form submitted, back/forward, or other

Demo

UIWebView

Demo

UIWebView - clicking links in table cells

Settings

Application Settings

- Many apps have settings for users to customize things
- Apple very consciously limits the number of settings
  - Focus on the settings that appeal to the widest audience
  - Avoid throwing in every switch “just because”
  - Settings are not free…
    - they have a cost which shouldn’t be underestimated
- Once decided what settings you need, where do they go?

Settings UI

- Apple Human Interface Guidelines makes 2 recommendations
  - Put in Settings application
    - Default behavior overrides
    - Infrequently set options
    - Examples: Mail account information, Safari search provider
  - Keep in your application
    - Configuration options
    - Frequently changed options
    - Examples: Stock symbols, Map/Satellite/Hybrid in Maps

Settings UI

- To put things in Settings, create a Settings bundle
- For in-app, frequently put on back of main view
  - Use info button, Utility Application template in Xcode
  - Stocks, Weather are examples

Settings Bundles

- Added as a new file in Xcode project
- Actually a wrapper containing
  - plist defining settings layout
  - localized resources for strings
- Modify root plist to contain “specifiers” for each setting
  - data driven, but can do a lot of stuff including hierarchies

Preference Specifiers

- Each item specifies one element in the settings UI
- Specifiers have a type
  - Title
  - TextField
  - ToggleSwitch
  - Slider
  - MultiValue
  - Group
  - ChildPane
- Each type has specific keys for details
  - Check the documentation for specifics of each one

Demo

Settings Bundle

View Animation Recap

- Animating view properties with UIKit is easy
  - frame, alpha, transform, etc.
- Begin a block, change state, commit

```
[UIView beginAnimations:@”fadeOut” context:nil];
[UIView setAnimationDuration:0.3];

// set our view’s alpha to fade it out
myView.alpha = 0.0;

[UIView commitAnimations];
```

Start and End States

- You indicate the start (current) and end states
    - CoreAnimation handles the interpolation
    - Works for individual view properties
- Same concept works for entire view hierarchies
    - Called “view transitions”
    - Same idea as properties
        - Begin a block
        - Modify view hierarchy
        - Commit animations

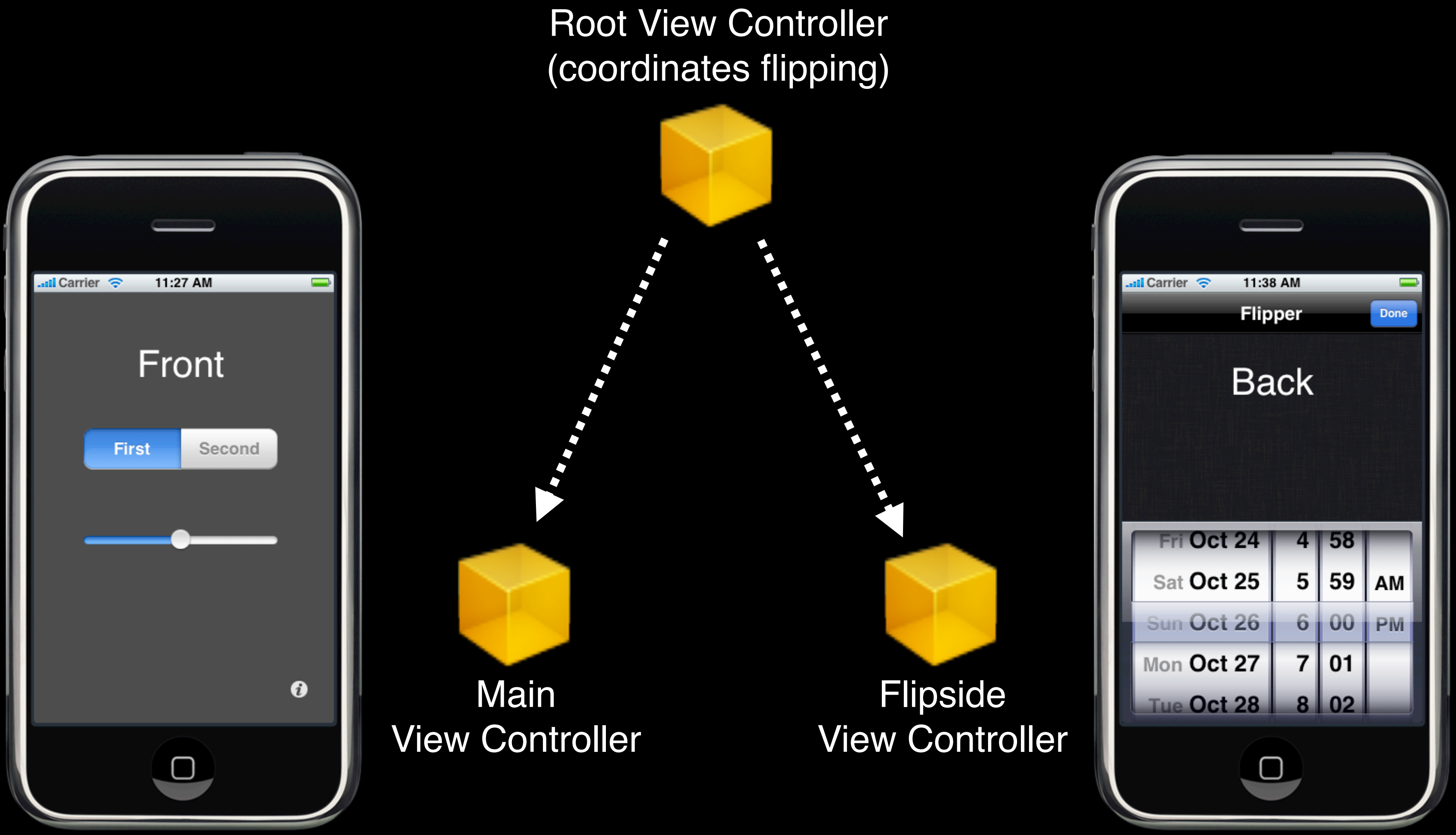
View Transition

- Specify view containing the hierarchy that should be animated

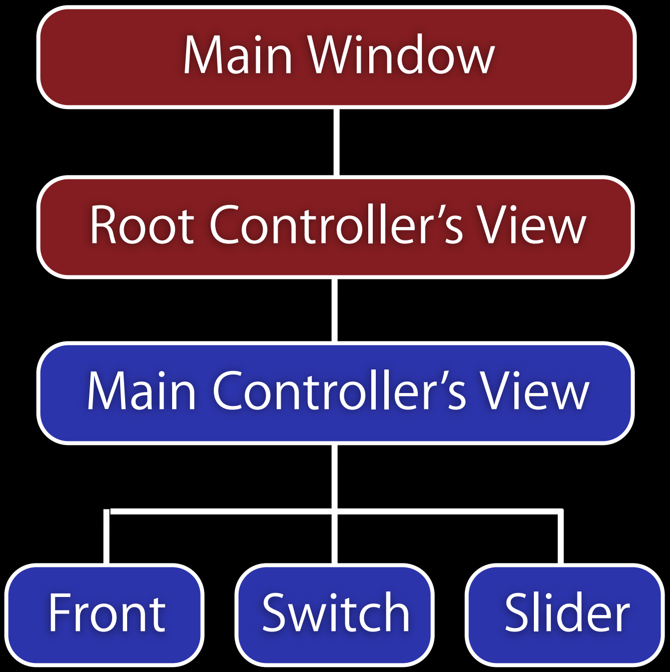
```
[UIView beginAnimations:@”flip” context:nil];
[UIView setAnimationDuration:1];

// set the animation transition type
[UIView setAnimationTransition:
           UIViewAnimationTransitionFlipFromRight
           forView:theView cache:YES];

// update view hierarchy...

[UIView commitAnimations];
```

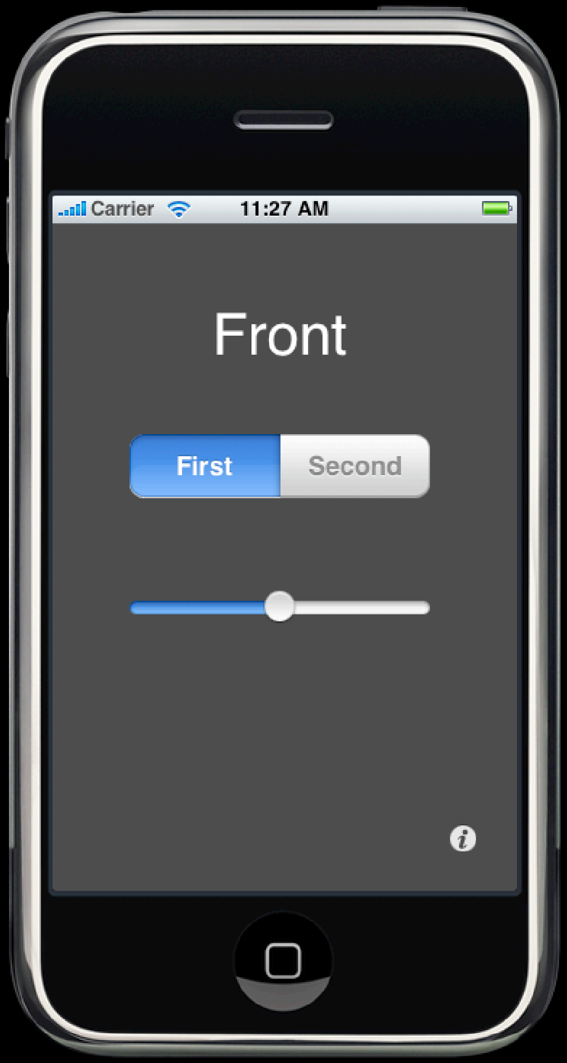
What view is this???

Flipper Example - View Controllers

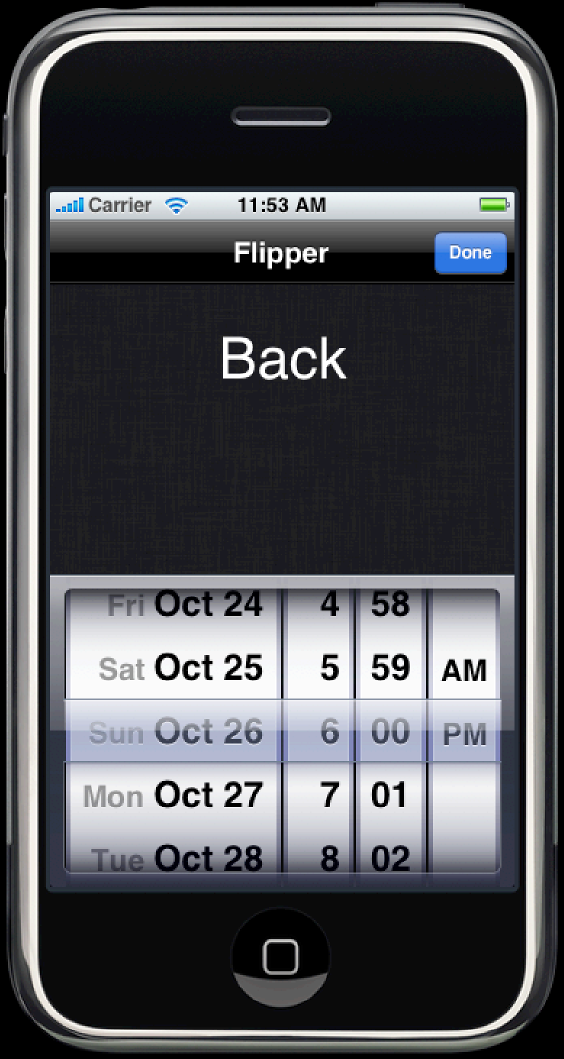


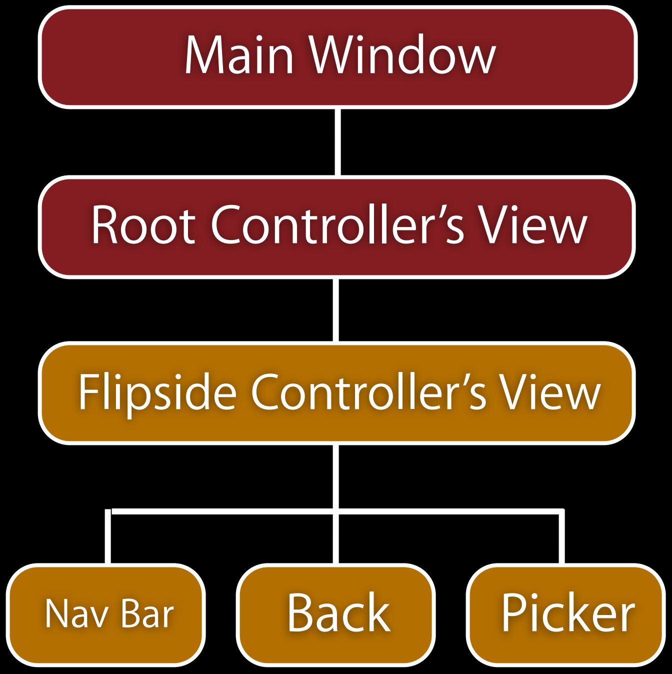
Flipper Example - Front View Hierarchy



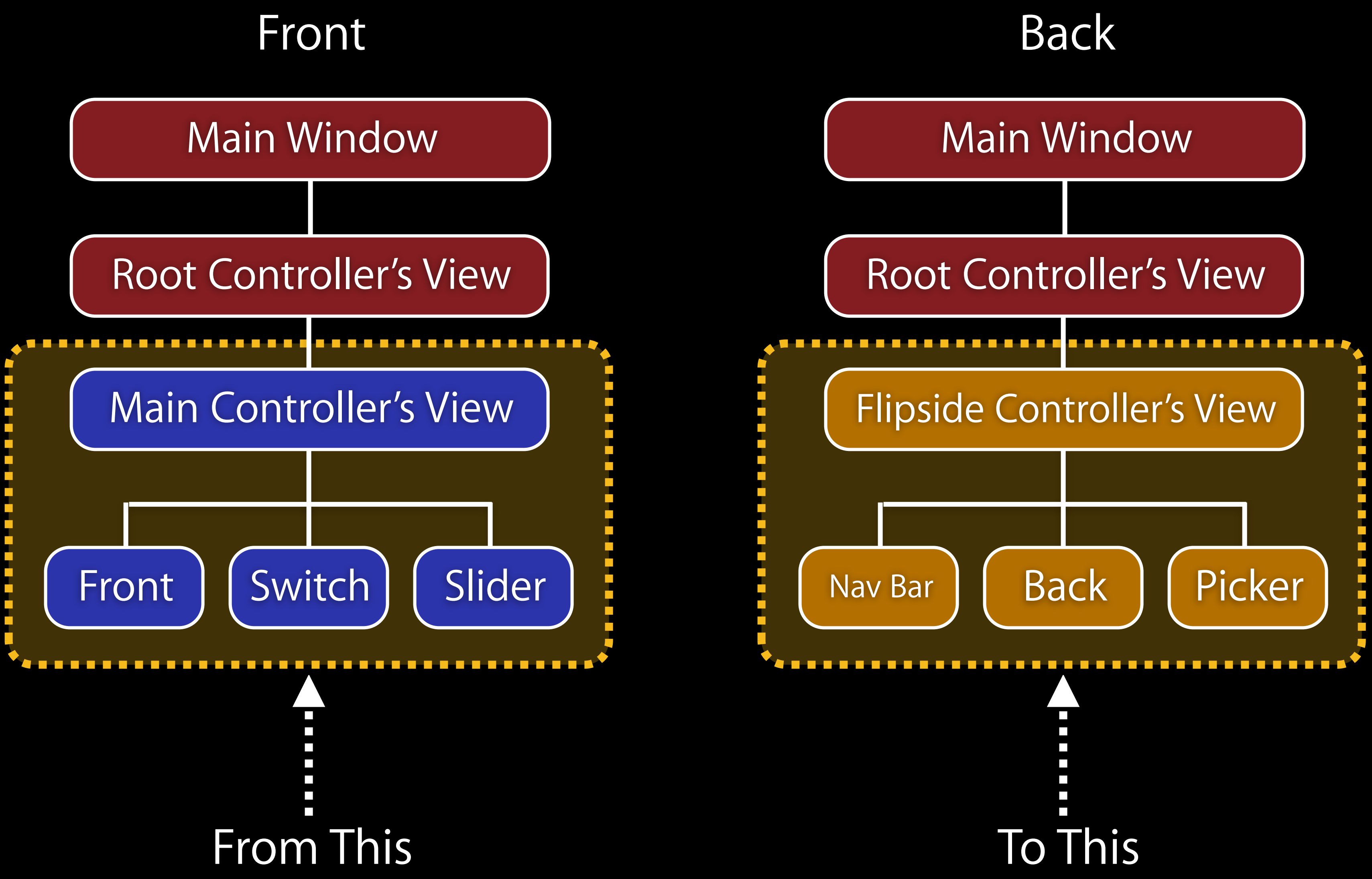


Flipper Example - Front View Hierarchy





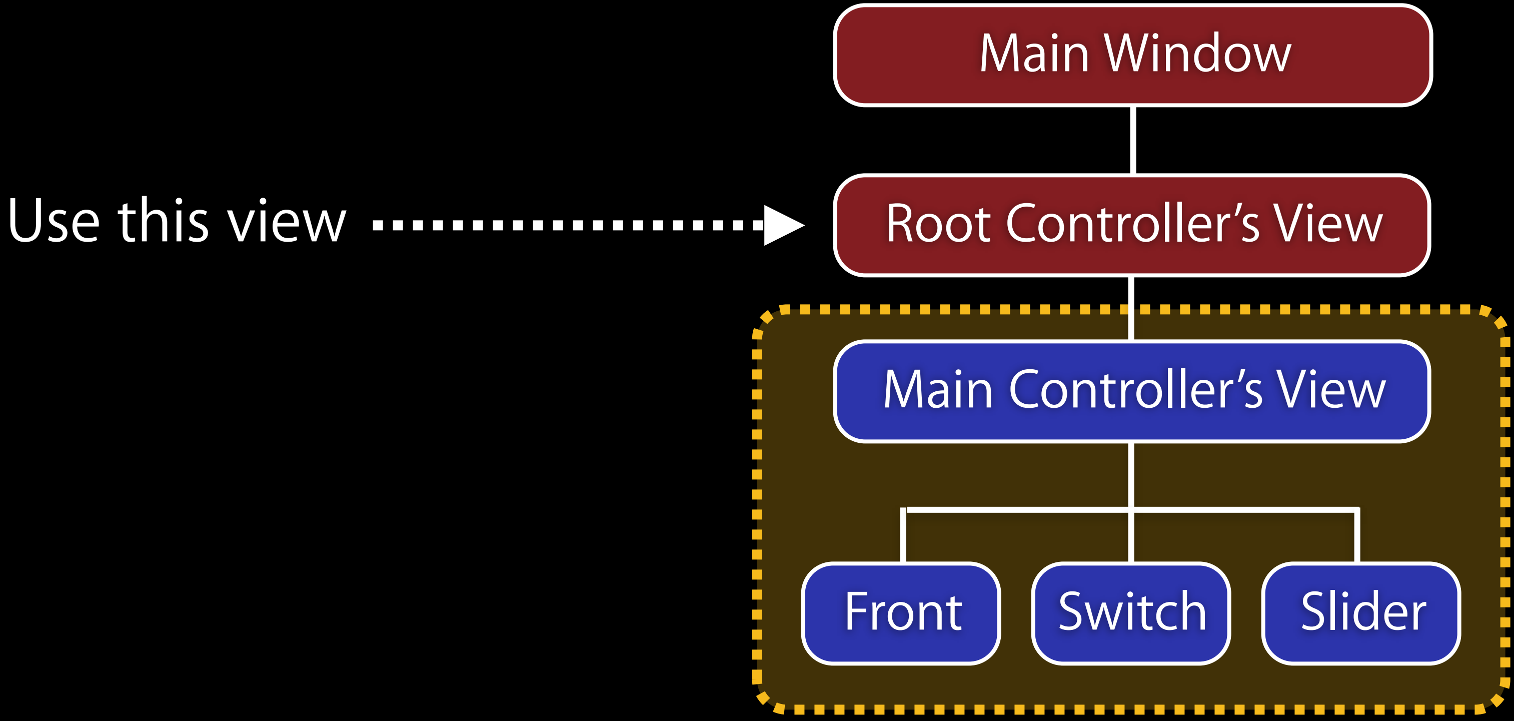
Flipper Example - Transition



Which View?

```
[UIView setAnimationTransition:
            UIViewAnimationTransitionFlipFromRight
            forView:theView cache:YES];
```

- Use the view that **contains** the changes to the view hierarchy



Which View?

```
[UIView setAnimationTransition:
            UIViewAnimationTransitionFlipFromRight
            forView:theView cache:YES];
```

- Use the view that **contains** the changes to the view hierarchy
- Behind the scenes CoreAnimation will snapshot before/after hierarchies and animates transition
- Similar to property animations, application sees end state

Other Transition Types

- UIView.h defines a small set of transitions
  - `UIViewAnimationTransitionFlipFromLeft`
  - `UIViewAnimationTransitionFlipFromRight`
  - `UIViewAnimationTransitionCurlUp`
  - `UIViewAnimationTransitionCurlDown`
- Curl transitions are what Notes application uses
  - Uses OpenGL, doesn't work in simulator
- Use appropriately
  - Just because you can…doesn't mean you should!
- Not just for full screen transitions
  - Can transition any arbitrary view hierarchy

Demo

Flip Ya For It

Questions?