

Designing Games with Core Animation

or

“How to drag stuff around with your finger”

Benjamin Ragheb
ben@benzado.com

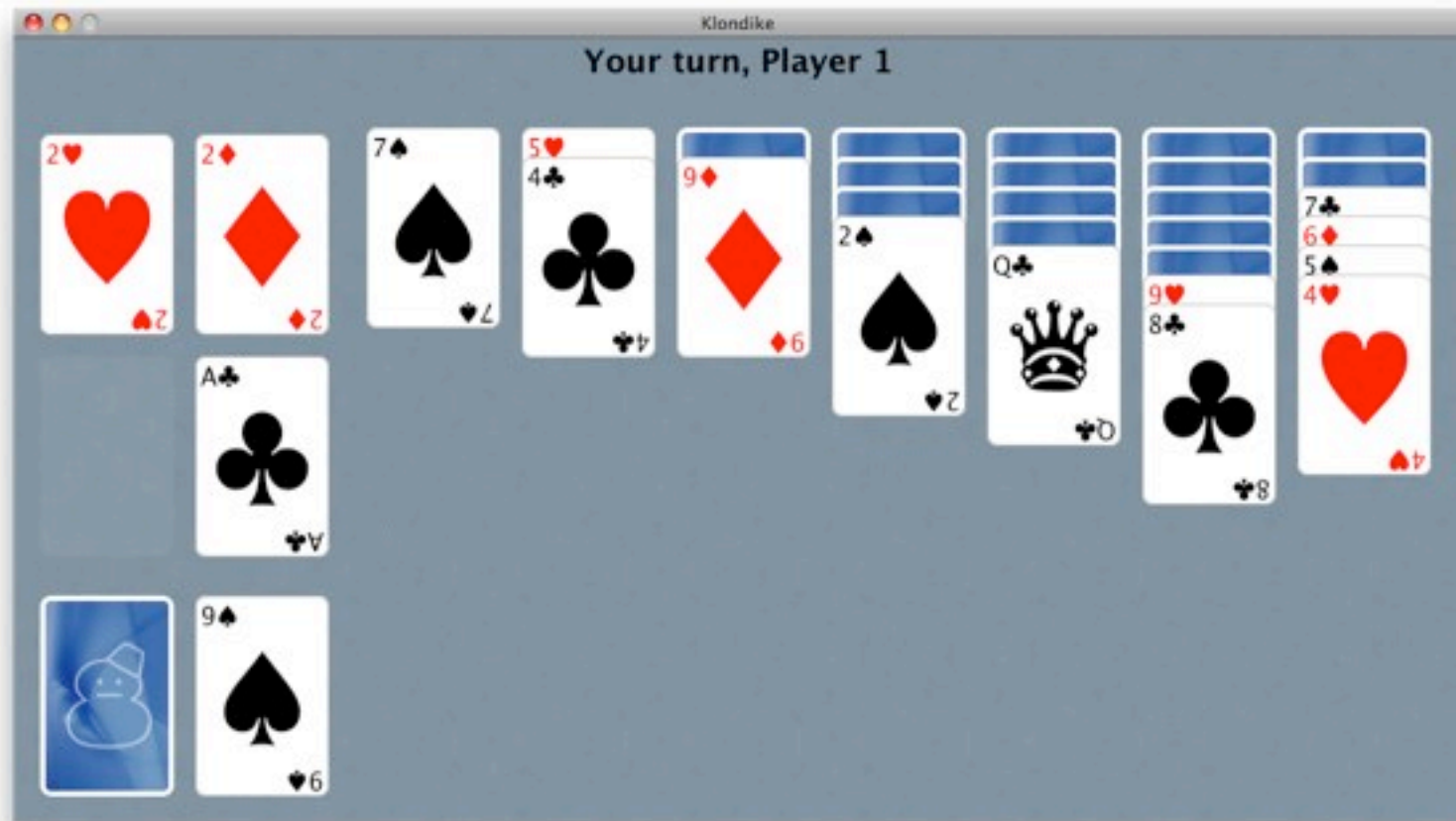
Me

- former Java code monkey
- Cocoa dabbler since 2001
- FatWatch
- Ruboku



GeekGameBoard

Jens Alfke



Desk Jockey

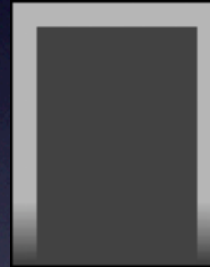


Artwork

Desk.png
320x460



Tray.png
80x100



Sheet.png
60x80

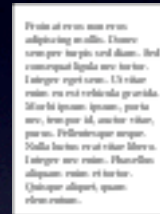


New Xcode Project

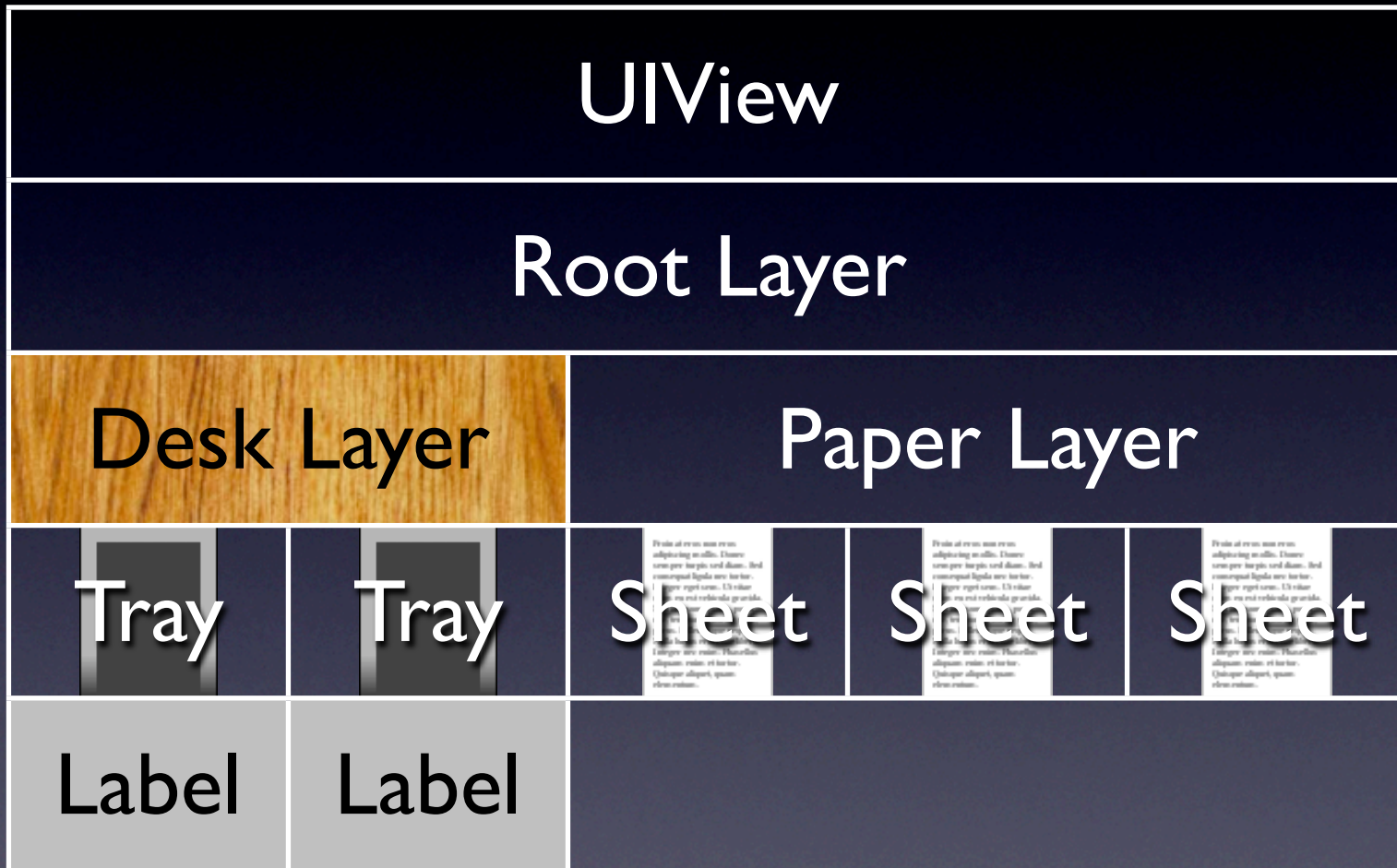
- View-Based Application
- Link to QuartzCore.framework
 - add #import to precompiled header file
- Custom UIView subclass
 - Reference in ViewController.xib
- Build & Go

CALayer

- *like* UIView
 - frame, bounds, hierarchy
- *unlike* UIView
 - lightweight, model not view
 - parallel presentation hierarchy
 - animator thread



Structure



Paper isn't on the desk!

Code

in UIView init method

```
deskLayer = [CALayer layer];
deskLayer.frame = self.bounds;
deskLayer.contents =
    (id)[[UIImage imageNamed:@"Desk.png"] CGImage];
[self.layer addSublayer:deskLayer];

paperRootLayer = [CALayer layer];
paperRootLayer.frame = self.bounds;
[self.layer addSublayer:paperRootLayer];
```

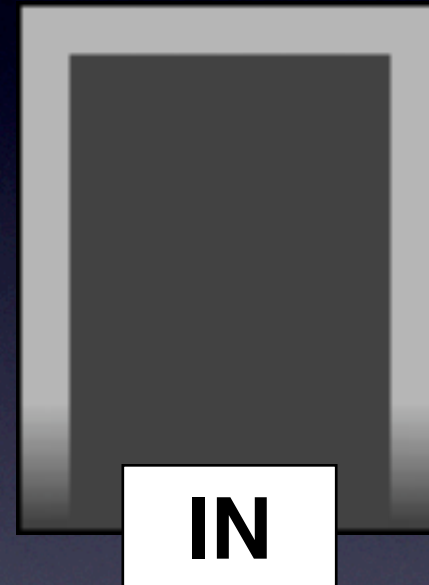
Do not override drawRect:!

So far



Trays

- Localizable
- Draw by delegate
 - Not your UIView!
- Key-value coding



Code

in UIView init method

```
CALayer *labelLayer = [CALayer layer];  
labelLayer.bounds = CGRectMake(0, 0, 40, 16);  
labelLayer.position = CGPointMake(40, 100);  
labelLayer.delegate = trayLabelDelegate;  
[labelLayer setNeedsDisplay];  
[labelLayer setValue:@"IN" forKey:@"text"];  
[trayLayer addSublayer:labelLayer];
```


Code

in TrayLabelDelegate

```
- (void)drawLayer:(CALayer *)layer inContext:(CGContextRef)ctx {  
    NSString *text = [layer valueForKey:@"text"];  
    ...  
    UIGraphicsPushContext(ctx);  
    [[UIColor whiteColor] setFill];  
    UIRectFill(layer.bounds);  
    [[UIColor blackColor] setStroke];  
    UIRectFrame(layer.bounds);  
    [[UIColor blackColor] setFill];  
    [text drawAtPoint:textPoint withFont:font];  
    UIGraphicsPopContext();  
}
```

So far



Interaction

touchesBegan:withEvent:
touchesMoved:withEvent:
touchesEnded:withEvent:
touchesCancelled:withEvent:

touchesBegan

- hitTest: (Paper Layer)
- save dragLayer
- save dragOrigin
- “lift” dragLayer

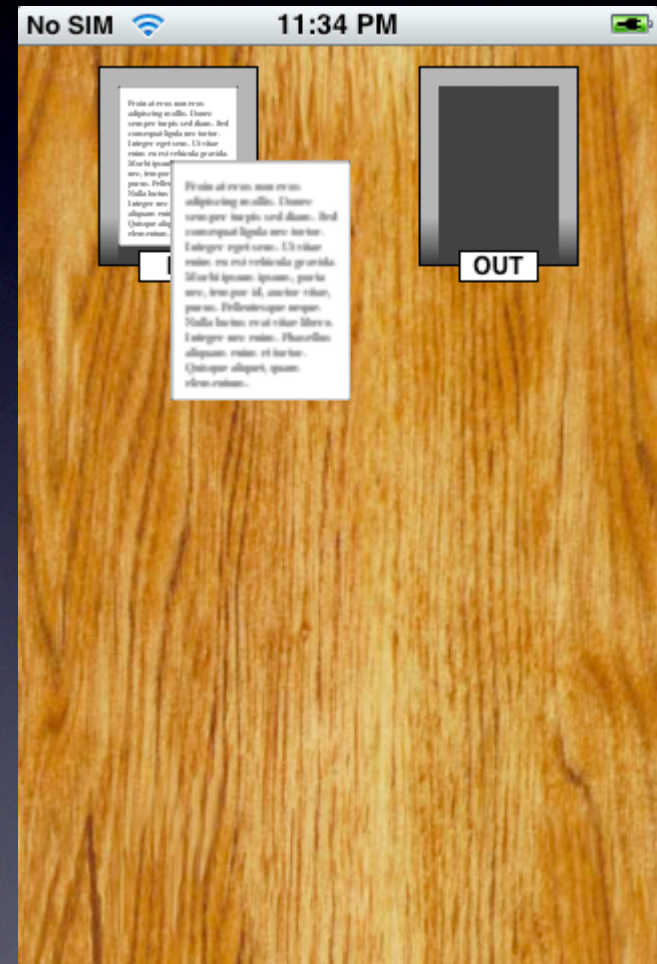


Code

```
- (void)touchesBegan:(NSSet *)touches withEvent:(UIEvent *)event {
    UITouch *touch = [touches anyObject];
    CGPoint viewPoint = [touch locationInView:self];
    CGPoint where = [paperRootLayer convertPoint:viewPoint
                                           fromLayer:self.layer];
    CALayer *hitLayer = [paperRootLayer hitTest:where];
    if (hitLayer != nil && hitLayer != paperRootLayer) {
        dragLayer = hitLayer;
        dragOrigin = hitLayer.position;
        dragLayer.zPosition = 2;
        [dragLayer setValue:[NSNumber numberWithFloat:1.5f]
                      forKeyPath:@"transform.scale"];
        [dragLayer setValue:[NSNumber numberWithFloat:0.0f]
                      forKeyPath:@"transform.rotation.z"];
    }
}
```

touchesMoved

- disable animation
- update position

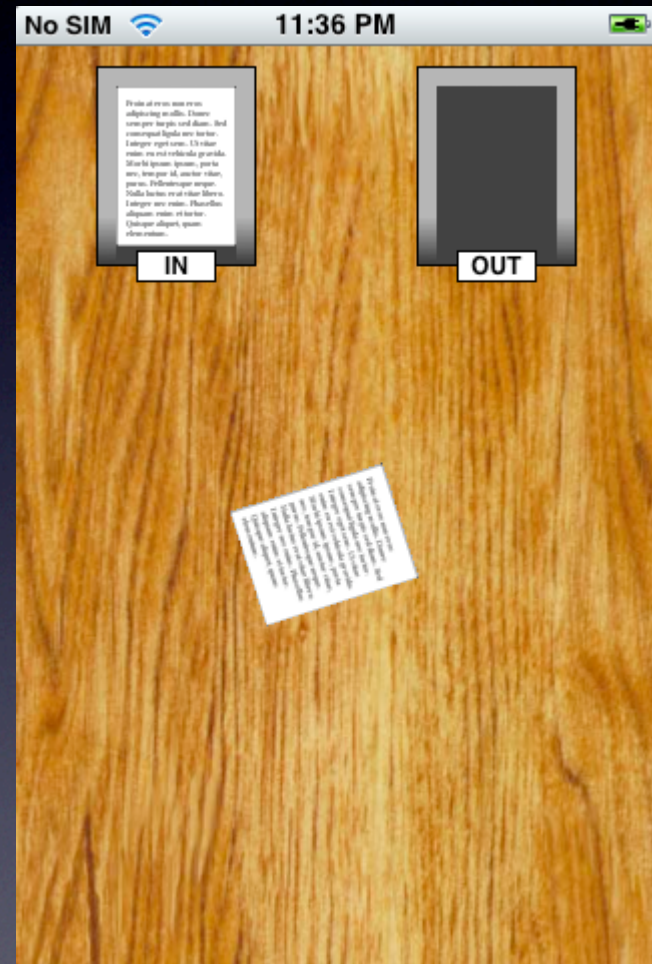


Code

```
[CATransaction flush];  
[CATransaction begin];  
[CATransaction setValue:(id)kCFBooleanTrue  
                        forKey:kCATransactionDisableActions];  
dragLayer.position = where;  
[CATransaction commit];
```

touchesEnded

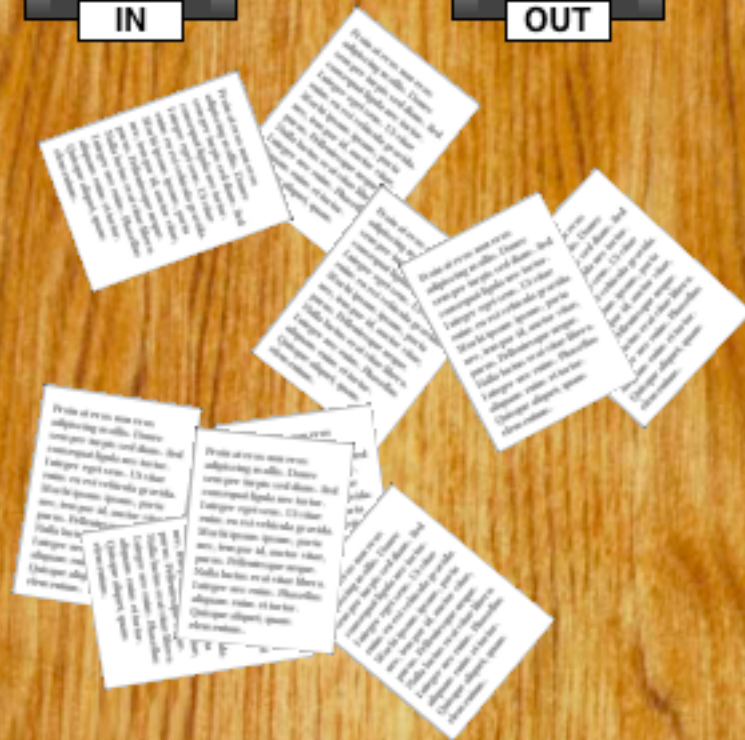
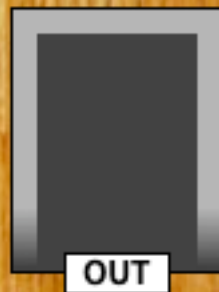
- hitTest: (Desk Layer)
- “drop” layer
 - neatly in tray
 - haphazardly on desk



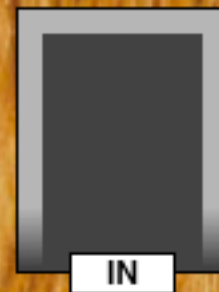
touchesCancelled

- by phone call or scroll view
- move dragLayer back to dragOrigin

No SIM 8:48 PM



No SIM 8:48 PM



Further Reading

- Download code at www.benzado.com
- Email me at ben@benzado.com
- GeekGameBoard (Apple Sample Code)
- Google
- StackOverflow.com