Polishing Your Interface Rotation Animations

Session 240

Josh Shaffer and Andy Matuschak
iOS Frameworks

Polishing Your Interface Rotation Animations

Polishing Your Interface Rotation Animations

- What is interface rotation?

Polishing Your Interface Rotation Animations

- What is interface rotation?
- iOS view hierarchy

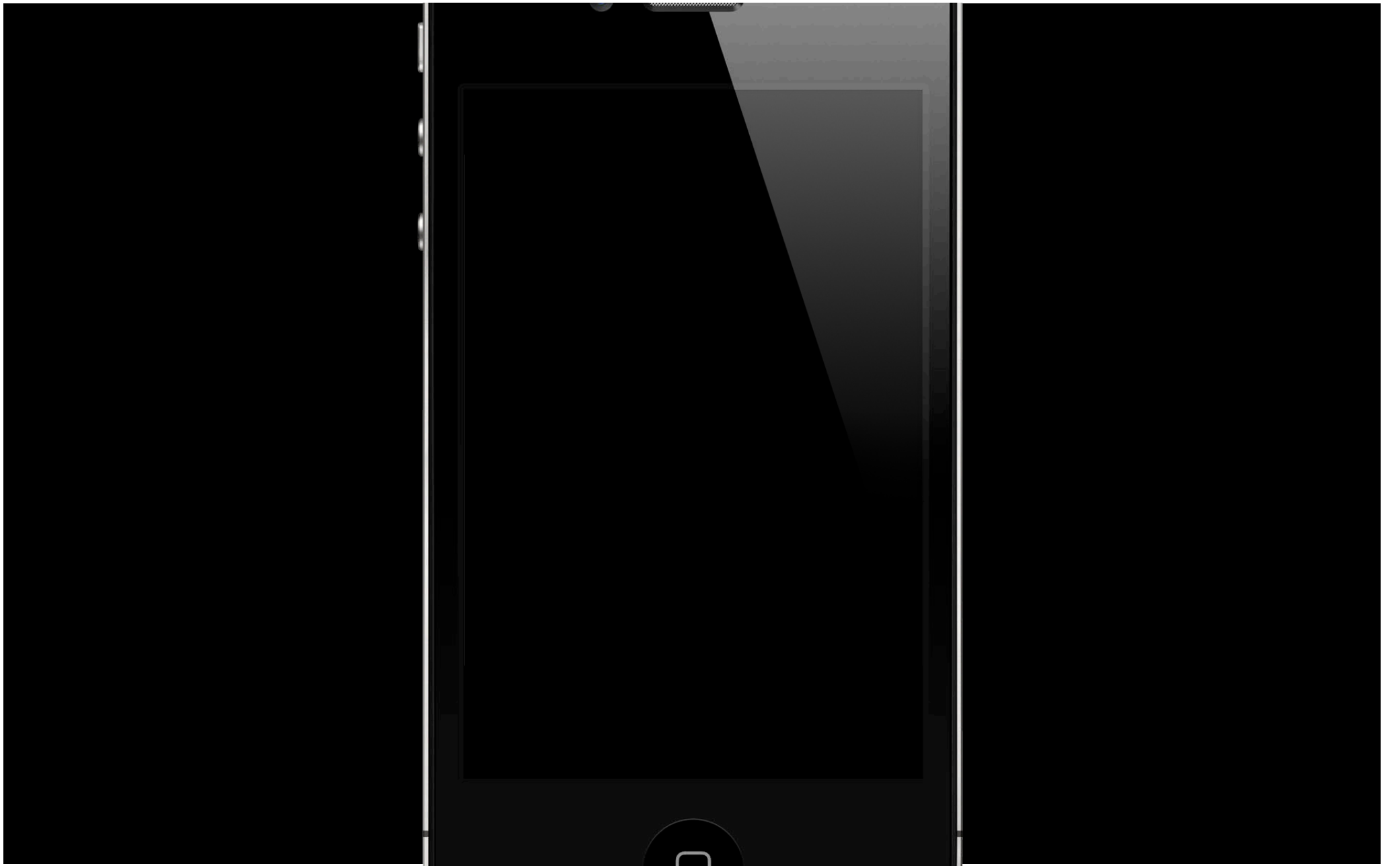
Polishing Your Interface Rotation Animations

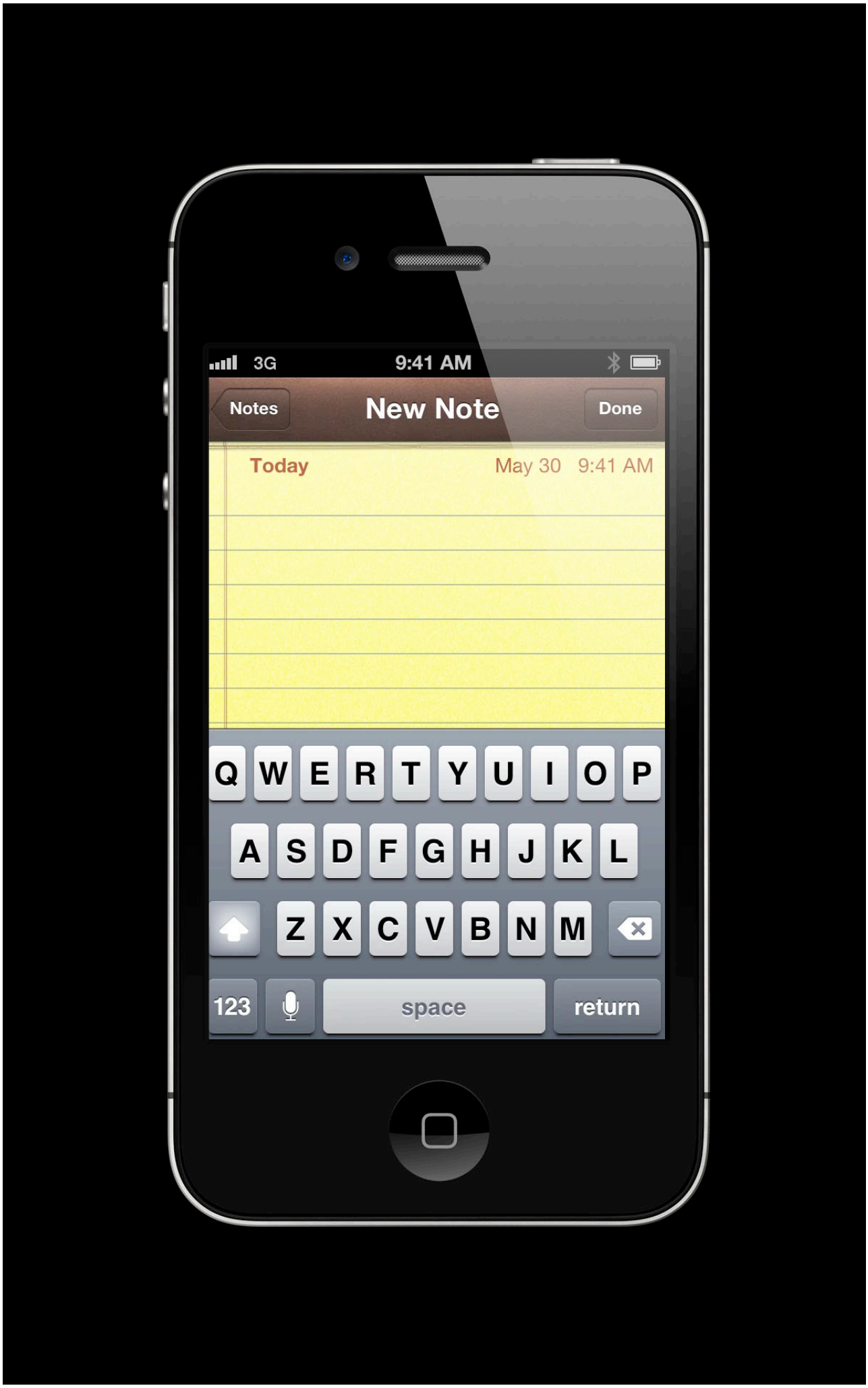
- What is interface rotation?
- iOS view hierarchy
- Performance optimization

Polishing Your Interface Rotation Animations

- What is interface rotation?
- iOS view hierarchy
- Performance optimization
- Visual sleight of hand

What is Interface Rotation?

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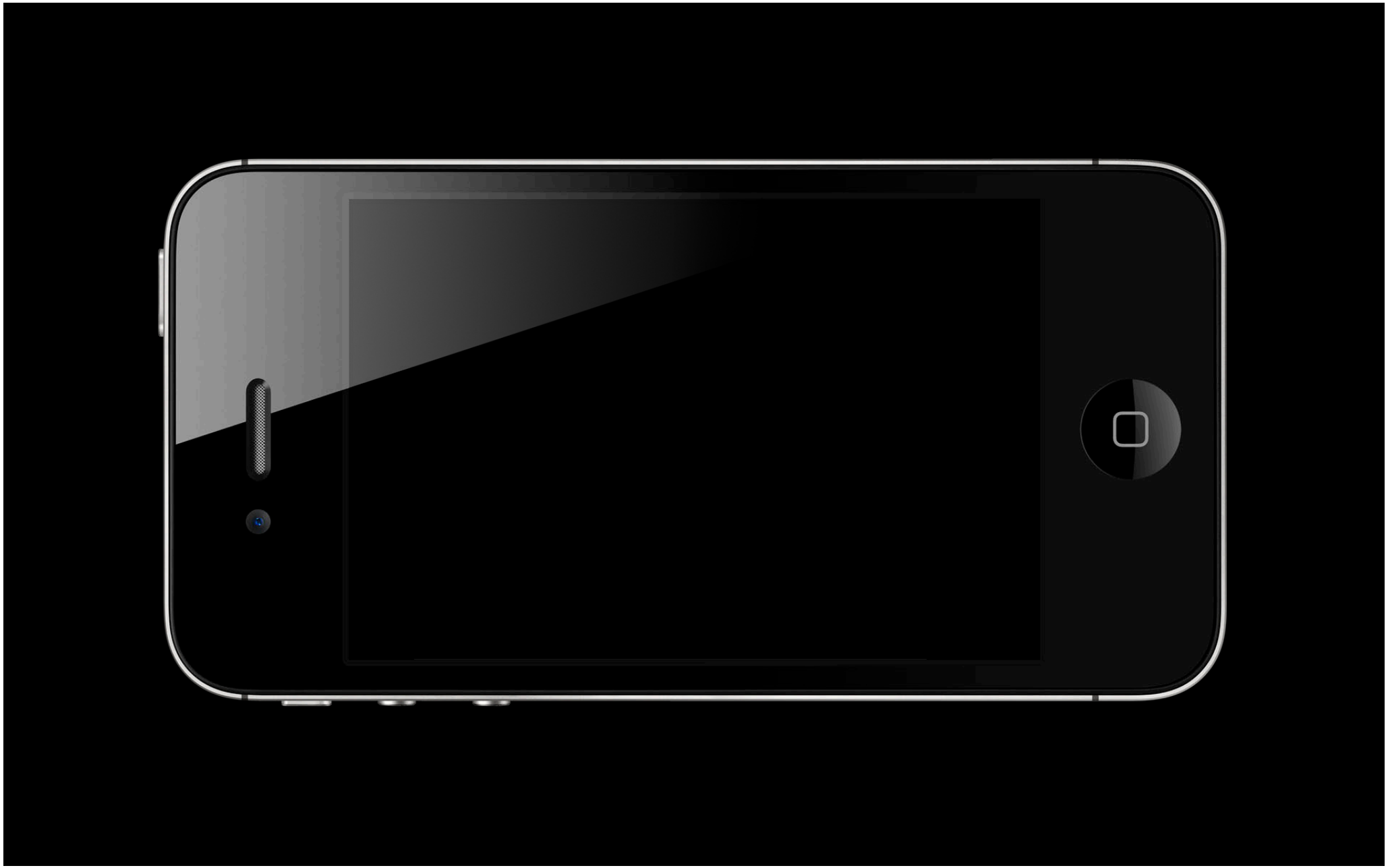

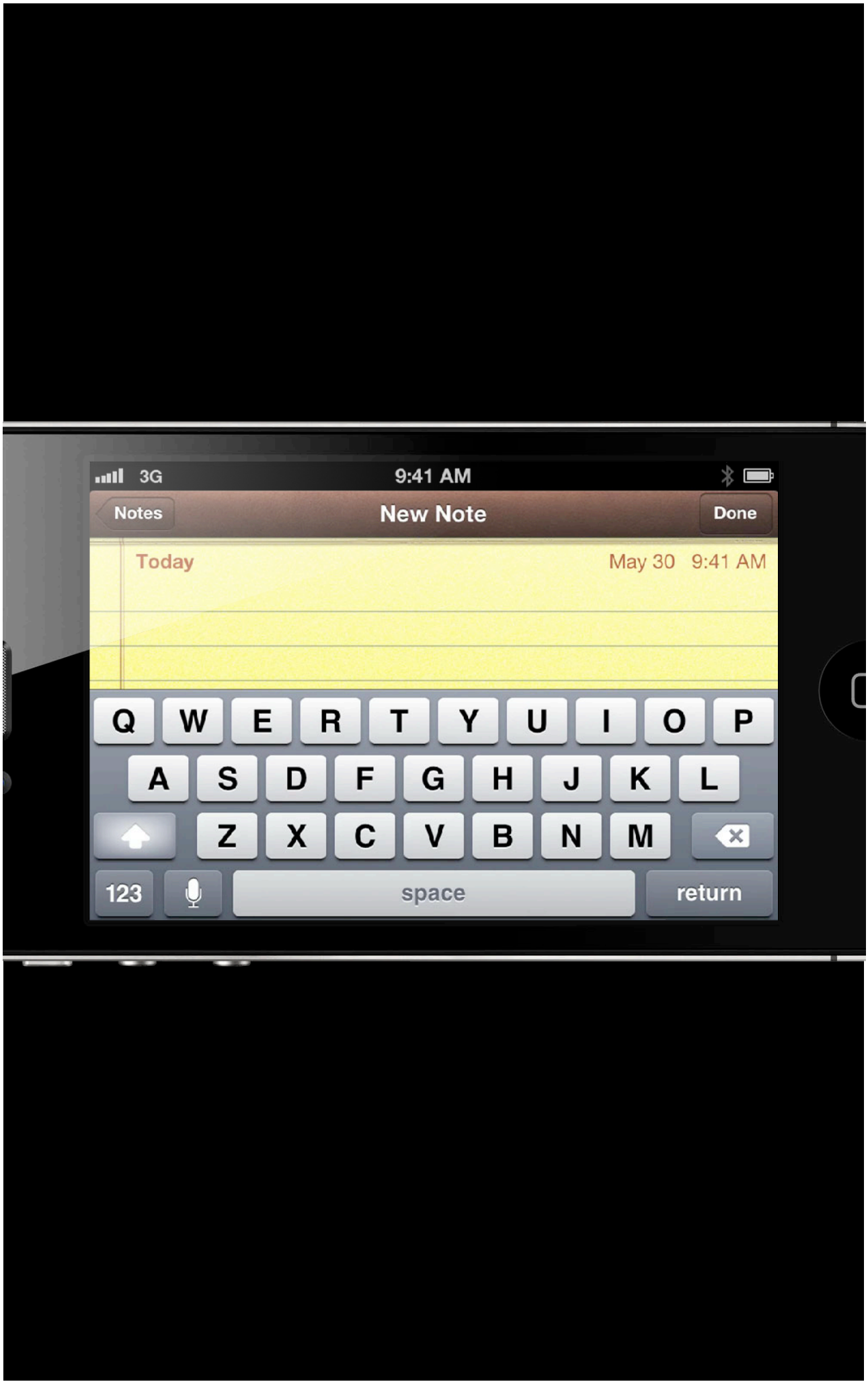
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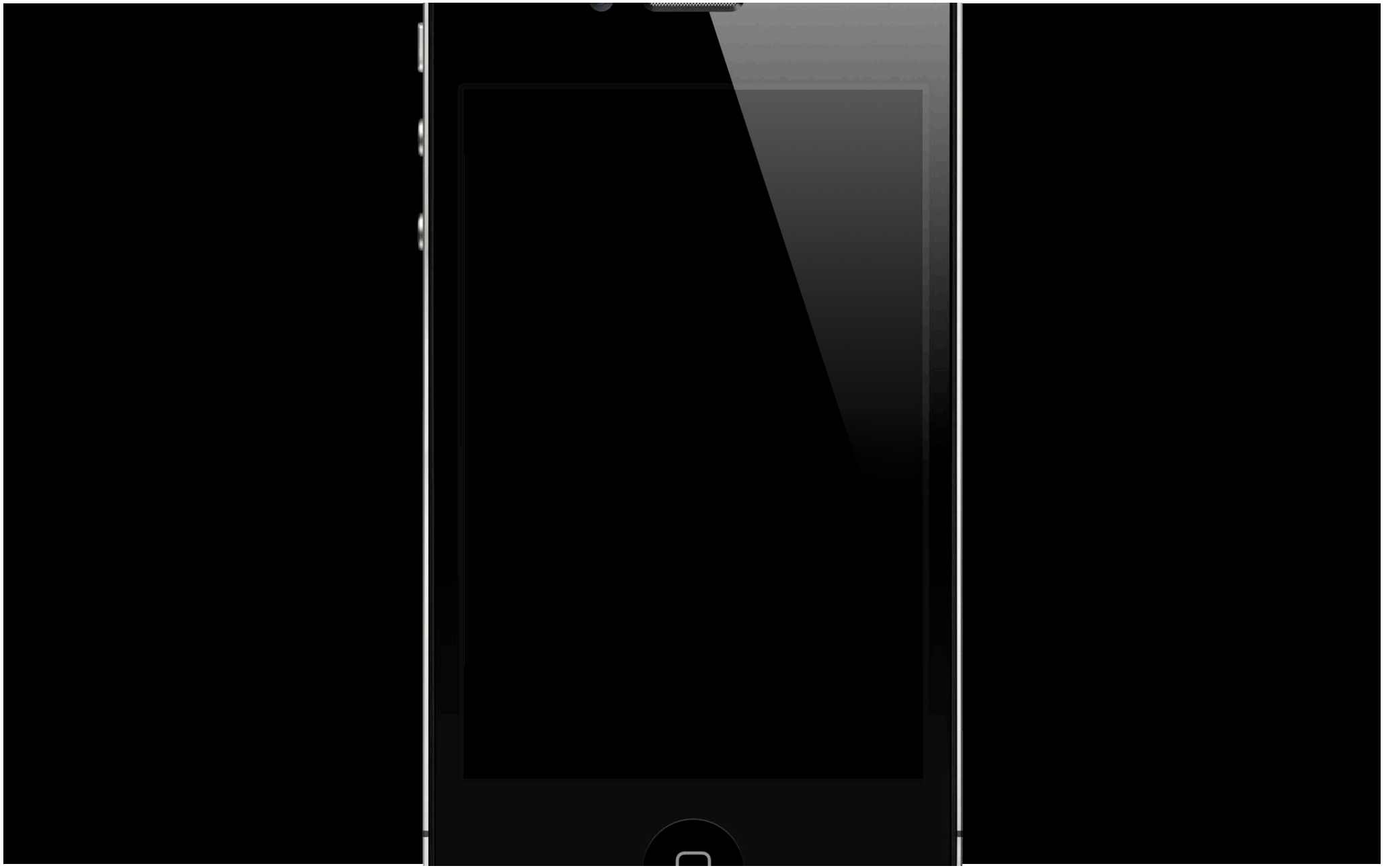

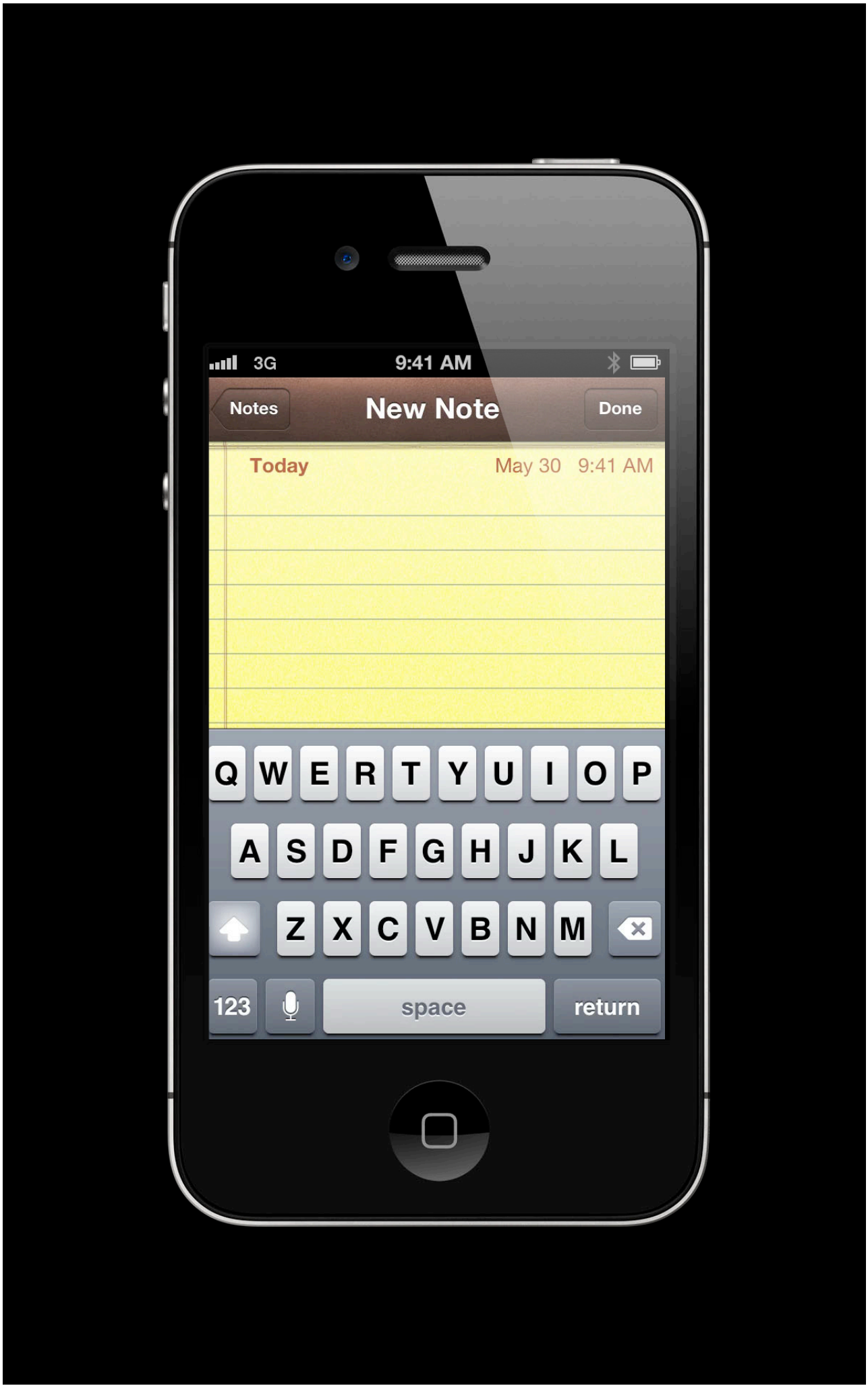
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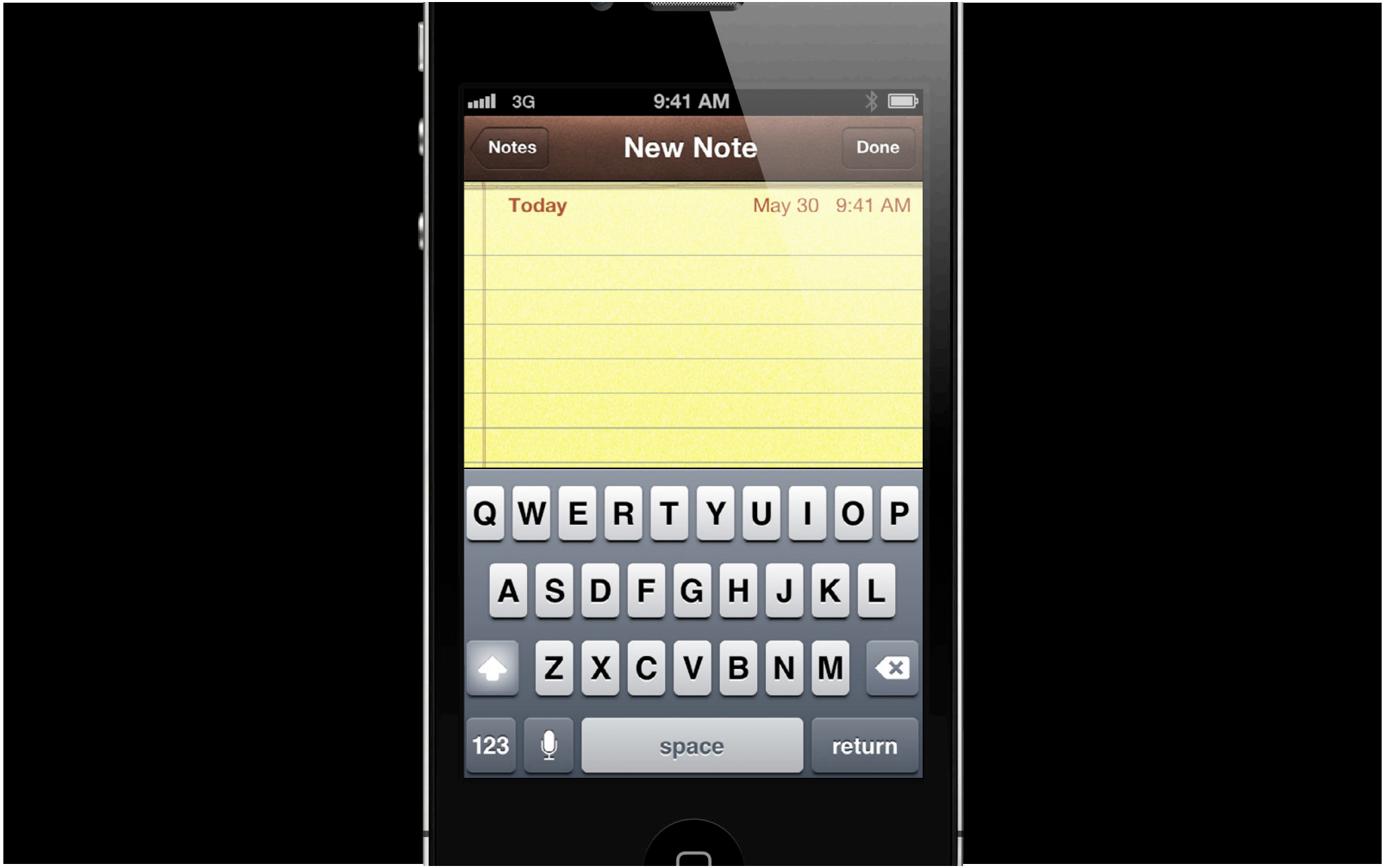
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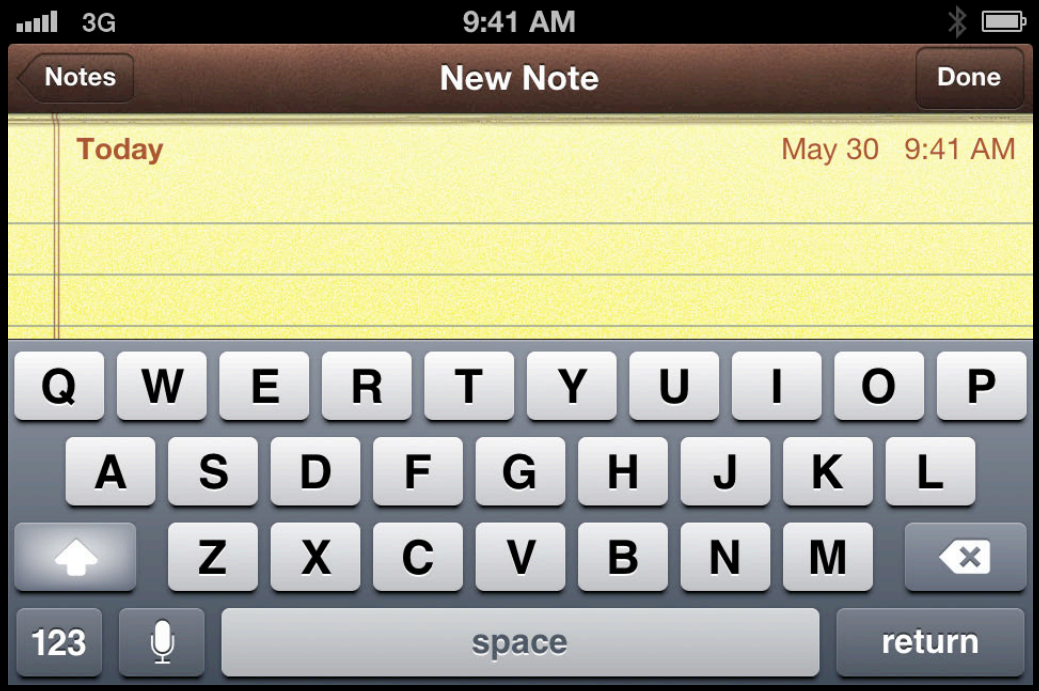
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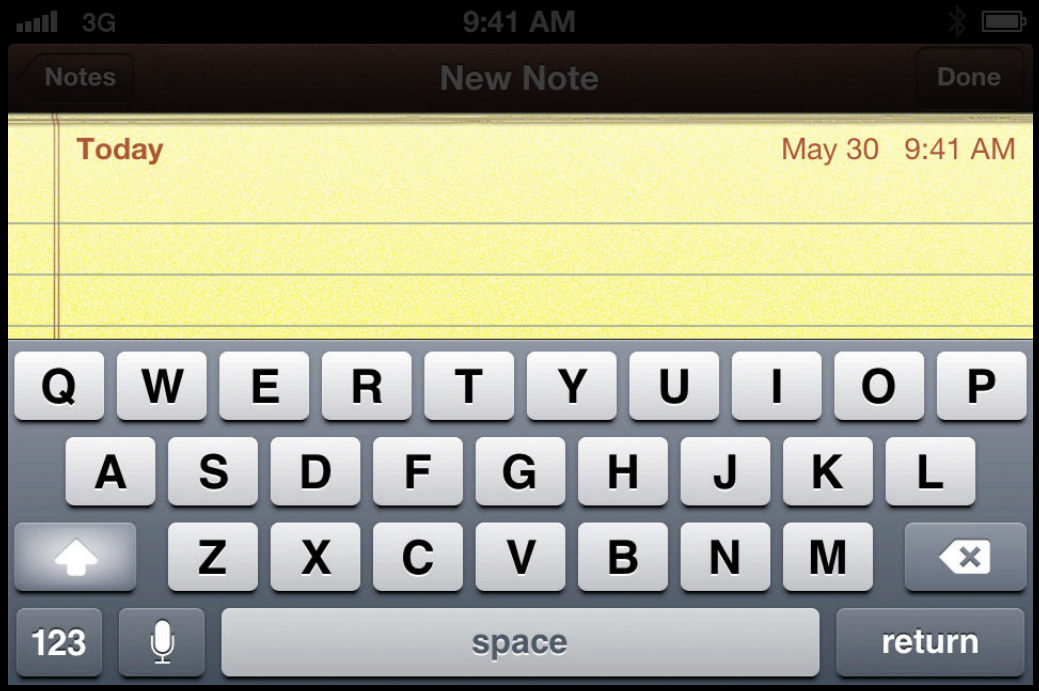
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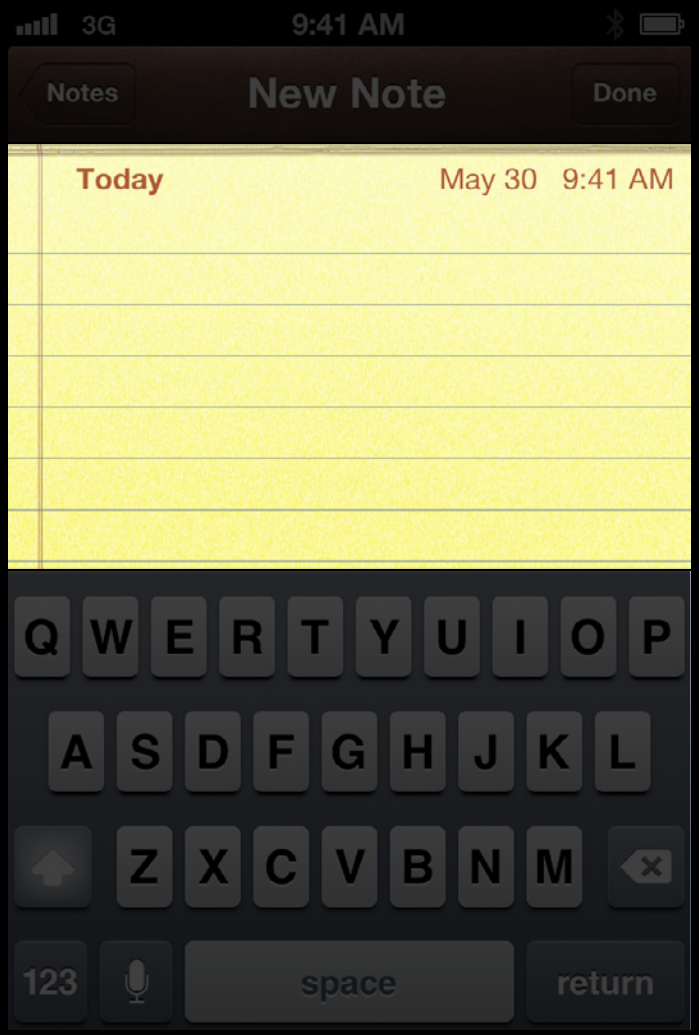
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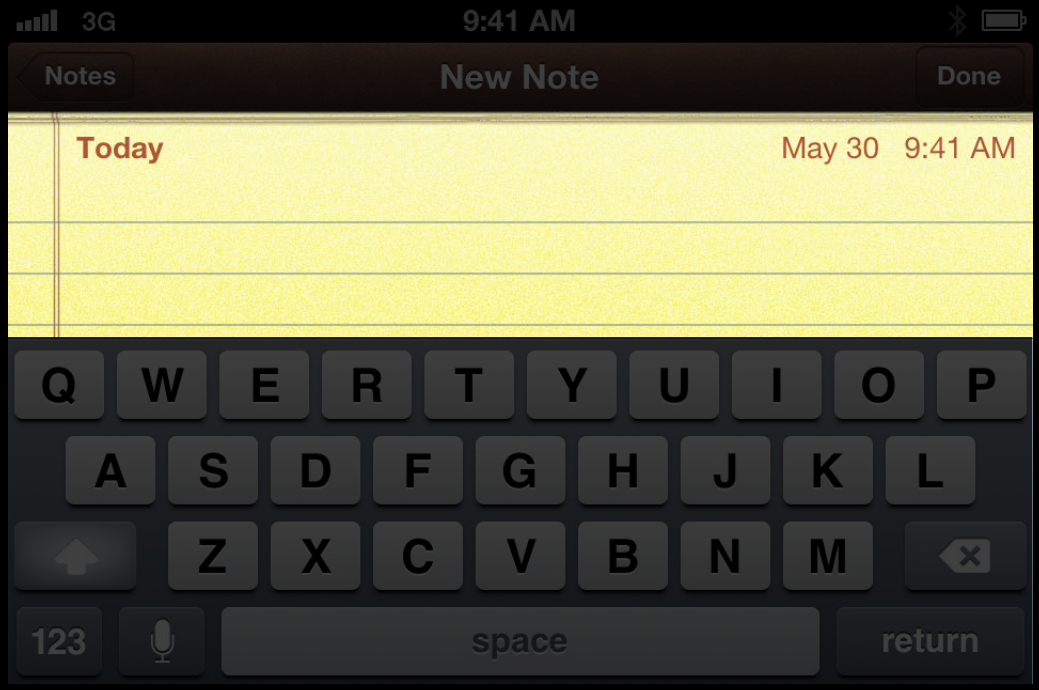
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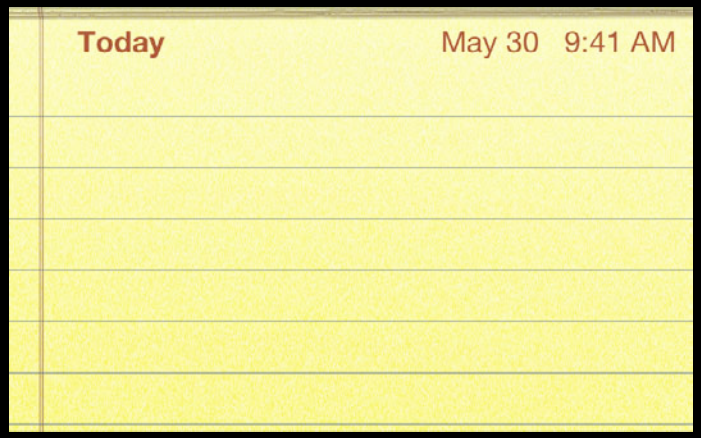
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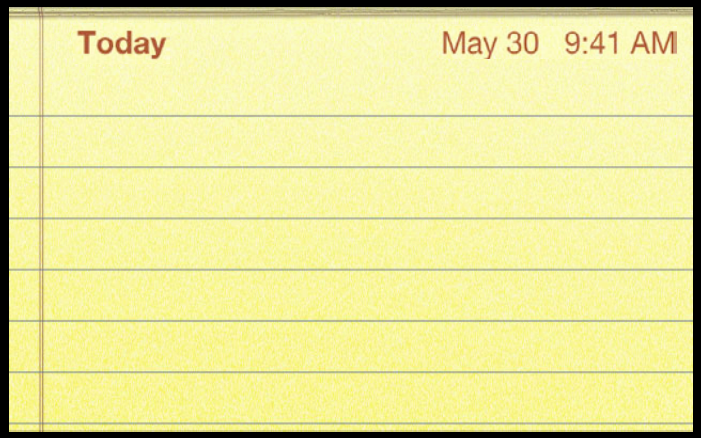
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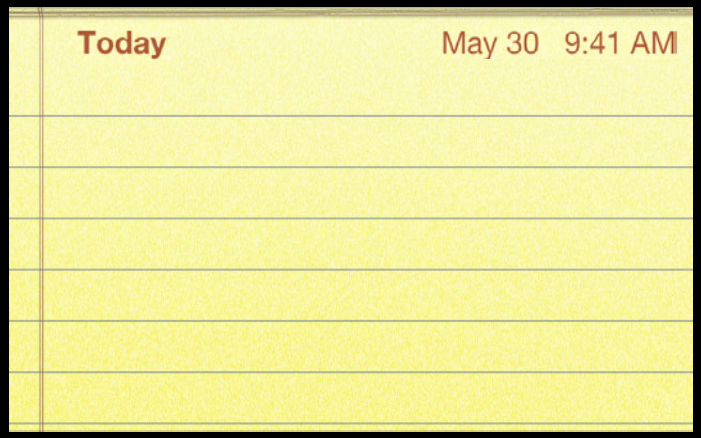
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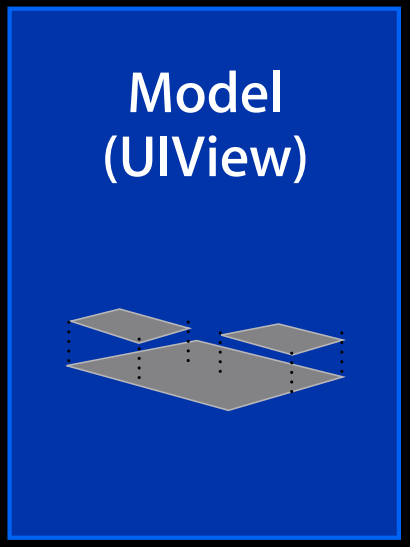
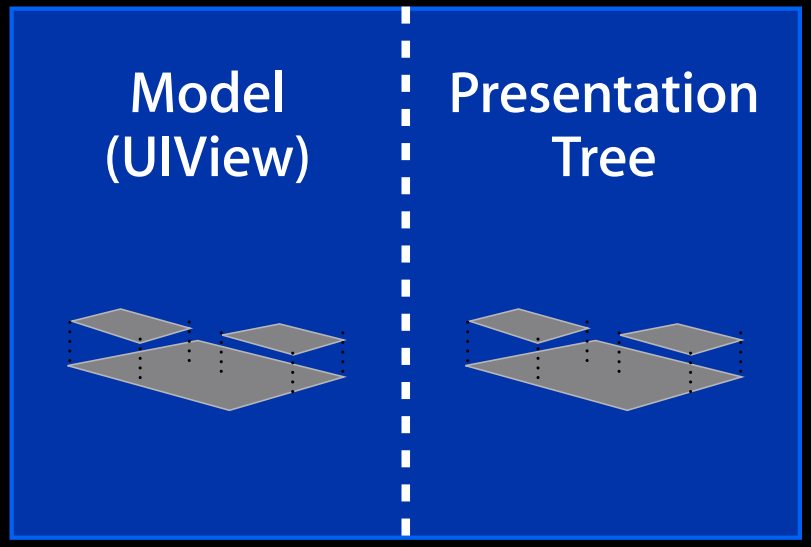
iOS View Hierarchy

iOS View Hierarchy



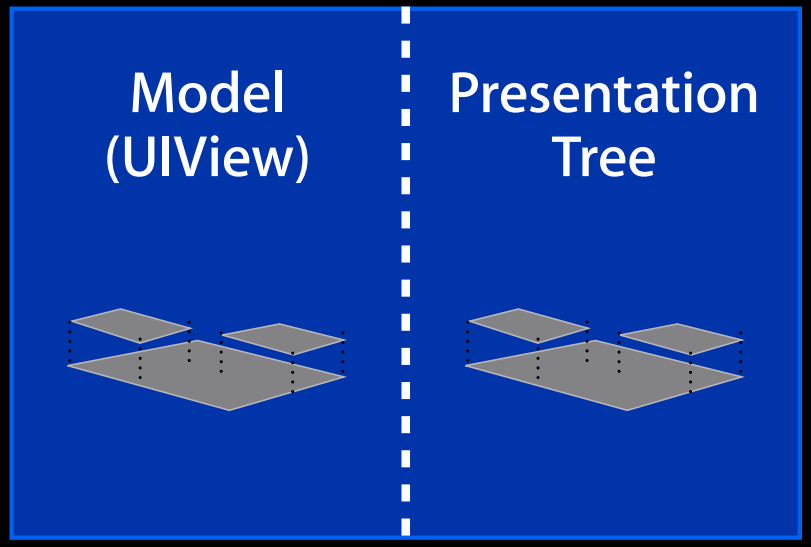
UIKit Application

iOS View Hierarchy



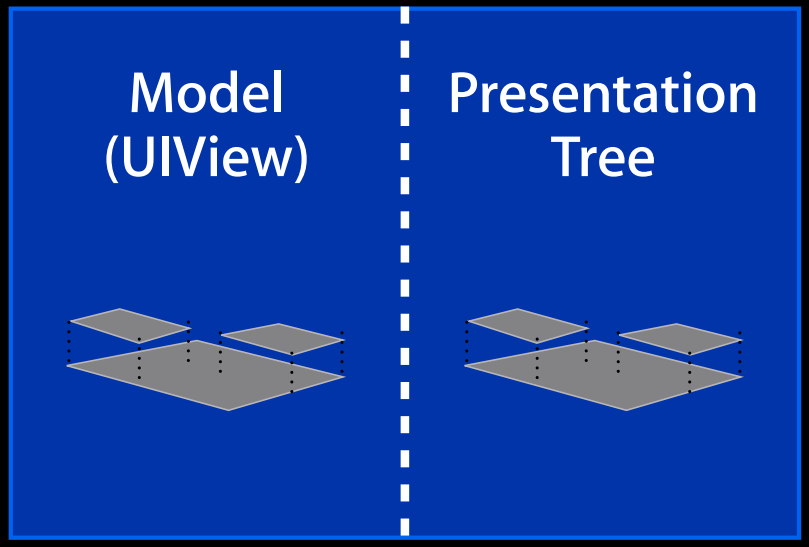
UIKit Application

iOS View Hierarchy



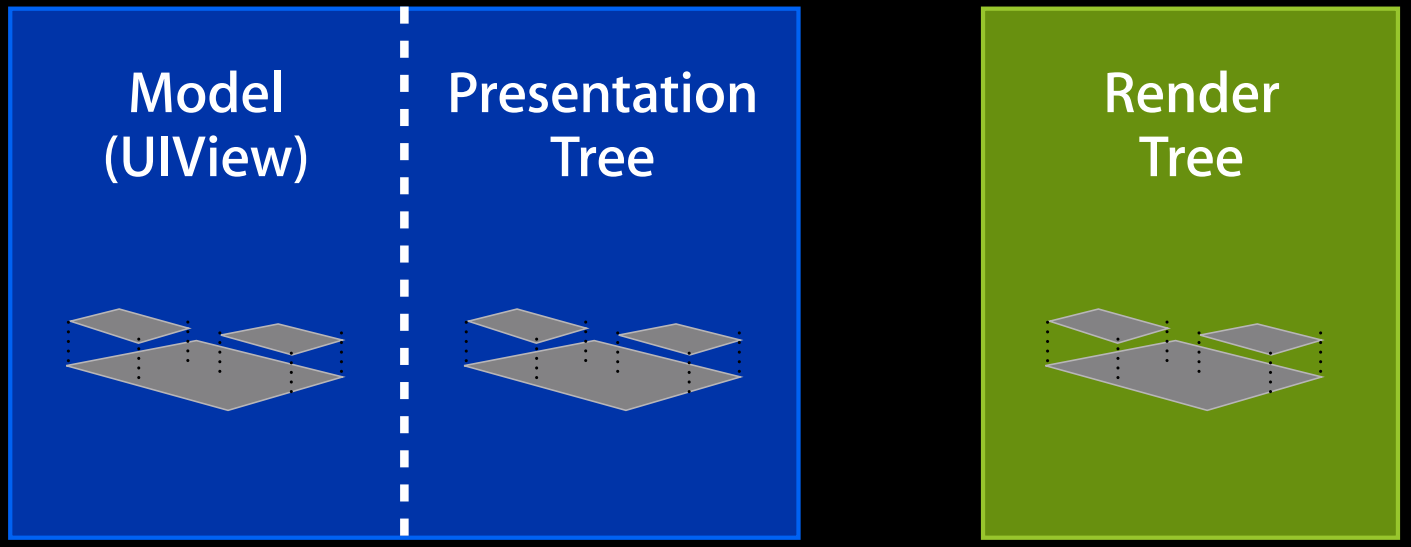
UIKit Application

iOS View Hierarchy



UIKit Application

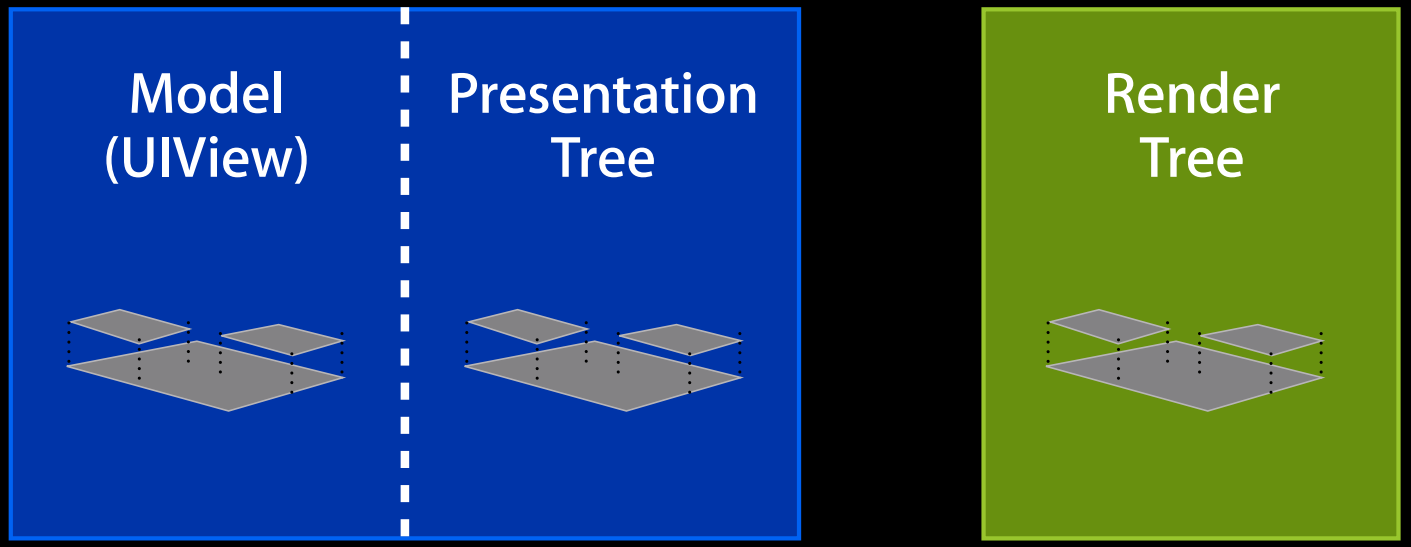
iOS View Hierarchy



UIKit Application

Core Animation
Render Server

iOS View Hierarchy



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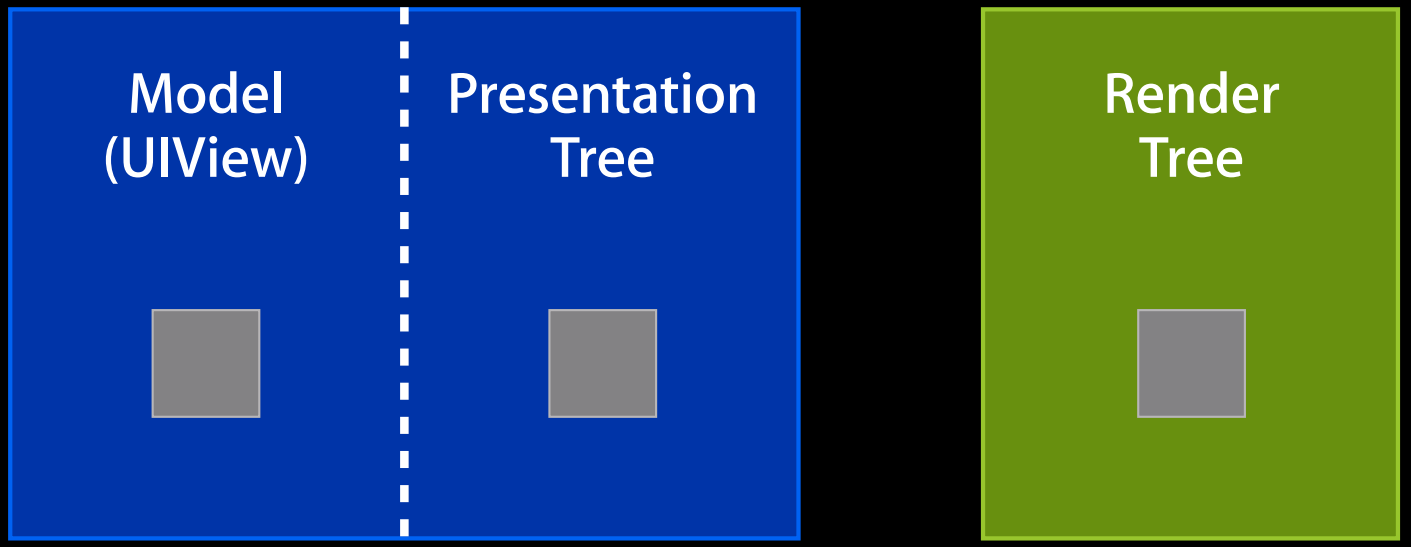
Presentation Tree	{25, 25}	{50, 50}
Render Tree	{25, 25}	{50, 50}



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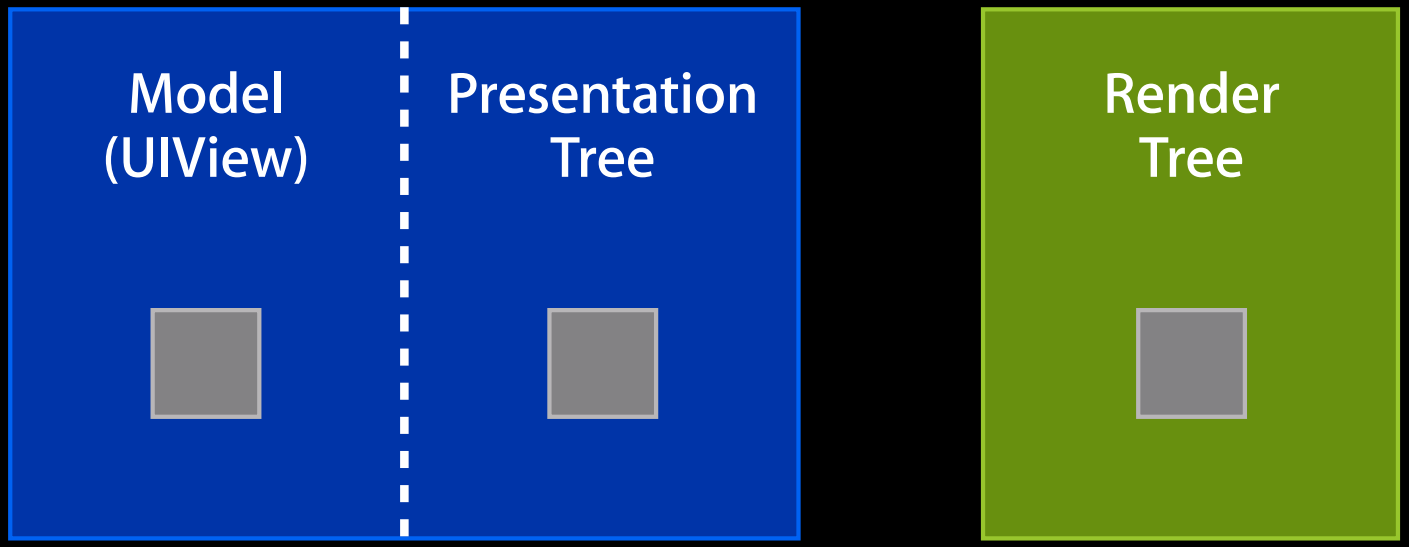

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Presentation Tree	{25, 25}	
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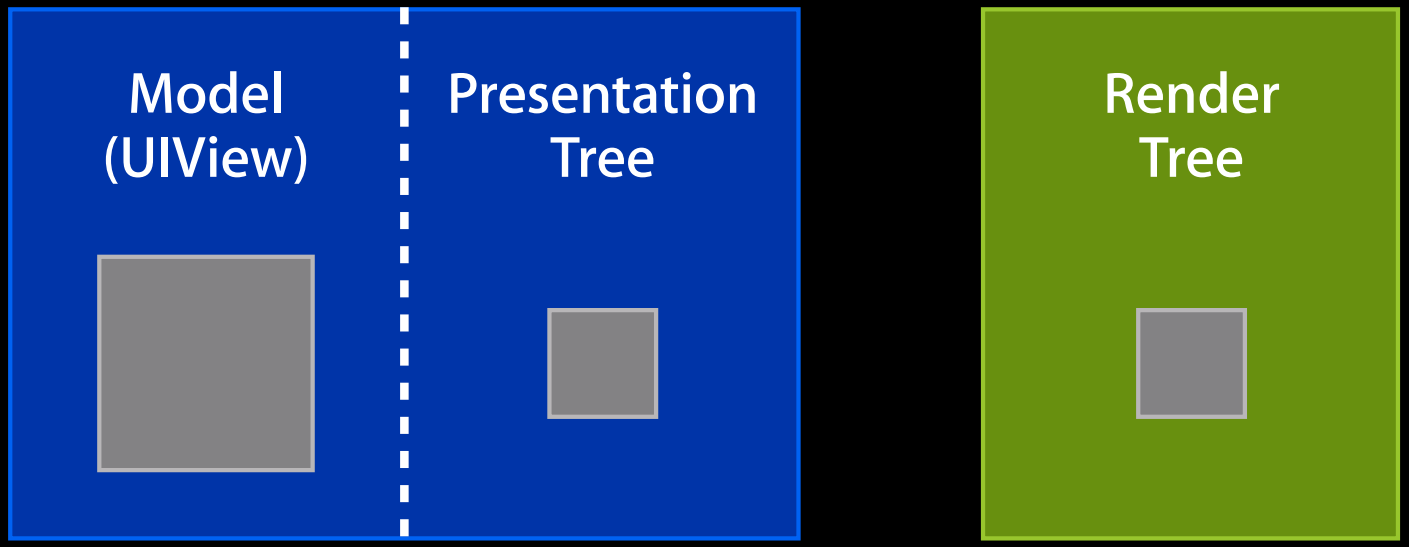

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Presentation Tree	{25, 25}	{50, 50}
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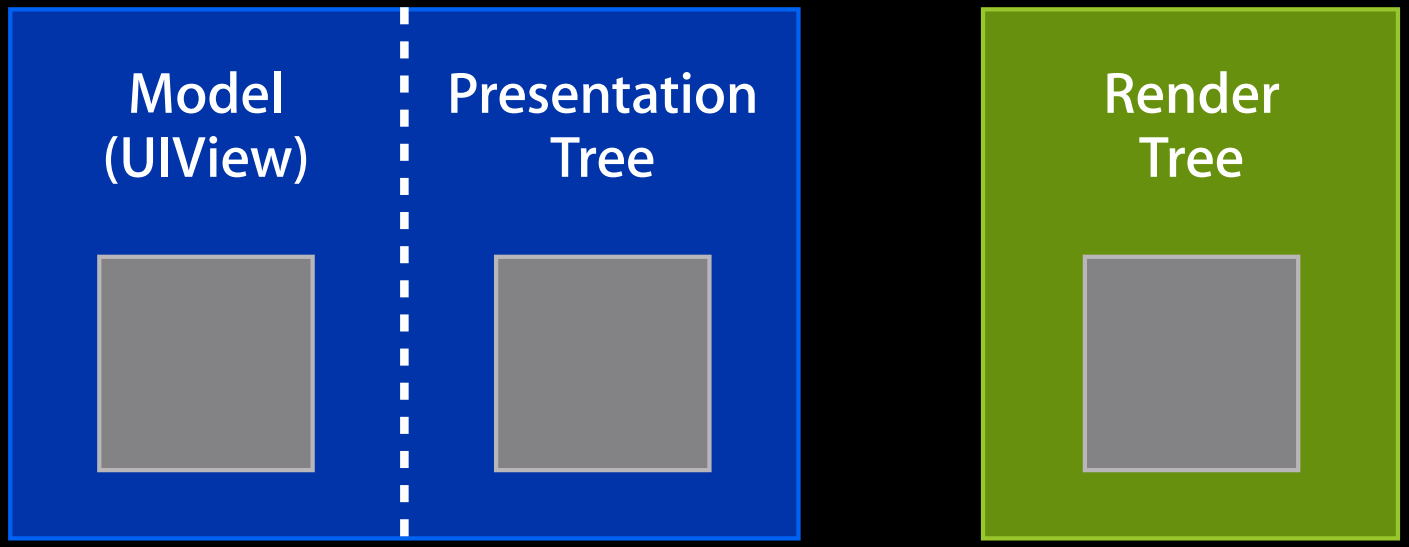

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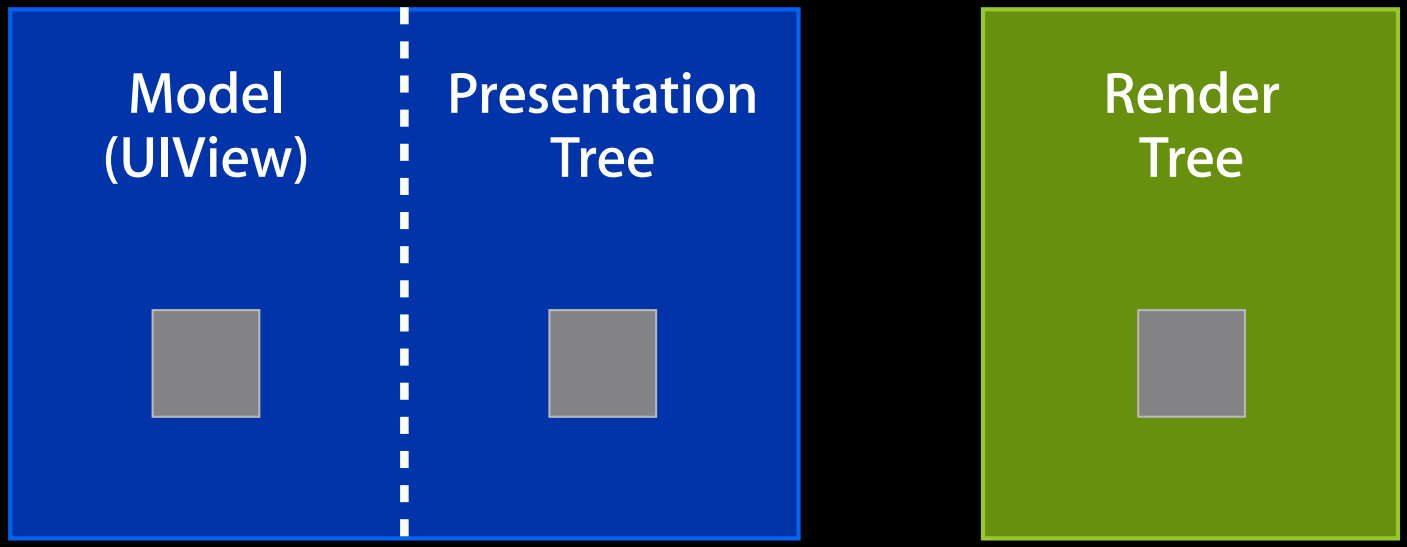
Render Tree	{25, 25}	{25, 25}	{37.5, 37.5}	{50, 50}



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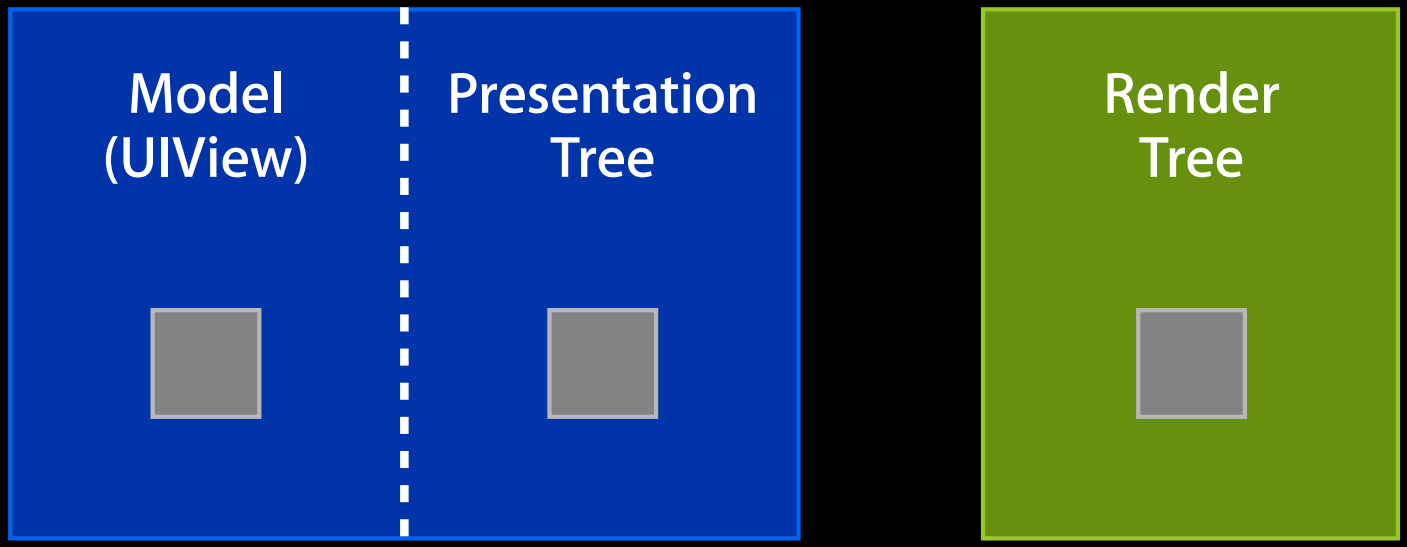
Presentation Tree	{25, 25}	{25, 25}	{37.5, 37.5}	{50, 50}
Render Tree	{25, 25}	{25, 25}	{37.5, 37.5}	{50, 50}



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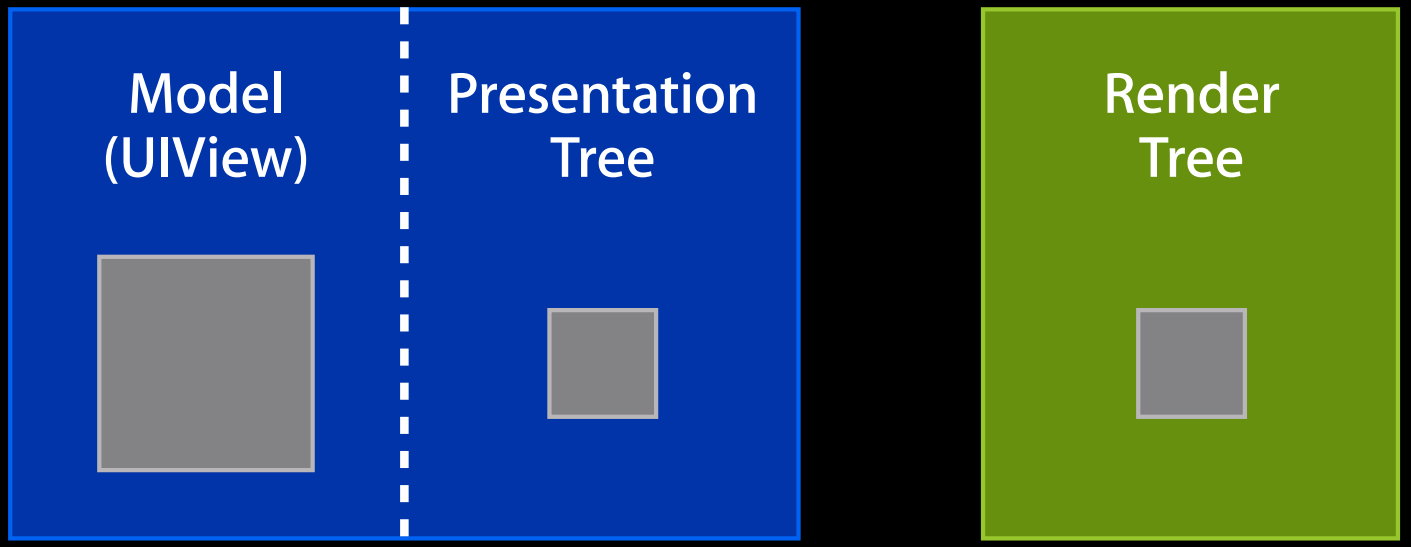

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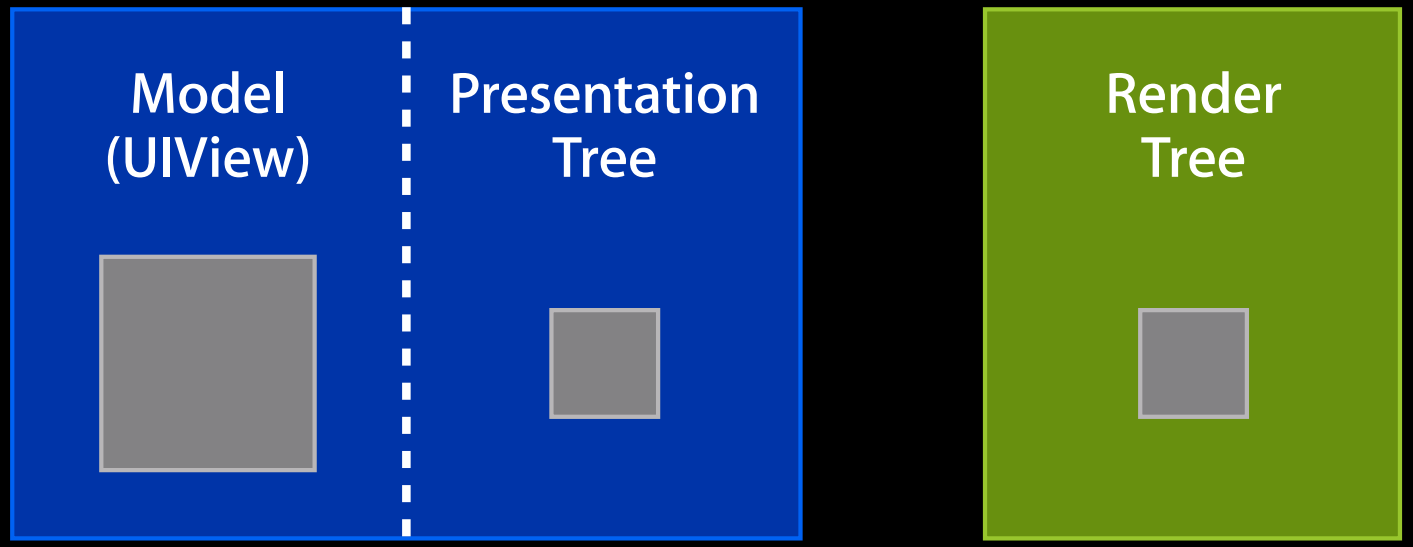

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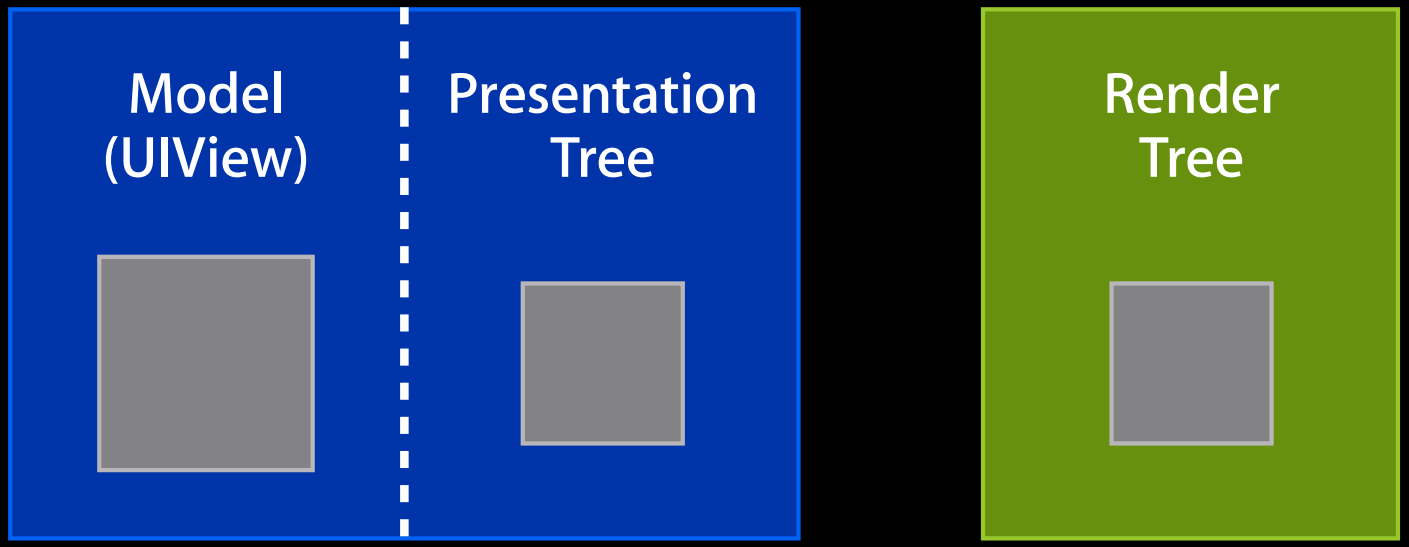

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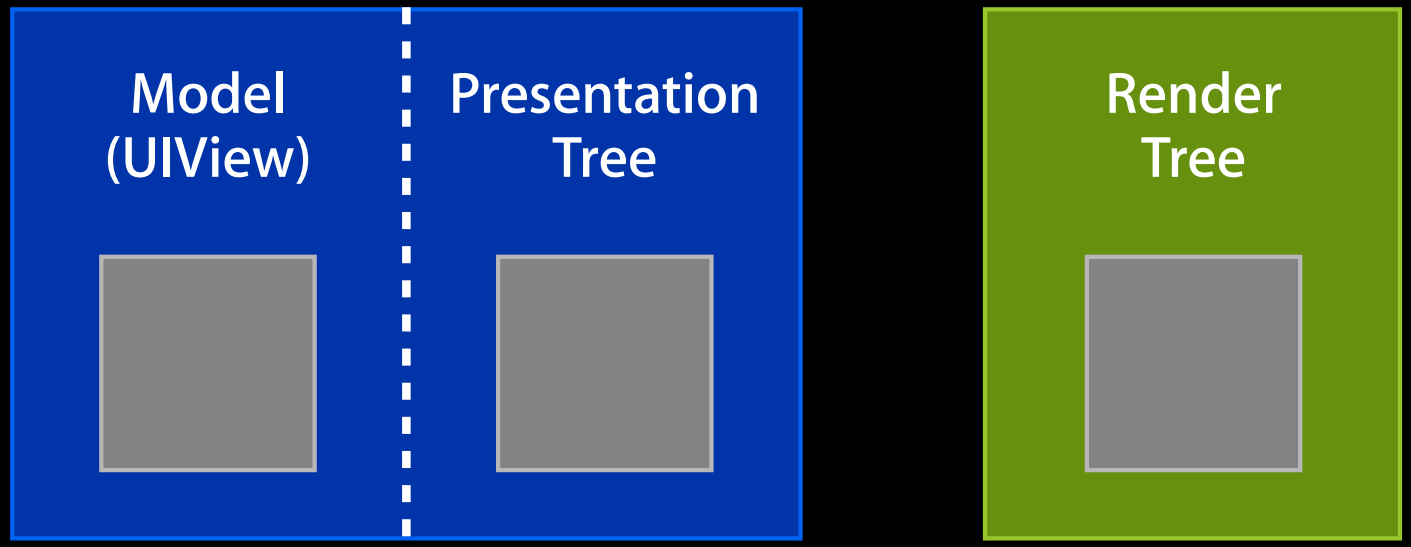
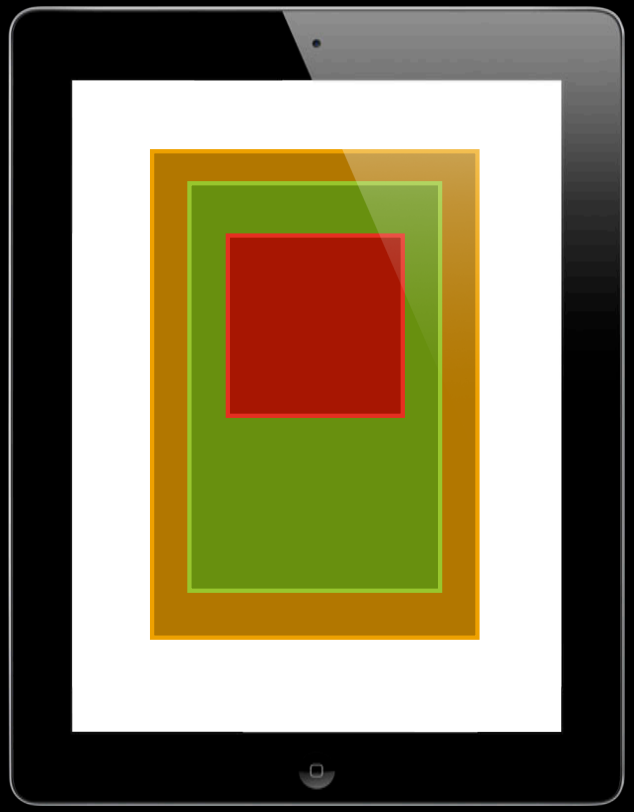


Rasterization

Andy Matuschak

Rasterization



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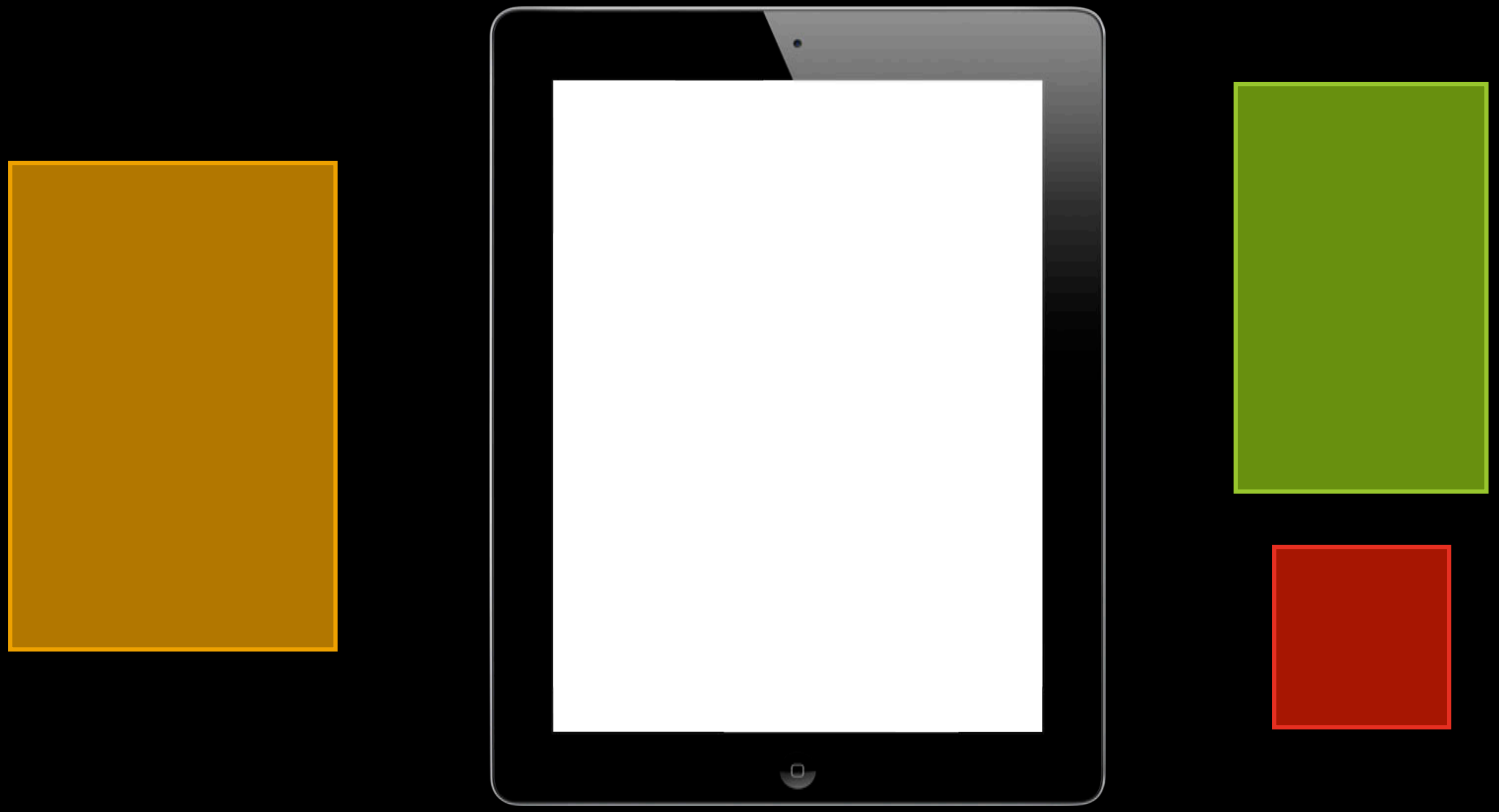

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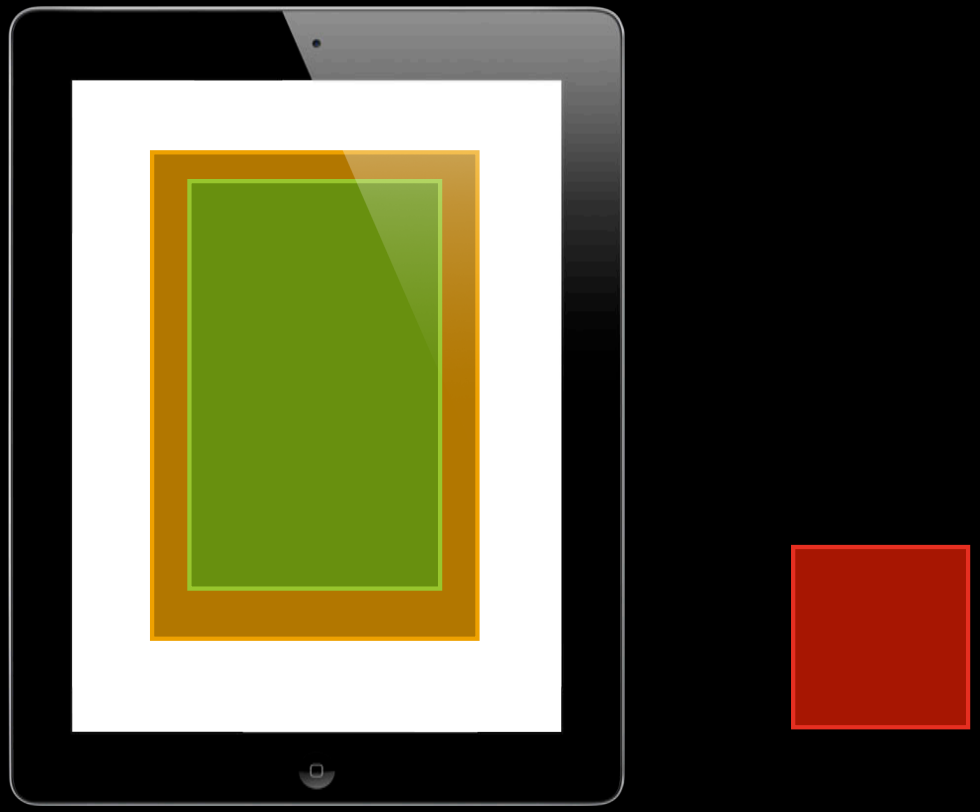

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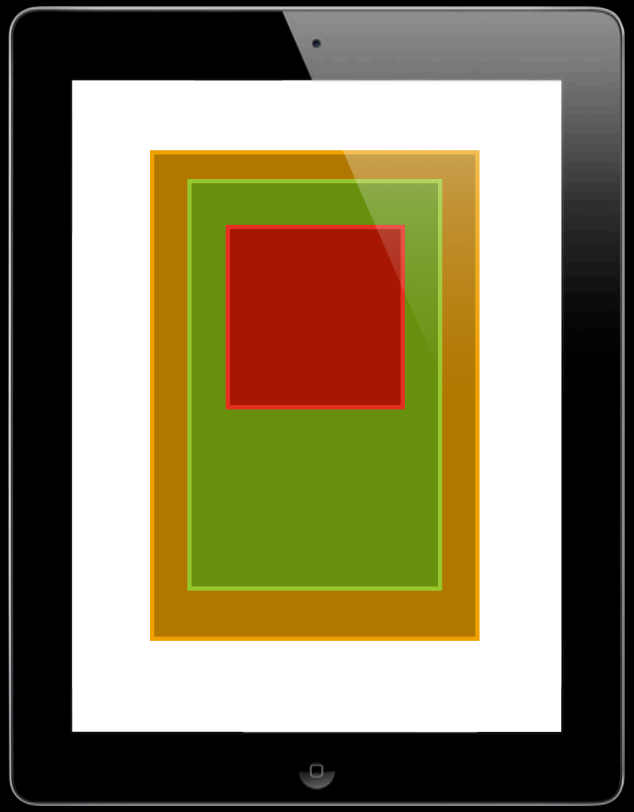

Rasterization

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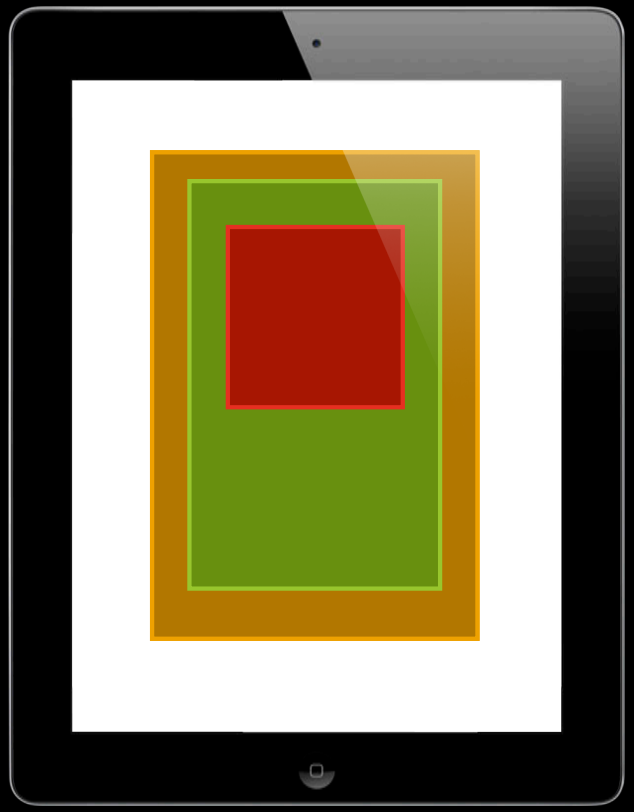

Rasterization

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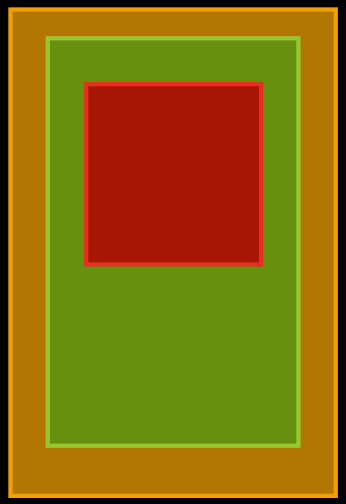

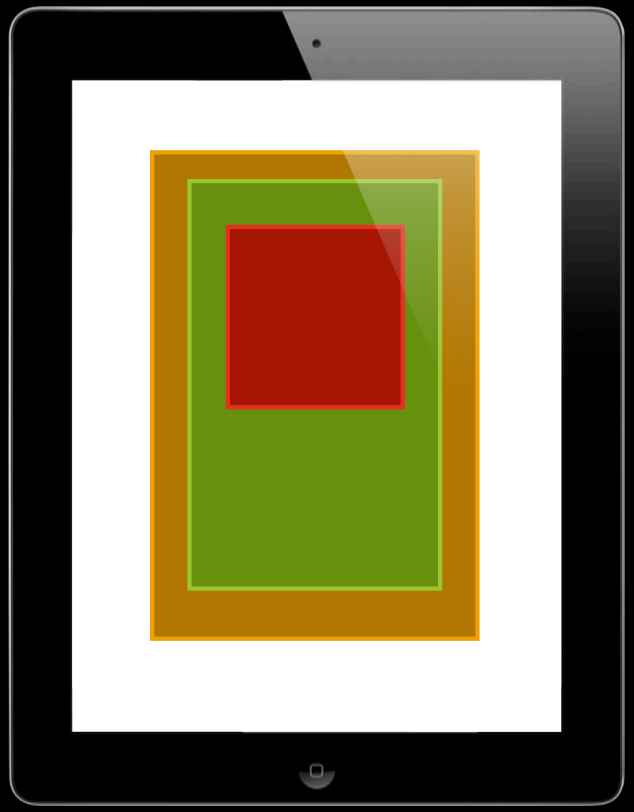

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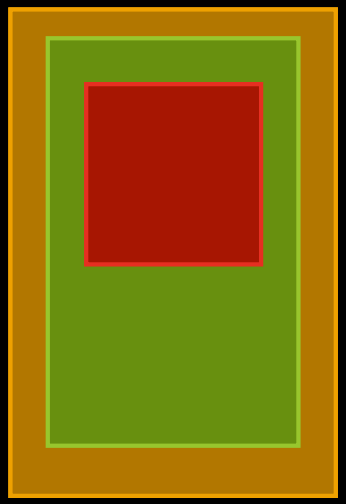

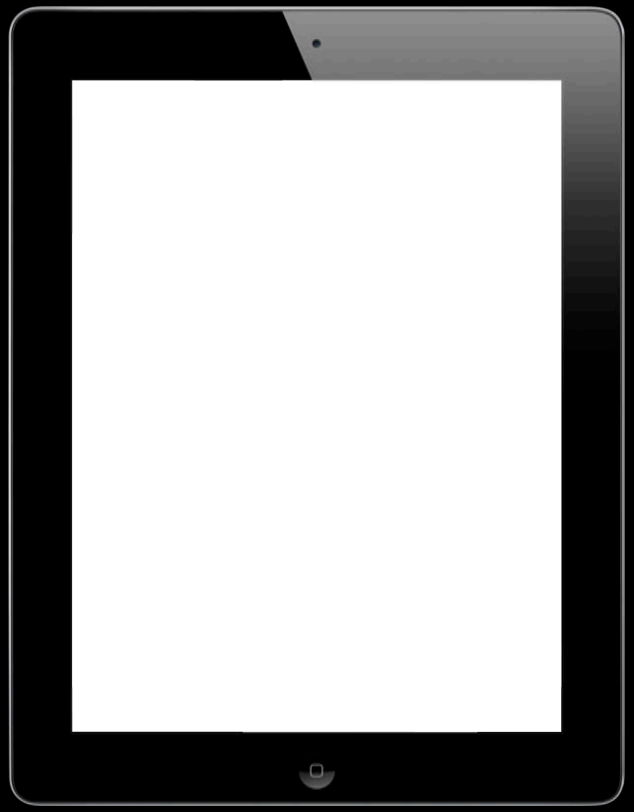

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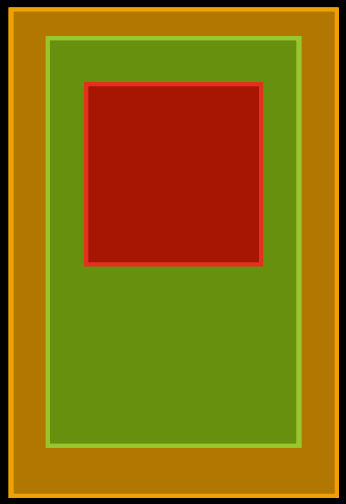

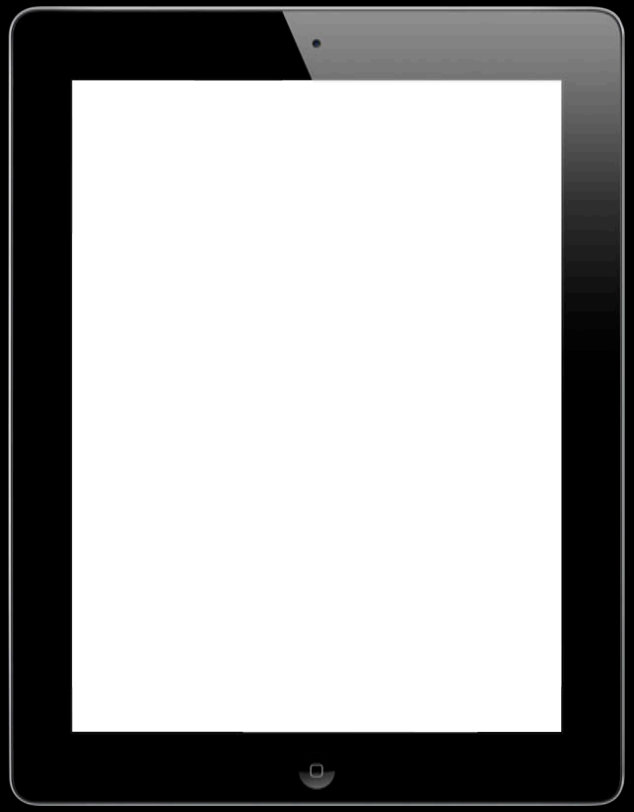

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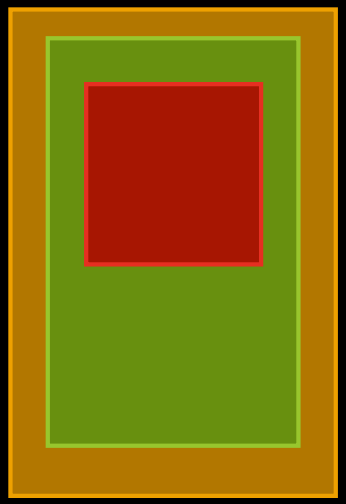
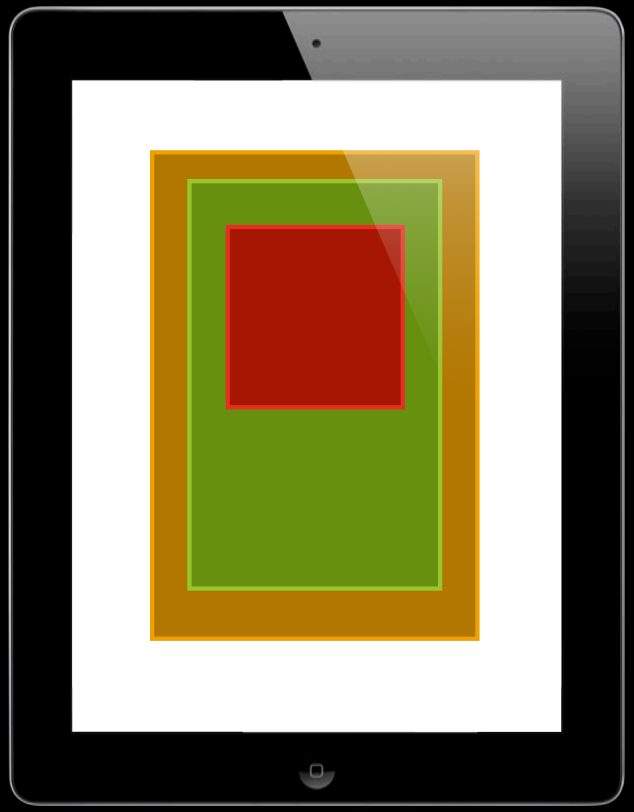
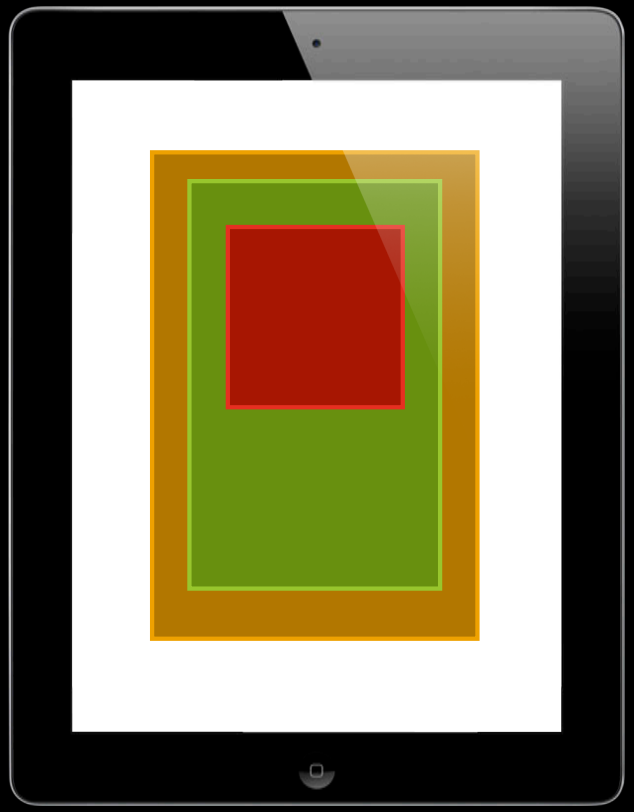




Rasterization

Shifting subtrees



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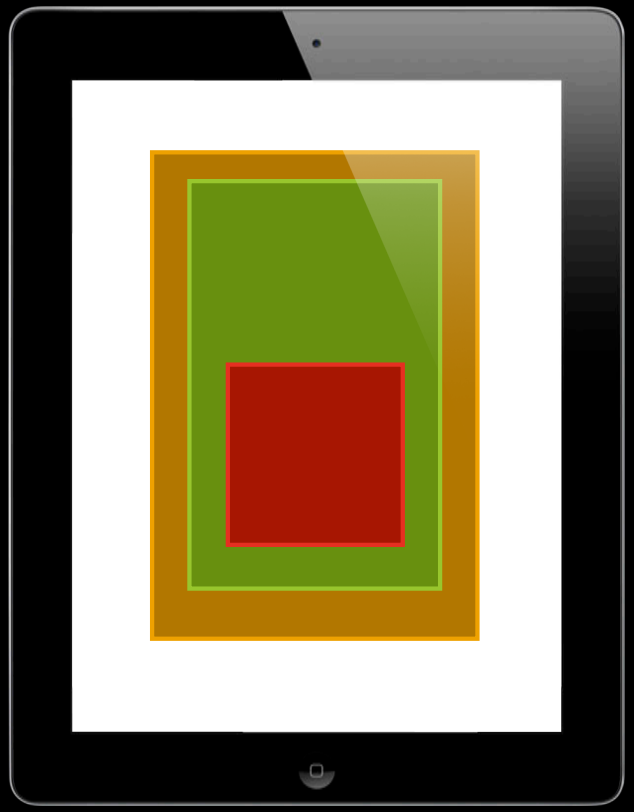

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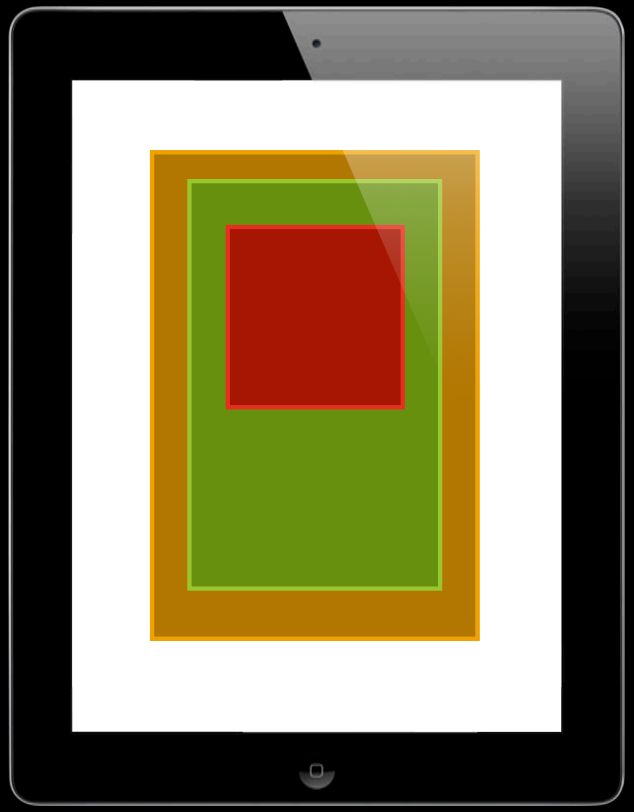

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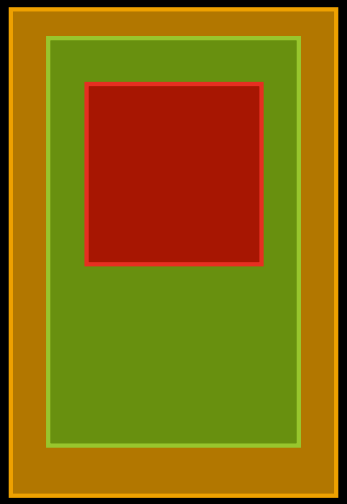
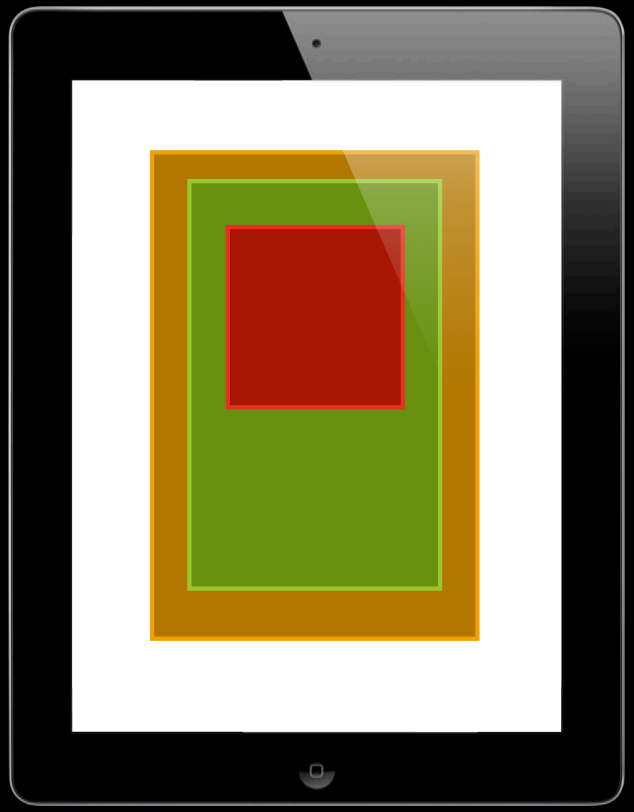
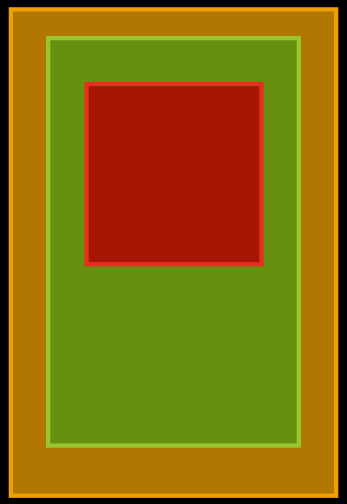
Shifting subtrees

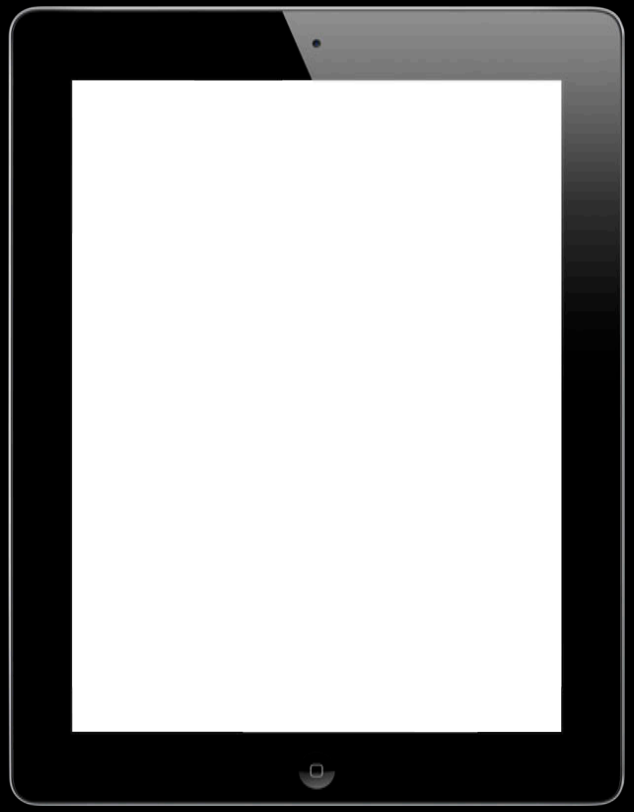




Rasterization

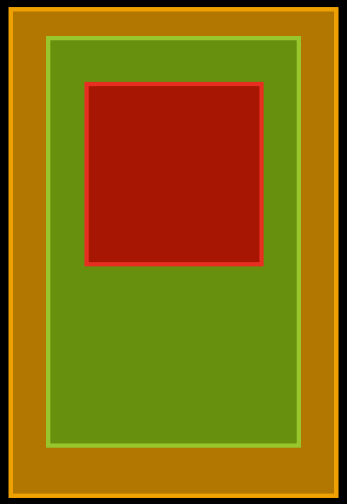
Shifting subtrees

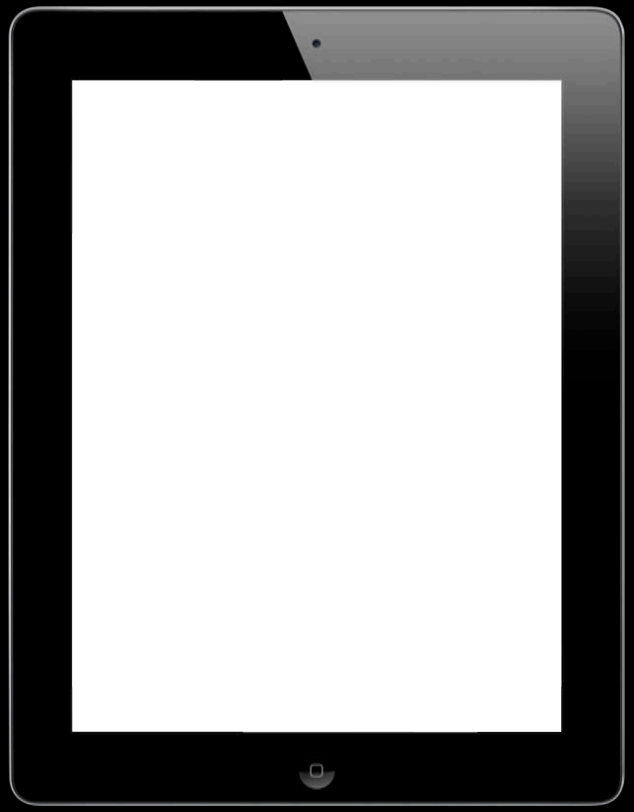




Rasterization

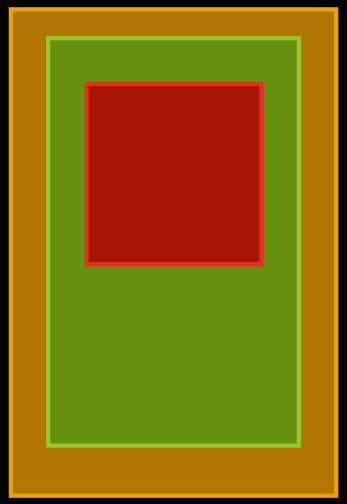
Shifting subtrees

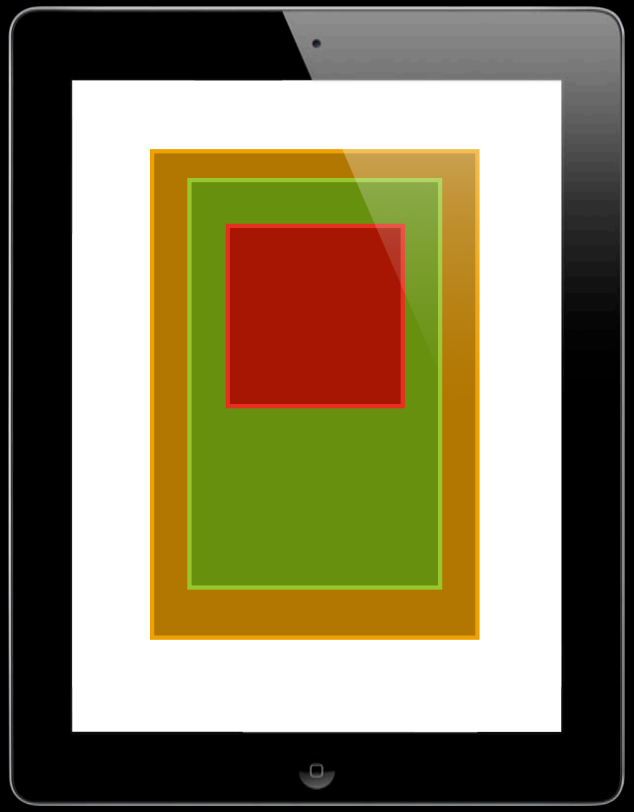




Rasterization

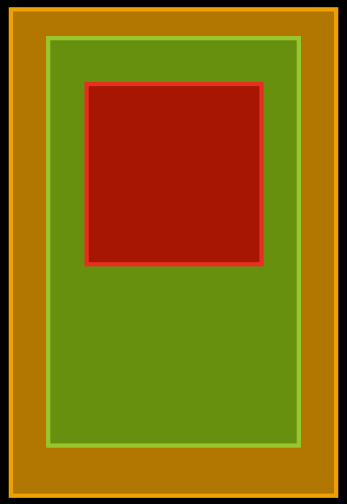
Shifting subtrees

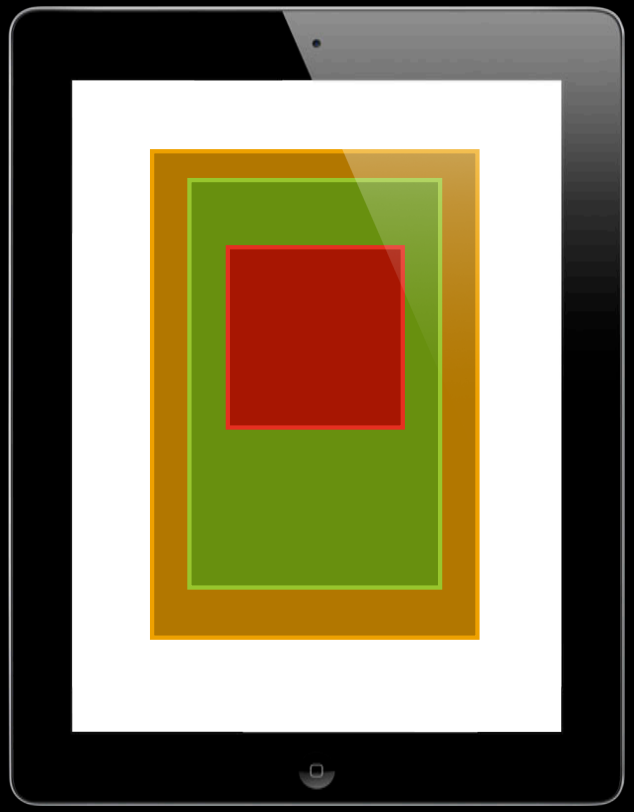




Rasterization

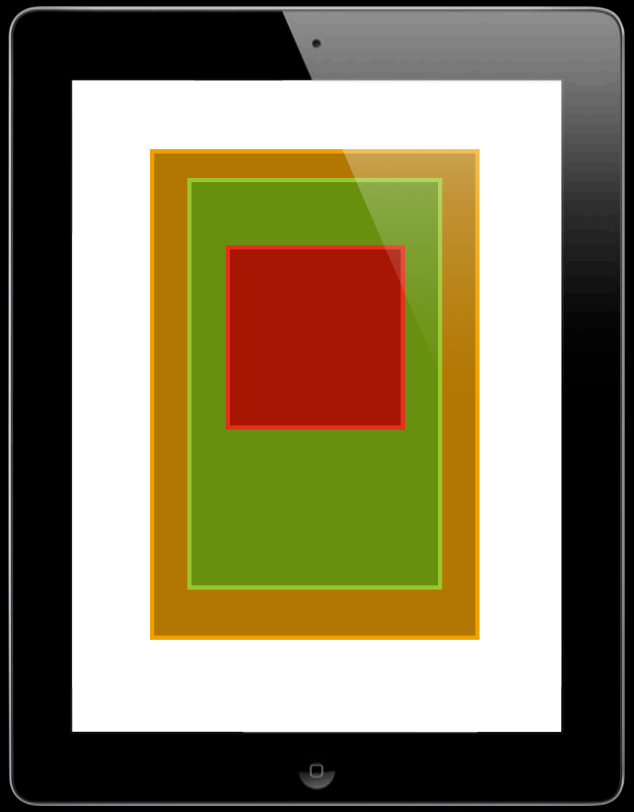
Shifting subtrees





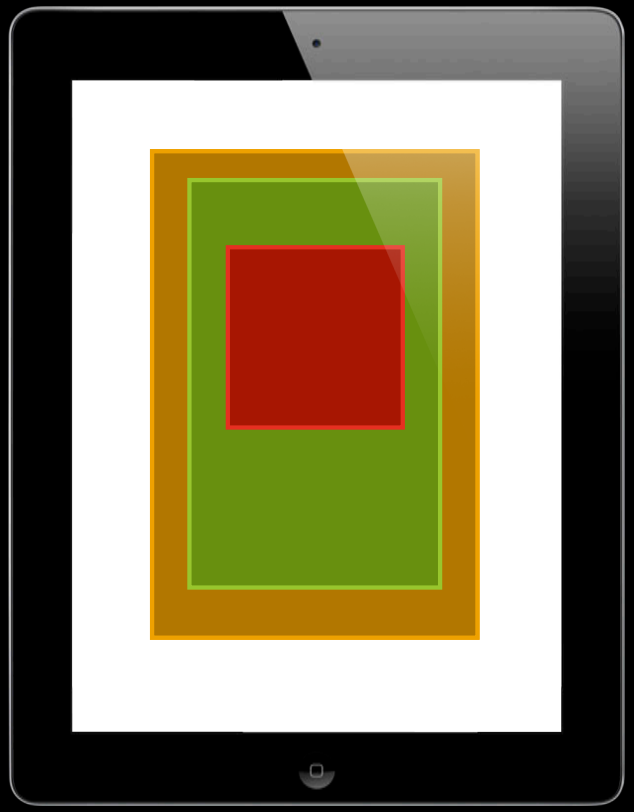
Rasterization

Shifting subtrees



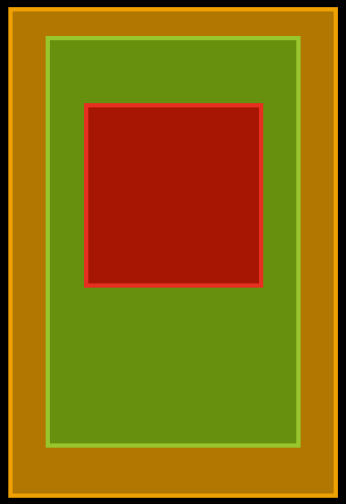
Rasterization

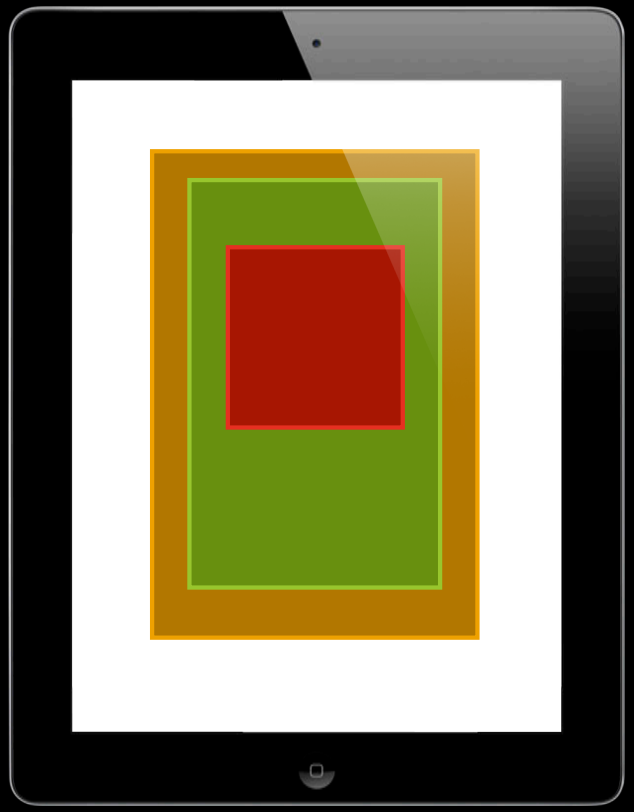
Shifting subtrees



Rasterization

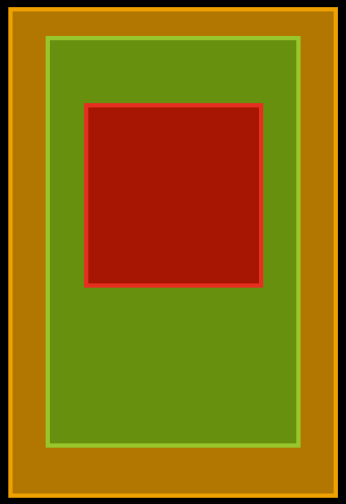
Shifting subtrees

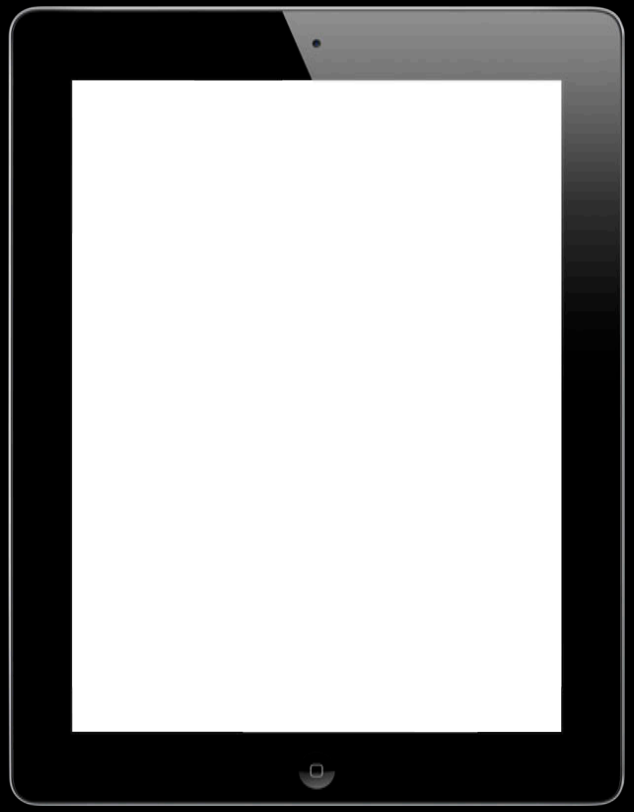




Rasterization

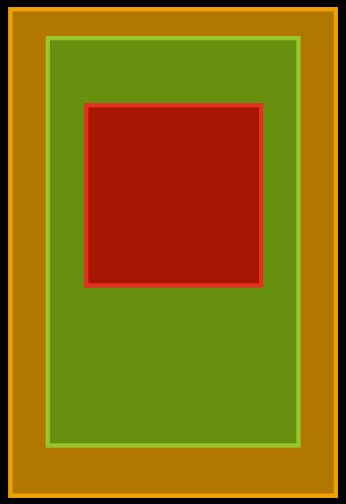
Shifting subtrees

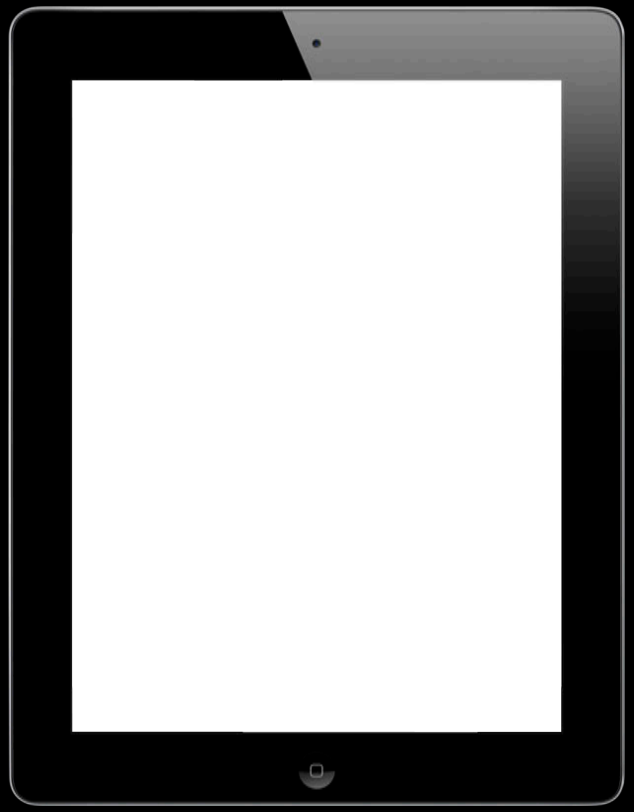




Rasterization

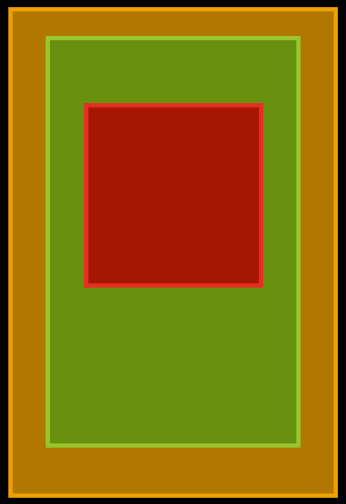
Shifting subtrees

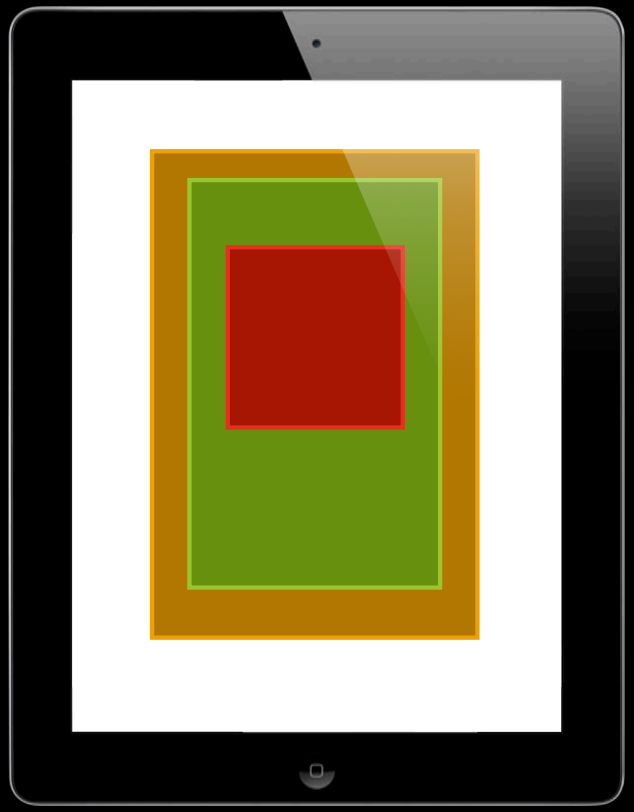




Rasterization

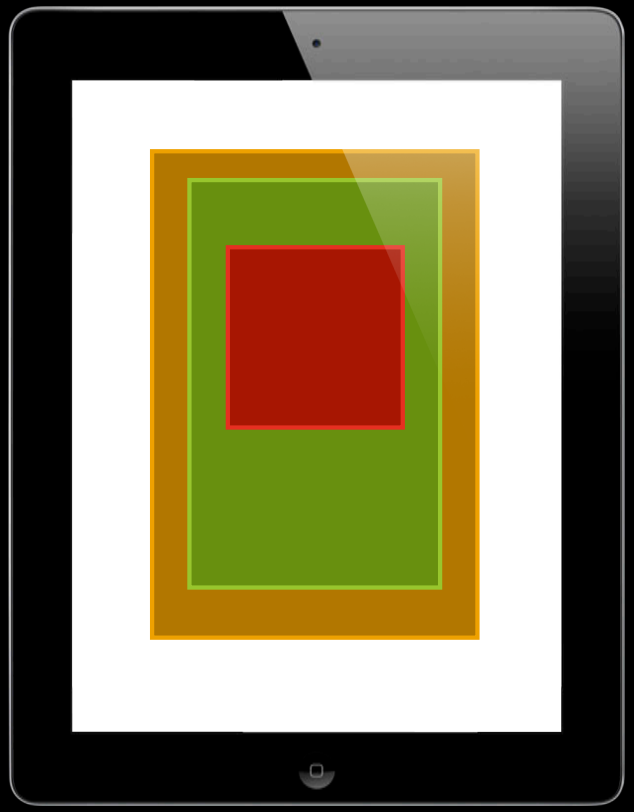
Shifting subtrees





Rasterization

Shifting subtrees



Rasterization

A two-part procedure

Rasterization

A two-part procedure

```
- (void)willAnimateRotationToInterfaceOrientation:(UIInterfaceOrientation)o
{
    [[[self view] layer] setShouldRasterize:YES];
}
```

Rasterization

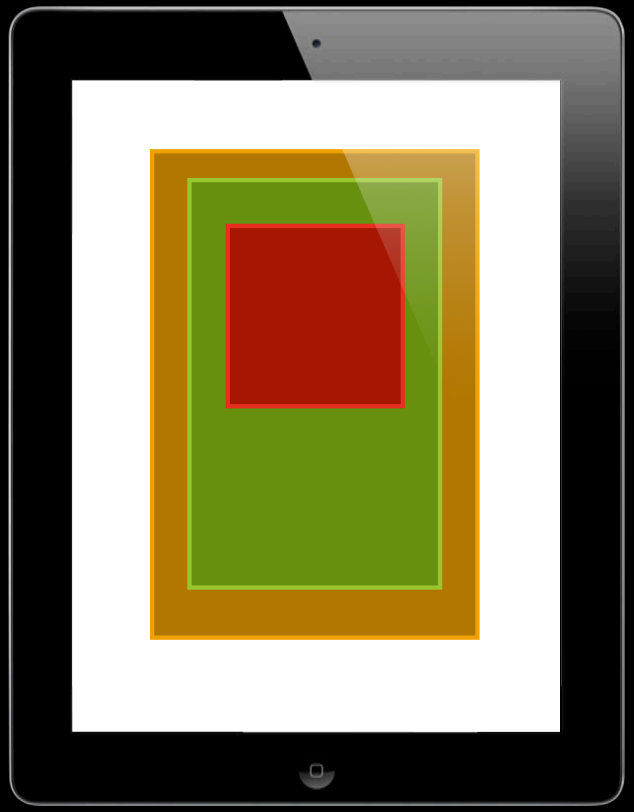
A two-part procedure

```
- (void)willAnimateRotationToInterfaceOrientation:(UIInterfaceOrientation)o
{
    [[[self view] layer] setShouldRasterize:YES];
}

- (void)didRotateToInterfaceOrientation:(UIInterfaceOrientation)o
{
    [[[self view] layer] setShouldRasterize:NO];
}
```

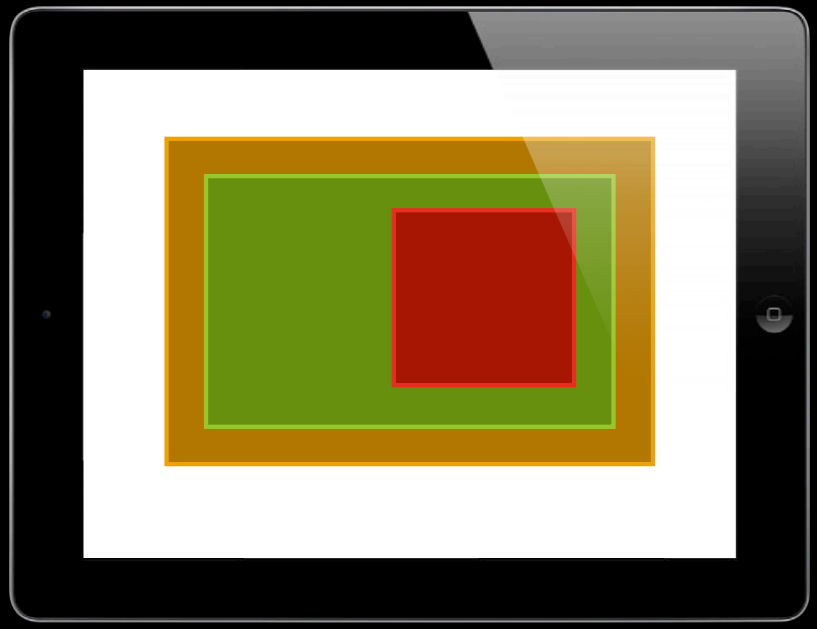
Rasterization

Shifting subtrees



Rasterization

Shifting subtrees



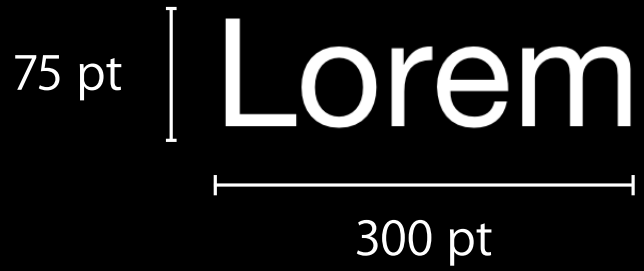
Rasterization Scale

Rasterization Scale

Lorem

Layer

Rasterization Scale



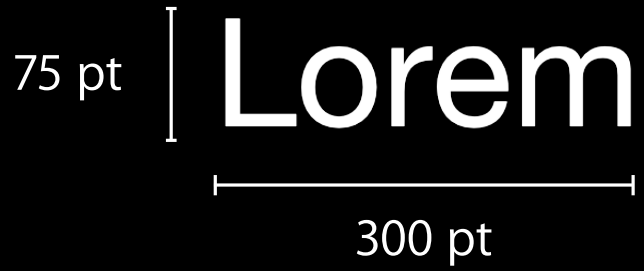
Layer

Rasterization Scale

Layer

Rasterization Scale

```
[[self layer] setShouldRasterize:YES];
```



Layer

Rasterization Scale

```
[[self layer] setShouldRasterize:YES];
```

Layer

Rasterized image

Rasterization Scale

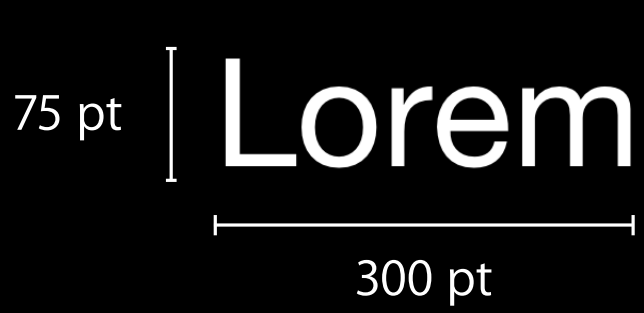
```
[[self layer] setShouldRasterize:YES];
```

Layer

Rasterized image

Rasterization Scale

```
[[self layer] setShouldRasterize:YES];
```

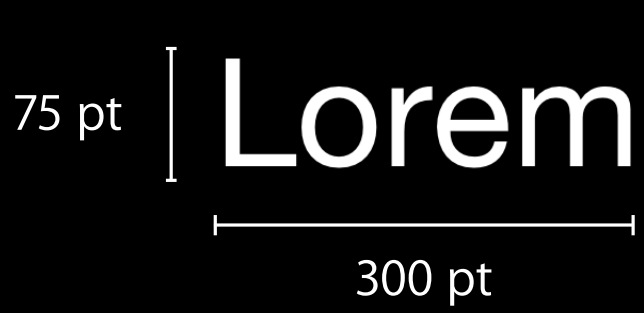


Layer

Rasterized image on Retina device

Rasterization Scale

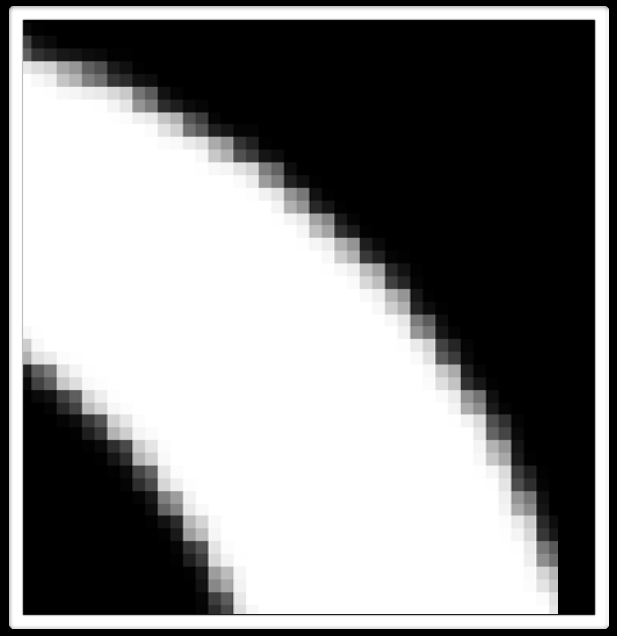
```
[[self layer] setShouldRasterize:YES];
```



Layer

Rasterized image on Retina device

Rasterization Scale

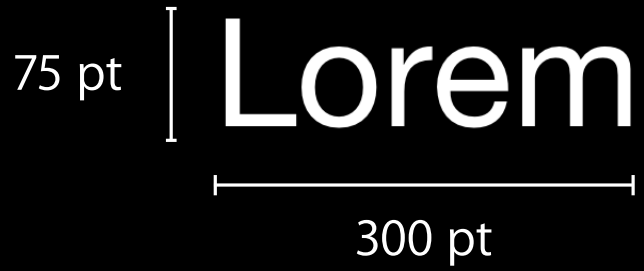


```
[[self layer] setShouldRasterize:YES];
```

Lorem

Rasterized image on Retina device

Rasterization Scale



Layer

```
[[self layer] setShouldRasterize:YES];
```

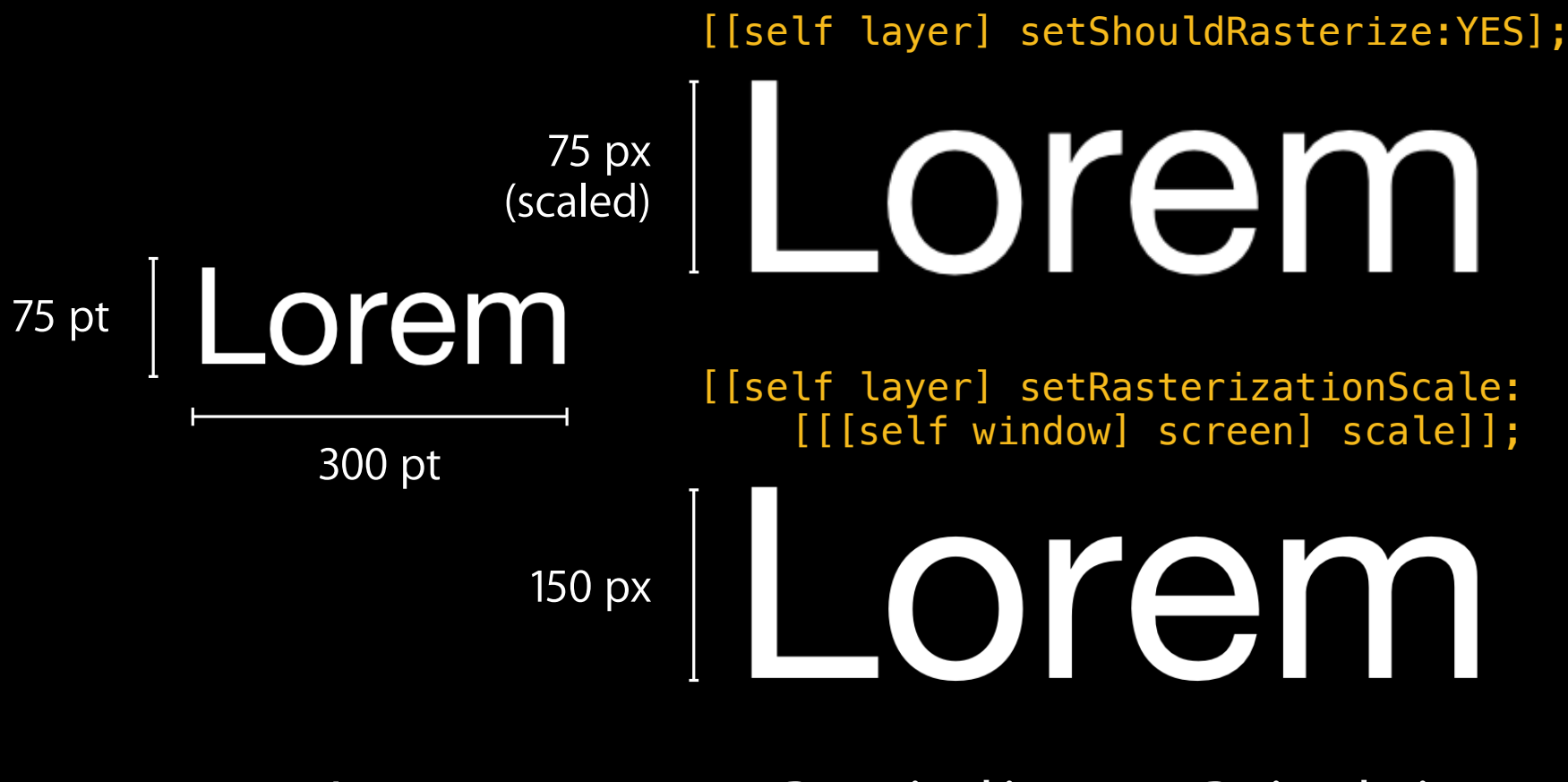
Lorem

```
[[self layer] setRasterizationScale:
    [[[self window] screen] scale]];
```

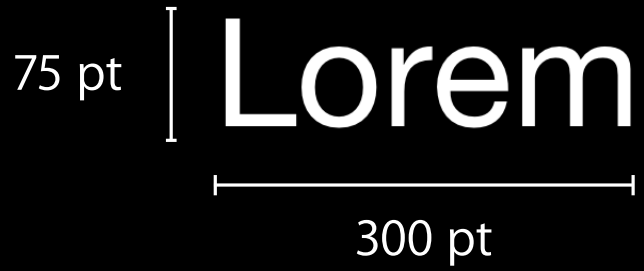
Lorem

Rasterized image on Retina device

Rasterization Scale



Rasterization Scale



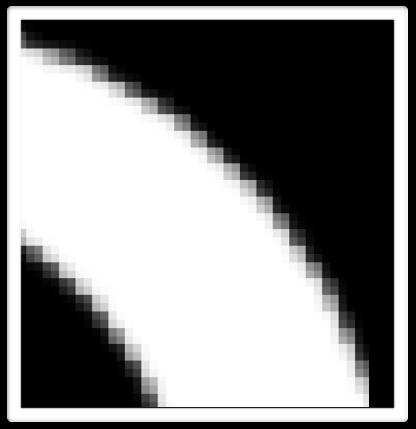
Layer

```
[[self layer] setShouldRasterize:YES];
```


```
[[self layer] setRasterizationScale:
    [[[self window] screen] scale]];
```

Rasterized image on Retina device

Rasterization Scale



```
[[self layer] setShouldRasterize:YES];
```

Lorem

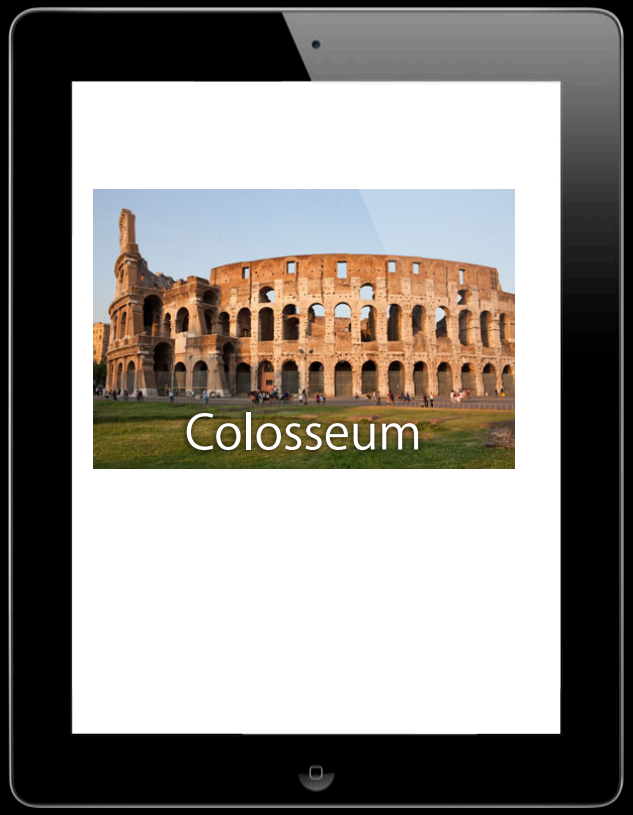
```
[[self layer] setRasterizationScale:
    [[[self window] screen] scale]];
```

Lorem

Rasterized image on Retina device

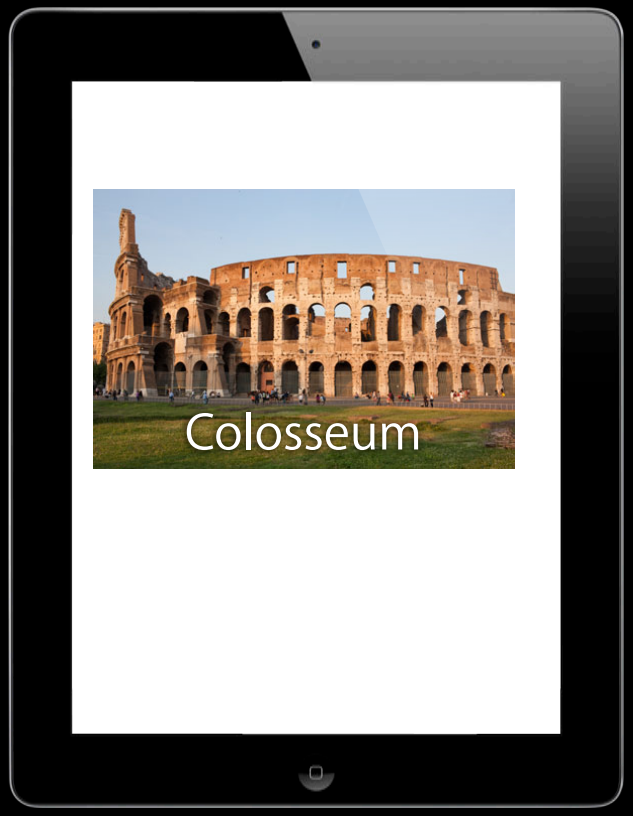
Rasterization

Memory implications



Rasterization

Memory implications

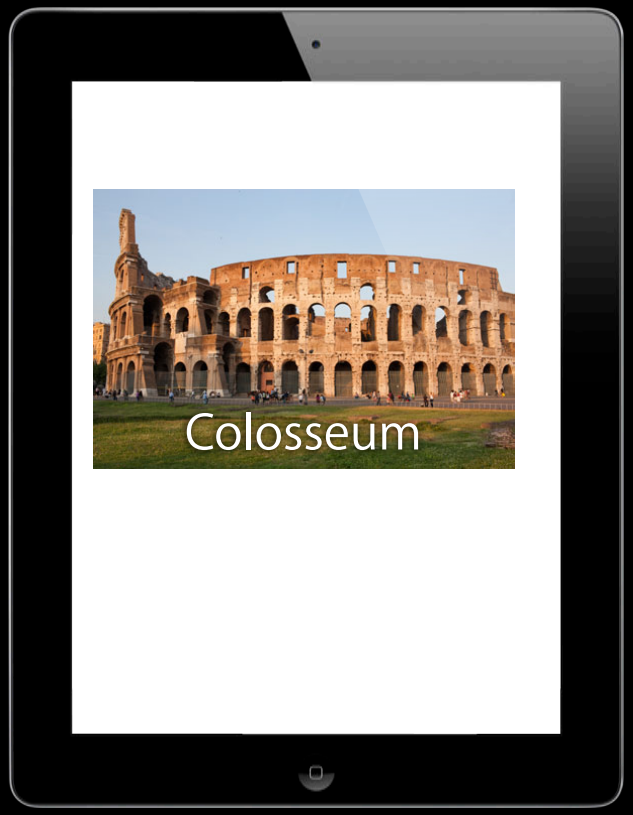


Memory footprint

Rasterization

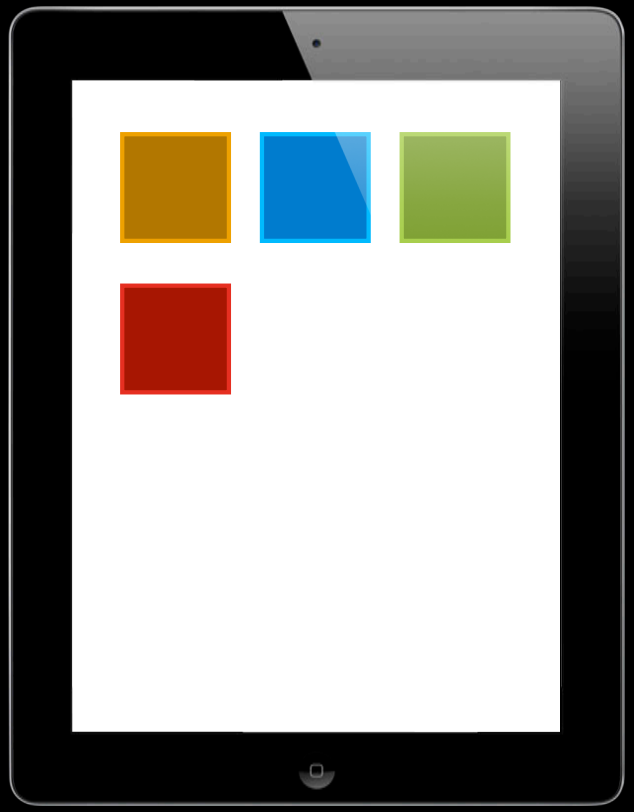
Memory implications

Memory footprint

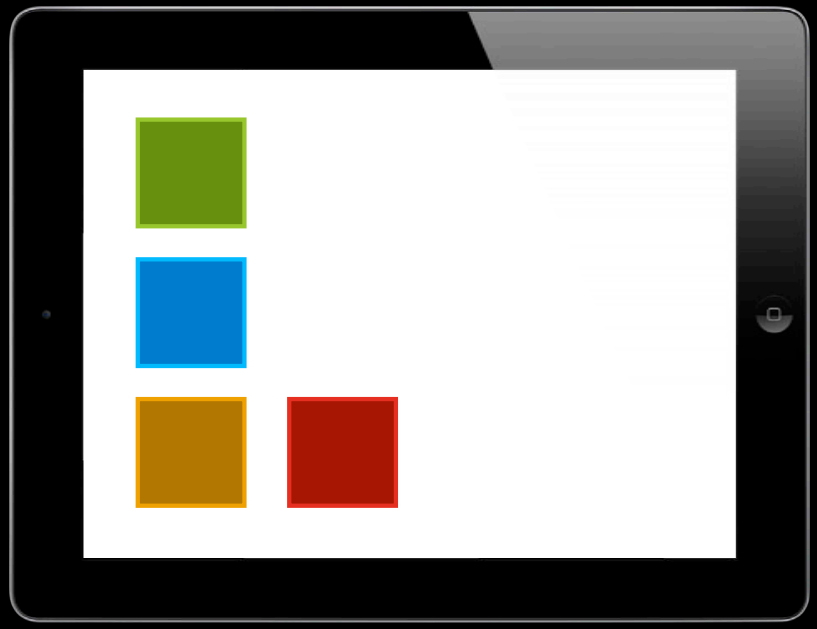


Snapshotting

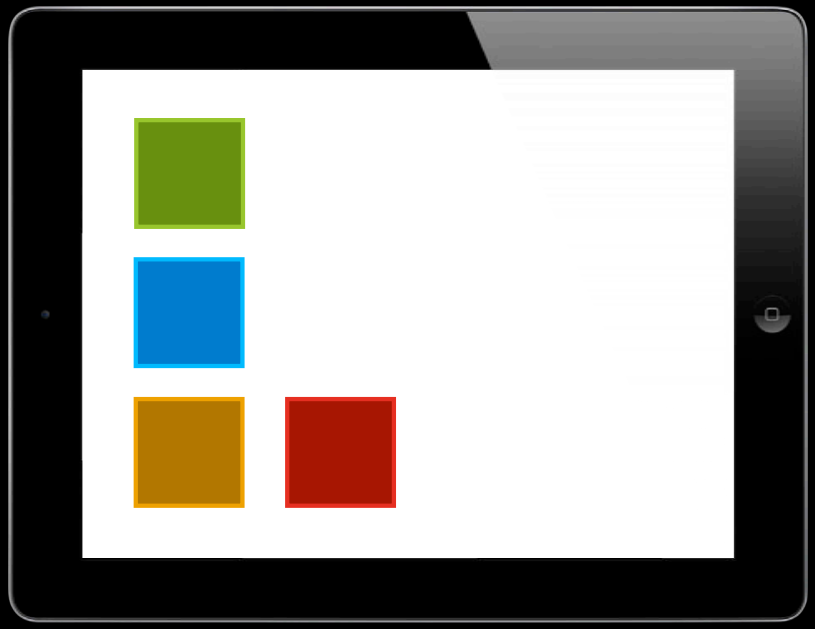
Snapshotting



Snapshotting



Snapshotting

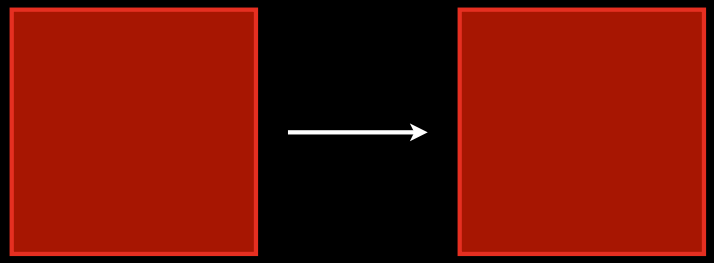


Snapshotting

Snapshotting

Original layer

Snapshotting

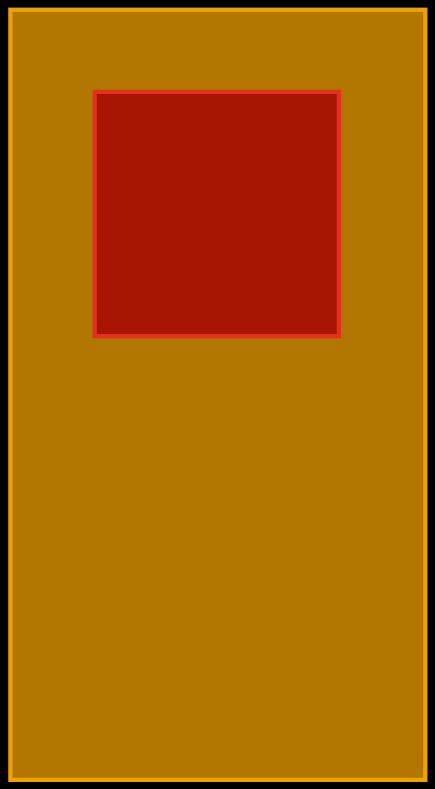


Original layer Image

```
UIGraphicsBeginImageContextWithOptions([layer bounds].size, NO, 0);
[layer renderInContext:UIGraphicsGetCurrentContext()];
UIImage *i = UIGraphicsGetImageFromCurrentImageContext();
UIGraphicsEndImageContext();
```

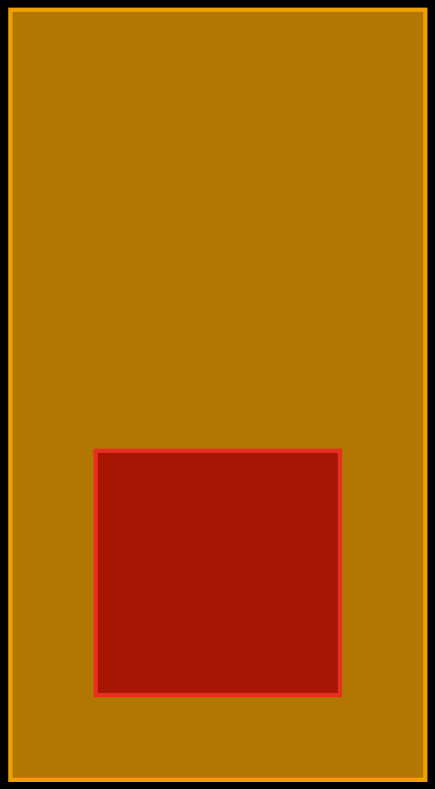
Snapshotting

Model tree vs. presentation tree



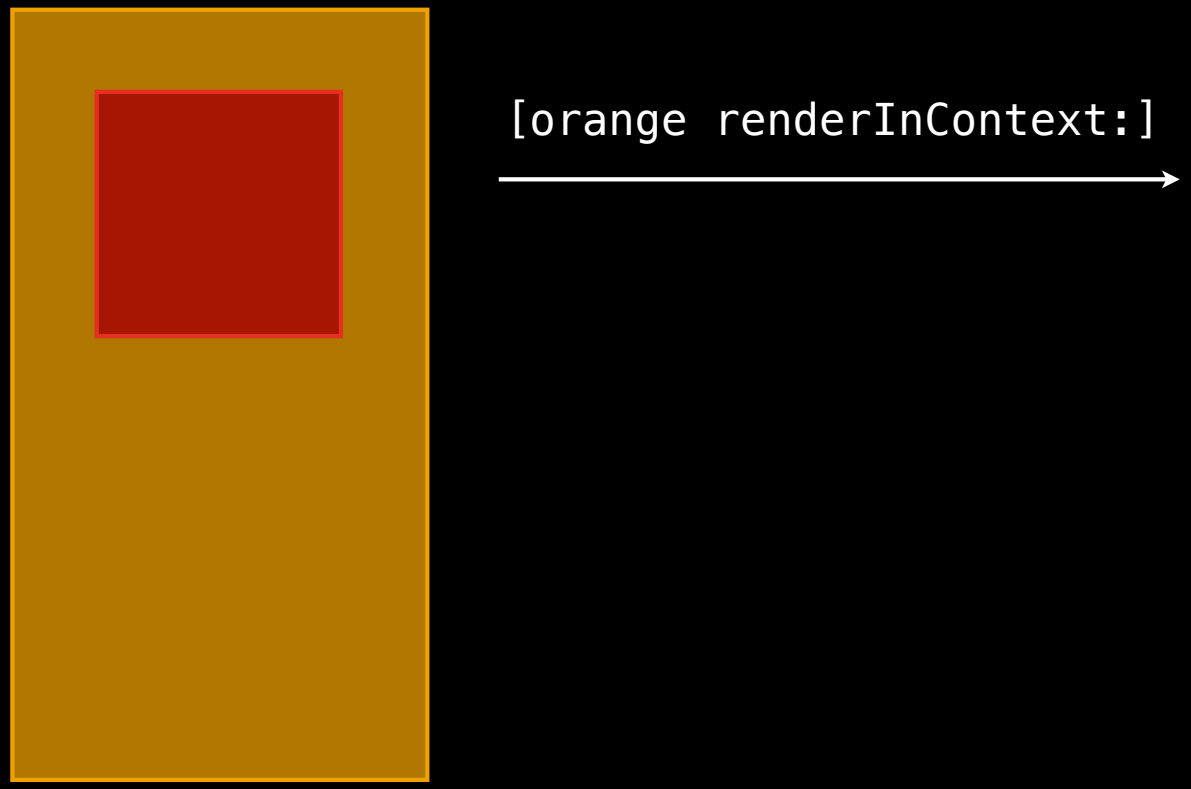
Snapshotting

Model tree vs. presentation tree



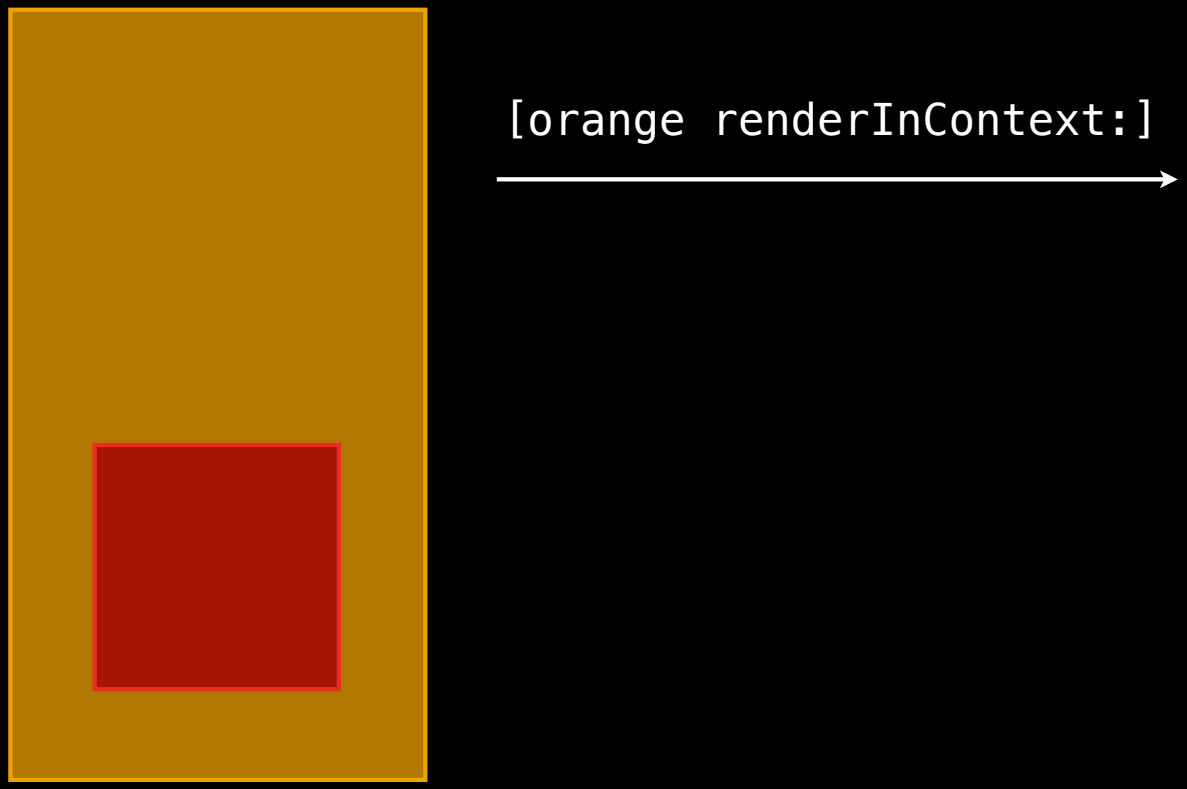
Snapshotting

Model tree vs. presentation tree



Snapshotting

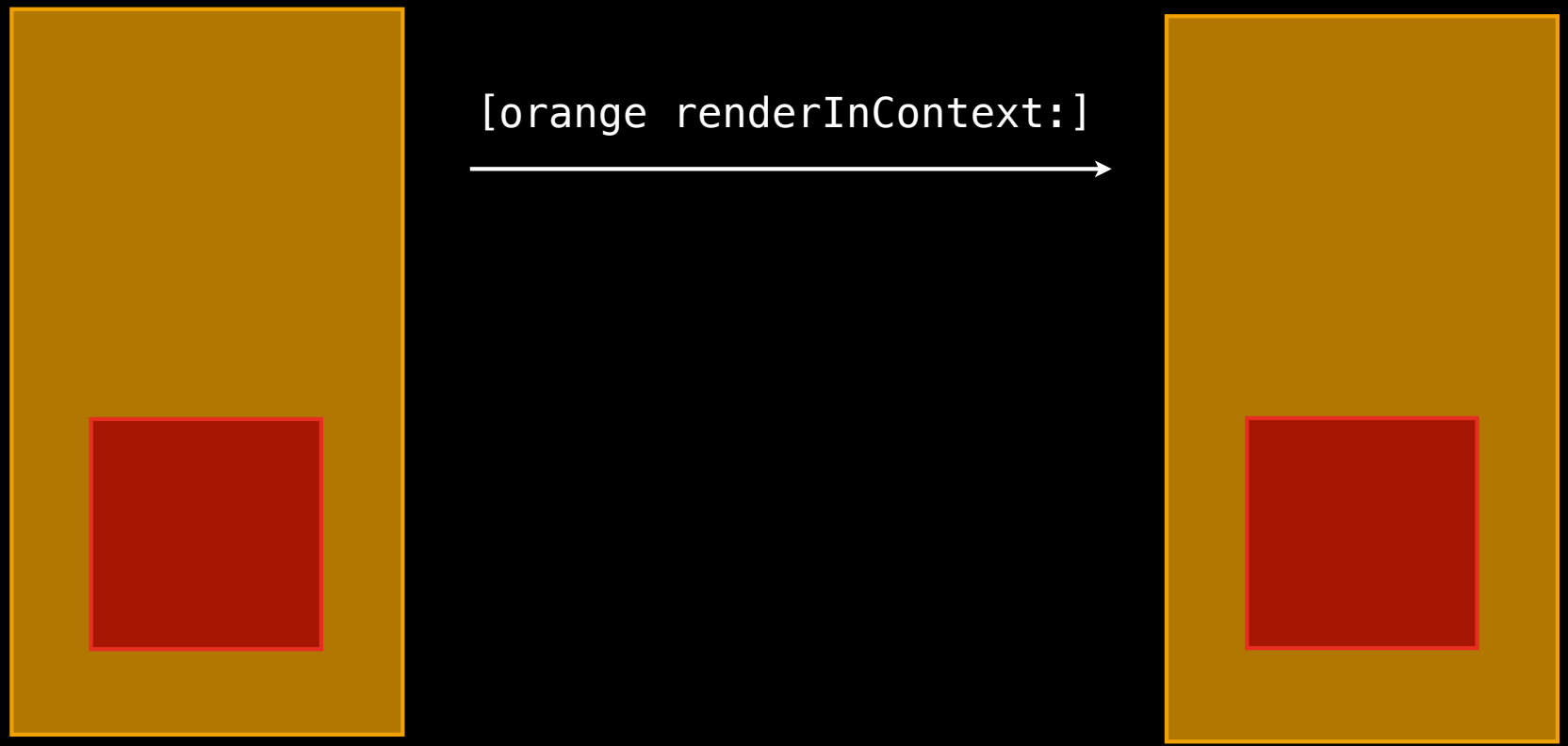
Model tree vs. presentation tree



```
[orange renderInContext:]
```

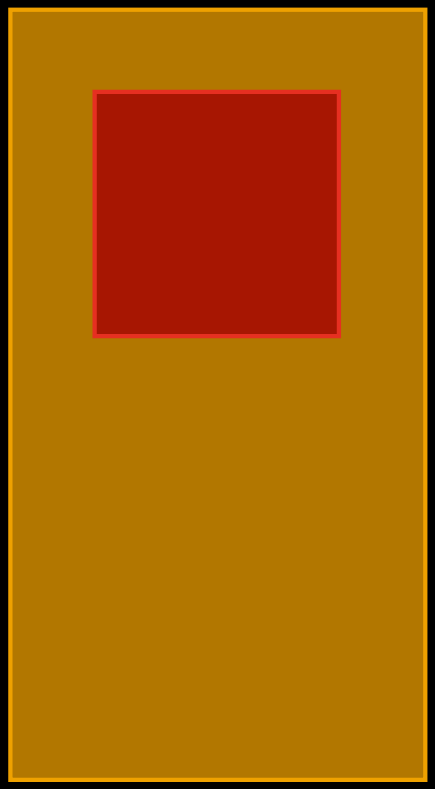
Snapshotting

Model tree vs. presentation tree



Snapshotting

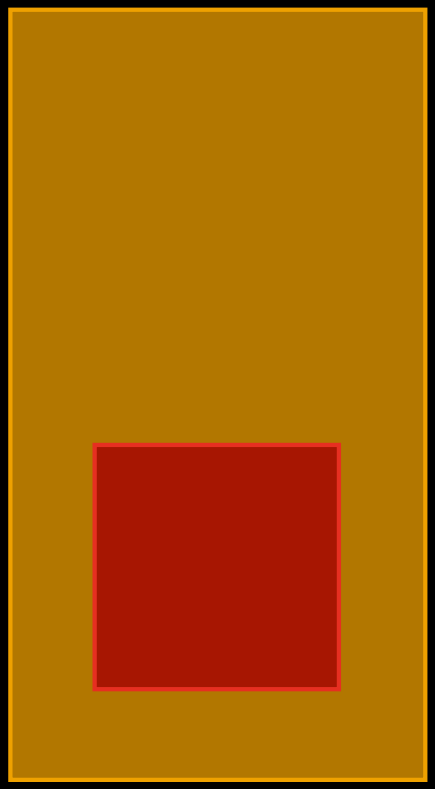
Model tree vs. presentation tree



```
[[orange presentationLayer]
    renderInContext:]
```

Snapshotting

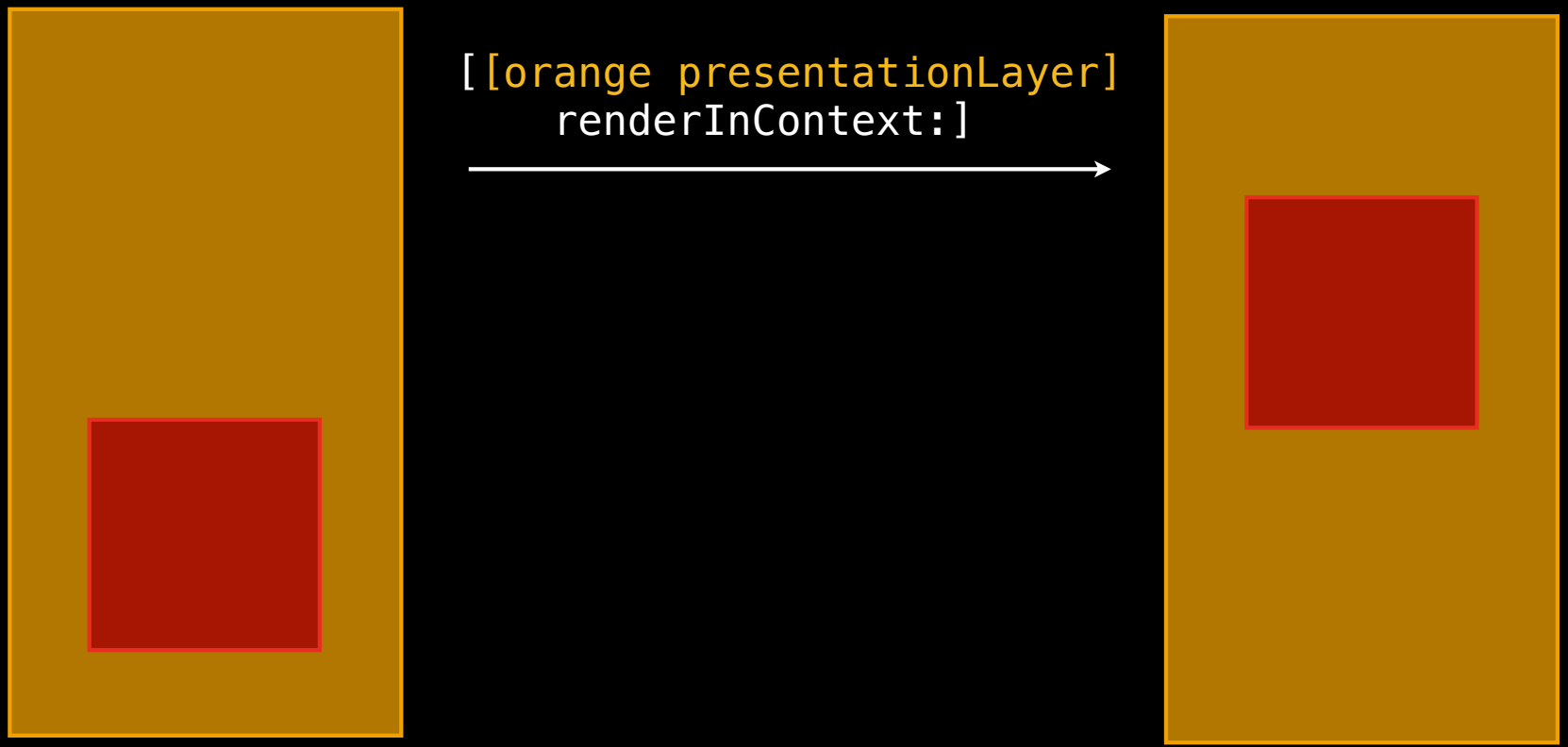
Model tree vs. presentation tree



```
[[orange presentationLayer]
    renderInContext:]
```

Snapshotting

Model tree vs. presentation tree



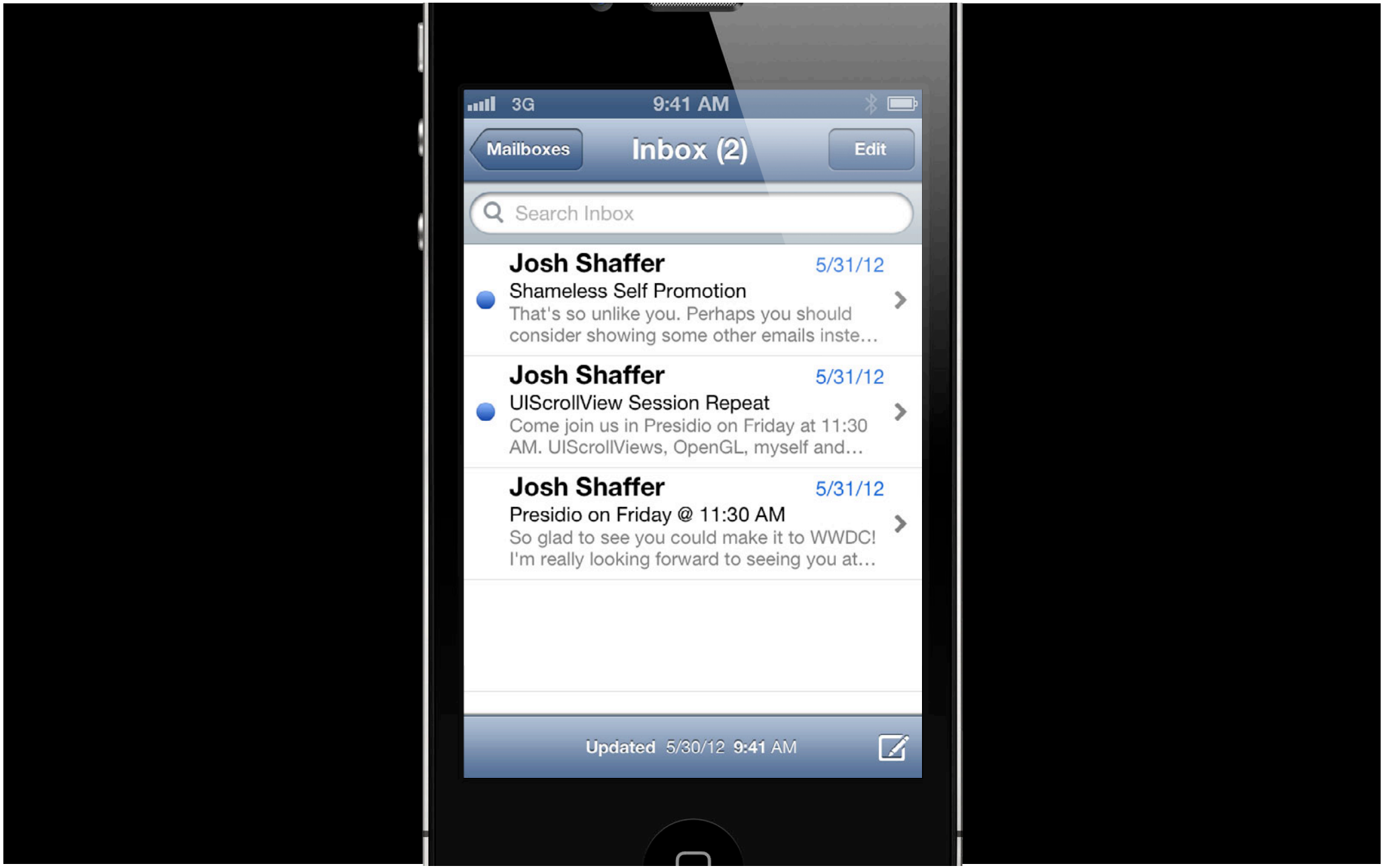
Snapshotting vs. Rasterization

Performance characteristics

	…are rendered by…	…on the…
Rasterizations	The render server	GPU
Snapshots	Your app	CPU

Snapshot Rotations

Josh Shaffer


3G
9:41 AM
Mailboxes
Inbox (2)
Edit
Search Inbox
Josh Shaffer
5/31/12
Shameless Self Promotion
That's so unlike you. Perhaps you should consider showing some other emails inste…
Josh Shaffer
5/31/12
UIScrollView Session Repeat
Come join us in Presidio on Friday at 11:30 AM. UIScrollViews, OpenGL, myself and…
Josh Shaffer
5/31/12
Presidio on Friday @ 11:30 AM
So glad to see you could make it to WWDC! I'm really looking forward to seeing you at…
Updated 5/30/12 9:41 AM


3G
9:41 AM
Mailboxes
Inbox (2)
Edit
Search Inbox
Josh Shaffer
5/31/12
Shameless Self Promotion
That's so unlike you. Perhaps you should consider showing some other emails instead. Josh
Josh Shaffer
5/31/12
UIScrollView Session Repeat
Come join us in Presidio on Friday at 11:30 AM. UIScrollViews, OpenGL, myself and Eliza. What more do you need to know? Josh
Josh Shaffer
5/31/12
Presidio on Friday @ 11:30 AM
Updated 5/30/12 9:41 AM


3G
9:41 AM
Mailboxes
Inbox (2)
Edit
Search Inbox
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5/31/12
Presidio on Friday @ 11:30 AM
Updated 5/30/12 9:41 AM


3G
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Mailboxes
Inbox (2)
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Presidio on Friday @ 11:30 AM
Updated 5/30/12 9:41 AM


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Josh Shaffer
5/31/12
Presidio on Friday @ 11:30 AM
Updated 5/30/12 9:41 AM


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Josh Shaffer
5/31/12
Presidio on Friday @ 11:30 AM
Updated 5/30/12 9:41 AM


3G
9:41 AM
Mailboxes
Inbox (2)
Edit
Search Inbox
Josh Shaffer
5/31/12
Shameless Self Promotion
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UIScrollView Session Repeat
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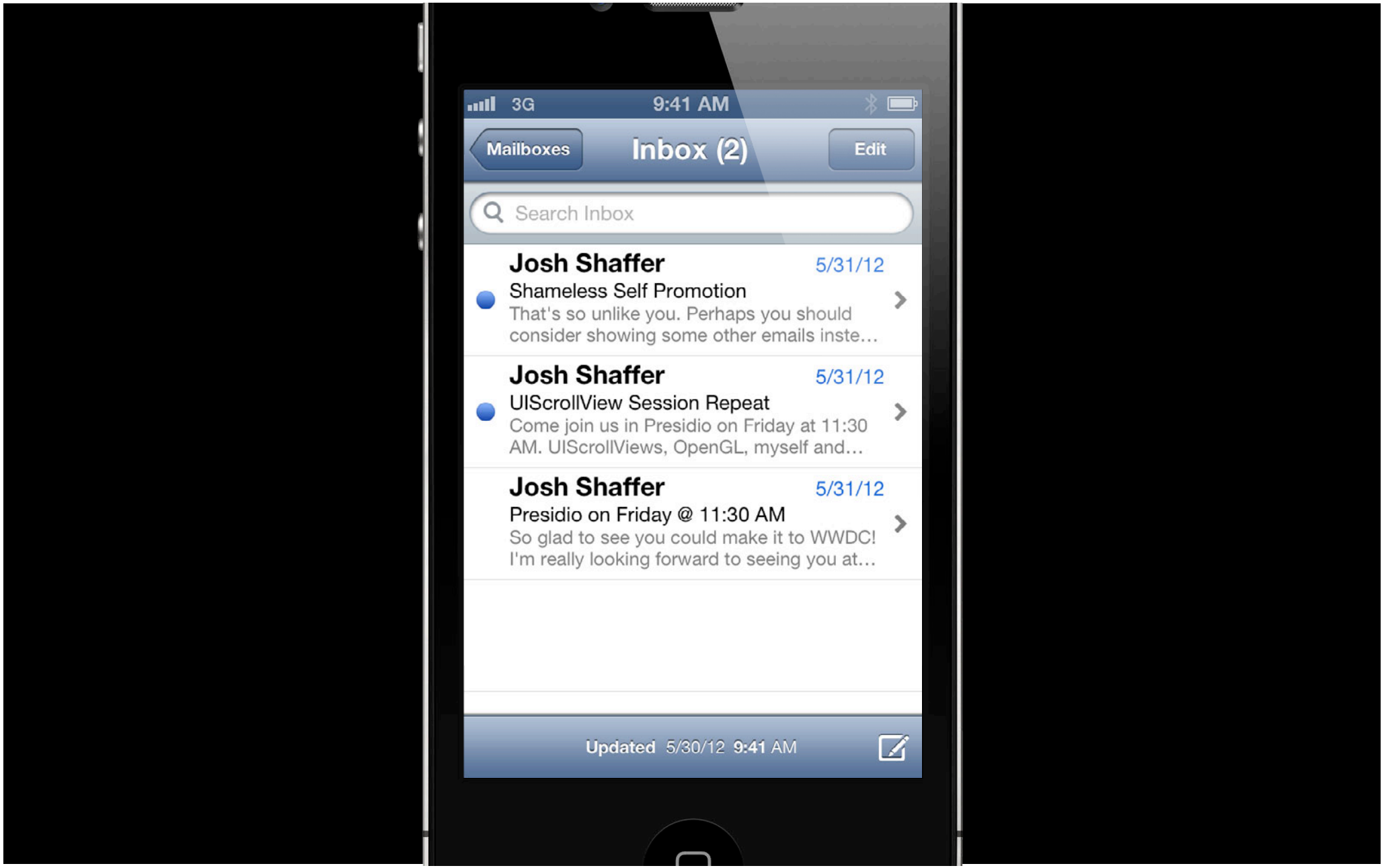
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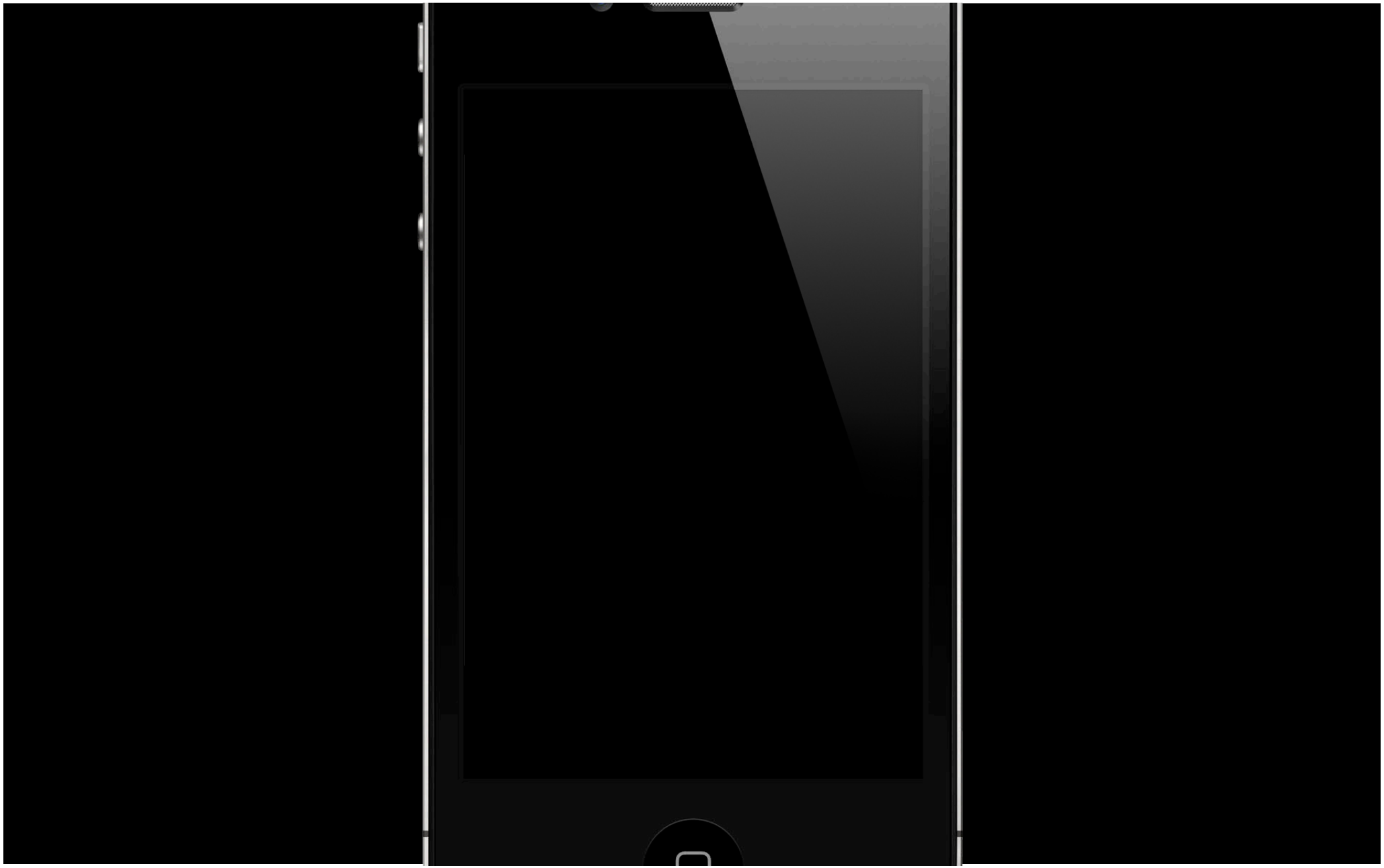


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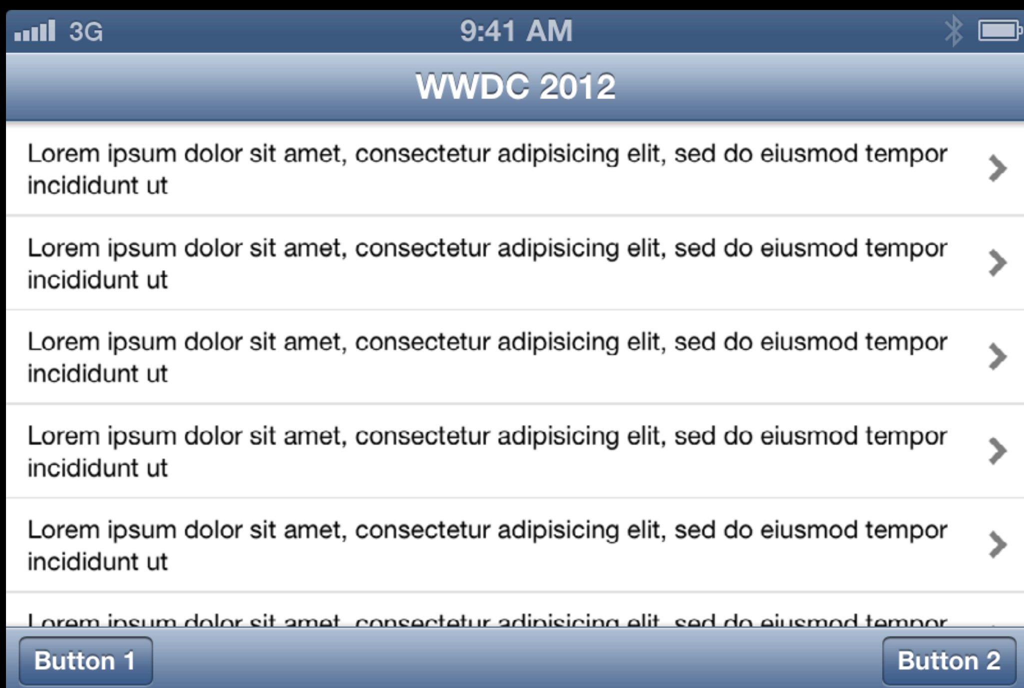
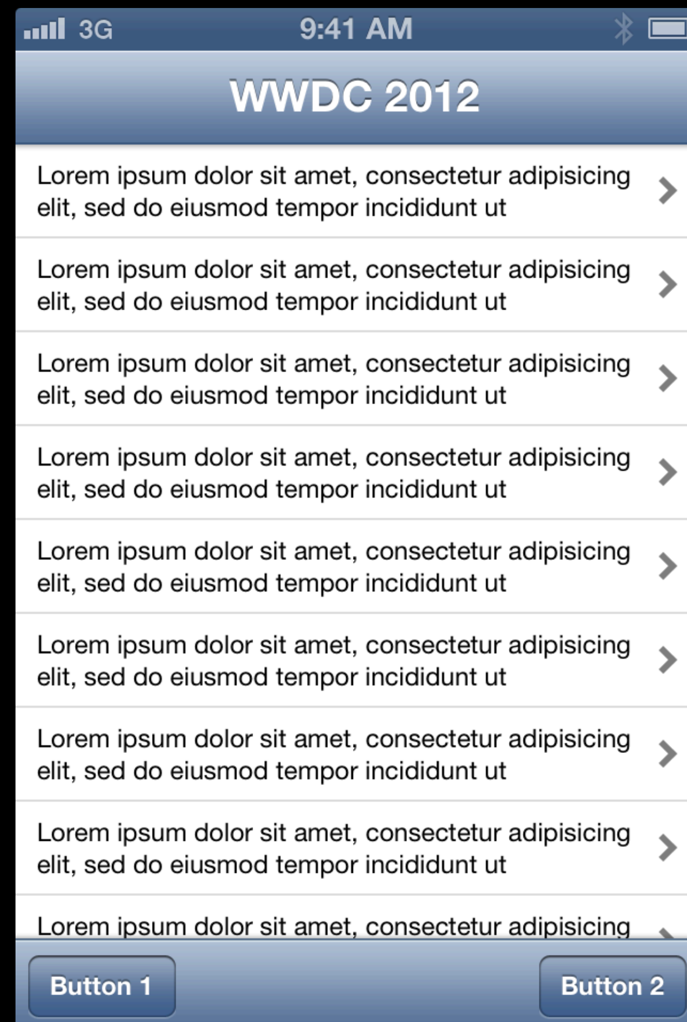
Snapshot Rotations





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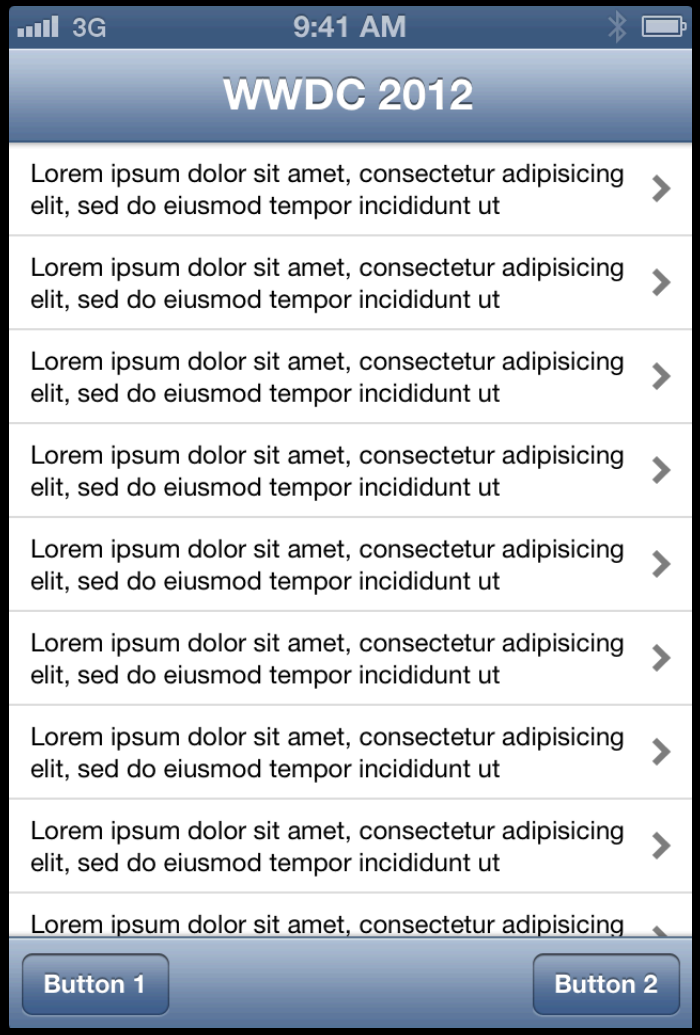

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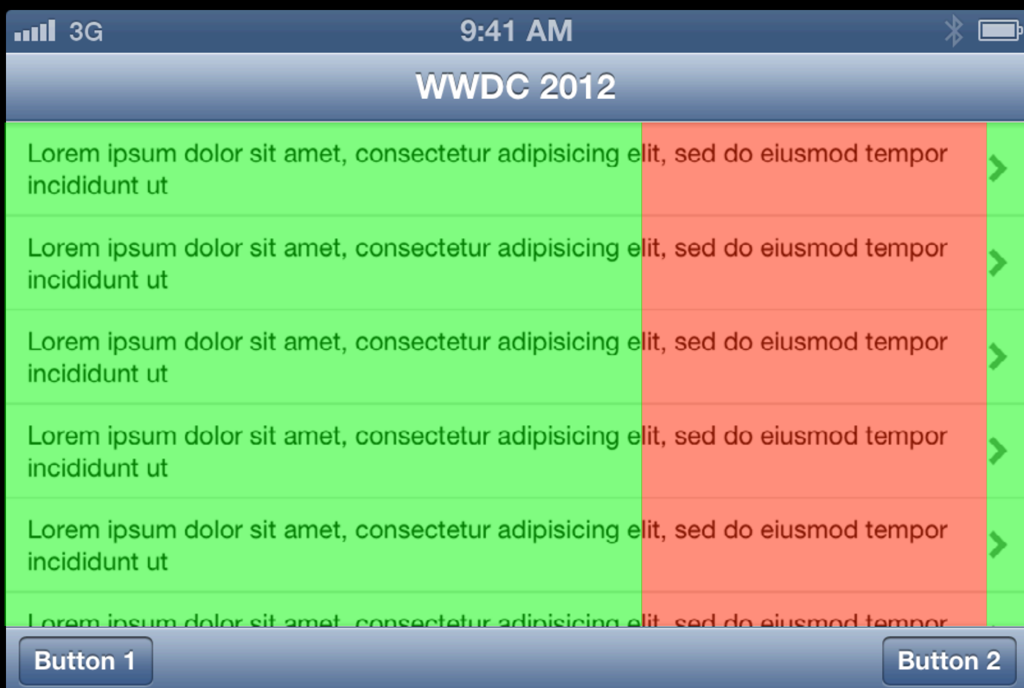

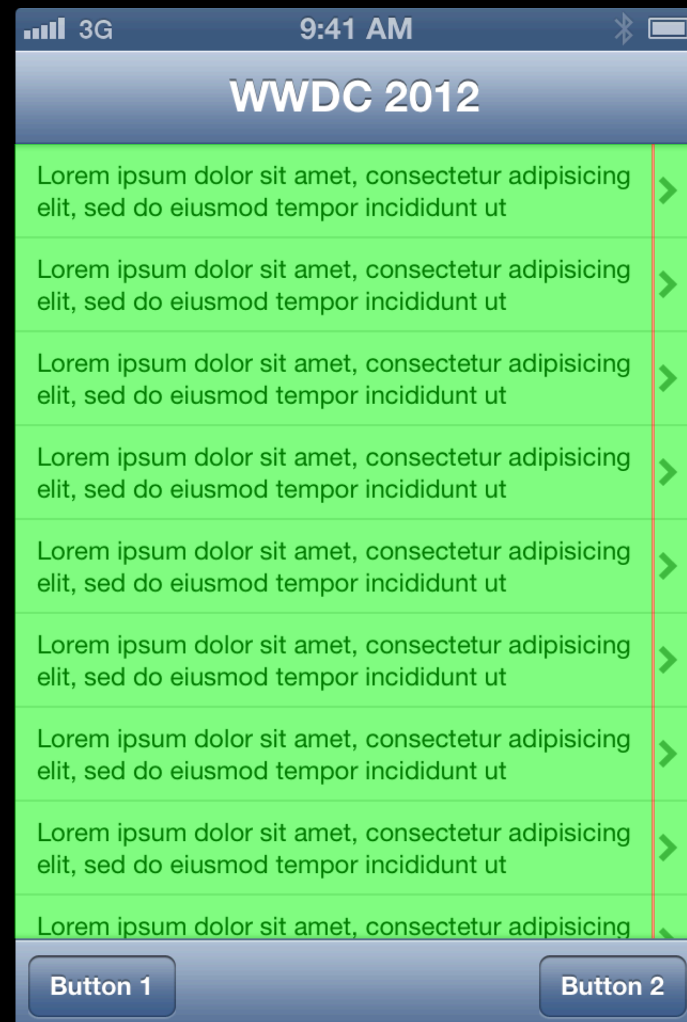

Standard Animation Rotations

Standard Animation Rotations

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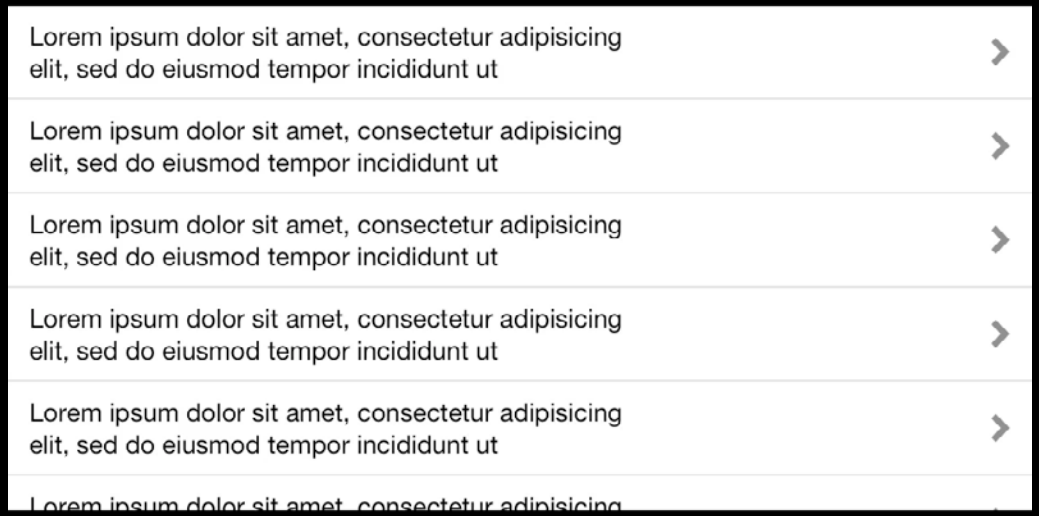

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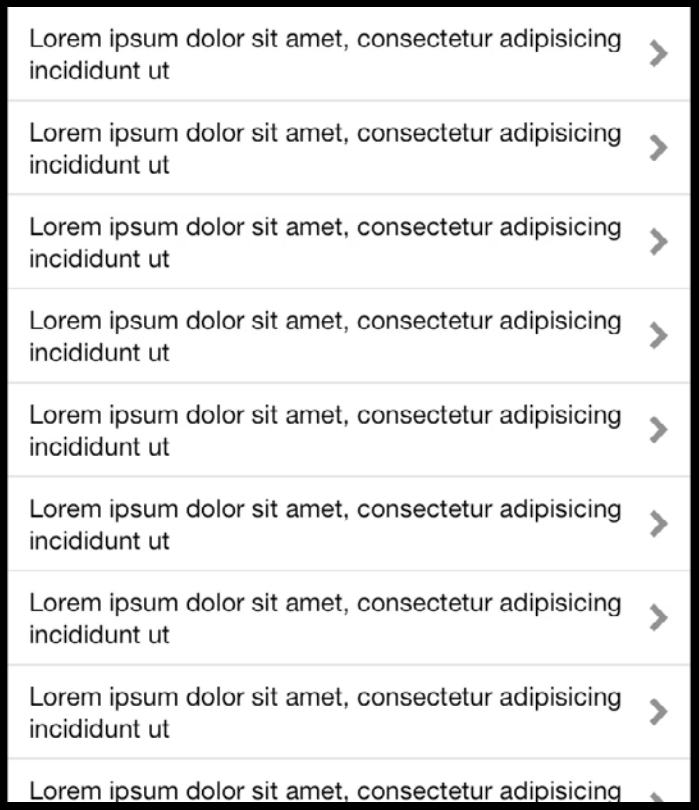
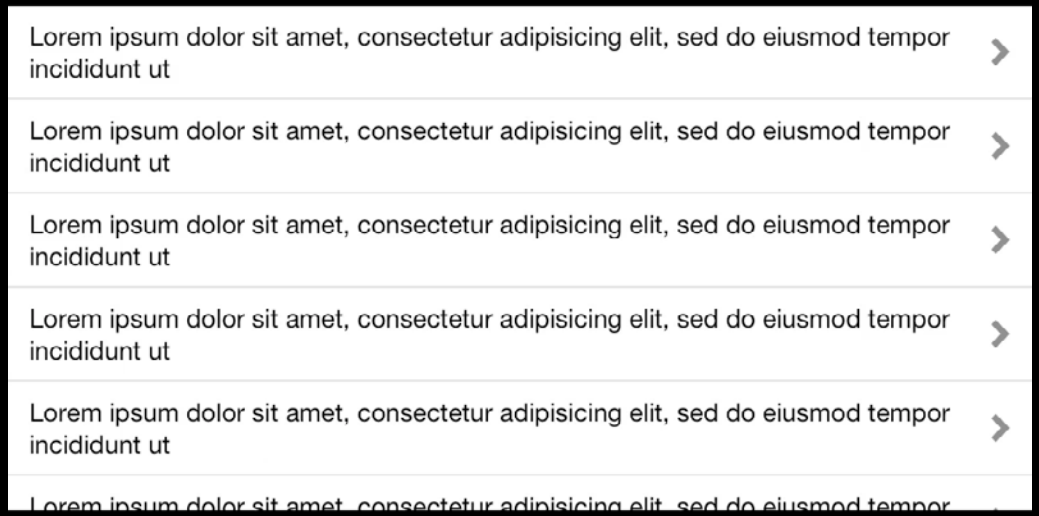


Snapshot Animation Rotations



Demo

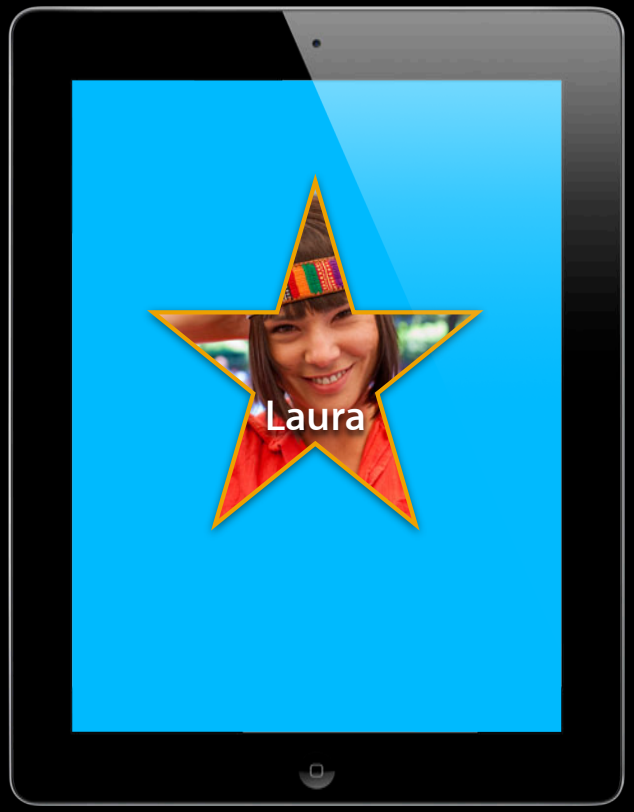
Masks

Performance characteristics and tricks

Andy Matuschak

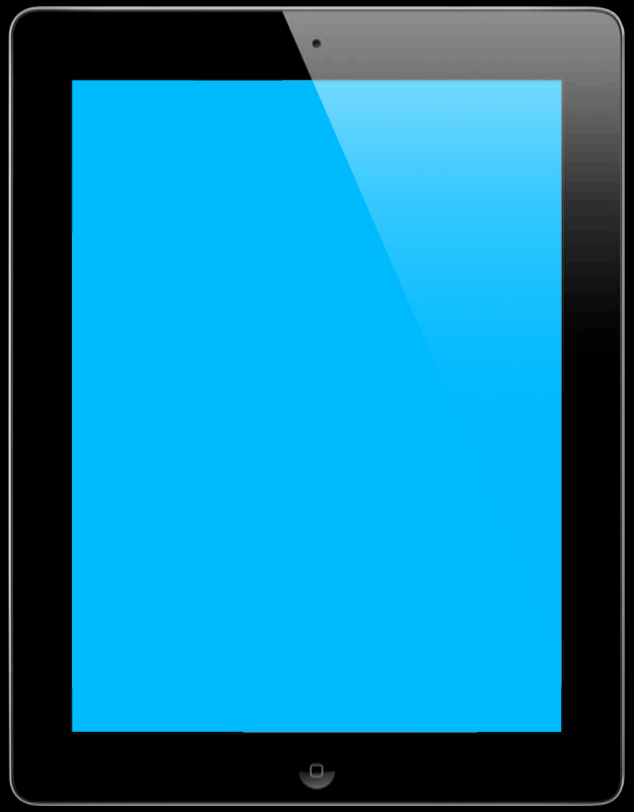
Masks

Performance characteristics



Masks

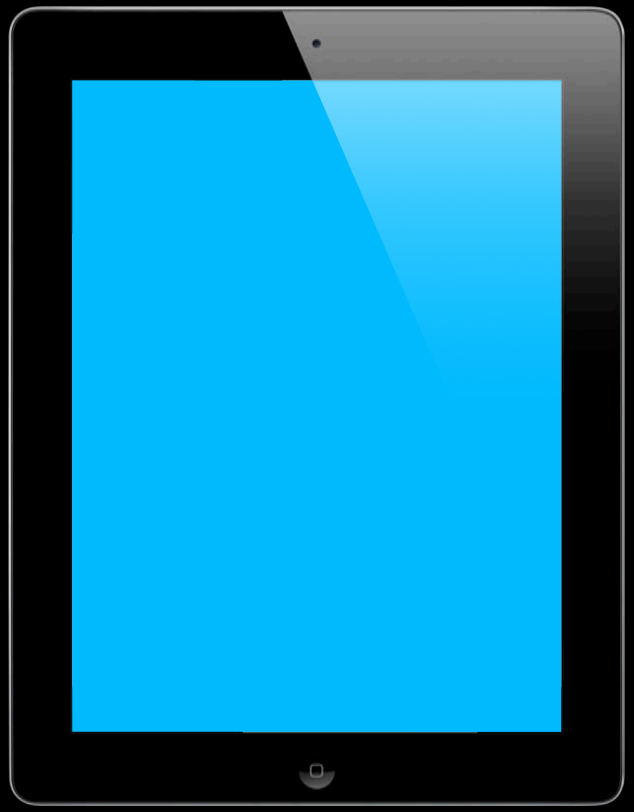
Performance characteristics



Masks

Performance characteristics

Offscreen Buffer



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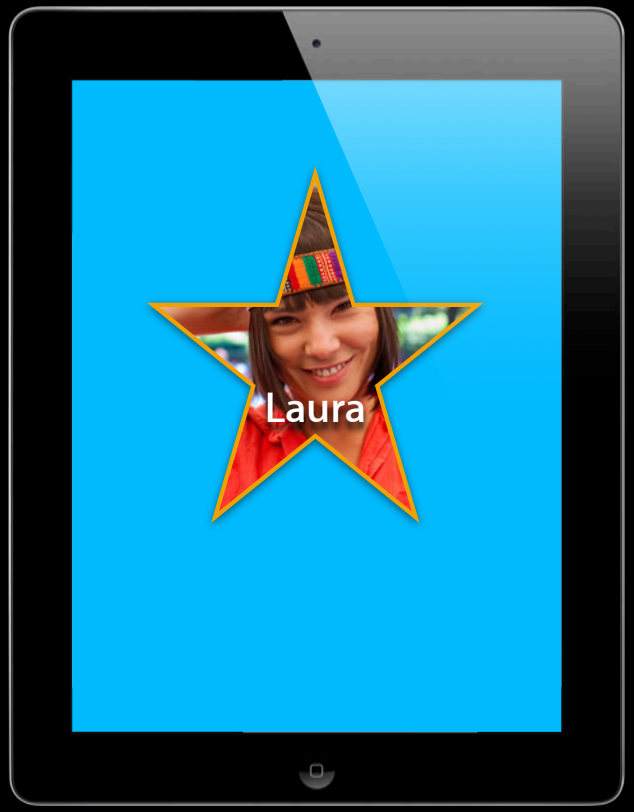

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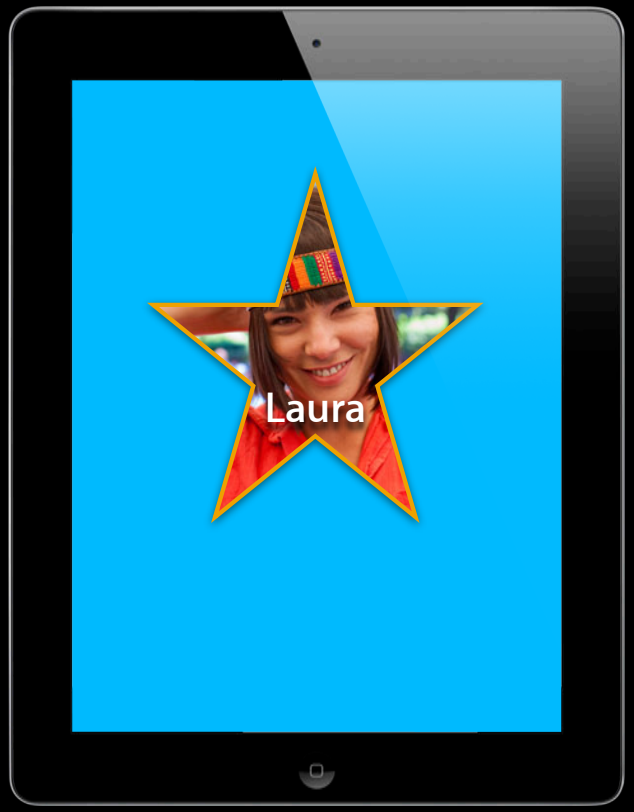


Masks

Performance mitigation

Masks

Performance mitigation

- Use `-[CALayer setShouldRasterize:]`

Masks

Performance mitigation

- Use `-[CALayer setShouldRasterize:]`
- Replace with snapshot

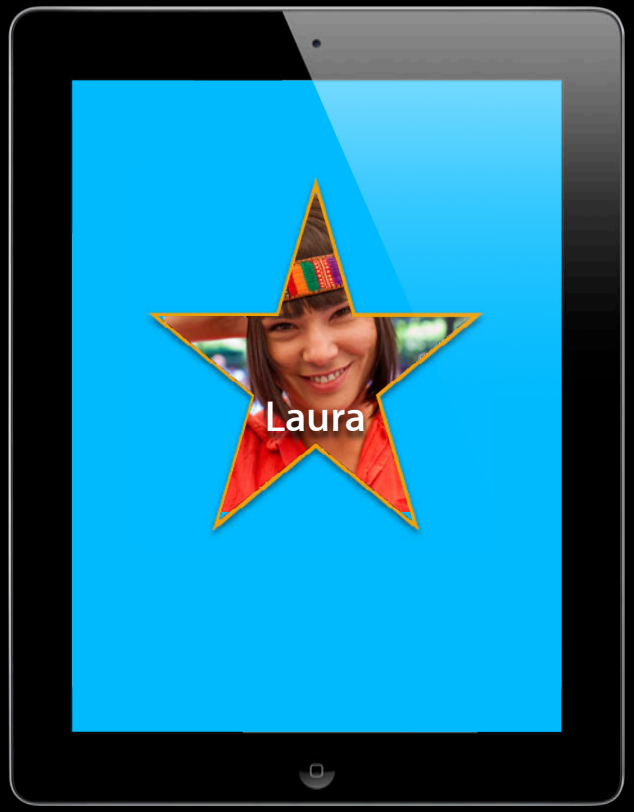
Masks

Performance mitigation

- Use `-[CALayer setShouldRasterize:]`
- Replace with snapshot
- Temporarily “overdraw” background as faux mask

Masks

“Overdrawing”



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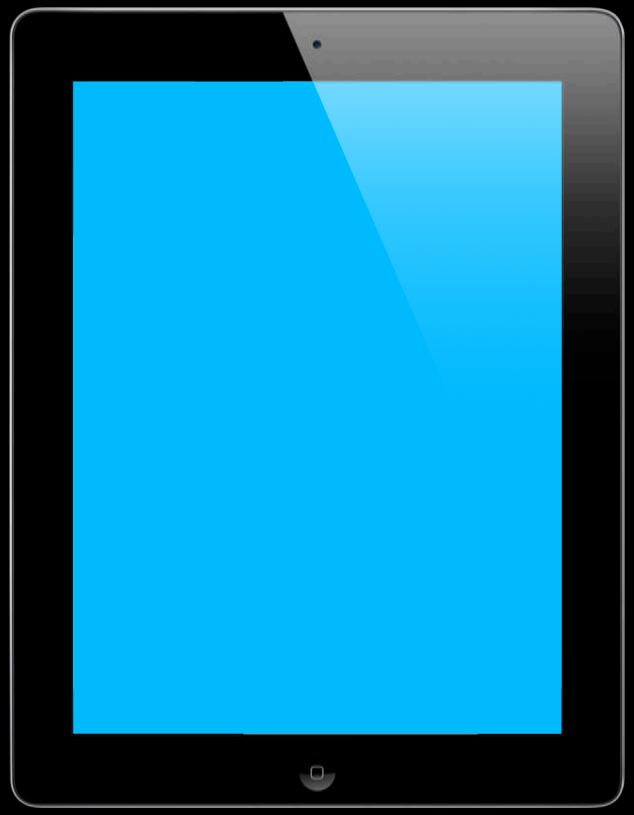
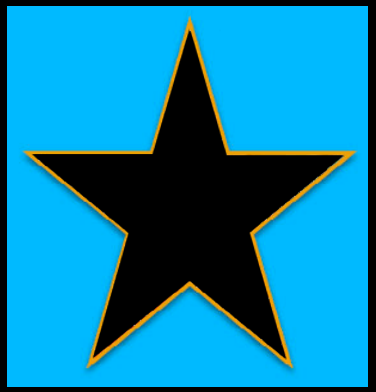


“Real” view



Mask view

Masking

Corner radius update

```
-[CALayer setCornerRadius:]
```

Masking

Corner radius update

`-[CALayer setCornerRadius:]`

Reduced performance penalty!

Simplify

"A strategically placed hand"

Demo

More Information

Jake Behrens
UI Frameworks Evangelist
behrens@apple.com

Apple Developer Forums
http://devforums.apple.com

What We've Learned

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- Leverage UIKit

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- Streamline with rasterization

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WWDC2012