Introducing Text Kit

Session 210
Ian Baird
iOS Text Kit Lead Engineer

These are confidential sessions—please refrain from streaming, blogging, or taking pictures
Agenda

• Motivation
Agenda

• Motivation
• What is Text Kit?
Agenda

• Motivation
• What is Text Kit?
• Feature set
Agenda

• Motivation
• What is Text Kit?
• Feature set
• Rich Text
Motivation
Motivation

In the beginning...
Motivation

In the beginning…

- String Drawing
- WebKit
- Core Text
- Core Graphics
Motivation
In the beginning...
Motivation

Core Text is very advanced

• Mastering Core Text considered to be a “rite of passage”
Motivation

Core Text is very advanced

• Mastering Core Text considered to be a “rite of passage”
• Advanced Unicode layout engine
Motivation
Core Text is very advanced

• Mastering Core Text considered to be a “rite of passage”
• Advanced Unicode layout engine
• Many concepts Toll-Free Bridged with Text Kit now
Motivation

UIWebView

• Great for embedding web content
Motivation

UIWebView

• Great for embedding web content
• WebKit is a great HTML rendering engine
Motivation

**UIWebView**

- Great for embedding web content
- WebKit is a great HTML rendering engine
- Unexpected behavior with scroll view objects
What Is Text Kit?
What Is Text Kit?

Introduction

• Fast modern text layout and rendering engine
What Is Text Kit?

Introduction

• Fast modern text layout and rendering engine
• Built on Core Text
What Is Text Kit?

Introduction

• Fast modern text layout and rendering engine
• Built on Core Text
• Great integration with UIKit
What Is Text Kit?
What Is Text Kit?

- Text Kit
- WebKit
- Core Text
- Core Graphics
What Is Text Kit?

UITextInputProtocol

UILabel | UITextField | UITextView | UIWebView

Text Kit | WebKit

Core Text

Core Graphics
What Is Text Kit?

Text Kit is a “first-class citizen” in UI Kit

• Complete control over text rendering in UI elements
What Is Text Kit?

Text Kit is a “first-class citizen” in UIKit

- Complete control over text rendering in UI elements
- UITextView, UITextField, and UILabel rebuilt on Text Kit
What Is Text Kit?

Text Kit is a “first-class citizen” in UIKit

• Complete control over text rendering in UI elements
• UITextView, UITextField, and UILabel rebuilt on Text Kit
• Seamlessly integrates with animations, UICollectionView, and UITableView
What Is Text Kit?

Extensible object-oriented architecture

- Subclassing
- Delegation
- Notifications

NSTextStorageWillProcessEditingNotification
NSTextStorageDidProcessEditingNotification
What Is Text Kit?

Extensible object-oriented architecture

• Subclassing
• Delegation
• Notifications

NSTextStorageWillProcessEditingNotification
NSTextStorageDidProcessEditingNotification
What Is Text Kit?
Extensible object-oriented architecture

- Subclassing
- Delegation
What Is Text Kit?

Extensible object-oriented architecture

• Subclassing
• Delegation
• Notifications

NSTextStorageWillProcessEditingNotification
NSTextStorageDidProcessEditingNotification
Feature Set

A tour of Text Kit
iPad at Work
Powerful Presentations


iPad provides a uniquely powerful way to share your Keynote or PowerPoint presentations in virtually any setting. With iPad in your briefcase, you’re able to collaborate and present business proposals at a moment’s notice—whether you’re in a client meeting, at an event, or in the boardroom. Showcasing your presentation on the large LED-backlit iPad display makes everything you present come alive vividly and brilliantly. You can even connect your iPad to an HDTV or projector to deliver your presentation on the big screen and captivate the attention of a larger audience. And because iPad wakes up from sleep instantly, your presentation is ready when you are.

Use iPad to create new opportunities:
- Turn impromptu meetings into sales transactions
- Give a sales pitch on the fly
- Deliver领土 at a moment’s notice
- Share and speak ideas anywhere

Wherever your work takes you, iPad gives you the flexibility and power to advance your business goals with immediate results.

Showcase your presentation.

With the Keynote app, you can create and deliver professional-looking presentations right on your iPad—even if the file was originally created on a PC in Microsoft PowerPoint. Keynote for iPad offers a familiar, easy-to-use interface that lets you create design and deliver world-class presentations by simply tapping and swiping.

Photos, charts, tables, and themes are only a tap away. Organize your data with beautiful tables and charts, and add high-quality animations such as Magic Move, Flip, and Tilt to grab your audience.

The Keynote app lets you view and edit Keynote ‘19 and PowerPoint files on your iPad. You can open and work on any Keynote file you need, right from your iPad. When you’re ready to present, simply tap to begin and swipe to move forward or backward through your slides. The Multi-Touch iPad display transforms your finger gestures into intuitive actions, so presenting is easy and intuitive.

But don’t keep iPad to yourself. Teach it to your customers, colleagues, and even your spouse, kids, and pets through your presentation. The immersive experience will end itself to a memorable customer engagement.


Podcast

“Podcast is a great tool to tell the whole story. Especially in this industry, where you’ve got to show bedrooms, banquet space, all the things we have to offer guests.”

Jon Wall, Global Head of Marketing and Brand Strategy

Hyatt Hotels & Resorts, Chicago, IL
Hospitality


Integer viverra posuere urna, vel volutpat eros eleifend in. Donec pharetra tincidunt lectus vitae luctus.


Feature Set
Interactive text coloring
Feature Set
Interactive text coloring

@somebody
Feature Set
Interactive text coloring

@somebody: nice layout!
Feature Set

Text folding

Heading 1
This is a snippet of text we’d like to hide.

Heading 2
This is a range of text we’d like to keep visible.
Feature Set

Text folding

Heading 1
Heading 2
This is a range of text we’d like to keep visible.
Feature Set
Custom truncation

Mary had a little lamb its fleece was white as snow.
Mary had ... fleece ... was white.
Feature Set
Enhanced in iOS 7

• Advanced techniques work in stock components
Feature Set

Enhanced in iOS 7

• Advanced techniques work in stock components
• UITextView and UITextField support all text attributes
Feature Set
Enhanced in iOS 7

• Advanced techniques work in stock components
• UITextView and UITextField support all text attributes
• Kerning and ligatures everywhere
Feature Set
Enhanced in iOS 7

• Advanced techniques work in stock components
• UITextView and UITextField support all text attributes
• Kerning and ligatures everywhere
• Letterpress
Advanced Text Layouts and Effects with Text Kit

Mission
Thursday 2:00PM
Feature Set

Dynamic Type

• Designed type styles
Feature Set

Dynamic Type

- Designed type styles
- Optimized for legibility
Feature Set

Dynamic Type

• Designed type styles
• Optimized for legibility
• User picks size
Feature Set

Dynamic Type

• Designed type styles
• Optimized for legibility
• User picks size

Apps that support Dynamic Type will adjust to your preferred reading size below.

Drag the slider below
Feature Set
Dynamic Type

• Designed type styles
• Optimized for legibility
• User picks size

Apps that support Dynamic Type will adjust to your preferred reading size below.

Drag the slider below
Feature Set
Dynamic Type
• Designed type styles
• Optimized for legibility
• User picks size
• Accessibility
Feature Set

Dynamic Type

• Designed type styles
• Optimized for legibility
• User picks size
• Accessibility
• Xcode 5
Feature Set
Font descriptors

• Specifies a font
Feature Set

Font descriptors

• Specifies a font
• Queries fonts (and supplies the result)
Feature Set

Font descriptors

• Specifies a font
• Queries fonts (and supplies the result)
• Can be archived
Using Fonts with Text Kit

Presidio
Friday 9:00AM
Feature Set
Symbolic traits

Headline 1
Headline 2
Subheadline 1
Subheadline 2
Body
Footnote
Caption 1
Caption 2
Feature Set

Symbolic traits

Headline 1
Headline 2
Subheadline 1
Subheadline 2
Body
Footnote
Caption 1
Caption 2
Feature Set
Symbolic traits

Regular

Headline 1
Headline 2
Subheadline 1
Subheadline 2
Body
Footnote
Caption 1
Caption 2
## Feature Set

**Symbolic traits**

<table>
<thead>
<tr>
<th>Regular</th>
<th>Bold</th>
<th>Italic</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Headline 1</strong></td>
<td><strong>Headline 1</strong></td>
<td><em>Headline 1</em></td>
</tr>
<tr>
<td><strong>Headline 2</strong></td>
<td><strong>Headline 2</strong></td>
<td><em>Headline 2</em></td>
</tr>
<tr>
<td><strong>Subheadline 1</strong></td>
<td><strong>Subheadline 1</strong></td>
<td><em>Subheadline 1</em></td>
</tr>
<tr>
<td><strong>Subheadline 2</strong></td>
<td><strong>Subheadline 2</strong></td>
<td><em>Subheadline 2</em></td>
</tr>
<tr>
<td><strong>Body</strong></td>
<td><strong>Body</strong></td>
<td><em>Body</em></td>
</tr>
<tr>
<td><strong>Footnote</strong></td>
<td><strong>Footnote</strong></td>
<td><em>Footnote</em></td>
</tr>
<tr>
<td><strong>Caption 1</strong></td>
<td><strong>Caption 1</strong></td>
<td><em>Caption 1</em></td>
</tr>
<tr>
<td><strong>Caption 2</strong></td>
<td><strong>Caption 2</strong></td>
<td><em>Caption 2</em></td>
</tr>
</tbody>
</table>
Feature Set
Symbolic traits

Regular

Headline 1
Headline 2
Subheadline 1
Subheadline 2
Body
Footnote
Caption 1
Caption 2
<table>
<thead>
<tr>
<th>Feature Set</th>
<th>Symbolic traits</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Regular</strong></td>
<td></td>
</tr>
<tr>
<td>Headline 1</td>
<td></td>
</tr>
<tr>
<td>Headline 2</td>
<td></td>
</tr>
<tr>
<td>Subheadline 1</td>
<td></td>
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<tr>
<td>Subheadline 2</td>
<td></td>
</tr>
<tr>
<td>Body</td>
<td></td>
</tr>
<tr>
<td>Footnote</td>
<td></td>
</tr>
<tr>
<td>Caption 1</td>
<td></td>
</tr>
<tr>
<td>Caption 2</td>
<td></td>
</tr>
<tr>
<td><strong>Expanded</strong></td>
<td></td>
</tr>
<tr>
<td>Headline 1</td>
<td></td>
</tr>
<tr>
<td>Headline 2</td>
<td></td>
</tr>
<tr>
<td>Subheadline 1</td>
<td></td>
</tr>
<tr>
<td>Subheadline 2</td>
<td></td>
</tr>
<tr>
<td>Body</td>
<td></td>
</tr>
<tr>
<td>Footnote</td>
<td></td>
</tr>
<tr>
<td>Caption 1</td>
<td></td>
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<tr>
<td>Caption 2</td>
<td></td>
</tr>
<tr>
<td><strong>Condensed</strong></td>
<td></td>
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<tr>
<td>Headline 1</td>
<td></td>
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<tr>
<td>Headline 2</td>
<td></td>
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<tr>
<td>Subheadline 1</td>
<td></td>
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<tr>
<td>Subheadline 2</td>
<td></td>
</tr>
<tr>
<td>Body</td>
<td></td>
</tr>
<tr>
<td>Footnote</td>
<td></td>
</tr>
<tr>
<td>Caption 1</td>
<td></td>
</tr>
<tr>
<td>Caption 2</td>
<td></td>
</tr>
</tbody>
</table>
Feature Set

Line spacing

Regular
Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed diam nonummy nibh euismod
Feature Set

Line spacing

<table>
<thead>
<tr>
<th>Regular</th>
<th>Loose</th>
<th>Tight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed diam nonummy nibh euismod</td>
<td>Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed diam nonummy nibh euismod</td>
<td>Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed diam nonummy nibh euismod</td>
</tr>
</tbody>
</table>
Font Enhancements

CSS font values
Font Enhancements

CSS font values

- `apple-system-headline1`
- `apple-system-headline2`
- `apple-system-body`
- `apple-system-subheadline1`
- `apple-system-subheadline2`
- `apple-system-footnote`
- `apple-system-caption1`
- `apple-system-caption2`
- `apple-system-short-headline1`
- `apple-system-short-headline2`
- `apple-system-short-body`
- `apple-system-short-subheadline1`
- `apple-system-short-subheadline2`
- `apple-system-short-footnote`
- `apple-system-short-caption1`
- `apple-system-tall-body`
What’s New in Safari and WebKit for Web Developers
Feature Set

UITextView composition

London Bridge is broken down,
Broken down, broken down.
London Bridge is broken down,
My fair lady.

Build it up with wood and clay,
Wood and clay, wood and clay,
Build it up with wood and clay,
My fair lady.

Wood and clay will wash away,
Wash away, wash away,
Wood and clay will wash away,
My fair lady.

Build it up with bricks and mortar,
Bricks and mortar, bricks and mortar,
Build it up with bricks and mortar,
My fair lady.

Bricks and mortar will not stay,
Will not stay, will not stay,
Bricks and mortar will not stay,
Feature Set

UITextView composition

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Feature Set
UITextView composition

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Build it up with bricks and mortar,
My fair lady.

Bricks and mortar will not stay,
Will not stay, will not stay,
Bricks and mortar will not stay.
Feature Set

Firestore composition

Wood and clay, wood and clay,
Build it up with wood and clay,
My fair lady.

Wood and clay will wash away,
Wash away, wash away,
Wood and clay will wash away,
My fair lady.

Build it up with bricks and mortar,
Bricks and mortar, bricks and

NSLayoutManager

London Bridge is broken down,
Broken down, broken down.
London Bridge is broken down,
My fair lady.

Build it up with wood and clay,
Wood and clay, wood and clay,
Build it up with wood and clay,
My fair lady.

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Bricks and mortar will not stay,
Will not stay, will not stay,
Bricks and mortar will not stay,
Feature Set
UITextView composition

Wood and clay, wood and clay,
Build it up with wood and clay,
My fair lady.

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Build it up with bricks and mortar,
Bricks and mortar, bricks and

NSLayoutManager

London Bridge is broken down,
Broken down, broken down,
London Bridge is broken down,
My fair lady.

Build it up with wood and clay,
Wood and clay, wood and clay,
Build it up with wood and clay,
My fair lady.

Wood and clay will wash away,
Wash away, wash away,
Wood and clay will wash away,
My fair lady.

Build it up with bricks and mortar,
Bricks and mortar, bricks and
Bricks and mortar will not stay,
Will not stay, will not stay,
Bricks and mortar will not stay,
Feature Set

Exclusion paths

• Simple figures and cutouts
Feature Set
Exclusion paths

• Simple figures and cutouts

```swift
UIBezierPath *exclusion = ButterflyBezierPath;
```
Feature Set
Exclusion paths

• Simple figures and cutouts

```swift
UIBezierPath *exclusion = ButterflyBezierPath;
textContainer.exclusionPaths = @[exclusion];
```
Feature Set

Exclusion paths

• Easy, declarative model
Feature Set

Exclusion paths

• Easy, declarative model
• No subclassing or delegation needed
Feature Set
NSTextContainer

• Defines coordinate system and geometry for NSLayoutManager

• Exclusion paths live in NSTextContainer’s coordinates

• Hit-testing done in NSTextContainer’s coordinates
Feature Set
NSTextContainer

• Defines coordinate system and geometry for NSLayoutManager
• Exclusion paths live in NSTextContainer’s coordinates
• Hit-testing done in NSTextContainer’s coordinates
Feature Set
NSTextContainer

- Defines coordinate system and geometry for NSLayoutManager
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Feature Set

NSTextContainer

• Defines coordinate system and geometry for NSLayoutManager

• Exclusion paths live in NSTextContainer’s coordinates

• Hit-testing done in NSTextContainer’s coordinates
Feature Set

Hit-testing with NSLayoutManager

• Resolving tap to a character index
  -(NSUInteger)characterIndexForPoint:(CGPoint)point
  inTextContainer:(NSTextContainer *)container
  fractionOfDistanceBetweenInsertionPoints:(CGFloat *)partialFraction;

An apple a day
Sends the doctor away
Apple in the morning
Doctor's warning
Roast apple at night
Starves the doctor outright
Eat an apple going to bed
Knock the doctor on the head
Three each day, seven days a week
Ruddy apple, ruddy cheek.
Feature Set

Hit-testing with NSLayoutManager

• Resolving tap to a character index

- (NSUInteger)characterIndexForPoint:(CGPoint)point
  inTextContainer:(NSTextContainer *)container
  fractionOfDistanceBetweenInsertionPoints:(CGFloat *)partialFraction;

An apple a day
Sends the doctor away
Apple in the morning
Doctor's warning
Roast apple at night
Starves the doctor outright
Eat an apple going to bed
Knock the doctor on the head
Three each day, seven days a week
Ruddy apple, ruddy cheek.
Feature Set

Glyphs

• What’s a glyph?
Feature Set

Glyphs

• What’s a glyph?
• Represents one or more characters
Feature Set

Glyphs

• What’s a glyph?
• Represents one or more characters
• No 1:1 mapping from glyph(s) to character(s) or vice-versa
Feature Set
Hit-testing with NSLayoutManager

• Glyph range to character range
Feature Set

Hit-testing with NSLayoutManager

• Glyph range to character range
  - `(NSRange)characterRangeForGlyphRange:(NSRange)glyphRange
    actualGlyphRange:(NSRangePointer)actualGlyphRange;`
Feature Set
Interacting with links

This is one of my favorite websites:

Apple
Feature Set
Interacting with links

This is one of my favorite websites:
Apple

Open
Add to Reading List
Copy
Cancel
Feature Set
Data Detectors

This is one of my favorite places:

Moscone Center
San Francisco, CA 94103
Feature Set
Data Detectors

This is one of my favorite places:

Moscone Center
San Francisco, CA 94103

Open in Maps
Add to Contacts
Copy
Cancel
Feature Set

Text attachments

Attachment
Feature Set

Text attachments

Attachment

Exclusion
Feature Set

Text attachments

• Usually used for inline images
Feature Set
Text attachments

• Usually used for inline images
• Affects text layout
Feature Set
Text attachments

• Usually used for inline images
• Affects text layout
• Geometry for the contained data

This is one of my favorite websites:
Apple
Feature Set

Interacting with attachments

This is one of my favorite websites:

Apple
Feature Set

Interacting with attachments

This is one of my favorite websites:

Apple

- Copy Image
- Save to Camera Roll
- Cancel
Demo
Interaction and layout

Jordan Breeding
UIKit Engineer
Text Kit Tour

Demo summary

• Data Detectors for basic interaction
Text Kit Tour

Demo summary

• Data Detectors for basic interaction
• Text views in collection view cells
Text Kit Tour

Demo summary

• Data Detectors for basic interaction
• Text views in collection view cells
• Text Styles
Text Kit Tour

Demo summary

• Data Detectors for basic interaction
• Text views in collection view cells
• Text Styles
• Exclusion paths
Text Kit Design
Realizing amazing designs with Text Kit

Ian Baird
iOS Text Kit Lead Engineer
Text Kit Design
Layout and positioning techniques
Text Kit Design
Layout and positioning techniques
Text Kit Design
Layout and positioning techniques
Hey John:

How's it going?

– Ian
Hey John:

How's it going?

- Ian
Text Kit Design
Layout and positioning

.8 * Cap height

Hey John:
Text Kit Design

Font metrics

• If you have a detailed spec (like Mail) you’ll need to become familiar with the following font metrics
Text Kit Design

Font metrics

• If you have a detailed spec (like Mail) you’ll need to become familiar with the following font metrics

• Line height

[mylettr lineHeight]
Text Kit Design

Font metrics

• If you have a detailed spec (like Mail) you’ll need to become familiar with the following font metrics

• Line height
  
  [myFont lineHeight]

• Cap height
  
  [myFont capHeight]
Text Kit Design

Font metrics

• If you have a detailed spec (like Mail) you’ll need to become familiar with the following font metrics

  • Line height  
    [myFont lineHeight]

  • Cap height  
    [myFont capHeight]

  • Leading: space between lines of text  
    [myFont leading]
Text Kit Design

Font metrics

• If you have a detailed spec (like Mail) you’ll need to become familiar with the following font metrics

• Line height
  [myFont lineHeight]

• Cap height
  [myFont capHeight]

• Leading: space between lines of text
  [myFont leading]

• Can be negative to move lines closer together!
Text Kit Design

Changing size

- **UIKitContentSizeCategoryDidChangeNotification** emitted when user selects a new size
Text Kit Design

Changing size

• **UIContentSizeCategoryDidChangeNotification** emitted when user selects a new size

• Observe **UIContentSizeCategoryDidChangeNotification** and re-layout your UI when received
Text Kit Design

Changing size

• `UIContentSizeCategoryDidChangeNotification` emitted when user selects a new size

• Observe `UIContentSizeCategoryDidChangeNotification` and re-layout your UI when received
  - Invalidate intrinsic content size on UIKit views positioned by Auto Layout
Text Kit Design

Changing size

- **UIContentSizeCategoryDidChangeNotification** emitted when user selects a new size

- Observe **UIContentSizeCategoryDidChangeNotification** and re-layout your UI when received
  - Invalidate intrinsic content size on UIKit views positioned by Auto Layout
  - Call **setNeedsLayout** to re-layout your UI if positioning manually
Text Kit Design

Changing size

- `UIContentSizeCategoryDidChangeNotification` emitted when user selects a new size

- Observe `UIContentSizeCategoryDidChangeNotification` and re-layout your UI when received
  - Invalidate intrinsic content size on UIKit views positioned by Auto Layout
  - Call `setNeedsLayout` to re-layout your UI if positioning manually
  - Invalidate cached preferred fonts or font descriptors
Demo

Text Kit and design

Jordan Breeding
UIKit Engineer
Text Kit and Design

It's dynamic!

• Realize complex designs
Text Kit and Design
It’s dynamic!

• Realize complex designs
• Respond to the change notification
Text Kit and Design
It’s dynamic!

- Realize complex designs
- Respond to the change notification
- Customize text container line break mode
Interactive Rich Text

Content modification during user input

Johannes Fortmann
UIKit Engineer
Text Kit and Rich Text
Interactive content updates
Text Kit and Rich Text

Interactive content updates

• iOS 6: `attributedText` property
Text Kit and Rich Text

Interactive content updates

- iOS 6: `attributedText` property
- iOS 7: direct access to `textStorage`
Text Kit and Rich Text

Interactive content updates

• iOS 6: `attributedString` property
• iOS 7: direct access to `textStorage`
• Selective editing messages with change notifications
Text Kit and Rich Text
Anatomy of an update
Text Kit and Rich Text

Anatomy of an update

• Use attributed string methods to modify
Text Kit and Rich Text

Anatomy of an update

• Use attributed string methods to modify
Text Kit and Rich Text

Anatomy of an update

- Use attributed string methods to modify
- Bracket edits to batch updates
Text Kit and Rich Text

Anatomy of an update

• Use attributed string methods to modify
• Bracket edits to batch updates

[tv.textStorage beginEditing];
Text Kit and Rich Text

Anatomy of an update

• Use attributed string methods to modify
• Bracket edits to batch updates

[tv.textStorage beginEditing];
[self markWord:@"Alice" inTextStorage:tv];

Dynamic Coloring

Alice was beginning to get very tired of sitting by her sister on the bank, and of having nothing to do: once or twice she had peeped into the book her sister was reading, but it had no pictures or conversations in it, 'and what is the use of a book,' thought Alice 'without pictures or conversation?'

So she was considering in her own mind (as well as she could, for the hot day made her feel very sleepy and stupid) whether the pleasure of making
Text Kit and Rich Text
Anatomy of an update

- Use attributed string methods to modify
- Bracket edits to batch updates

```objective-c
[tv.textStorage beginEditing];
[self markWord:@"Alice" inTextStorage:tv];
[tv.textStorage endEditing];
```
Text Kit and Rich Text

Anatomy of an update

• Use attributed string methods to modify
• Bracket edits to batch updates

[tv.textStorage beginEditing];
[self markWord:@"Alice" inTextStorage:tv];
[tv.textStorage endEditing];

...Text Kit processes changes...
Anatomy of an update

- Use attributed string methods to modify
- Bracket edits to batch updates

```
[txt.textStorage beginEditing];
[self markWord:@"Alice" inTextStorage:txt];
[txt.textStorage endEditing];
```

...Text Kit processes changes...

```
Alice was beginning to get very tired of sitting by her sister on the bank, and of having nothing to do: once or twice she had peeped into the book her sister was reading, but it had no pictures or conversations in it, "and what is the use of a book," thought Alice "without pictures or conversation?"

So she was considering in her own mind (as well as she could, for the hot day made her feel very sleepy and stupid) whether the pleasure of making
```
Q W E R T Y U I O P
A S D F G H J K L
Z X C V B N M
```

space

return
Rich Text Editing

Subclassing NSTextStorage

• Why?
Rich Text Editing
Subclassing NSTextStorage

• Why?
• Example: Change text attributes while typing
Rich Text Editing
Subclassing NSTextStorage

• Why?
• Example: Change text attributes while typing
  
  @somebody
Rich Text Editing
Subclassing NSTextStorage

• Why?
• Example: Change text attributes while typing

@somebody: nice layout!
Rich Text Editing
Subclassing NSTextStorage
Rich Text Editing

Subclassing NSTextStorage

• Class cluster
Rich Text Editing
Subclassing NSTextStorage

• Class cluster
Rich Text Editing
Subclassing NSTextStorage

• Class cluster
Rich Text Editing
Subclassing NSTextStorage

• Class cluster
Rich Text Editing
Subclassing NSTextStorage

• Class cluster
• Override primitive methods
  - string
  - attributesAtIndex:effectiveRange:
  - replaceCharactersInRange:withString:
  - setAttributes:range:
Rich Text Editing
Subclassing NSTextStorage

- Class cluster
- Override primitive methods
  - -string
  - -attributesAtIndex:effectiveRange:
  - -replaceCharactersInRange:withString:
  - -setAttributes:range:
Rich Text Editing
Subclassing NSTextStorage

• Class cluster
• Override primitive methods
  – string
  – attributesAtIndex:effectiveRange:
  – replaceCharactersInRange:withString:
  – setAttributes:range:
Demo
Dynamic attributes and interaction
Text Kit and Data

Demo
Text Kit and Data Demo

• Assembling the text system
Text Kit and Data

Demo

• Assembling the text system
• Subclassing NSTextStorage
Text Kit and Data

Demo

• Assembling the text system
• Subclassing NSTextStorage
• Interactive content modification
Wrapping It Up

Knowledge absorption
Text Kit

• Highly capable first-class citizen of UIKit
Text Kit

- Highly capable first-class citizen of UIKit
- Powerful
Text Kit

• Highly capable first-class citizen of UIKit
• Powerful
• Customizable and extensible
More Information

Jake Behrens
App Frameworks Evangelist
behrens@apple.com

Documentation
iOS Human Interface Guidelines

Apple Developer Forums
http://devforums.apple.com
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<td>Mission</td>
<td>Thursday 2:00PM</td>
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<td>Presidio</td>
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<td>Tuesday 9:00AM</td>
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| Text Kit and Core Text Lab | Frameworks Lab A  
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