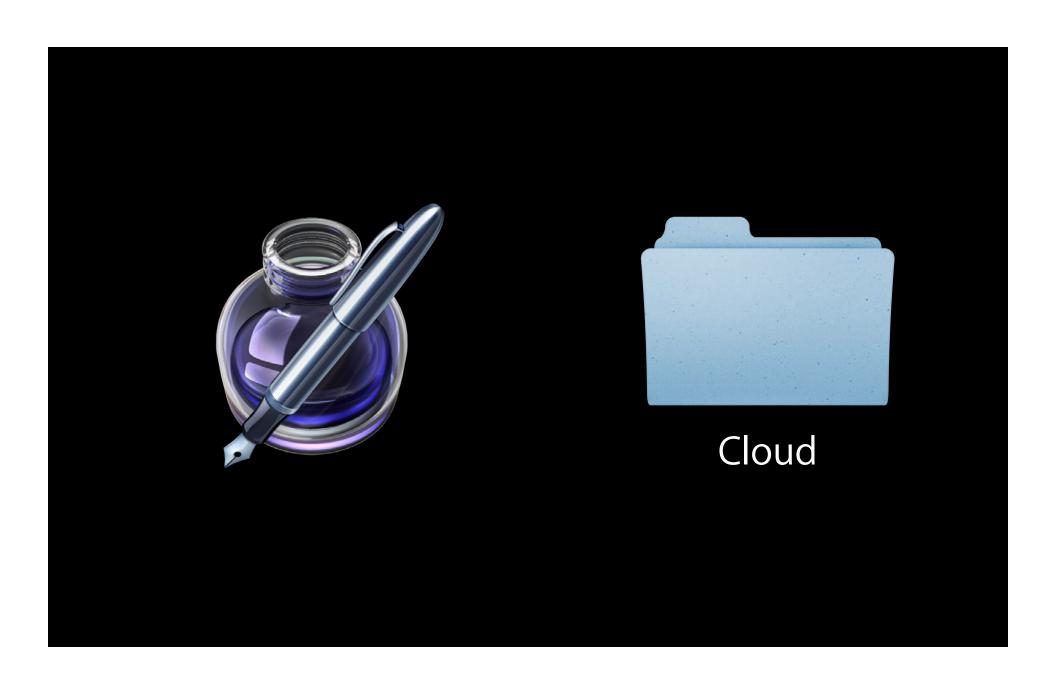
Using iCloud with NSDocument

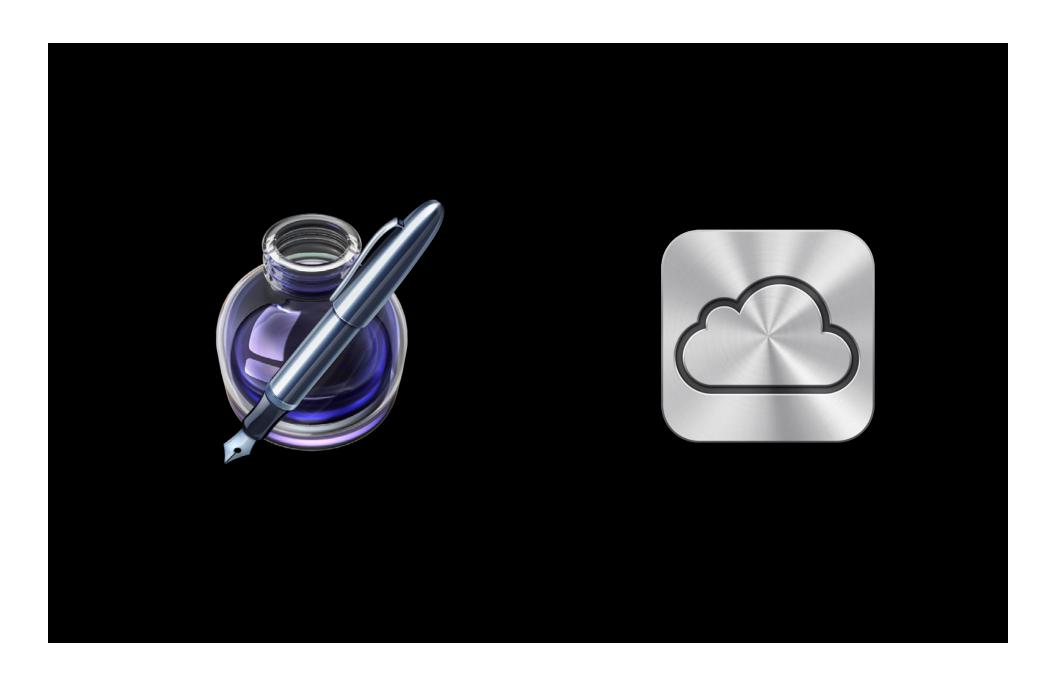
Session 224

Kevin PerrySoftware Engineer, Cocoa Frameworks

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















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File Coordination







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File Coordination
Document Management







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File Coordination Document Management Conflict Resolution







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File Coordination
Document Management
Conflict Resolution
Alerts





• Identifies your development team



- Identifies your development team
- Defines the devices your App can run on



- Identifies your development team
- Defines the devices your App can run on
- Grants iCloud support



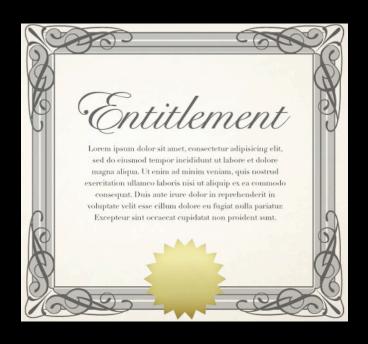
- Identifies your development team
- Defines the devices your App can run on
- Grants iCloud support
- Defines your Ubiquity container



- Identifies your development team
- Defines the devices your App can run on
- Grants iCloud support
- Defines your Ubiquity container
- Provisioning Portal



Get Entitled



Demo



iCloud

Adoption
Mechanics
Best Practices



Auto Save

Adoption
Responsiveness
Serialization
Versions



iCloud

Adoption
Mechanics
Best Practices



Auto Save

Adoption Responsiveness

> Serialization Versions



iCloud

Adoption
Mechanics
Best Practices



Modern document workflow

- Modern document workflow
- Versions

- Modern document workflow
- Versions
- Automatic Termination and Resume

- Modern document workflow
- Versions
- Automatic Termination and Resume
- iCloud

- Modern document workflow
- Versions
- Automatic Termination and Resume
- iCloud
- File Coordination

Enable Auto Save

Enable Auto Save

```
+ (B00L)autosavesInPlace {
    return YES;
}
```

Enable Auto Save

```
+ (B00L)autosavesInPlace {
    return YES;
}
```

NSAutosave Elsewhere Operation NSAutosave In Place Operation



User	Initiated
\cup \sim $-$	

Save In Place	"Save" —	NSSaveOperation

NSSaveOperation

User Initiated

Save In Place	"Save" — NSSaveOperation

NSSaveOperation



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My Document

User Initiated

Save In Place	"Save" — NSSaveOperation

NSSaveOperation



My Document

User Initiated

Save In Place	"Save" — NSSaveOperation
Save Elsewhere	"Export" — NSSaveToOperation

NSS ave To Operation



My Document

Save In Place	"Save" — NSSaveOperation
Save Elsewhere	"Export" — NSSaveToOperation

NSSaveToOperation



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My Document



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Another Document

Save In Place	"Save" — NSSaveOperation	
Save Elsewhere	"Export" — NSSaveToOperation	
Save Elsewhere & Redirect	"Save As" — NSSaveAsOperation	

NSS ave As Operation



My Document

Save In Place	"Save" — NSSaveOperation	
Save Elsewhere	"Export" — NSSaveToOperation	
Save Elsewhere & Redirect	"Save As" — NSSaveAsOperation	

NSSaveAsOperation



My Document

cupidatat non proident, sunt in culpa qui officia deserunt mollit anim id est laborum.



My Document 2

Save In Place	"Save" — NSSaveOperation
Save Elsewhere	"Export" — NSSaveToOperation
Save Elsewhere & Redirect	"Save As" — NSSaveAsOperation

NSSaveAsOperation







My Document 2

	User Initiated	Automatic
Save In Place	"Save" — NSSaveOperation	NSAutosaveInPlaceOperation
Save Elsewhere	"Export" — NSSaveToOperation	NSAutosave Elsewhere Operation
Save Elsewhere & Redirect	"Save As" — NSSaveAsOperation	

	User Initiated	Automatic
Save In Place	"Save" — NSSaveOperation	NSAutosaveInPlaceOperation
Save Elsewhere	"Export" — NSSaveToOperation	NSAutosave Elsewhere Operation
Save Elsewhere & Redirect	"Save As" — NSSaveAsOperation	

	User Initiated	Automatic
Save In Place	"Save" — NSSaveOperation	NSAutosaveInPlaceOperation
Save Elsewhere	"Export" — NSSaveToOperation	NSAutosave Elsewhere Operation
Save Elsewhere & Redirect	"Save As" — NSSaveAsOperation	



	User Initiated	Automatic
Save In Place	"Save" — NSSaveOperation	NSAutosaveInPlaceOperation
Save Elsewhere	"Export" — NSSaveToOperation	NSAutosave Elsewhere Operation
Save Elsewhere & Redirect	"Save As" — NSSaveAsOperation	





	User Initiated	Automatic
Save In Place	"Save" — NSSaveOperation	NSAutosaveInPlaceOperation
Save Elsewhere	"Export" — NSSaveToOperation	NSAutosave Elsewhere Operation
Save Elsewhere & Redirect	"Save As" — NSSaveAsOperation	







Autosaved Document

	User Initiated	Automatic
Save In Place	"Save" — NSSaveOperation	NSAutosaveInPlaceOperation
Save Elsewhere	"Export" — NSSaveToOperation	NSAutosave Elsewhere Operation
Save Elsewhere & Redirect	"Save As" — NSSaveAsOperation	



My Document

	User Initiated	Automatic
Save In Place	"Save" — NSSaveOperation	NSAutosave In Place Operation
Save Elsewhere	"Export" — NSSaveToOperation	NSAutosaveElsewhereOperation
Save Elsewhere & Redirect	"Save As" — NSSaveAsOperation	

NSAutos a veln Place Operation



My Document

	User Initiated	Automatic
Save In Place	"Save" — NSSaveOperation	NSAutosave In Place Operation
Save Elsewhere	"Export" — NSSaveToOperation	NSAutosave Elsewhere Operation
Save Elsewhere & Redirect	"Save As" — NSSaveAsOperation	

NSAutos a veln Place Operation



My Document

Demo



Auto Save

Adoption
Responsiveness
Serialization
Versions



iCloud

Adoption

Mechanics

Best Practices

Asynchronous saving

- Asynchronous saving
- Cancellable autosaves

- Asynchronous saving
- Cancellable autosaves
- See "Auto Save and Versions in Mac OS X 10.7 Lion"

- Asynchronous saving
- Cancellable autosaves
- See "Auto Save and Versions in Mac OS X 10.7 Lion"
 - developer.apple.com/videos



Auto Save

Adoption
Responsiveness
Serialization
Versions



iCloud

Adoption

Mechanics

Best Practices



User Activities



User Activities



File Access



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User Activities



User Activities



Save Revert Duplicate Print



User Activities



Save Revert Duplicate Print Move Rename iCloud conflict resolution

Show UI

Show UI

Perform

Show UI

Perform

Present Errors

Show UI

Perform

Present Errors

Recover

Print

Show UI
Perform
Present Errors

Recover Activity

Print

Show UI
Perform
Present Errors
Recover
Activity

Print

Conflict Resolution

Show UI

Perform

Present Errors

Recover

Activity

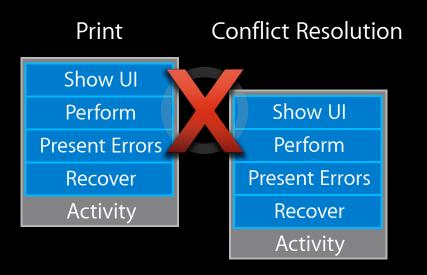
Show UI

Perform

Present Errors

Recover

Activity



-performActivityWithSynchronousWaiting:usingBlock:

Print

Conflict Resolution

Show UI

Perform

Present Errors

Recover

Activity

Show UI

Perform

Present Errors

Recover

Activity

-performActivityWithSynchronousWaiting:usingBlock:

-performActivity...

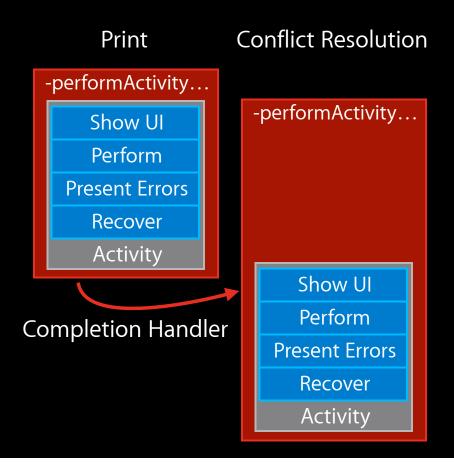
Show UI
Perform
Present Errors
Recover
Activity

Conflict Resolution

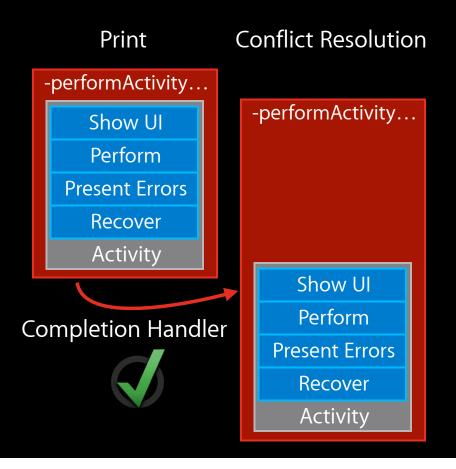
-performActivity...

Show UI
Perform
Present Errors
Recover
Activity

-performActivityWithSynchronousWaiting:usingBlock:



-performActivityWithSynchronousWaiting:usingBlock:



-performActivityWithSynchronousWaiting:usingBlock:

Print Conflict Resolution
-performActivity...

Perform

Present Errors

Show UI

Recover

Activity

Show UI

Perform

-performActivity...

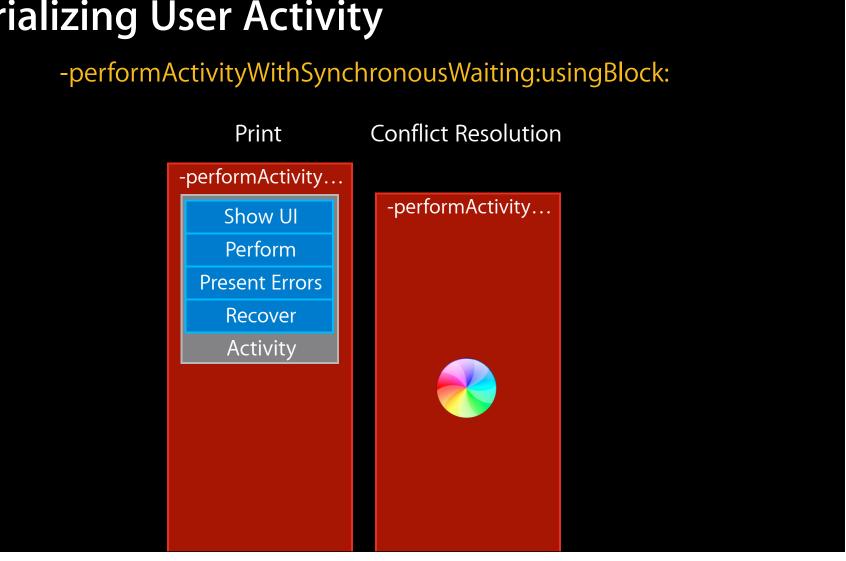
Present Errors

Recover

Activity

-performActivityWithSynchronousWaiting:usingBlock:

Conflict Resolution Print -performActivity... -performActivity... Show UI Perform **Present Errors** Recover Activity



Demo

Serialized Resources

File Access



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URL Modification date On-disk contents Edit state

File Access For QC: Colon is part of code—leave in

Two types

For QC:

- Two types
 - Synchronous

For QC:

- Two types
 - Synchronous
 - Blocks main thread

For QC:

- Two types
 - Synchronous
 - Blocks main thread
 - Invoked synchronously

For QC:

- Two types
 - Synchronous
 - Blocks main thread
 - Invoked synchronously
 - File access completes on return

For QC:

- Two types
 - Synchronous
 - Blocks main thread
 - Invoked synchronously
 - File access completes on return
 - Asynchronous

For QC:

- Two types
 - Synchronous
 - Blocks main thread
 - Invoked synchronously
 - File access completes on return
 - Asynchronous
 - Enqueues block, return immediately

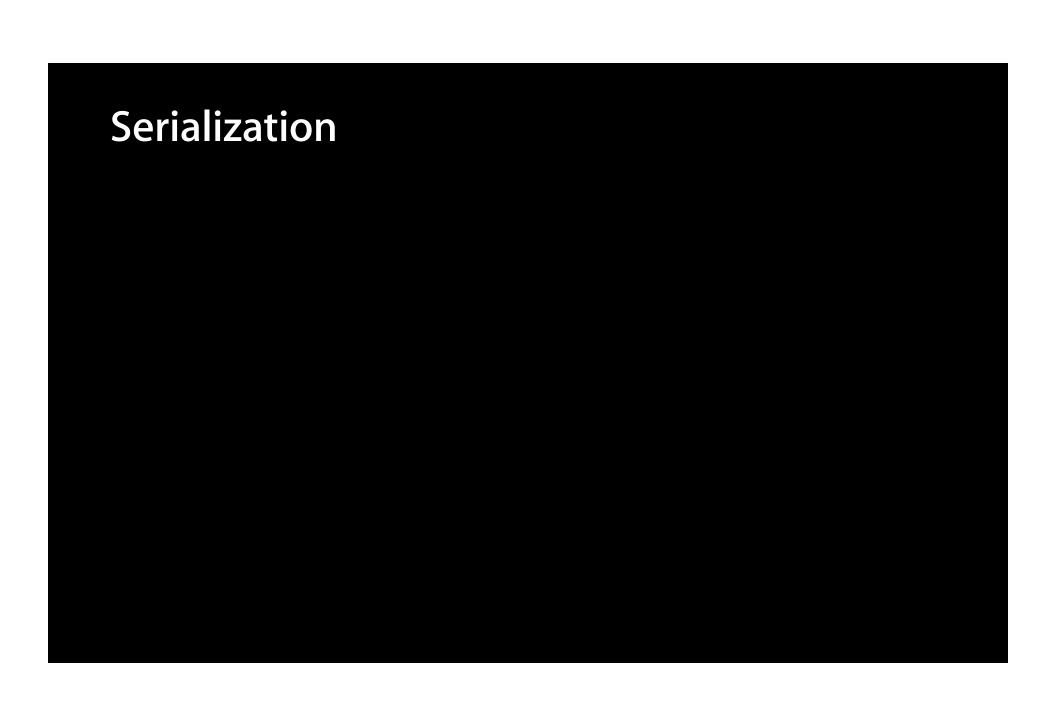
For QC:

- Two types
 - Synchronous
 - Blocks main thread
 - Invoked synchronously
 - File access completes on return
 - Asynchronous
 - Enqueues block, return immediately
 - Required to work safely with document on non-main thread



- Two types
 - Synchronous
 - Blocks main thread
 - Invoked synchronously
 - File access completes on return
 - Asynchronous
 - Enqueues block, return immediately
 - Required to work safely with document on non-main thread
 - Resume on main thread using -continueAsynchronousWorkOnMainThreadUsingBlock:





Serialization

- Debugging
 - Hangs
 - Blocks never executing

Serialization



- Debugging
 - Hangs
 - Blocks never executing
- _NSDocumentSerializationInfo()

```
(lldb) bt
    -[NSDocument performSynchronousFileAccessUsingBlock:]
-[NSDocument _checkAutosavingThenContinue:]
```

```
(lldb) bt
    ...
    -[NSDocument performSynchronousFileAccessUsingBlock:]
    -[NSDocument _checkAutosavingThenContinue:]
    ...
(lldb) po _NSDocumentSerializationInfo()
```

```
(lldb) bt
  -[NSDocument performSynchronousFileAccessUsingBlock:]
  -[NSDocument checkAutosavingThenContinue:]
(lldb) po _NSDocumentSerializationInfo()
Pending serialization requests (3 total)
[0] FILE ACCESS: Document: "Untitled.sketch2" -- State: ACTIVE
   1 -[NSDocument performAsynchronousFileAccessUsingBlock:]
   2 -[SKTDocument doSomethingWithFile]
[1] FILE ACCESS: Document: "Untitled.sketch2" -- State: WAITING
       -[NSDocument performAsynchronousFileAccessUsingBlock:]
       -[NSDocument autosaveWithImplicitCancellability:completionHandler:]
[2] FILE ACCESS: Document: "Untitled.sketch2" -- State: WAITING
      -[NSDocument performSynchronousFileAccessUsingBlock:]
       -[NSDocument checkAutosavingThenContinue:]
```

```
(lldb) bt
  -[NSDocument performSynchronousFileAccessUsingBlock:]
  -[NSDocument checkAutosavingThenContinue:]
(lldb) po _NSDocumentSerializationInfo()
Pending serialization requests (3 total)
[0] FILE ACCESS: Document: "Untitled.sketch2" -- State: ACTIVE
   1 -[NSDocument performAsynchronousFileAccessUsingBlock:]
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       -[NSDocument performAsynchronousFileAccessUsingBlock:]
       -[NSDocument autosaveWithImplicitCancellability:completionHandler:]
[2] FILE ACCESS: Document: "Untitled.sketch2" -- State: WAITING
   1 -[NSDocument performSynchronousFileAccessUsingBlock:]
       -[NSDocument checkAutosavingThenContinue:]
```

```
(lldb) bt
  -[NSDocument performSynchronousFileAccessUsingBlock:]
  -[NSDocument checkAutosavingThenContinue:]
(lldb) po NSDocumentSerializationInfo()
Pending serialization requests (3 total)
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       -[NSDocument checkAutosavingThenContinue:]
```

```
(lldb) bt
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```
(lldb) bt
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  -[NSDocument checkAutosavingThenContinue:]
(lldb) po _NSDocumentSerializationInfo()
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   1 -[NSDocument performAsynchronousFileAccessUsingBlock:]
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[1] FILE ACCESS: Document: "Untitled.sketch2" -- State: WAITING
       -[NSDocument performAsynchronousFileAccessUsingBlock:]
       -[NSDocument autosaveWithImplicitCancellability:completionHandler:]
[2] FILE ACCESS: Document: "Untitled.sketch2" -- State: WAITING
      -[NSDocument performSynchronousFileAccessUsingBlock:]
       -[NSDocument checkAutosavingThenContinue:]
```

```
(lldb) bt
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       -[NSDocument autosaveWithImplicitCancellability:completionHandler:]
[2] FILE ACCESS: Document: "Untitled.sketch2" -- State: WAITING
      -[NSDocument performSynchronousFileAccessUsingBlock:]
       -[NSDocument checkAutosavingThenContinue:]
```

```
- (void)doSomethingWithFile {
   [self performAsynchronousFileAccessUsingBlock:^(void (^completionHandler)(void)) {
    if ([self fileURL]) {
        [self performSomeFileAccessThenContinue:^{
            completionHandler();
        }];
    }
};
}
```

```
- (void)doSomethingWithFile {
   [self performAsynchronousFileAccessUsingBlock:^(void (^completionHandler)(void)) {
    if ([self fileURL]) {
        [self performSomeFileAccessThenContinue:^{
            completionHandler();
        }];
    }
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- (void)doSomethingWithFile {
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    if ([self fileURL]) {
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        }];
    }
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```
- (void)doSomethingWithFile {
    [self performAsynchronousFileAccessUsingBlock:^(void (^completionHandler)(void)) {
    if ([self fileURL]) {
        [self performSomeFileAccessThenContinue:^{
            completionHandler();
        }];
    }
}
```

```
- (void)doSomethingWithFile {
   [self performAsynchronousFileAccessUsingBlock:^(void (^completionHandler)(void)) {
    if ([self fileURL]) {
        [self performSomeFileAccessThenContinue:^{
            completionHandler();
        }];
    } else {
        completionHandler();
    }
};
}
```



Auto Save

Adoption
Responsiveness
Serialization
Versions



iCloud

Adoption
Mechanics
Best Practices



Versions

• Revert and Versions Browser

Versions

- Revert and Versions Browser
- Periodically preserves document contents

Versions

- Revert and Versions Browser
- Periodically preserves document contents
- Automatic



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Versions



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Versions



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Versions



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Backup File Optimization



Versions



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Backup File Optimization



Versions



My Document (Backup)



Backup File Optimization



Versions



My Document (Backup)





Backup File Optimization



Versions



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Backup File Optimization



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My Document

Versions

-writeSafelyToURL:ofType:forSaveOperation:error:



Backup File Optimization



Versions



My Document (Backup)



My Document

-writeSafelyToURL:ofType:forSaveOperation:error:

-backupFileURL

Finished Writing



Finished Writing Copy to Versions...

main thread

Finished Writing Copy to Versions...



main thread





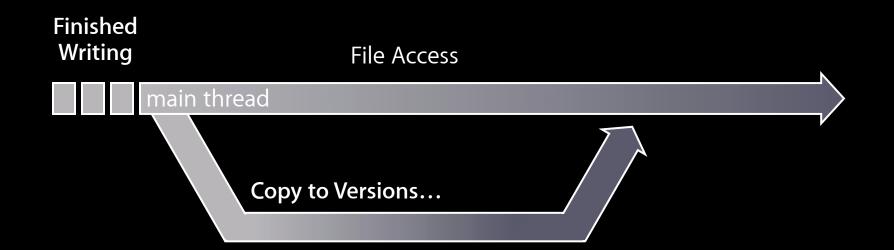




main thread

Copy to Versions...



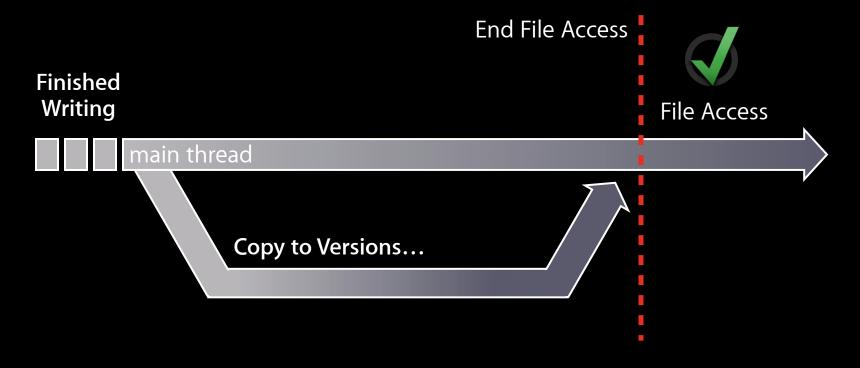






Post-Save Preservation End File Access Finished Writing File / cess main thread Copy to Versions...







Auto Save

Adoption
Responsiveness
Serialization
Versions



iCloud

Adoption
Mechanics
Best Practices



Auto Save

Adoption Responsiveness Serialization Versions



iCloud

Adoption
Mechanics
Best Practices

App-Centric Open Panel

- App-Centric Open Panel
- Non-modal

- App-Centric Open Panel
- Non-modal
- New API



- App-Centric Open Panel
- Non-modal
- New API

	Modal Only	Non-modal Supported
To Invoke	-URLs From Running Open Panel	-begin Open Panel With Completion Handler:
To Override	-run Modal Open Panel: for Types:	-begin Open Panel: for Types: completion Handler:



App-Centric Open Panel



- App-Centric Open Panel
- "Move To..." and "Move to iCloud"



- App-Centric Open Panel
- "Move To..." and "Move to iCloud"
 - NSDocument: -moveToURL:completionHandler:



- App-Centric Open Panel
- "Move To..." and "Move to iCloud"
 - NSDocument: -moveToURL:completionHandler:
- Drafts



Drafts



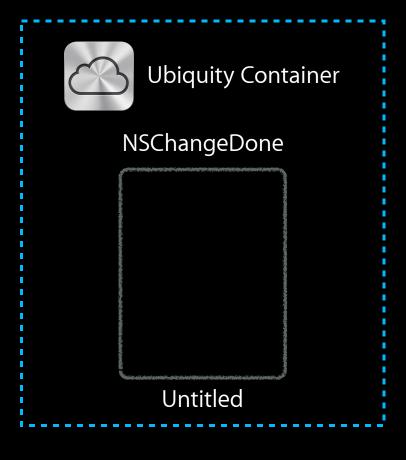


Ubiquity Container













Ubiquity Container



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Ubiquity Container

NSAutos ave As Operation



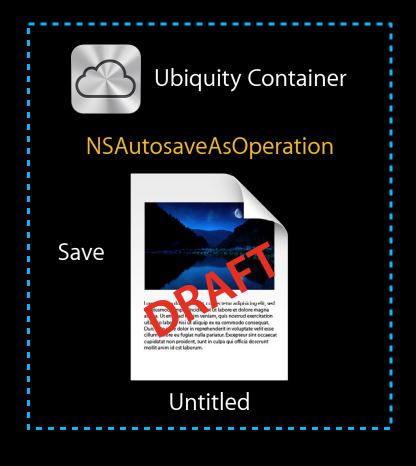
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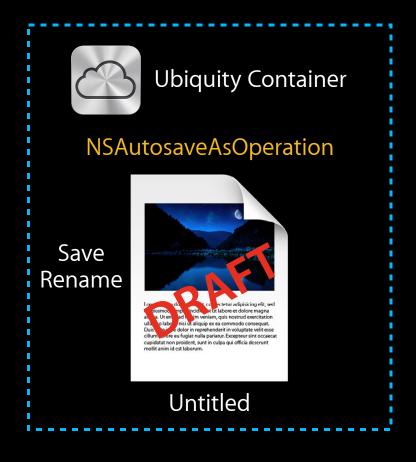




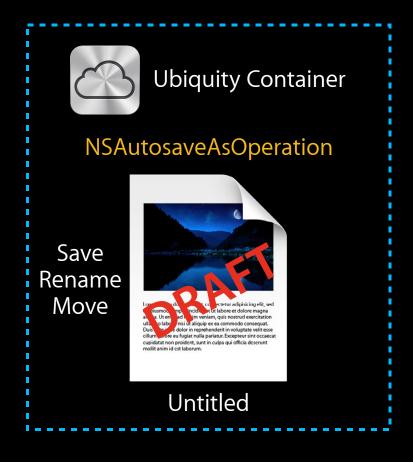




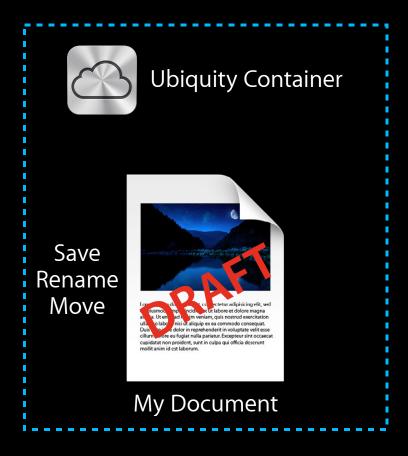




















	User Initiated	Automatic
Save In Place	"Save" — NSSaveOperation	NSAutosaveInPlaceOperation
Save Elsewhere	"Export" — NSSaveToOperation	NSAutosave Elsewhere Operation
Save Elsewhere & Redirect	"Save As" — NSSaveAsOperation	NSAutosaveAsOperation



	User Initiated	Automatic
Save In Place	"Save" — NSSaveOperation	NSAutosave In Place Operation
Save Elsewhere	"Export" — NSSaveToOperation	NSAutosaveElsewhereOperation
Save Elsewhere & Redirect	"Save As" — NSSaveAsOperation	NSAutosave As Operation

Accessors -setDraft: & -isDraft



	User Initiated	Automatic
Save In Place	"Save" — NSSaveOperation	NSAutosaveInPlaceOperation
Save Elsewhere	"Export" — NSSaveToOperation	NSAutosave Elsewhere Operation
Save Elsewhere & Redirect	"Save As" — NSSaveAsOperation	NSAutosaveAsOperation

Accessors	-setDraft: & -isDraft
Customize Draft Name	-default Draft Name



	User Initiated	Automatic
Save In Place	"Save" — NSSaveOperation	NSAutosaveInPlaceOperation
Save Elsewhere	"Export" — NSSaveToOperation	NSAutosave Elsewhere Operation
Save Elsewhere & Redirect	"Save As" — NSSaveAsOperation	NSAutosaveAsOperation

Accessors	-setDraft: & -isDraft
Customize Draft Name	-default Draft Name
Disable Drafts	+autosavesDrafts



















Coordinated Write











Coordinated Write











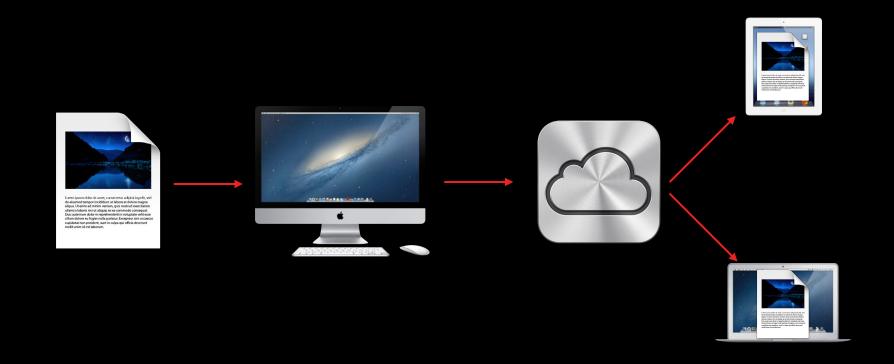
Coordinated Write













































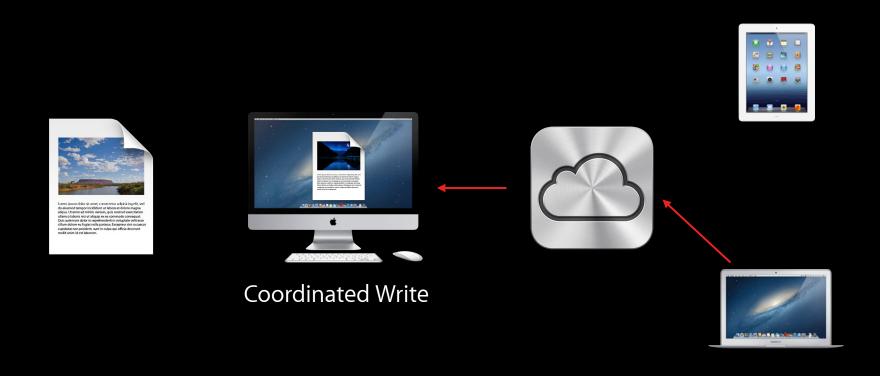


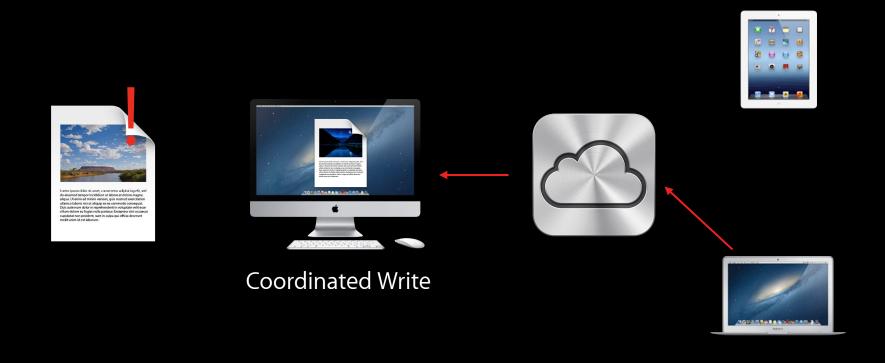


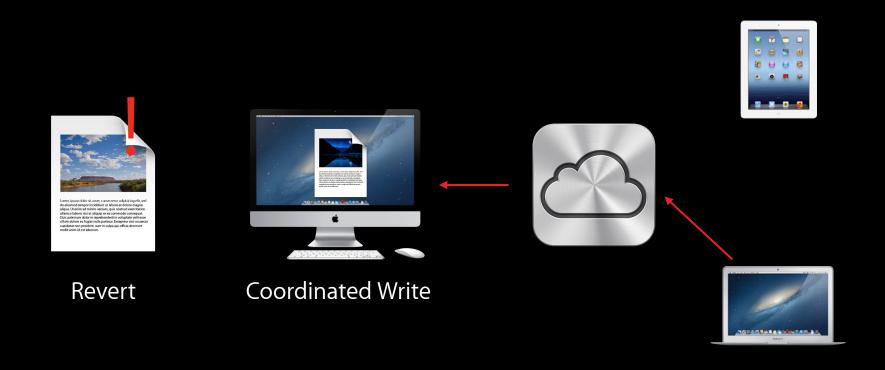


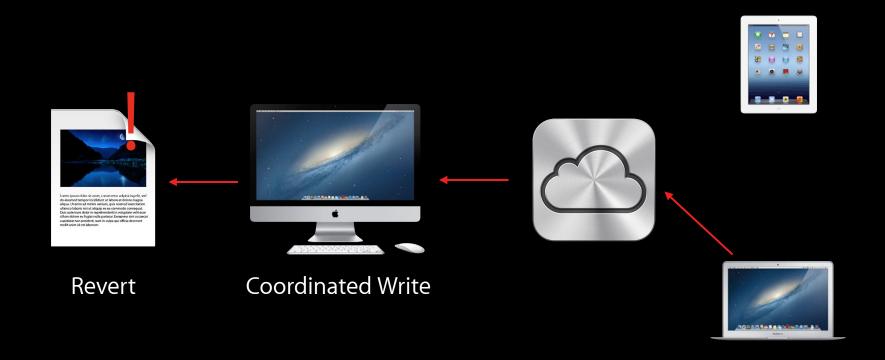
























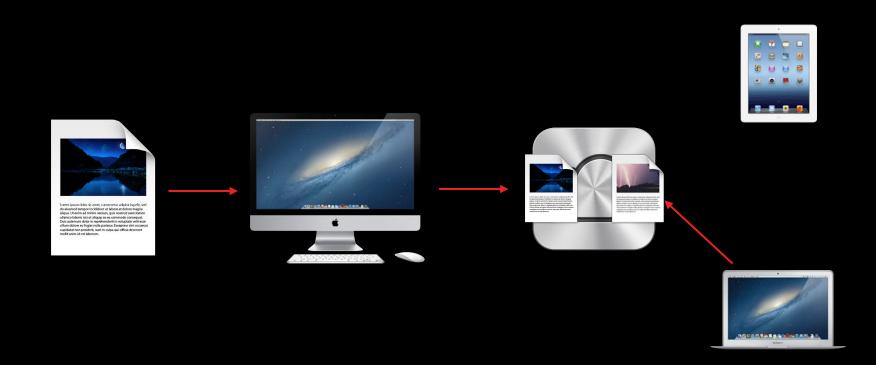
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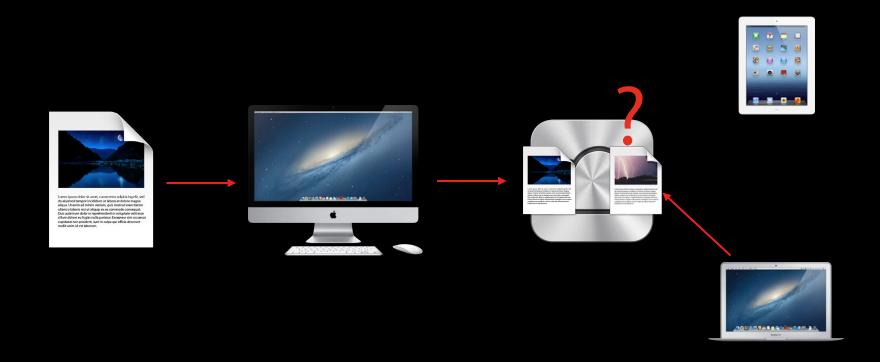












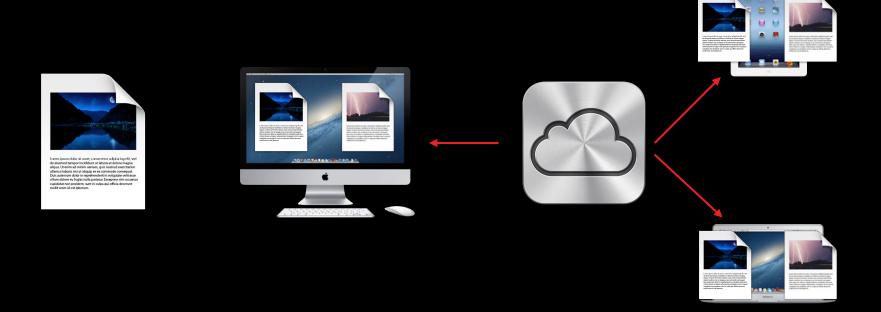














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Conflicting Changes











Conflicting Changes













Auto Save

Adoption Responsiveness Serialization Versions



iCloud

Adoption Mechanics

• Override NSDocument as little as possible

- Override NSDocument as little as possible
- Eliminate open panel accessory views

- Override NSDocument as little as possible
- Eliminate open panel accessory views
- Quick Look thumbnail and preview

- Override NSDocument as little as possible
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- Quick Look thumbnail and preview
- File formats

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- Quick Look thumbnail and preview
- File formats
- Consider App running simultaneously on different devices

- Override NSDocument as little as possible
- Eliminate open panel accessory views
- Quick Look thumbnail and preview
- File formats
- Consider App running simultaneously on different devices
- Test reverting



Foundation APIs



- Foundation APIs
 - File Coordination



- Foundation APIs
 - File Coordination
 - -URLForUbiquityContainerIdentifier:



- Foundation APIs
 - File Coordination
 - -URLForUbiquityContainerIdentifier:
 - NSMetadataQuery





- Foundation APIs
 - File Coordination
 - - URLFor Ubiquity Container Identifier:
 - NSMetadataQuery
 - -ubiquityIdentityToken





- Foundation APIs
 - File Coordination
 - - URLFor Ubiquity Container Identifier:
 - NSMetadataQuery
 - -ubiquityldentityToken
 - NSUbiquityIdentityDidChangeNotification





- Foundation APIs
 - File Coordination
 - - URLFor Ubiquity Container Identifier:
 - NSMetadataQuery
 - -ubiquityldentityToken
 - NSUbiquityIdentityDidChangeNotification
- +usesUbiquitousStorage
 - Disable NSDocument iCloud features





Auto Save

Adoption
Responsiveness
Serialization
Versions



iCloud

Adoption
Mechanics
Best Practices

Related Sessions

Using iCloud with UIDocument	Marina Wednesday 10:15AM
Using iCloud with Core Data	Mission Thursday 4:30PM
Advanced iCloud Document Storage	Marina Thursday 3:15PM

Labs

Open and Save Panels Within an App Sandbox Q & A Lab	Essentials Lab B Wednesday 4:30PM
Security Lab	Core OS Lab B Thursday 9:00AM
Cocoa and OS X Gestures Lab	Essentials Lab B Thursday 2:00PM
iCloud Storage Lab	Essentials Lab B Thursday 4:30PM
Cocoa and XPC Lab	Essentials Lab B Friday 10:30AM
iCloud Storage Lab	Essentials Lab B Friday 11:30AM

More Information

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WWDC2012





