JavaScript for Automation

Session 306
Sal Soghoian
Product Manager Automation Technologies
Automation in Mavericks

Notifications
Code signing
use statements
Script libraries
Speakable workflows
Automation in Yosemite

- Code-signed workflows
- Enhanced script libraries
- Script progress indicators
- Dictation commands
JavaScript for Automation
Script

Slider
<table>
<thead>
<tr>
<th>AppleScript</th>
<th>&lt;No selected element&gt;</th>
</tr>
</thead>
</table>

### AppleScript

The current text in the AppleScript editor is:

- **<No selected element>**
Stop
AppleScript
JavaScript

<No selected element>
AppleScript
<table>
<thead>
<tr>
<th>Language</th>
<th>Selected Element</th>
</tr>
</thead>
<tbody>
<tr>
<td>JavaScript</td>
<td>&lt;No selected element&gt;</td>
</tr>
</tbody>
</table>
Keynote = Application('Keynote')
documents = Keynote.documents

progress = $.NSProgress.currentProgress
progress.totalUnitCount = documents.length

destinationPath = $('~/Movies').stringByExpandingTildeInPath

for (i in documents) {
    document = documents[i]
    exportName = document.name().replace('.key','.m4v')
    document.export({
        to: Path(destinationPath.js + '/' + exportName),
        as: 'QuickTime movie'
    })
    progress.completedUnitCount = i
}

progress.completedUnitCount = documents.length
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    })
    progress.completedUnitCount = i
}

progress.completedUnitCount = documents.length

// Target app "Keynote"
Application("Keynote").documents.length
--- 3

/* Progress: 1 of 3 */
Application("Keynote").documents[0].name()
--- "New Product Design.key"
Application("Keynote").export([object ObjectSpecifier], {to:[object ObjectSpecifier], as:'QuickTime movie'})
/* Progress: 33% completed */
Keynote = Application('Keynote')
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progress = $.NSProgress.currentProgress
progress.totalUnitCount = documents.length

destinationPath = $('~/Movies').stringByExpandingTildeInPath

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    })
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}

progress.completedUnitCount = documents.length

/**/ Application("Keynote").documents[1].name()
    --> "Wind Power.key"
/**/ Application("Keynote").export([object ObjectSpecifier], {to:[object ObjectSpecifier], as:'QuickTime movie'})
/**/
Keynote = Application('Keynote')
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destinationPath = $('~/Movies').stringByExpandingTildeInPath

for (i in documents) {
    document = documents[i]
    exportName = document.name().replace('\.key','\.m4v')
    document.export({
        to: Path(destinationPath.js + '/' + exportName),
        as: 'QuickTime movie'
    })
    progress.completedUnitCount = i
}

progress.completedUnitCount = documents.length
Keynote = Application('Keynote')

documents = Keynote.documents

progress = $.NSProgress.currentProgress
progress.totalUnitCount = documents.length

destinationPath = $('~/Movies').stringByExpandingTildeInPath

for (i in documents) {
  document = documents[i]
  exportName = document.name().replace('.key','.m4v')
  document.export({
    to: Path(destinationPath.js + '/' + exportName),
    as: 'QuickTime movie'
  })
  progress.completedUnitCount = i
}

progress.completedUnitCount = documents.length

Event Log

Application("Keynote").documents[2].name()
--> "Community Projects.key"

Application("Keynote").export([object ObjectSpecifier], {to:[object ObjectSpecifier], as:'QuickTime movie'})
/* Progress: 3 of 3 */
/* Progress: 100% completed */
// Stop targeting
Result:
3
Default Script Editor: Script Editor (2.7)
Default Language: AppleScript (2.4)

- Show inherited items in dictionary viewer
- Show “tell” application pop-up menu
- Show Script menu in menu bar
- Show Computer scripts

Show application scripts at: top, bottom
AppleScript
JavaScript
General

Default Script Editor: Script Editor (2.7)
Default Language: JavaScript (1.0)

- Show inherited items in dictionary viewer
- Show “tell” application pop-up menu
- Show Script menu in menu bar
- Show Computer scripts
  - Show application scripts at: top, bottom
Script Menu
<table>
<thead>
<tr>
<th>Category</th>
<th>Font</th>
<th>Size</th>
<th>Col</th>
</tr>
</thead>
<tbody>
<tr>
<td>New text (uncompiled)</td>
<td>Menlo Regular</td>
<td>14</td>
<td></td>
</tr>
<tr>
<td>Operators, etc. (+ &amp; ,)</td>
<td>Menlo Regular</td>
<td>14</td>
<td></td>
</tr>
<tr>
<td>Language keywords</td>
<td>Menlo Regular</td>
<td>14</td>
<td></td>
</tr>
<tr>
<td>Application keywords</td>
<td>Helvetica Neue</td>
<td>14</td>
<td></td>
</tr>
<tr>
<td>Comments</td>
<td>Menlo Regular</td>
<td>14</td>
<td></td>
</tr>
<tr>
<td>Values (numbers, data)</td>
<td>Menlo Regular</td>
<td>14</td>
<td></td>
</tr>
<tr>
<td>Variables and...routine names</td>
<td>Helvetica Neue</td>
<td>14</td>
<td></td>
</tr>
<tr>
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<td>Menlo Regular</td>
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<tr>
<td>Parameter names</td>
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<td>14</td>
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</tr>
<tr>
<td>Classes</td>
<td>Helvetica Neue</td>
<td>14</td>
<td></td>
</tr>
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</table>

*Use Defaults*  *Revert*  *Apply*
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</tbody>
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Language: JavaScript
File

New
New from Template
Open...
Open Dictionary...
Open Recent
Close
Save...
Duplicate
Rename...
Move To...
Export...
Revert To
Page Setup...
Print...
Document Object [see also Standard Suite, Compatibility Suite] : The Keynote document. syn presentation

ELEMENTS
contains slides, masterSlides.

PROPERTIES
id (text, r/o) : Document ID.
slideNumbersShowing (boolean) : Are the slide numbers displayed?
documentTheme (Theme) : The theme assigned to the document.
autoLoop (boolean) : Make the slideshow play repeatedly.
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Document Object [see also Standard Suite, Compatibility Suite]: The Keynote document. *syn* presentation

**ELEMENTS**
contains *slides, masterSlides*.

**PROPERTIES**
- *id* (text, r/o): Document ID.
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- *autoLoop* (boolean): Make the slideshow play repeatedly.
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**METHODS**
- export, start, stop, showNext, showPrevious, showSlideSwitcher, cancelSlideSwitcher, acceptSlideSwitcher.
Document Object [see also Standard Suite, Compatibility Suite]: The Keynote document object is a proprietary object representing a Keynote presentation. It contains:

**Elements:**
- slides
- masterSlides

**Properties:**
- id (text, r/o): Document ID.
- slideNumbersShowing (boolean): Are the slide numbers displayed?
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**Methods:**
- export, start, stop, showNext, showPrevious, showSlideSwitcher, cancelSlideSwitcher, acceptSlideSwitcher.
Definition Viewer

Document Object [see also Standard Suite, Compatibility Suite]: The Keynote document. syn presentation

Elements
contains slides, masterSlides.

Properties
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Methods
- export, start, stop, showNext, showPrevious, showSlideSwitcher, cancelSlideSwitcher, acceptSlideSwitcher.
**Class**

Contains `slides`, `masterSlides`.

**Properties**

- `id` (text, r/o): Document ID.
- `slideNumbersShowing` (boolean): Are the slide numbers displayed?
- `documentTheme` (Theme): The theme assigned to the document.
- `autoLoop` (boolean): Make the slideshow play repeatedly.
- `autoPlay` (boolean): Automatically play the presentation when opening the file.
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- `currentSlide` (Slide, r/o): The slide that would display if the presentation was started.

**Methods**

- `export`, `start`, `stop`, `showNext`, `showPrevious`, `showSlideSwitcher`, `cancelSlideSwitcher`, `acceptSlideSwitcher`.
Document **Object** [see also **Standard Suite**, **Compatibility Suite**]: The Keynote document. *syn presentation*

**ELEMENTS**
contains **slides**, **masterSlides**.

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**METHODS**
export, start, stop, showNext, showPrevious, showSlideSwitcher, cancelSlideSwitcher, acceptSlideSwitcher.
JavaScript for Automation

David Steinberg
Automation Engineer
JavaScript for Automation

Application scripting
Libraries and applets
UI scripting
Using system APIs
Automation
Automation
Automate tasks
Automation

Automate tasks
Automation

Interact with applications
Automation
Interact with applications
Demo
Automation
Automation

Cocoa Scripting
Automation

Object Model

Object Model

Object Model

Cocoa Scripting
Automation

Object Model

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Object Model

Cocoa Scripting
Automation

Apple Events

Object Model
Object Model
Object Model

Cocoa Scripting
Automation

Apple Events

Cocoa Scripting

Object Model

Object Model

Object Model
Automation
Object model
Automation
Object model
Automation

Object model

application

application "Mail"
Automation

Object model

application

inbox

inbox of application "Mail"
Automation

Object model

inbox of application "Mail"
Automation

Object model

application

inbox

messages

message 1

message 2

\[\ldots\]

message 2 of inbox of application "Mail"
JavaScript
JavaScript and Automation
JavaScript and Automation

Object Model

Apple Events

Cocoa Scripting

Object Model

Object Model

Object Model
JavaScript and Automation

- JavaScript Core
- JavaScript AE Bridge
- Apple Events
- Cocoa Scripting
- Object Model
- Apple Events
- Object Model
- Object Model
- Object Model
Application Scripting

Application object

Name: Application('Safari')
Application Scripting

Application object

Name: Application('Safari')

Bundle ID: Application('com.apple.mail')
Application Scripting

Application object

Name: Application('Safari')

Bundle ID: Application('com.apple.mail')

Path: Application('/Applications/TextEdit.app')
Application Scripting

Application object

Name: Application('Safari')

Bundle ID: Application('com.apple.mail')

Path: Application('/Applications/TextEdit.app')

Process ID: Application(763)
Application Scripting

Application object

Name: Application('Safari')
Bundle ID: Application('com.apple.mail')
Path: Application('/Applications/TextEdit.app')
Process ID: Application(763)

Current Application: Application.currentApplication()
Application Scripting

Syntax
Application Scripting
Syntax

Properties: Safari.name
Application Scripting

Syntax

Properties: Safari.name

Elements: Safari.documents[0]
Application Scripting

Syntax

Properties: Safari.name

Elements: Safari.documents[0]

Commands: Safari.open(...)
Application Scripting

Syntax

Properties:  Safari.name

Elements:    Safari.documents[0]

Commands:   Safari.open(...)
Application Scripting

Getting and setting properties
Application Scripting

Getting and setting properties

Safari = Application('Safari')
Application Scripting

Getting and setting properties

Safari = Application('Safari')

doc = Safari.document[0]
Application Scripting
Getting and setting properties

Safari = Application('Safari')

doc = Safari.document[0]

url = doc.url()
Safari = Application('Safari')

doc = Safari.document[0]

url = doc.url()

doc.url = 'http://apple.com'
Application Scripting

Element arrays

Safari = Application('Safari')
Application Scripting

Element arrays

Safari = Application('Safari')

window = Safari.windows[0]
Safari = Application('Safari')

window = Safari.windows[0]

window = Safari.windows['Apple']
Application Scripting

Element arrays

Safari = Application('Safari')

window = Safari.windows[0]

window = Safari.windows['Apple']

window = Safari.windows['#412']
Demo
Application Scripting

Filtering arrays

Mail = Application('Mail')
Application Scripting

Filtering arrays

Mail = Application('Mail')

jsEmails = Mail.inbox.messages.whose({subject:'JavaScript'})
Application Scripting

Sending commands
Application Scripting
Sending commands

Mail = Application('Mail')
Application Scripting

Sending commands

```
Mail = Application('Mail')
message = Mail.inbox.messages[0]
```
Application Scripting

Sending commands

```python
Mail = Application('Mail')

message = Mail.inbox.messages[0]

message.open()
```
Application Scripting

Sending commands

```python
Mail = Application('Mail')

message = Mail.inbox.messages[0]

message.open()

Mail.open(message)
```
Application Scripting

Sending commands

Mail = Application('Mail')

message = Mail.inbox.messages[0]

message.open()

Mail.open(message)

response = message.reply({
    replyAll: true,
    openingWindow: false
})
Application Scripting

Paths
Application Scripting

Paths

TextEdit = Application('TextEdit')
Application Scripting

Paths

TextEdit = Application('TextEdit')

path = Path('/Users/username/Desktop/foo.rtf')
Application Scripting

Paths

TextEdit = Application('TextEdit')

path = Path('/Users/username/Desktop/foo.rtf')

TextEdit.open(path)
Application Scripting
Creating objects
Application Scripting

Creating objects

TextEdit = Application('TextEdit')
Application Scripting

Creating objects

TextEdit = Application('TextEdit')

```
doc =.TextEdit.Document()
```
Application Scripting

Creating objects

TextEdit = Application('TextEdit')

doc = TextEdit.Document()

TextEdit.documents.push(doc)
Application Scripting

Creating objects

```python
TextEdit = Application('TextEdit')

doc = TextEdit.Document()

TextEdit.documents.push(doc)

doc.text = 'Hello world'
```
Application Scripting

Creating objects

TextEdit = Application('TextEdit')

doc = TextEdit.Document()

TextEdit.documents.push(doc)

doc.text = 'Hello world'

jsDoc = TextEdit.Document({text:'JavaScript for Automation'})

TextEdit.documents.push(jsDoc)
Application Scripting
Standard additions
app = Application.currentApplication()
app = Application.currentApplication()

app.includeStandardAdditions = true
app = Application.currentApplication()

app.includeStandardAdditions = true

app.beep(3)
app = Application.currentApplication()

app.includeStandardAdditions = true

app.beep(3)

app.say('Hello world')
app = Application.currentApplication()

app.includeStandardAdditions = true

app.beep(3)

app.say('Hello world')

app.displayAlert('Finished task')
Libraries
function log(message, format) {
    ...
}

Libraries

Home ➤ Library ➤ Script Libraries ➤ toolbox.scpt
function log(message, format) {
...
}

toolbox = Library('toolbox')
toolbox.log('hello world')
Applets
Applets
Event handlers
Applets
Event handlers

function run() { ... }
Applets

Event handlers

function run() { ... }

function openDocuments(docs) { ... }
Applets

Event handlers

function run() { ... }

function openDocuments(docs) { ... }

function printDocuments(docs) { ... }
function run() { ... }

function openDocuments(docs) { ... }

function printDocuments(docs) { ... }

function idle() { ... }
Applets
Event handlers

function run() { ... }

function openDocuments(docs) { ... }

function printDocuments(docs) { ... }

function idle() { ... }

function reopen() { ... }
Applets

Event handlers

function run() { ... }

function openDocuments(docs) { ... }

function printDocuments(docs) { ... }

function idle() { ... }

function reopen() { ... }

function quit() { ... }
Demo
UI Scripting
UI Scripting
Built on accessibility
UI Scripting
Built on accessibility
UI Scripting
Built on accessibility

System Events
UI Scripting
Built on accessibility

UI Scripting

System Events

Accessibility icon
UI Scripting
Clicking and typing
UI Scripting
Clicking and typing

SystemEvents = Application('System Events')
UI Scripting
Clicking and typing

SystemEvents = Application('System Events')

notesUI = SystemEvents.processes['Notes']
UI Scripting
Clicking and typing

SystemEvents = Application('System Events')

notesUI = SystemEvents.processes['Notes']

notesUI.windows[0].buttons[0].click()
UI Scripting
Clicking and typing

SystemEvents = Application('System Events')

notesUI = SystemEvents.processes['Notes']

notesUI.windows[0].buttons[0].click()

Notes = Application('Notes')
Notes.activate()
UI Scripting
Clicking and typing

SystemEvents = Application('System Events')

notesUI = SystemEvents.processes['Notes']

notesUI.windows[0].buttons[0].click()

Notes = Application('Notes')
Notes.activate()

SystemEvents.keystroke('m', {
    using: 'command down'
})
Using System APIs
Using System APIs

ObjC and $

Using System APIs

ObjC and $

ObjC.wrap(...)$
Using System APIs

ObjC and $

ObjC.wrap(...)

ObjC.unwrap(...)

ObjC.deepUnwrap(...)

Using System APIs

ObjC and $

ObjC.wrap(...)
ObjC.unwrap(...)
ObjC.deepUnwrap(...)

ObjC.import(...)

Using System APIs

ObjC and $

ObjC.wrap(...)
ObjC.unwrap(...)  
ObjC.deepUnwrap(...)  
ObjC.import(...)

$.NSString
Using System APIs

ObjC and $

ObjC.wrap(…)
ObjC.unwrap(…)
ObjC.deepUnwrap(…)
ObjC.import(…)

$.NSString

$('foo')
Using System APIs

Calling methods
Using System APIs

Calling methods

```
str = [[NSString alloc] initWithUTF8String:"bar"];
[str writeToFile:@"/tmp/foo" atomically:YES];
```
Using System APIs

Calling methods

str = [[NSString alloc] initWithUTF8String:"
bar"];

[str writeToFile:@"/tmp/foo" atomically:YES];

str = $.NSString.alloc.initWithUTF8String(‘bar’)  
str.writeFileAtomically(‘/tmp/foo’, true)
Demo
Using System APIs
Accessing properties
Using System APIs

Accessing properties

```swift
task = $.NSTask.alloc.init
```
Using System APIs

Accessing properties

task = $.NSTask.alloc.init

task.running
Using System APIs

Accessing properties

```
task = $.NSTask.alloc.init

task.running

task.launchPath = '/bin/sleep'
```
Using System APIs

Bridged nil
Using System APIs
Bridged nil

error = $()
Using System APIs

Bridged nil

error = $()

doc = $.NSXMLDocument.alloc.initWithStringOptionsError(xmlString, undefined, error)
Using System APIs

Bridged nil

error = $$()

doc = $.NSXMLDocument.alloc.initWithXMLStringOptionsError(
    xmlString,
    undefined,
    error
)

if (doc.isNil()) {
    $.NSLog(error.userInfo.description)
}
Using System APIs

Subclassing
Using System APIs

Subclassing

ObjC.registerSubclass({

})
Using System APIs

Subclassing

ObjC.registerSubclass(
{
  name: 'AppDelegate',
})
Using System APIs

Subclassing

ObjC.registerSubclass({
    name: 'AppDelegate',
    superclass: 'NSObject',
})

})
Using System APIs

Subclassing

ObjC.registerSubclass({
    name: 'AppDelegate',
    superclass: 'NSObject',
    protocols: ['NSApplicationDelegate'],
});
Using System APIs

Subclassing

ObjC.registerSubclass({
    name: 'AppDelegate',
    superclass: 'NSObject',
    protocols: ['NSApplicationDelegate'],
    properties: {
        window: 'id'
    }
})
Using System APIs

Subclassing

ObjC.registerSubclass(
    
        name: 'AppDelegate',
        superclass: 'NSObject',
        protocols: ['NSApplicationDelegate'],
        properties: {
            window: 'id'
        },

        methods: {
            'applicationDidFinishLaunching:': {
                types: ['void', ['id']],
                implementation: function (notification) {
                    $.NSLog('Application finished launching');
                }
            }
        }

    })
Demo
Using System APIs

Release notes
Using System APIs

Release notes

Binding C functions
Using System APIs

Release notes

Binding C functions
Explicit pass-by-reference
Using System APIs

Release notes

Binding C functions
Explicit pass-by-reference
Passing functions as blocks
Where to Use It
JavaScript for Automation
System-wide scripting
JavaScript for Automation
System-wide scripting
JavaScript for Automation
System-wide scripting

Script Editor

Applets/Droplets
JavaScript for Automation
System-wide scripting

- Script Editor
- Applets/Droplets
- Script Menu
JavaScript for Automation
System-wide scripting

- Script Editor
- Automator
- Applets/Droplets
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JavaScript for Automation
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System-wide scripting

Script Editor
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Script Menu
Automator
Services
osascript
Demo
JavaScript for Automation

Summary
JavaScript for Automation

Summary

Built on JavaScriptCore and OSA
JavaScript for Automation

Summary

Built on JavaScriptCore and OSA
Integrated system-wide
JavaScript for Automation

Summary

Built on JavaScriptCore and OSA
Integrated system-wide
Offers many options for scripting
JavaScript for Automation

Call to action

Script applications
JavaScript for Automation

Call to action

Script applications
Make your applications scriptable
JavaScript for Automation

Call to action

Script applications
Make your applications scriptable
Tell others to make their applications scriptable
More Information

Evangelism
evangelism@apple.com

Documentation
JavaScript for Automation Release Notes
https://developer.apple.com

Apple Developer Forums
http://devforums.apple.com
<table>
<thead>
<tr>
<th>Lab</th>
<th>Services Lab B</th>
<th>Friday 12:45PM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Automation Lab</td>
<td></td>
<td></td>
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</table>