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Scripting the Unscriptable GUI Scripts in AppleScript

Thursday, July 20 - 1:30pm https://sched.co/1MmYG

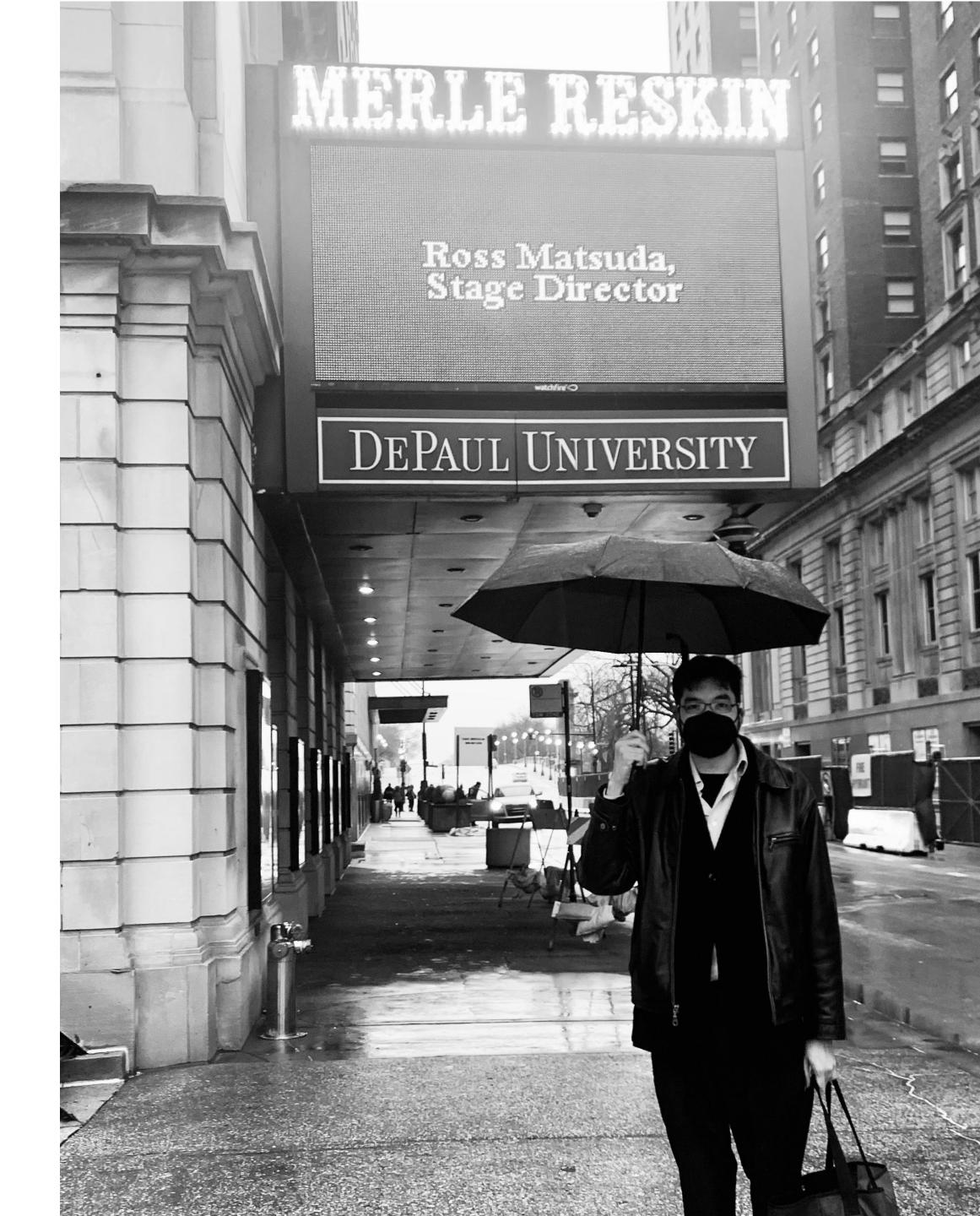
Circa macOS 13.4.1



Ross Matsuda Apple Systems Engineer at Ntiva

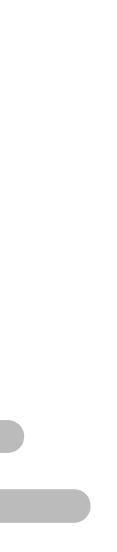
MacAdmins Slack: @Xirias

www.sudoade.com



- Simulating user action and input
- Handled in AppleScript
- A terrible idea





Q Search
Notifications
Sound
Focus
🔀 Screen Time
General
Appearance
Accessibility
Control Center
Siri & Spotlight
🖐 Privacy & Security
🗖 Desktop & Dock
🔆 Displays
🛞 Wallpaper
🖸 Screen Saver
Battery
🔔 Lock Screen
Touch ID & Password

< Sharing

Screen Sharing Off		í
File Sharing Off		í
Printer SharingOff		í
Remote Login Off		í
Remote Management Off 		í
Remote Apple Events Off 		í
Internet Sharing Off		í
Off ● Off		í
Media Sharing Off		í
Bluetooth Sharing On		í
Local hostname	Mitsudomoe	local

/usr/bin/sudo -u "\$CURRENT_USER" \ /usr/bin/defaults -currentHost write \ -bool false

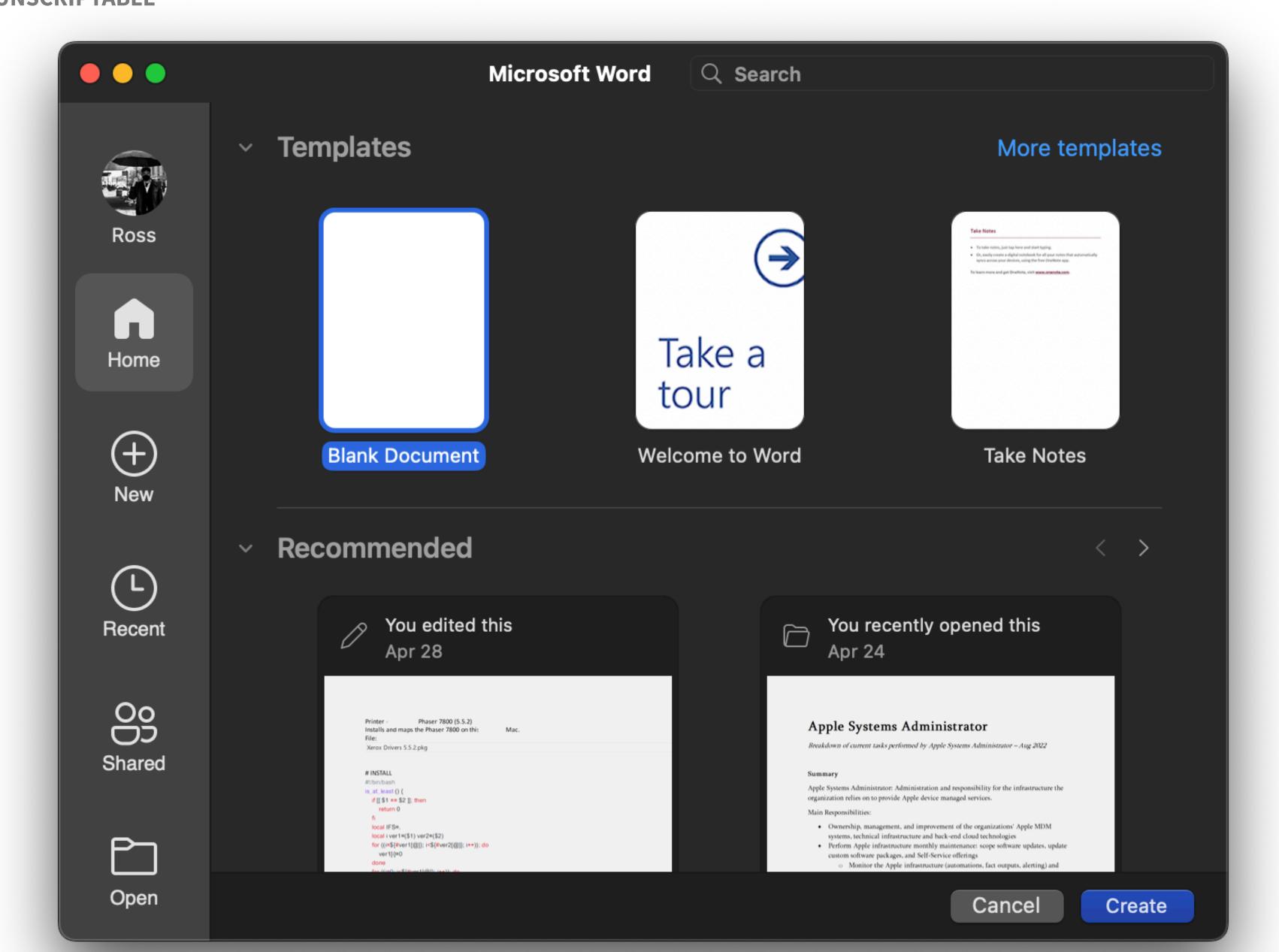
com.apple.Bluetooth PrefKeyServicesEnabled \

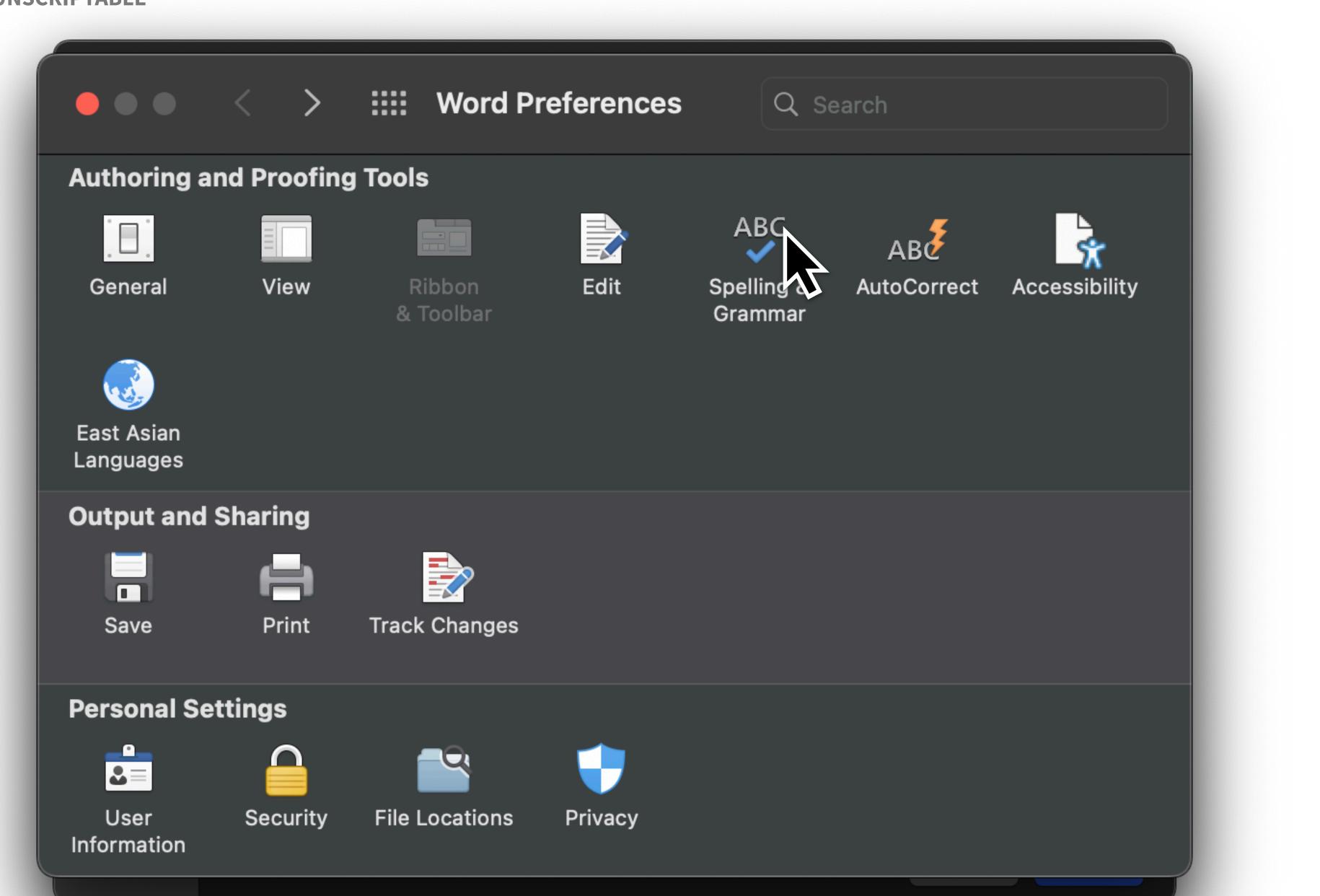


What is GUI scripting? Example 1

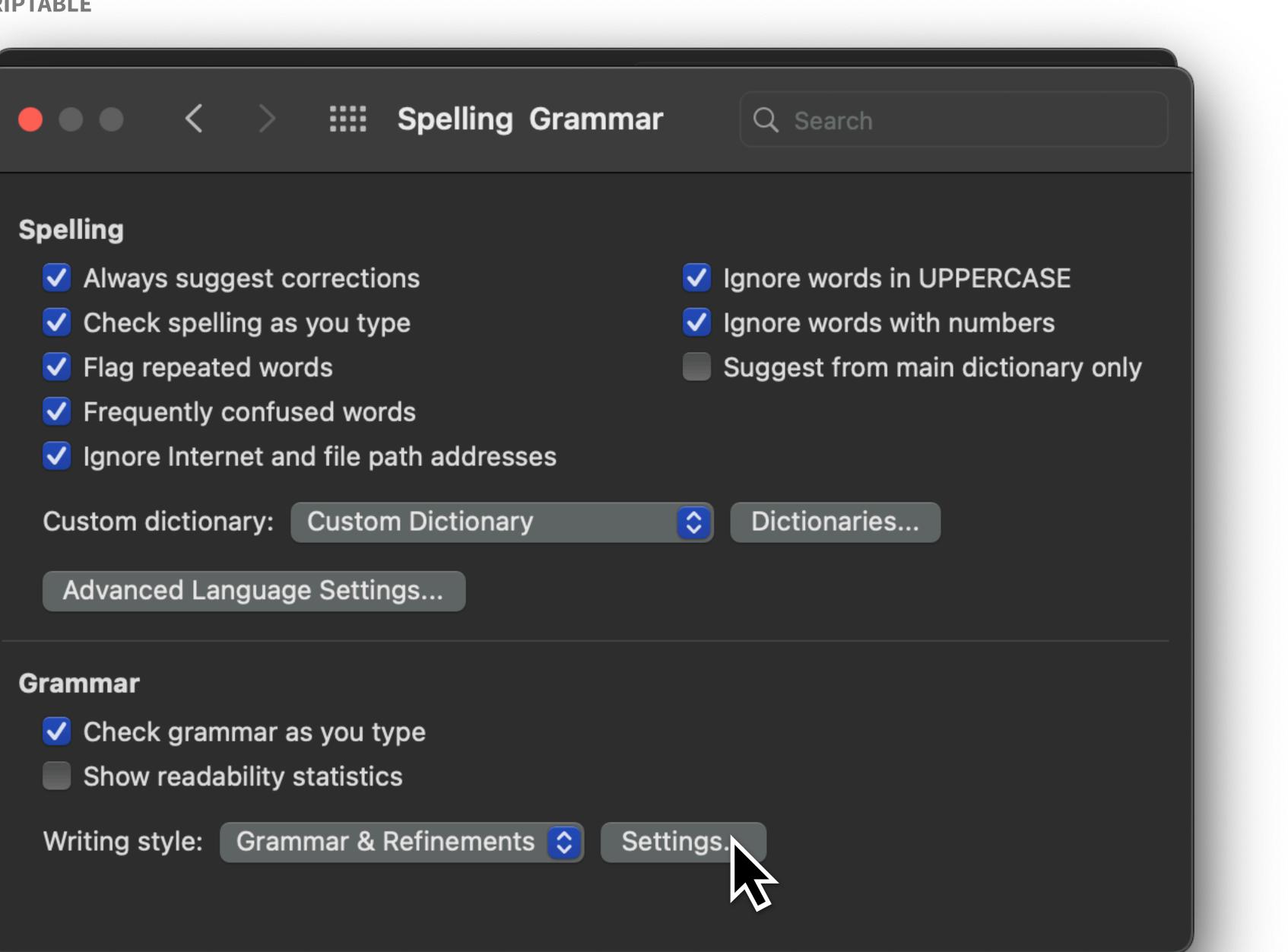
Microsoft Word:

Set grammar to expect two spaces after a period instead of one.





•••



Spelling

- Always suggest correction
- Check spelling as you
- Flag repeated words
- Frequently confused \
- Ignore Internet and file
- Custom dictionary: Cus

Advanced Language Se

Grammar

- Check grammar as yo
- Show readability statis

Writing style: Grammar

Writing style:

- Academic Degrees
- Adjective Used instead of Adverb \checkmark
- Adjective Used instead of Noun \checkmark
- Adjective Used instead of Verb \checkmark
- Adverb instead of Adjective
- Agreement within Noun Phrases
- "An" "And" Confusion \checkmark
- Capitalization \checkmark

Require

Punctuati

Reset All

Grammar Settings

Grammar & Refinements 💲

Grammar and style options:

ion Required with Quotes	don't check 🗘
pace between Sentences	don't check 🗘
	Cancel OK

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Advanced Language Se

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- Adverb instead of Adjective
- Agreement within Noun Phrases
- "An" "And" Confusion \checkmark
- \checkmark Capitalization

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Punctuation Required with Quotes don't check \diamond Space between Sentences one space two space Reset All N

Grammar Settings

Grammar & Refinements 💲

Grammar and style options:

Spelling

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- Check spelling as you
- Flag repeated words
- Frequently confused \
- Ignore Internet and file

Custom dictionary: Cus

Advanced Language Se

Grammar

- Check grammar as yo
- Show readability static

Writing style: Grammar

Writing sty

1

Grammar a

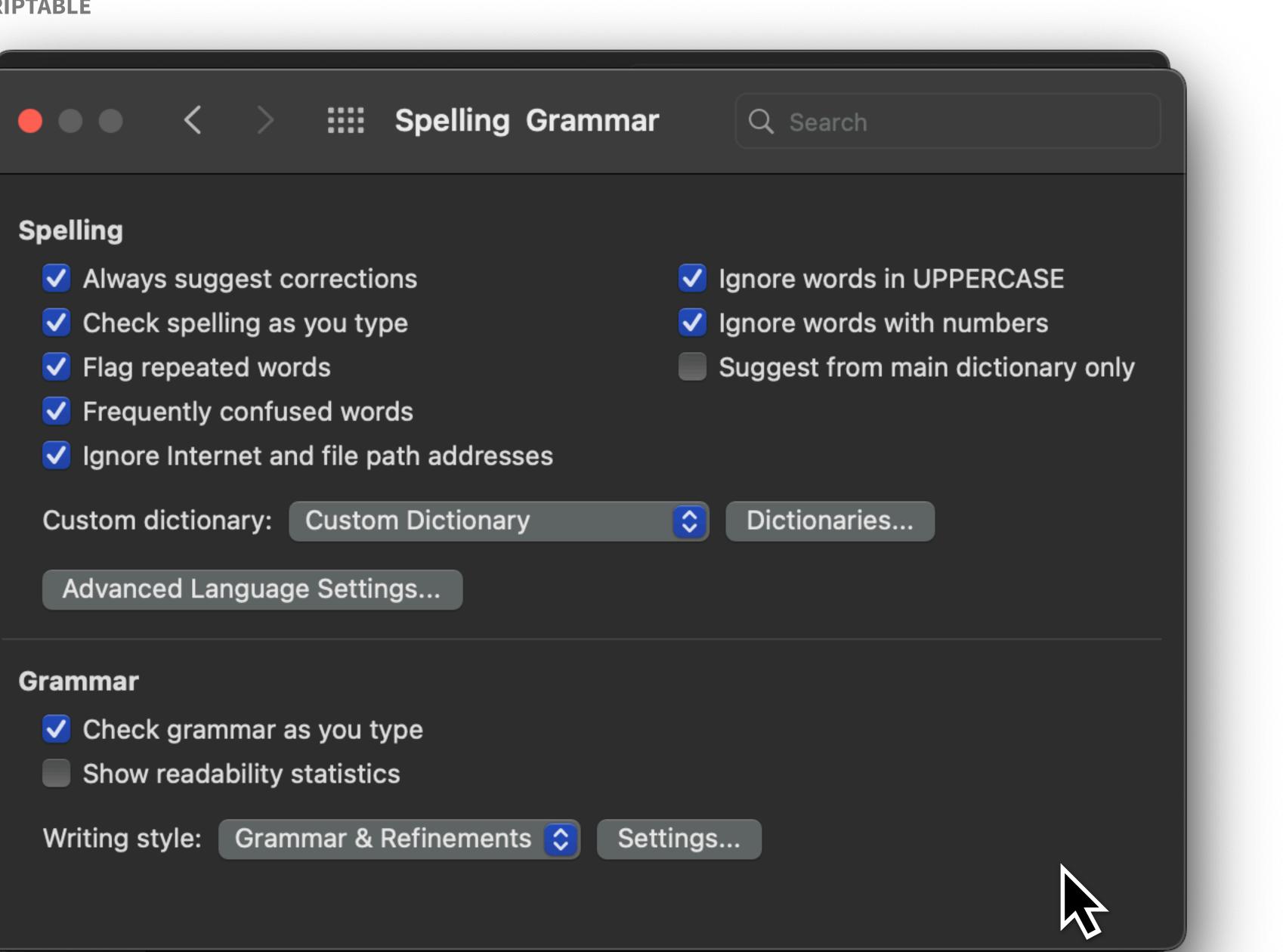
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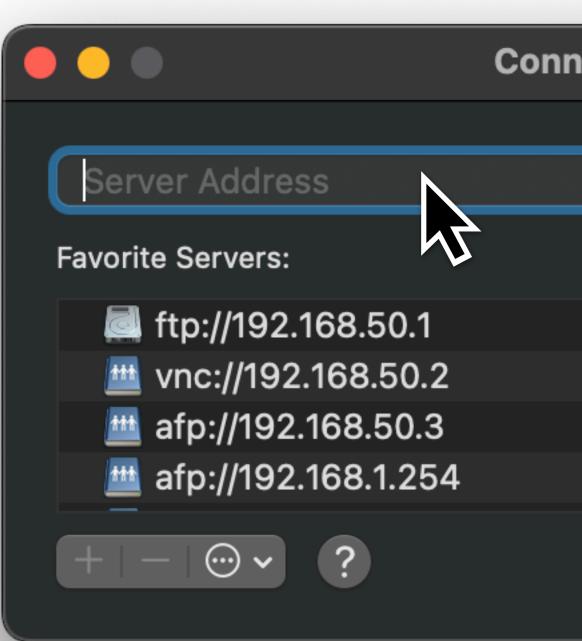
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tion Required with Quotes don't check Space between Sentences two spaces	
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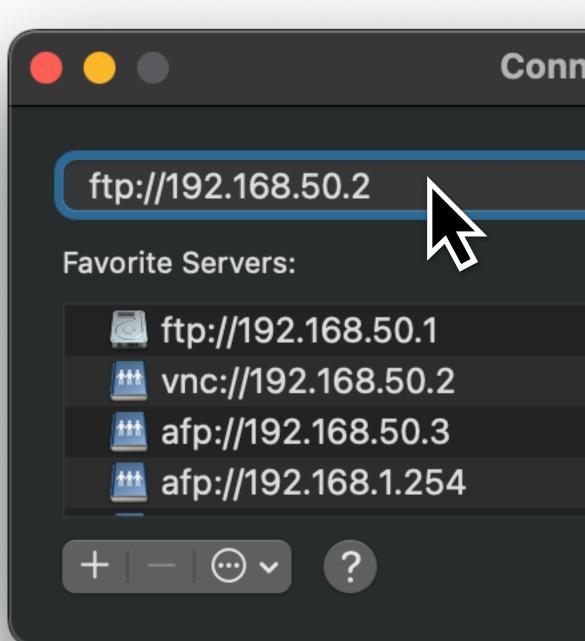


What is GUI scripting? Example 2 Finder:

Connect to Server Bookmark



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(Browse	Connect



nect to Server		
	Browse	Connect



Con

ftp://192.168.50.2

+ - 0 . ?

Favorite Servers:

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- mt.://192.168.50.2
- milling afp://192.168.50.3
- milling afp://192.168.1.254

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	Browse	Connect



Con

ftp://192.168.50.2

- ~ ?

Favorite Servers:

- kip://192.168.50.2
- ktp://192.168.50.1
- minimized with the second seco
- mightail afp://192.168.50.3

nect to Server		
	Browse	Connect



- You can automate things that don't have traditional CLI or MDM configurations
- Support desk time savings
- Makes you look like a spooky ghost





That's it. That's the slide.









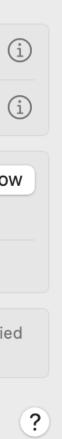
Cons

- Fragile
- OS-specific
- Software version-specific
- Specific-specific

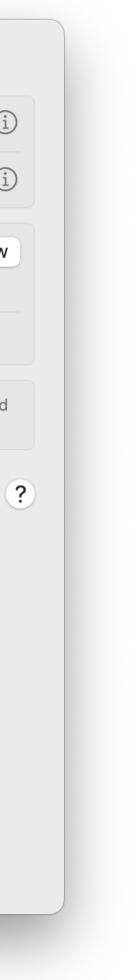
Cons

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12

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Privacy & Security		



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Privacy & Security		



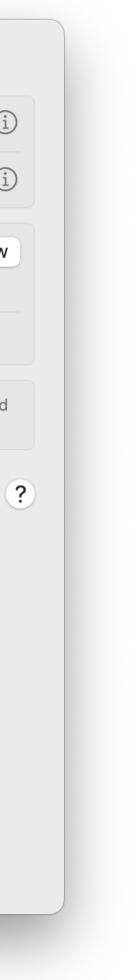
Cons

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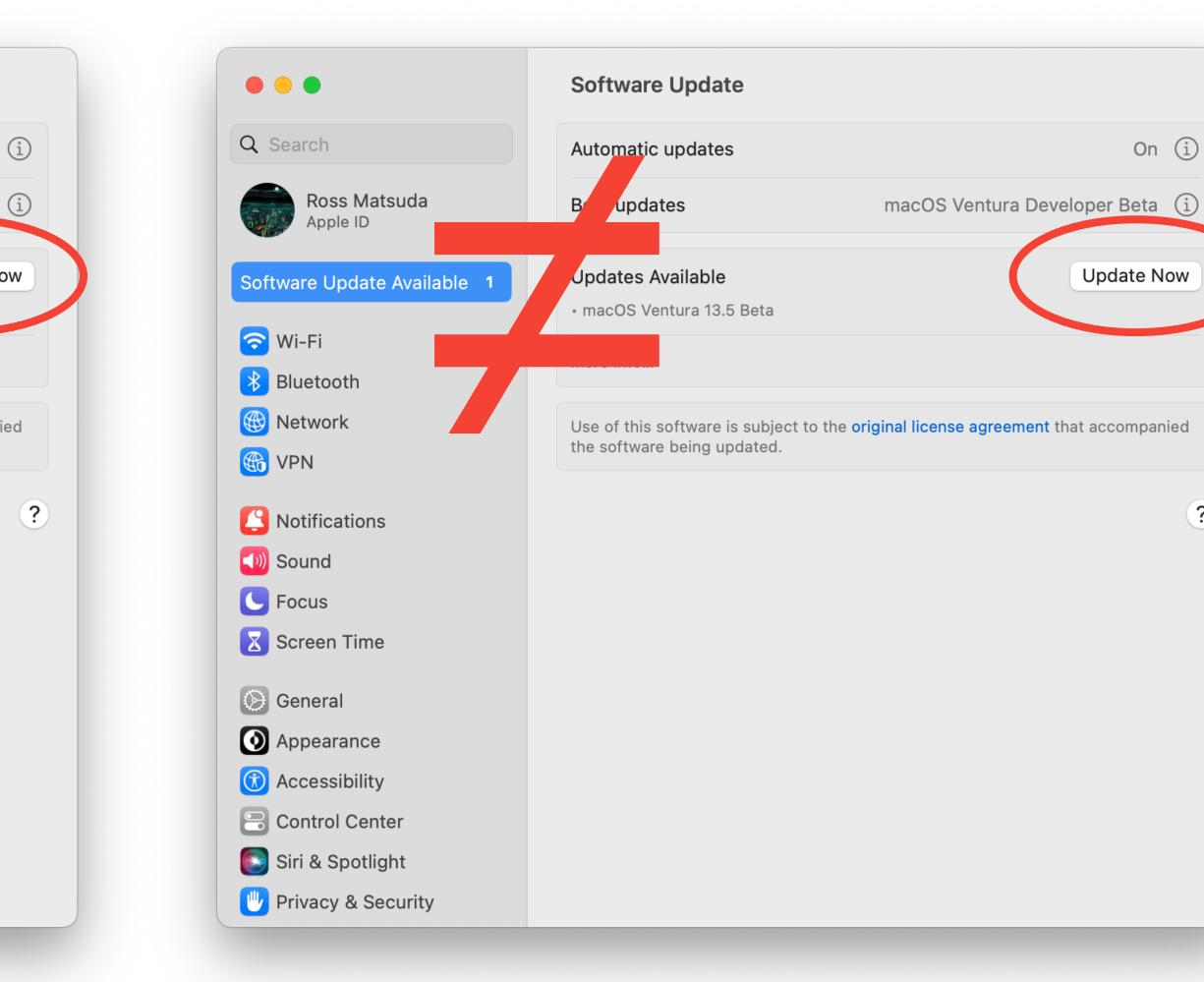


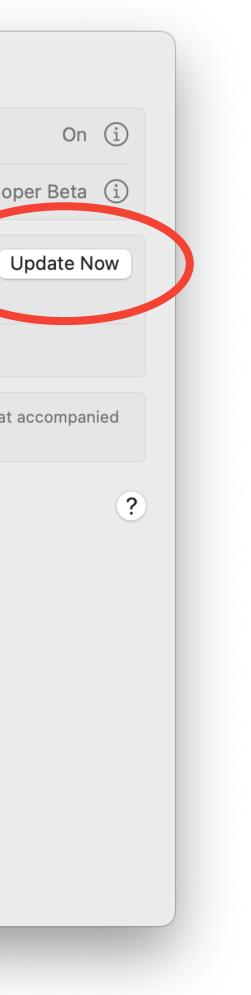
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And that's why this is a terrible idea.

KILLIND & Secultures

Souther Hatsteiner



"sampleScript" wants acr control "System Ever Allowing control will provid Johndenos sinti lotinos access to documents and data in "System Events", and to perform actions within that app. This script needs to control other applications to run.

Don't Allow

OK

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c.

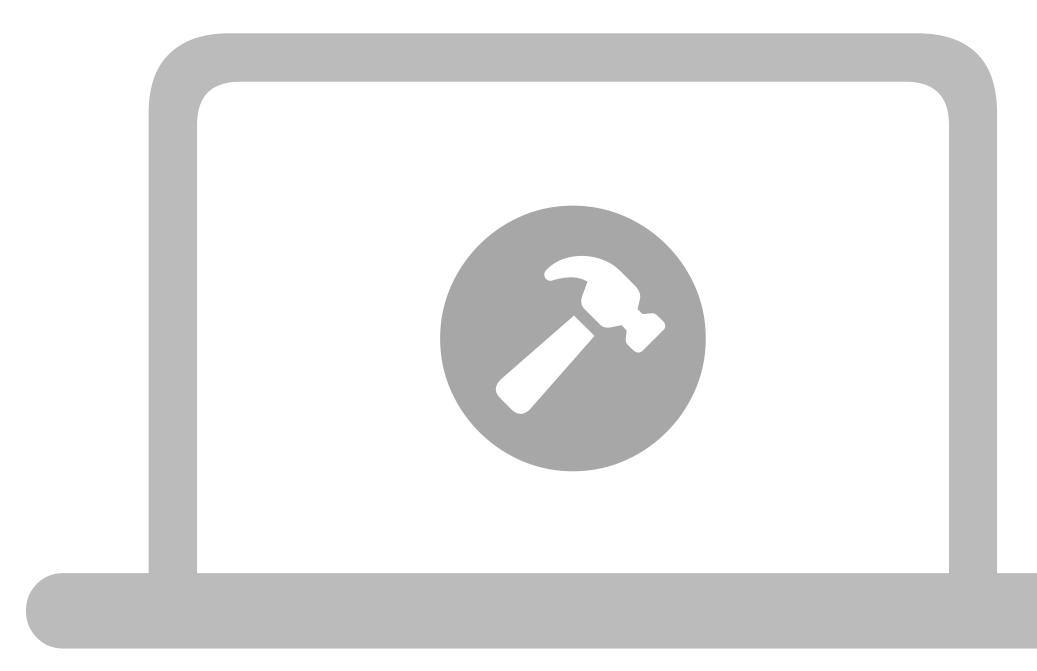
So let's do it.

Become ungovernable. Write GUI scripts.



1 - Test Environment

- Hardware-required or VM?
- OS targets (major/minor)
- App targets
- User account settings
- Constraints





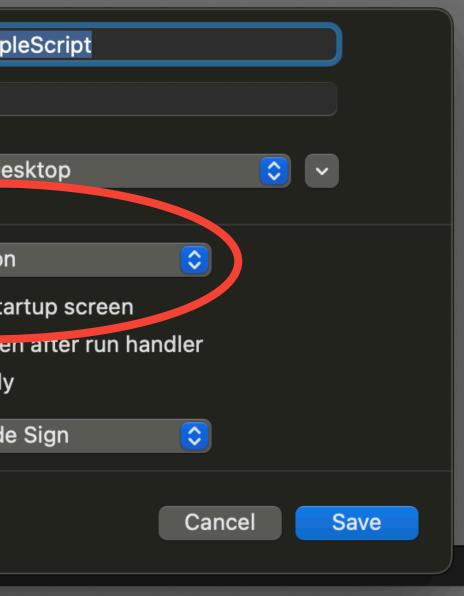
2 - Delivery method

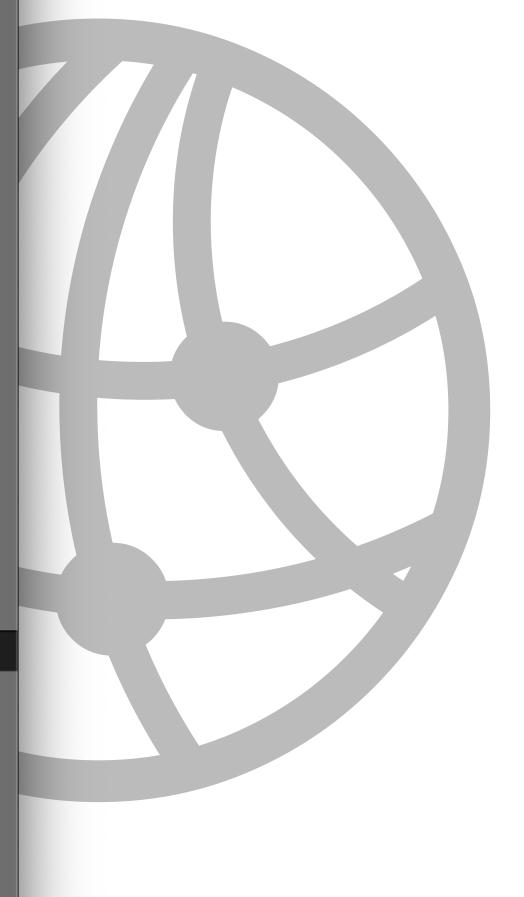
- AppleScript App
- osascript



SCRIPTING THE UNSCRIPTABLE	sampleScript Edited
Prerequ	AppleScript <>> tell application "Google Chrome" activate end tell tell application "System Events" key down {command} key down {shift} key up {shift} key up {comma end tellend tell
2 - Delivery m	Tags: Where: 🖻 Des
 AppleScrip 	File Format: Application Options: Show star
• osascri	Code Sign: Don't Code
	Description
• • • 15	







```
#!/bin/bash
osascript <<EOD</pre>
  tell application "Google Chrome"
      activate
  end tell
  tell application "System Events"
      key down {command}
      key down {shift}
      keystroke "f"
      key up {shift}
      key up {command}
  end tell
EOD
```

3 - PPPCs

- Accessibility
- System Events



<key>Accessibility</key> <array> <dict>

<key>IdentifierType</key>
<string>bundleID</string>

<key>Identifier</key>

<string>com.apple.ScriptEditor.id.Loading-Available-Updates</string>

<string>identifier "com.apple.ScriptEditor.id.Loading-Available-Updates" and anchor apple generic and certificate leaf[subject.CN] = "Apple Development: yourNameHere (XXXXXXXX)" and certificate 1[field.2.4.680.135792.468.0.1.3] /* exists */</string> <key>Comment</key>

<string></string>

<key>Allowed</key>

<true/>

</dict>

</array>

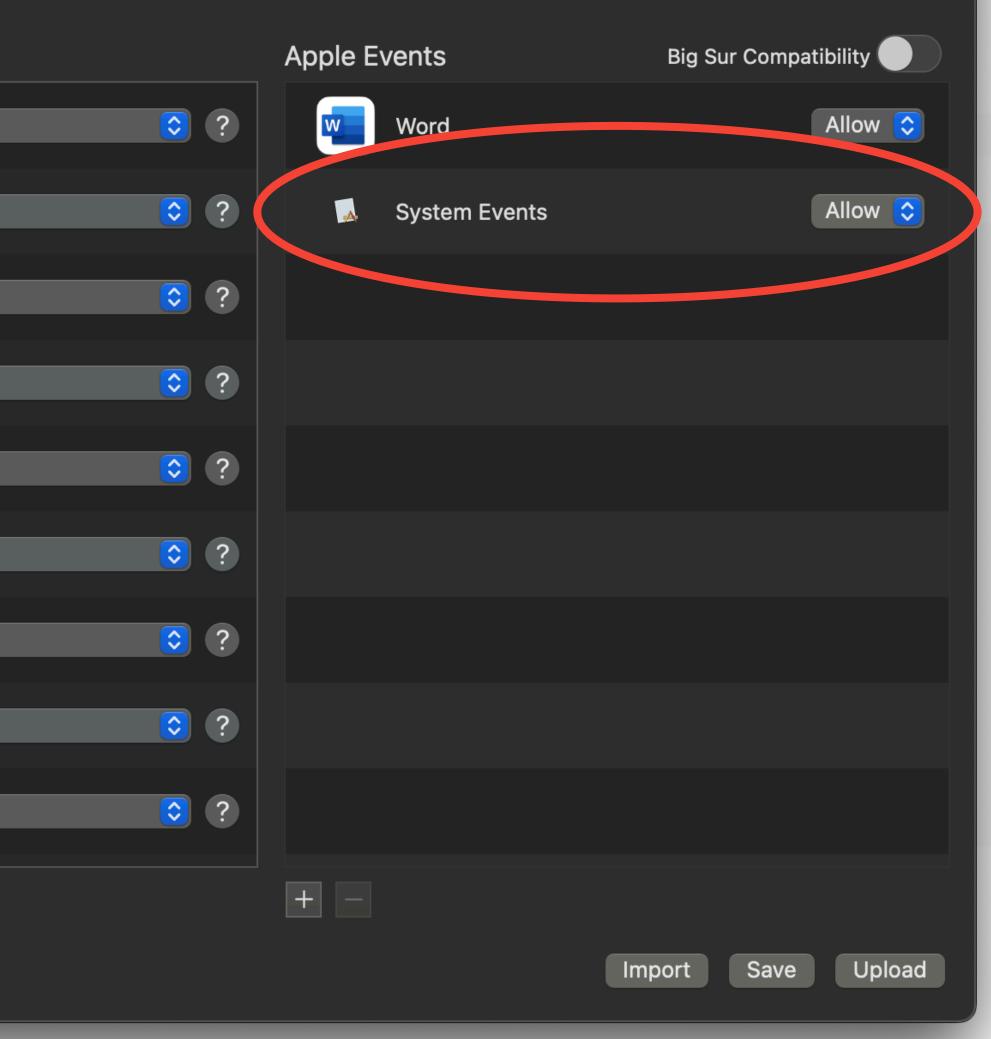
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minal" and anchor apple



3 - PPPCs

- Accessibility
- System Events



<dict>

<key>IdentifierType</key>

<string>bundleID</string>

<key>Identifier</key>

<string>com.apple.ScriptEditor.id.Loading-Available-Updates</string> <key>Comment</key>

<string></string>

<key>CodeRequirement</key>

and anchor apple generic and certificate leaf[subject.CN] = "Apple Development: yourNameHere (XXXXXXXXX)" and certificate 1[field.2.4.680.135792.468.0.1.3] /* exists */</string> <key>Allowed</key>

<true/>

<key>AEReceiverIdentifierType</key>

<string>bundleID</string>

<key>AEReceiverIdentifier</key>

<string>com.apple.systempreferences</string> <key>AEReceiverCodeRequirement</key> <string>identifier "com.apple.systempreferences" and anchor

apple</string>

</dict>

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<string>identifier "com.apple.ScriptEditor.id.Loading-Available-Updates"
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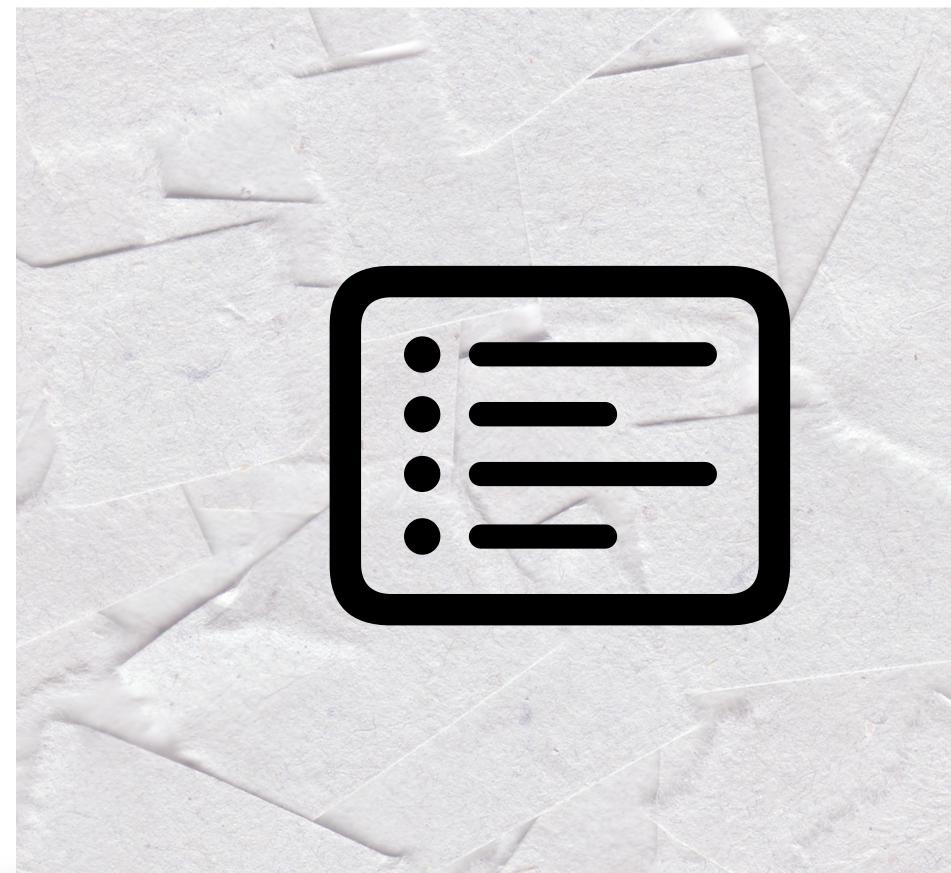
1 - Set your workflow

- Pretend you're helping a user
- Start with device state
- Detailed instructions
- Identify your final interactive step



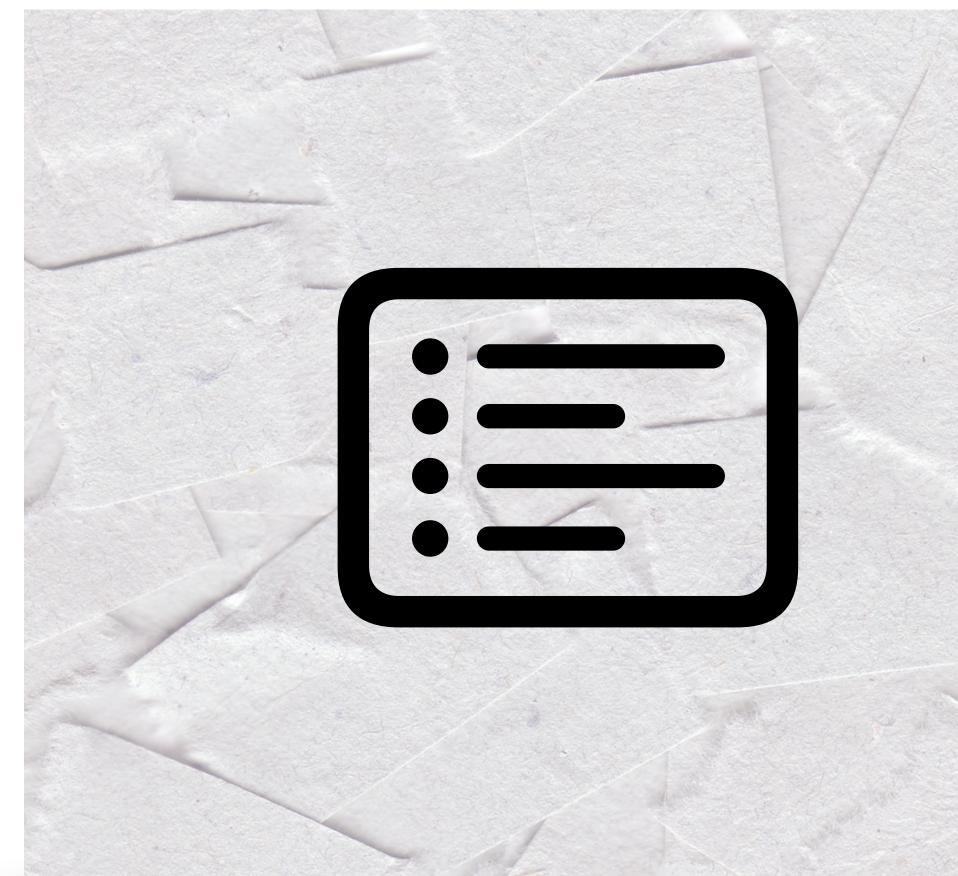
1 - Set your workflow

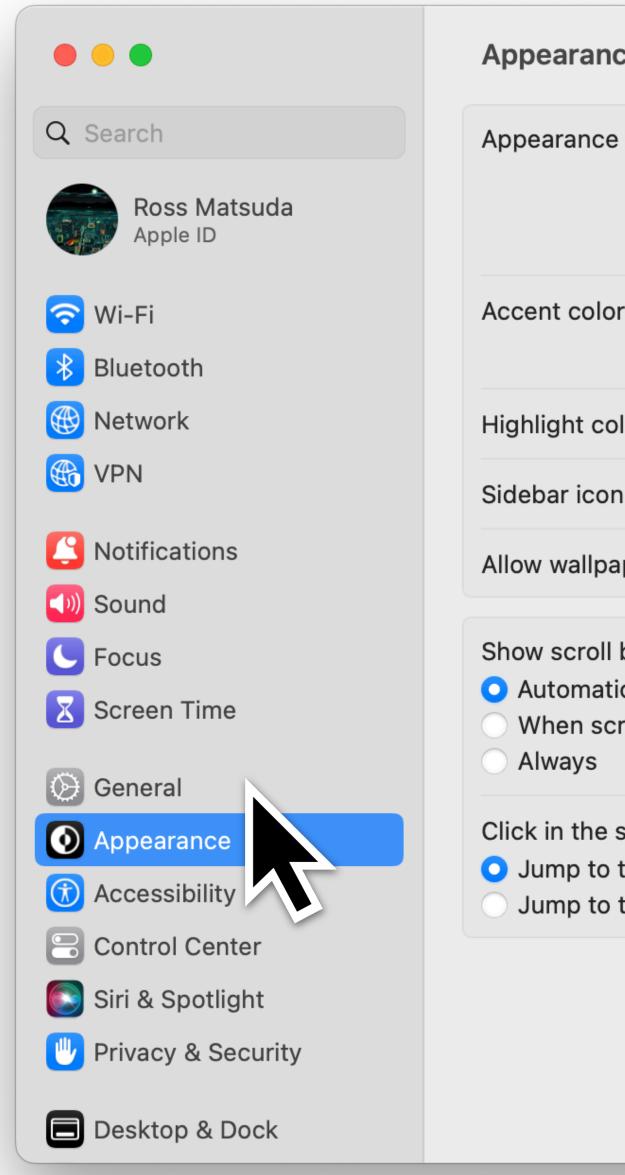
- Any steps to remove for savvier users?
- What steps can be handled with CLI?
- Use GUI scripting for as few steps as possible



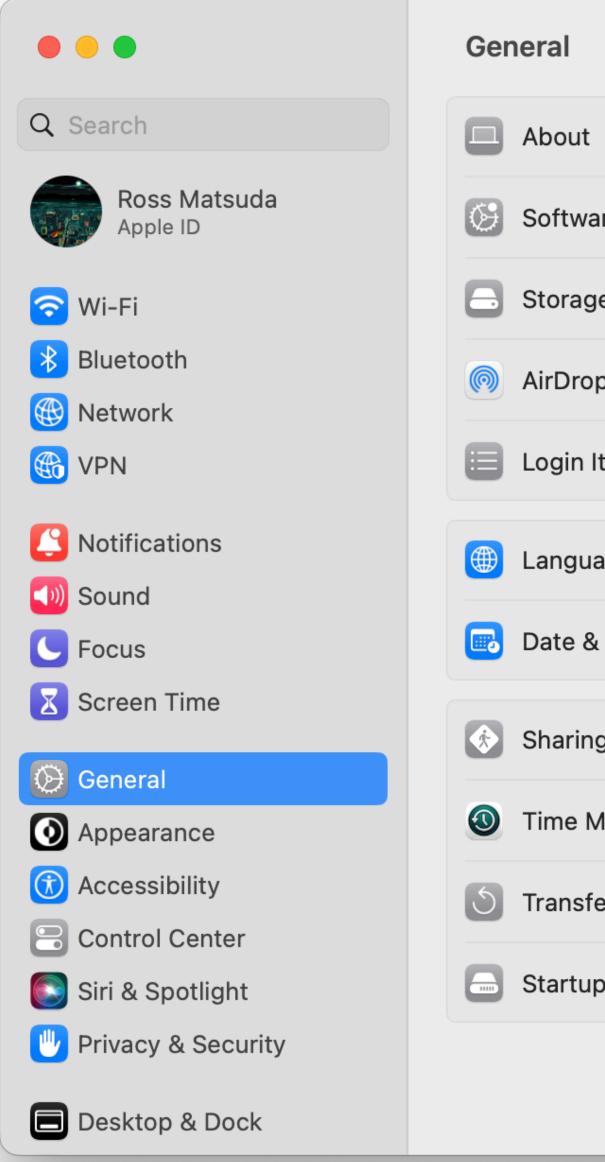
1 - Set your workflow

For today's nonsense, let's look at clicking the "More Info" button in System Settings, Software Update

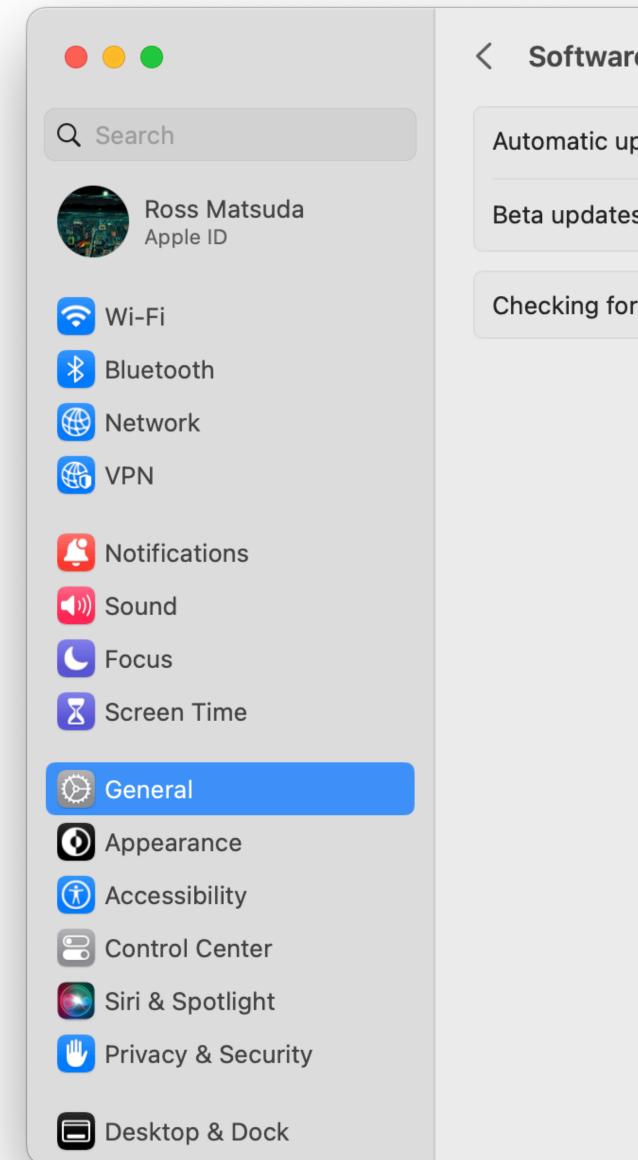




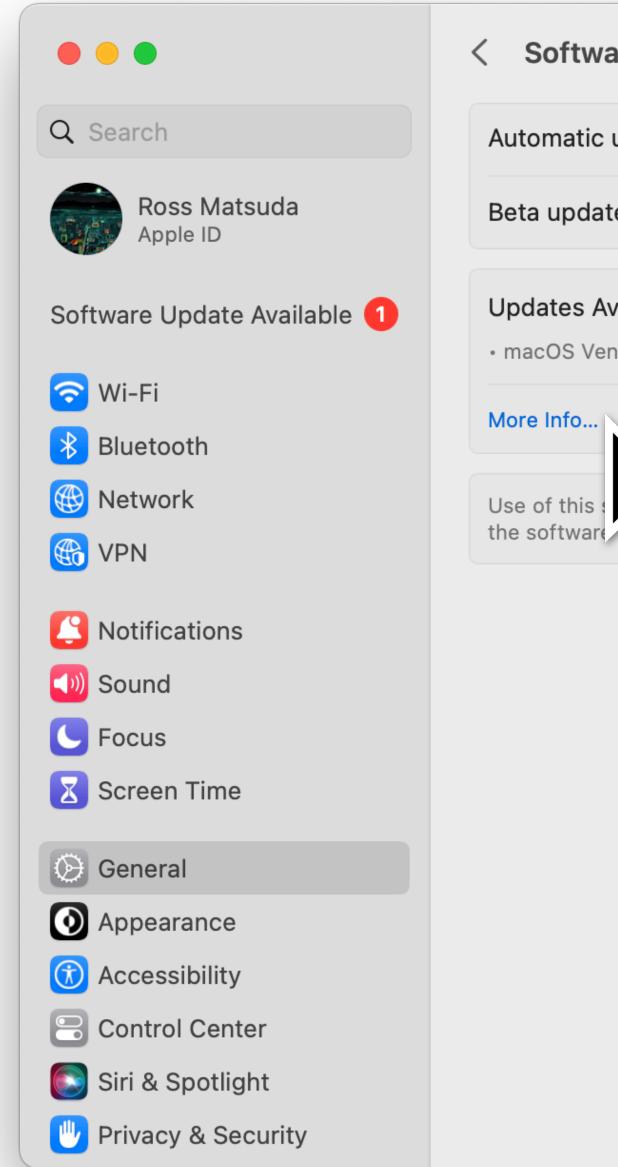
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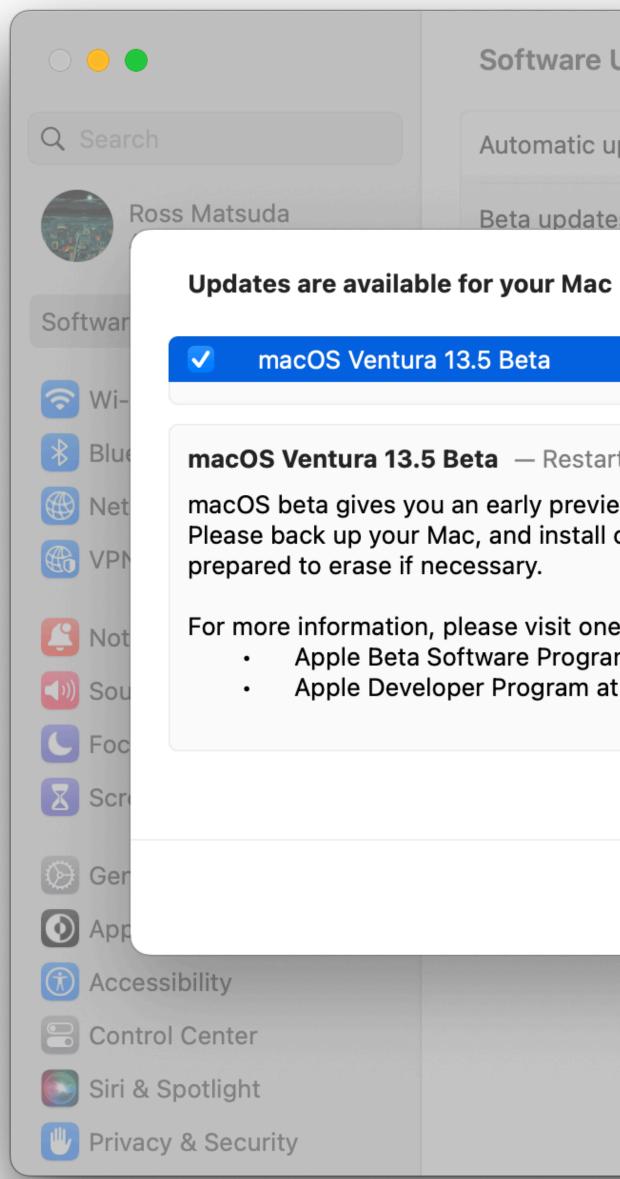
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Regarding the "More Info" target in macOS 13+ FB11749823

2 - Define element names

Start from the first step you can't handle with CLI

- Open System Preferences
- Click on General
- Click on Software Update



2 - Define element names

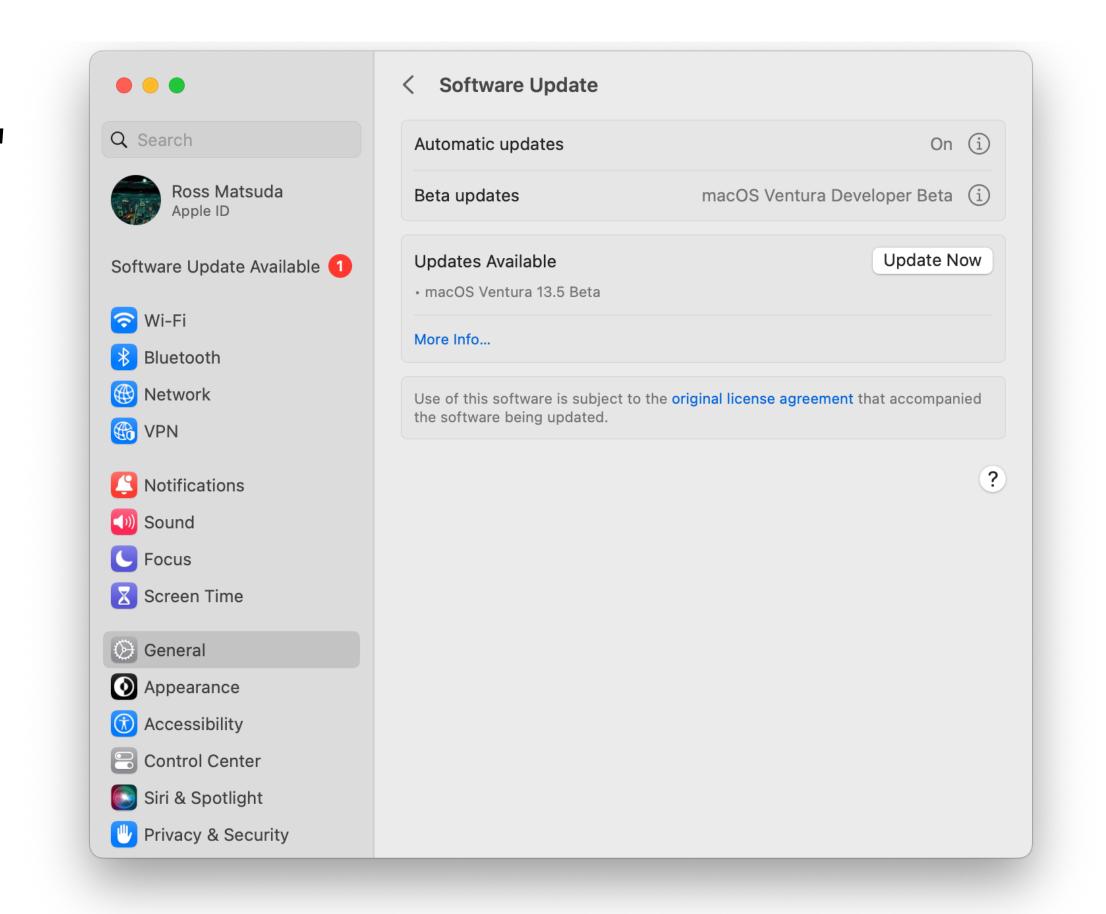
open x-apple.systempreferences: com.apple.Software-Update-Settings.extension

Click on General
Click on Software Update

2 - Define element names

tell application "System Events" tell front window of process "System Settings" set uiElems to entire contents end tell end tell

 Customize the second line to change targets



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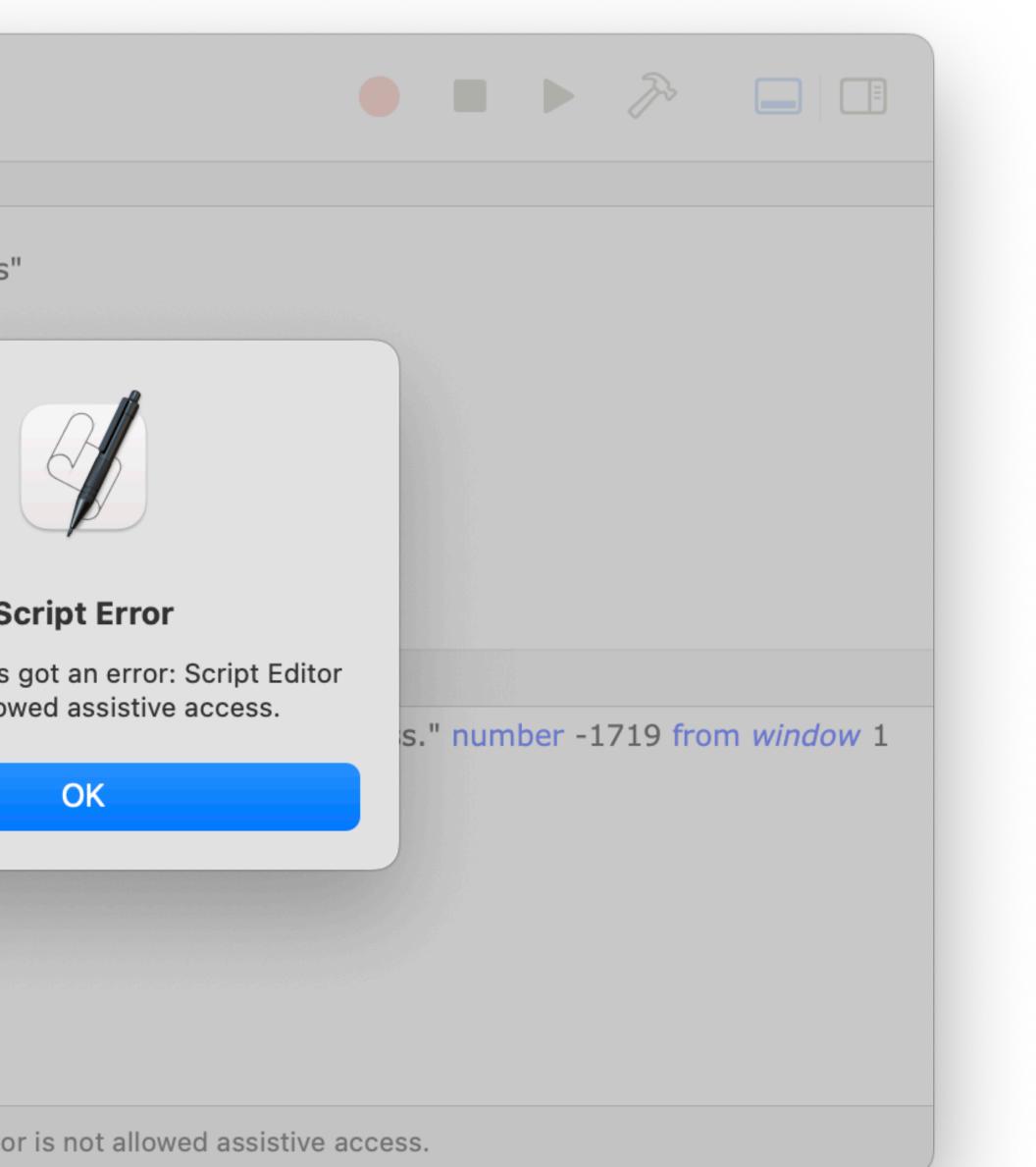
AppleScript
 <No selected element>

tell application "System Events" tell front window of process "System Settings" set uiElems to entire contents end tell end tell

Result

{group 1 of window "Appearance" of application process "System Settings" of application "System Events", *splitter group* 1 of *group* 1 of *window* "Appearance" of *application process* "System Settings" of *application process* "System Events", *group* 1 of *splitter group* 1 of *group* 1 of *window* "Appearance" of *application process* "System Settings" of *application process* "System Events", *text field* 1 of *group* 1 of *splitter group* 1 of *window* "Appearance" of *application process* "System Settings" of *application process* "System Events", *text field* 1 of *group* 1 of *splitter group* 1 of *window* "Appearance" of *application process* "System Settings" of *application* "System Events", *row* 1 of *outline* 1 of *scroll area* 1 of *group* 1 of *splitter group* 1 of *group* 1 of *window* "Appearance" of *application process* "System Settings" of *application* "System Events", *UI element* 1 of *row* 1 of *application* "System Events", *UI element* 1 of *row* 1 of *application* "System Settings" of *application* "System Eve

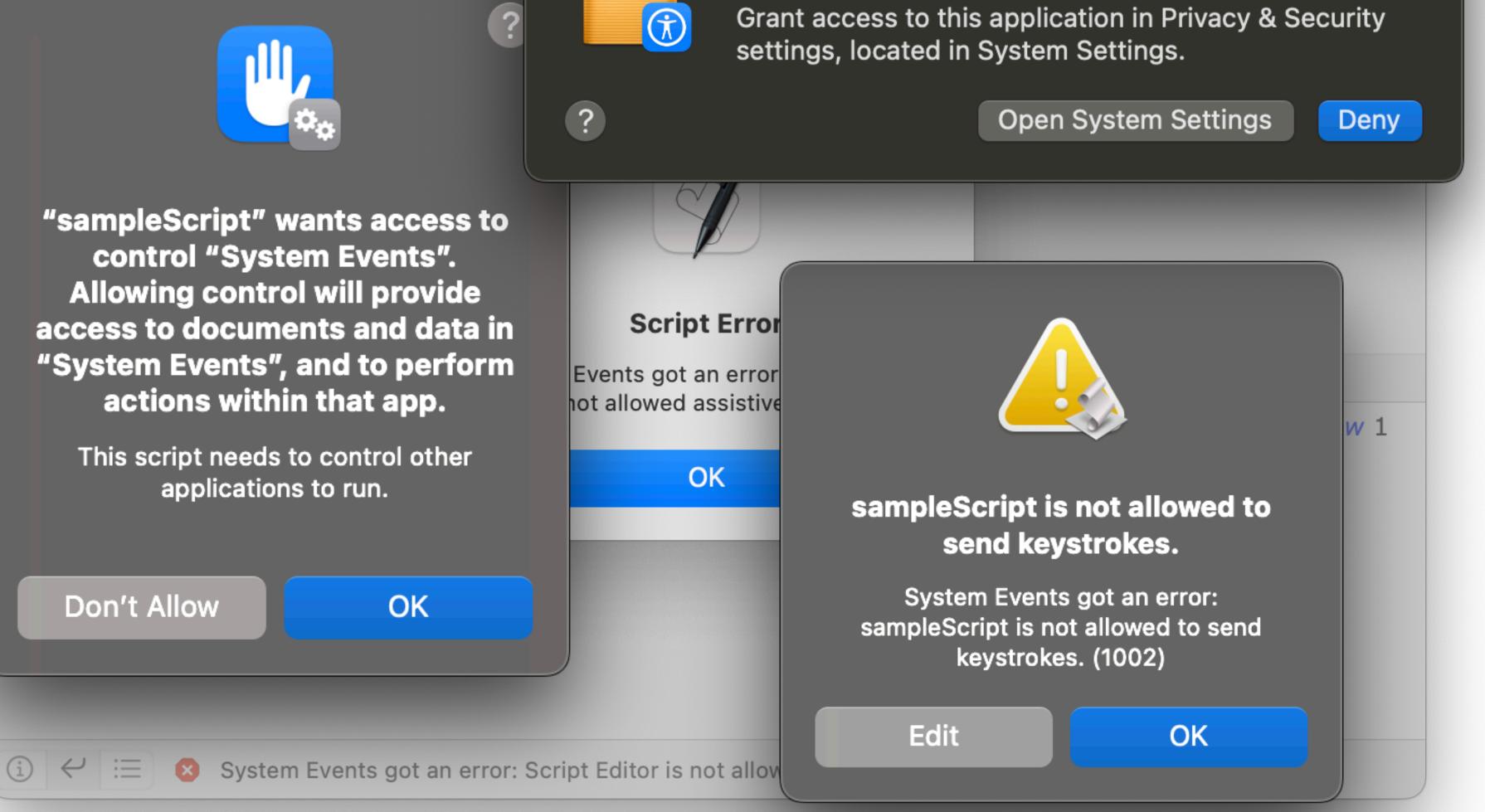
• • • getUIElements Edited
AppleScript \$\$\le <\no selected element > \$\le \le \le \le \le \le \le \le \le \le
tell application "System Events" tell front window of process "System Settings set uiElems to entire contents end tell
end tell
Result error "System Events got an error: of process "System Settings"





getUIElements Edited

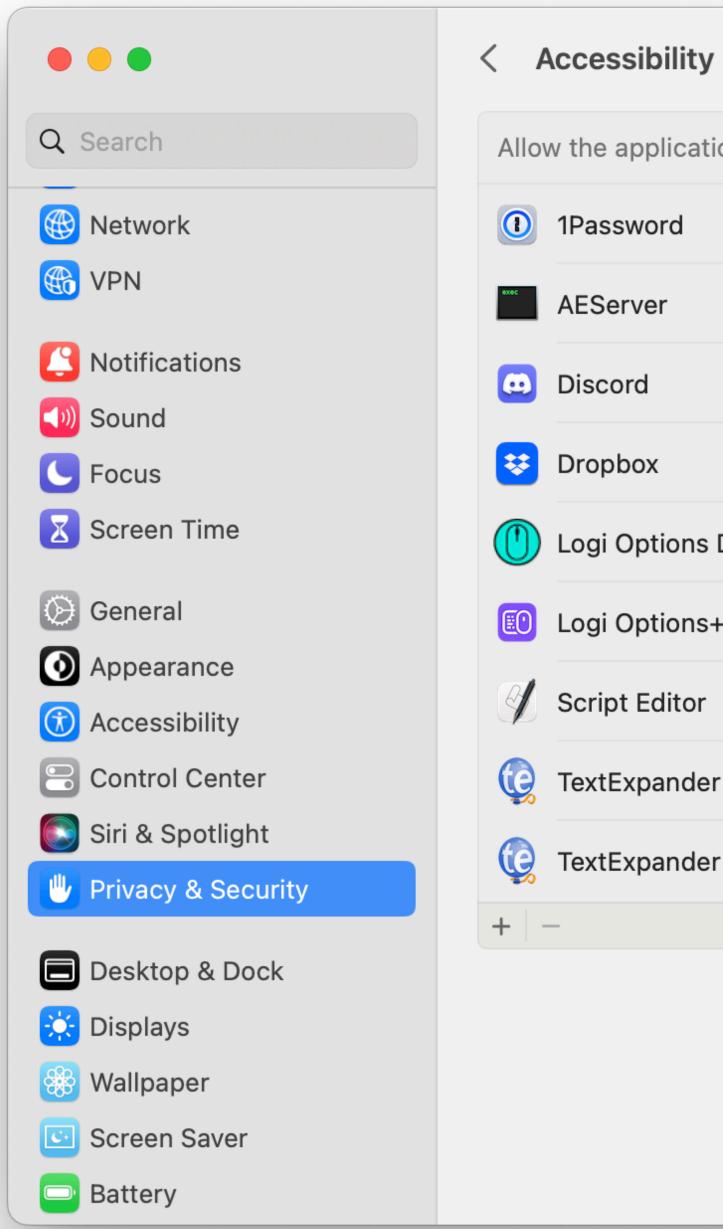
AppleScript © <No selected element> ©



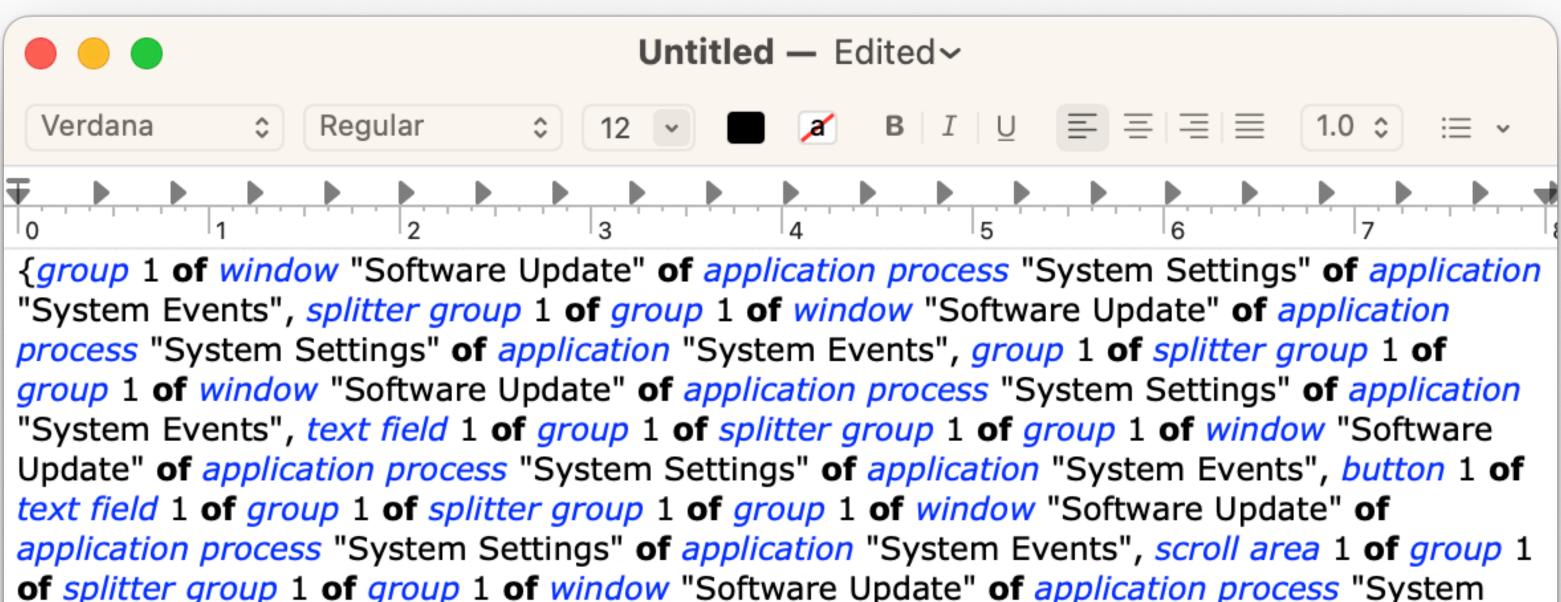
Accessibility Access (Events)



"sampleScript" would like to control this computer using accessibility features.

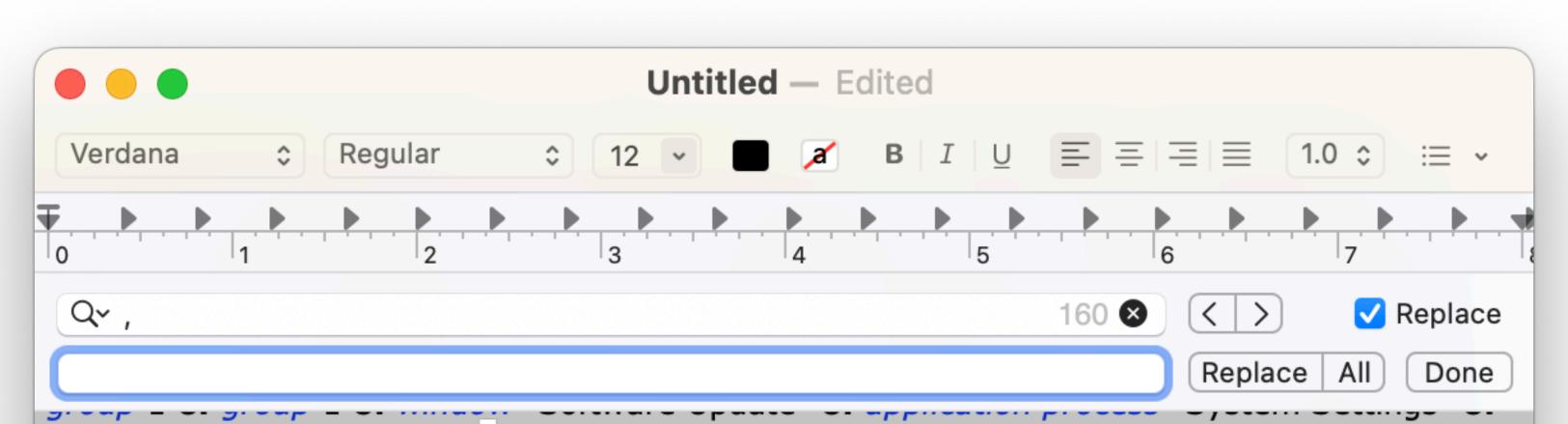


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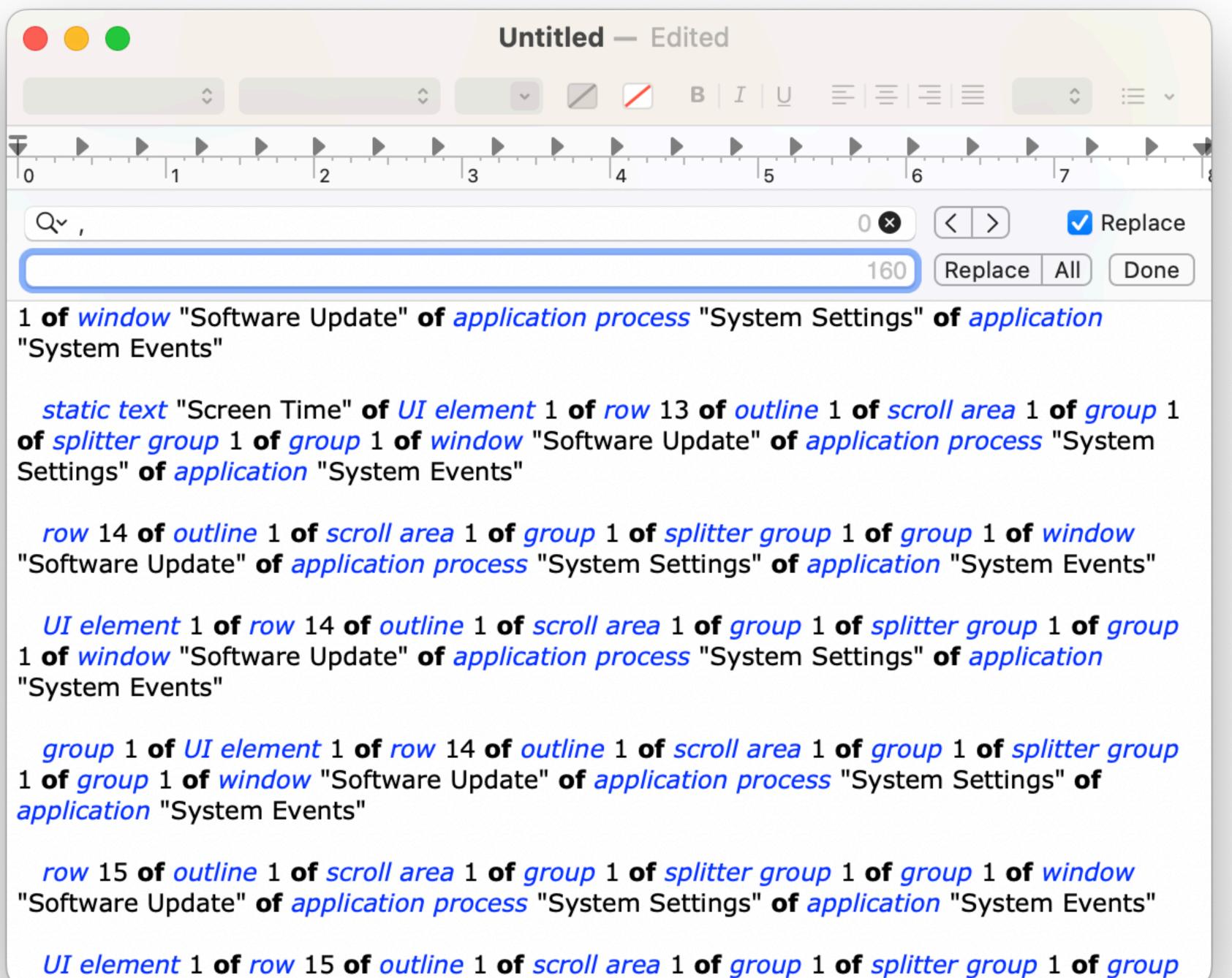


of splitter group 1 of group 1 of window "Software Update" of application process "System" Settings" of application "System Events", outline 1 of scroll area 1 of group 1 of splitter group 1 of group 1 of window "Software Update" of application process "System Settings" of application "System Events", row 1 of outline 1 of scroll area 1 of group 1 of splitter group 1 of group 1 of window "Software Update" of application process "System Settings" of application "System Events", UI element 1 of row 1 of outline 1 of scroll area 1 of group 1 of splitter group 1 of group 1 of window "Software Update" of application process "System" Settings" of application "System Events", group 1 of UI element 1 of row 1 of outline 1 of scroll area 1 of group 1 of splitter group 1 of group 1 of window "Software Update" of application process "System Settings" of application "System Events", row 2 of outline 1 of scroll area 1 of group 1 of splitter group 1 of group 1 of window "Software Update" of application process "System Settings" of application "System Events", UI element 1 of row 2 of outline 1 of scroll area 1 of group 1 of splitter group 1 of group 1 of window "Software" Update" of application process "System Settings" of application "System Events", static text "Sign in, with your Apple ID" of UI element 1 of row 2 of outline 1 of scroll area 1 of group 1 of splitter group 1 of group 1 of window "Software Update" of application process "System Settings" of application "System Events", row 3 of outline 1 of scroll area 1 of group 1 of splitter group 1 of group 1 of window "Software Update" of application process "System

CARRIAGE RETURN



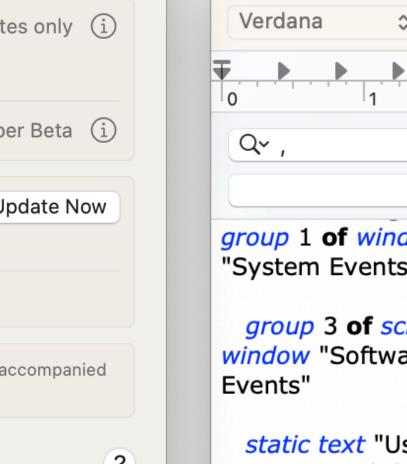
application "System Events", static text "• macOS Ventura 13.4" of group 2 of scroll area 1 of group 1 of group 1 of group 2 of splitter group 1 of group 1 of window "Software Update" of application process "System Settings" of application "System Events , button 2 of group 2 of scroll area 1 of group 1 of group 1 of group 2 of splitter group 1 of group 1 of window "Software Update" of application process "System Settings" of application "System Events", group 3 of scroll area 1 of group 1 of group 1 of group 2 of splitter group 1 of group 1 of window "Software Update" of application process "System Settings" of application "System" Events", static text "Use of this software is subject to the original license agreement that accompanied the software being updated." of group 3 of scroll area 1 of group 1 of group 1 of group 2 of splitter group 1 of group 1 of window "Software Update" of application process "System Settings" of application "System Events", button 1 of scroll area 1 of group 1 of group 1 of group 2 of splitter group 1 of group 1 of window "Software Update" of application process "System Settings" of application "System Events", toolbar 1 of window "Software Update" of application process "System Settings" of application "System Events", button 1 of toolbar 1 of window "Software Update" of application process "System Settings" of application "System Events", button 1 of button 1 of toolbar 1 of window "Software Update" of application process "System Settings" of application "System Events", button 1 of window "Software Update" of application process "System Settings" of application "System Events", button 2 of window "Software Update" of application process "System Settings" of application "System Events", button 3 of window "Software Update" of application process "System Settings" of application "System Events", static text "Software Update" of window "Software" Update" of application process "System Settings" of application "System Events"}



static text "Use of this software is subject to the original license agreement that accompanied the software being updated." of group 3 of scroll area 1 of group 1 of group 1 of group 2 of splitter group 1 of group 1 of window "Software Update" of application process "System Settings" of application "System Events"

2 - Define element

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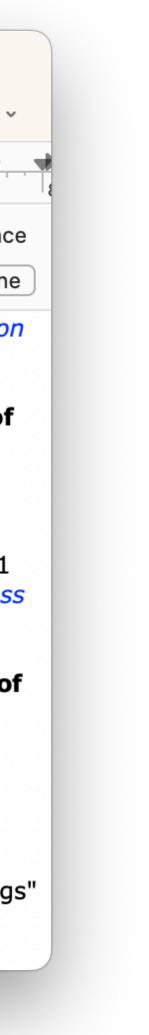
group 1 of *window* "Software Update" of *application process* "System Settings" of *application* "System Events"

group 3 of scroll area 1 of group 1 of group 1 of group 2 of splitter group 1 of group 1 of window "Software Update" of application process "System Settings" of application "System Events"

static text "Use of this software is subject to the original license agreement that accompanied the software being updated." of group 3 of scroll area 1 of group 1 of group 1 of group 2 of splitter group 1 of group 1 of window "Software Update" of application process "System Settings" of application "System Events"

button 1 of *scroll area* 1 of *group* 1 of *group* 1 of *group* 2 of *splitter group* 1 of *group* 1 of *window* "Software Update" of *application process* "System Settings" of *application* "System Events"

toolbar 1 of window "Software Update" of application process "System Settings" of application "System Events"



2 - Define element

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group 1 of *window* "Software Update" of *application process* "System Settings" of *application* "System Events"

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button 1 of *scroll area* 1 of *group* 1 of *group* 1 of *group* 2 of *splitter group* 1 of *group* 1 of *window* "Software Update" of *application process* "System Settings" of *application* "System Events"

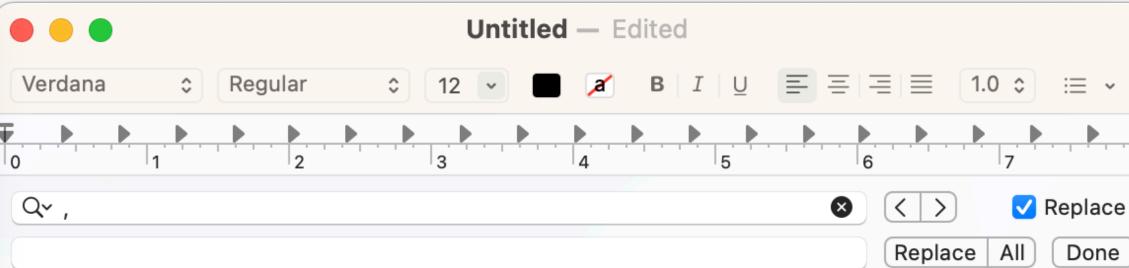
toolbar 1 of window "Software Update" of application process "System Settings" of application "System Events"



2 - Define element

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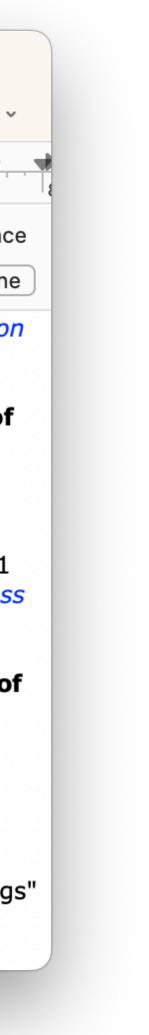
group 1 of *window* "Software Update" of *application process* "System Settings" of *application* "System Events"

group 3 of scroll area 1 of group 1 of group 1 of group 2 of splitter group 1 of group 1 of window "Software Update" of application process "System Settings" of application "System Events"

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button 1 of *scroll area* 1 of *group* 1 of *group* 1 of *group* 2 of *splitter group* 1 of *group* 1 of *window* "Software Update" of *application process* "System Settings" of *application* "System Events"

toolbar 1 of window "Software Update" of application process "System Settings" of application "System Events"



2 - Define element

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group 1 of window Software Update" of application process "System Settings" of application "System Events"

group 3 of scroll area 1 of group 1 of group 1 of group 2 of splitter group 1 of group 1 of window "Software Update" of application process "System Settings" of application "System Events"

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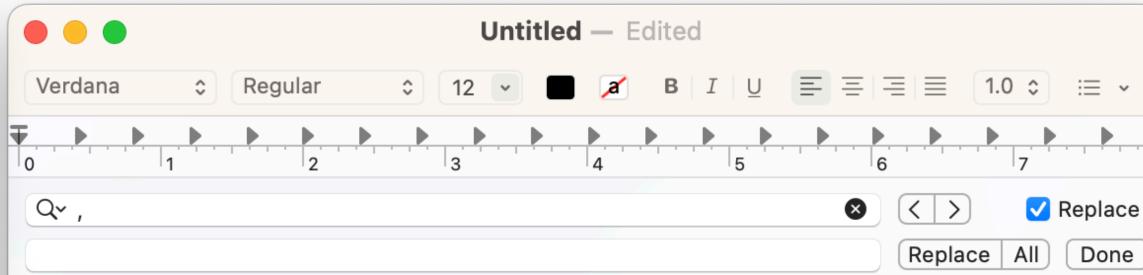
button 1 of *scroll area* 1 of *group* 1 of *group* 1 of *group* 2 of *splitter group* 1 of *group* 1 of *window* "Software Update" of *application process* "System Settings" of *application* "System Events"

toolbar 1 of window "Software Update" of application process "System Settings" of application "System Events"



2 - Define element

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with your Apple ID	Beta updates	macOS Ventura Developer Beta
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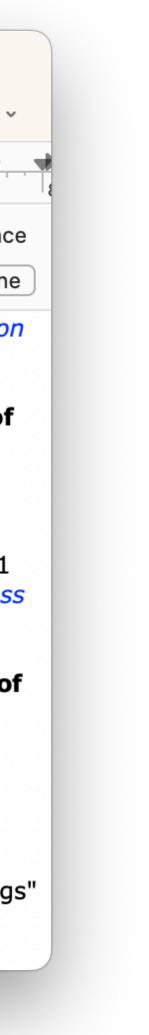
group 1 of *window* "Software Update" of *application process* "System Settings" of *application* "System Events"

group 3 of scroll area 1 of group 1 of group 1 of group 2 of splitter group 1 of group 1 of window "Software Update" of application process "System Settings" of application "System Events"

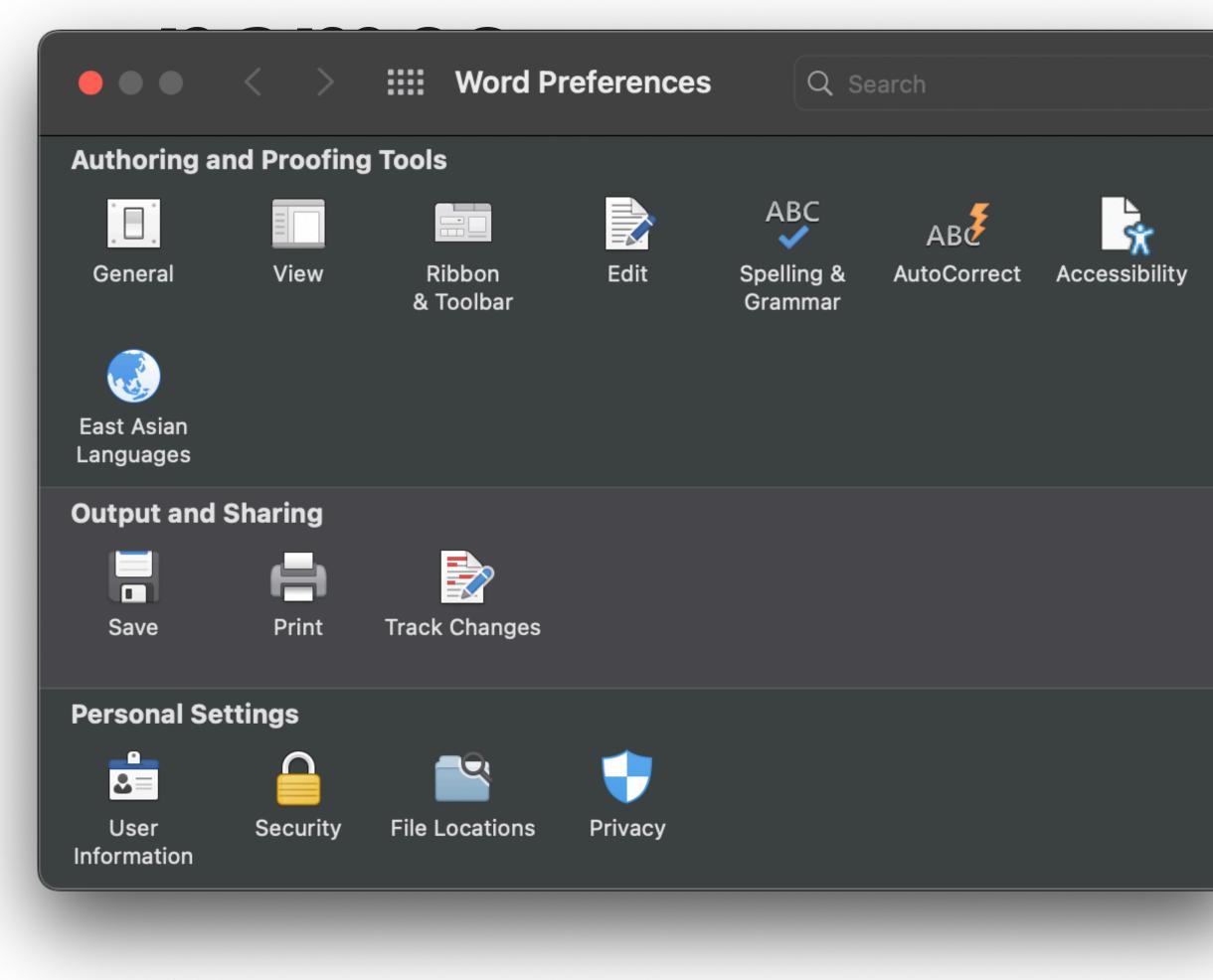
static text "Use of this software is subject to the original license agreement that accompanied the software being updated." of group 3 of scroll area 1 of group 1 of group 1 of group 2 of splitter group 1 of group 1 of window "Software Update" of application process "System Settings" of application "System Events"

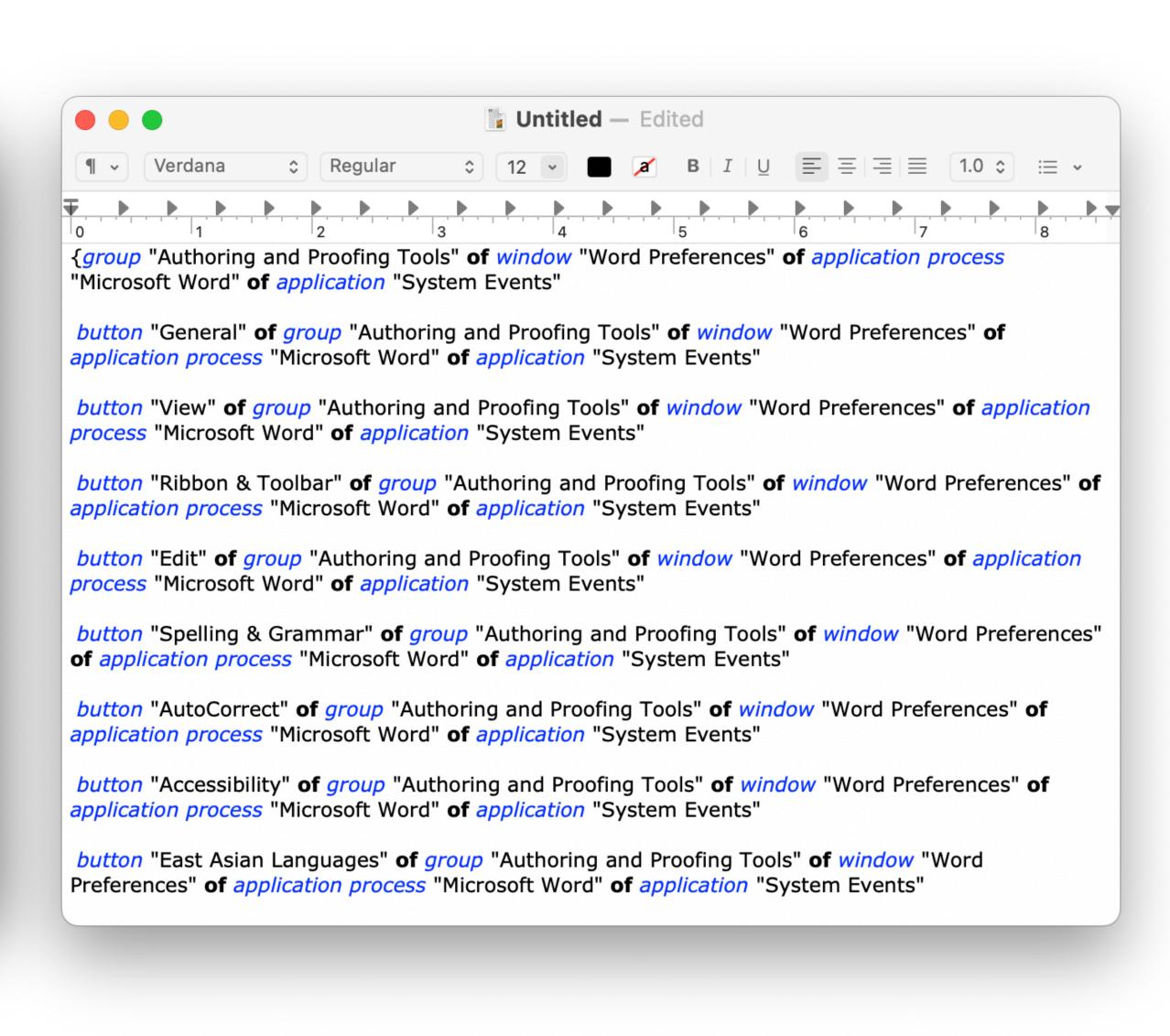
button 1 of *scroll area* 1 of *group* 1 of *group* 1 of *group* 2 of *splitter group* 1 of *group* 1 of *window* "Software Update" of *application process* "System Settings" of *application* "System Events"

toolbar 1 of window "Software Update" of application process "System Settings" of application "System Events"



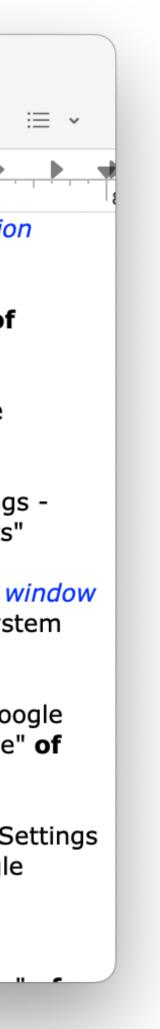
2 - Define element





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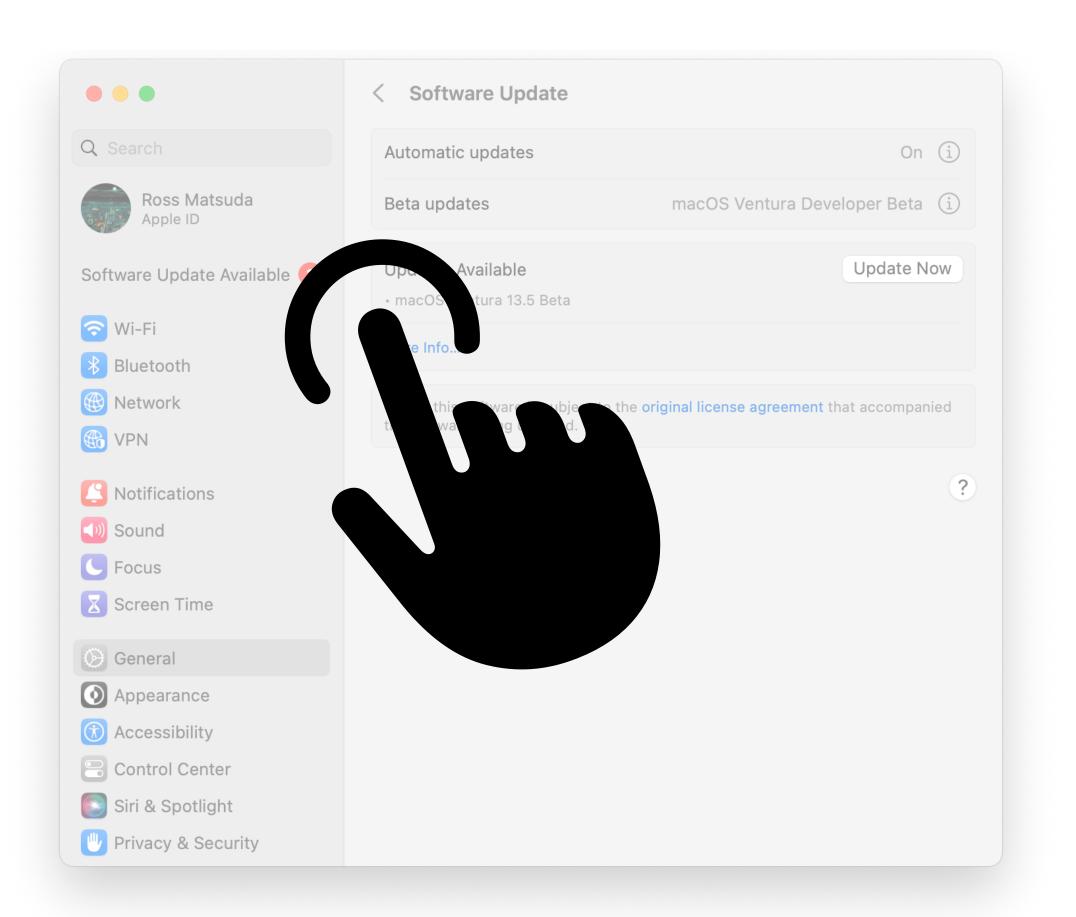
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Click element

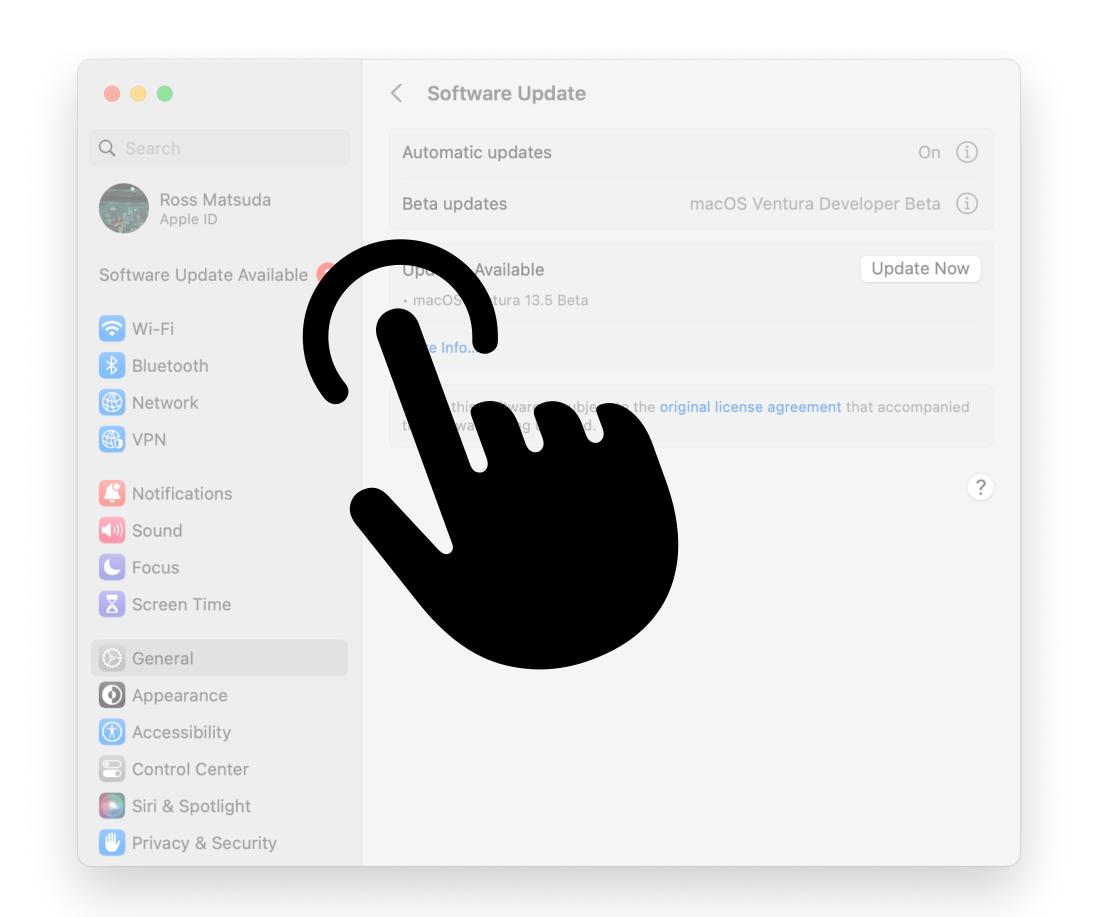
tell application "System Events"
 tell process "System Settings"

click button 1 of group 2 of scroll area 1 of group 1 of group 1 of group 2 of splitter group 1 of group 1 of window "Software Update" of application process "System Settings" of application "System Events"



Click element

tell application "System Events"
 tell process "System Settings"
 click [the thing]
 end tell
end tell



Sending keystrokes

tell *application* "Microsoft Word" activate

end tell

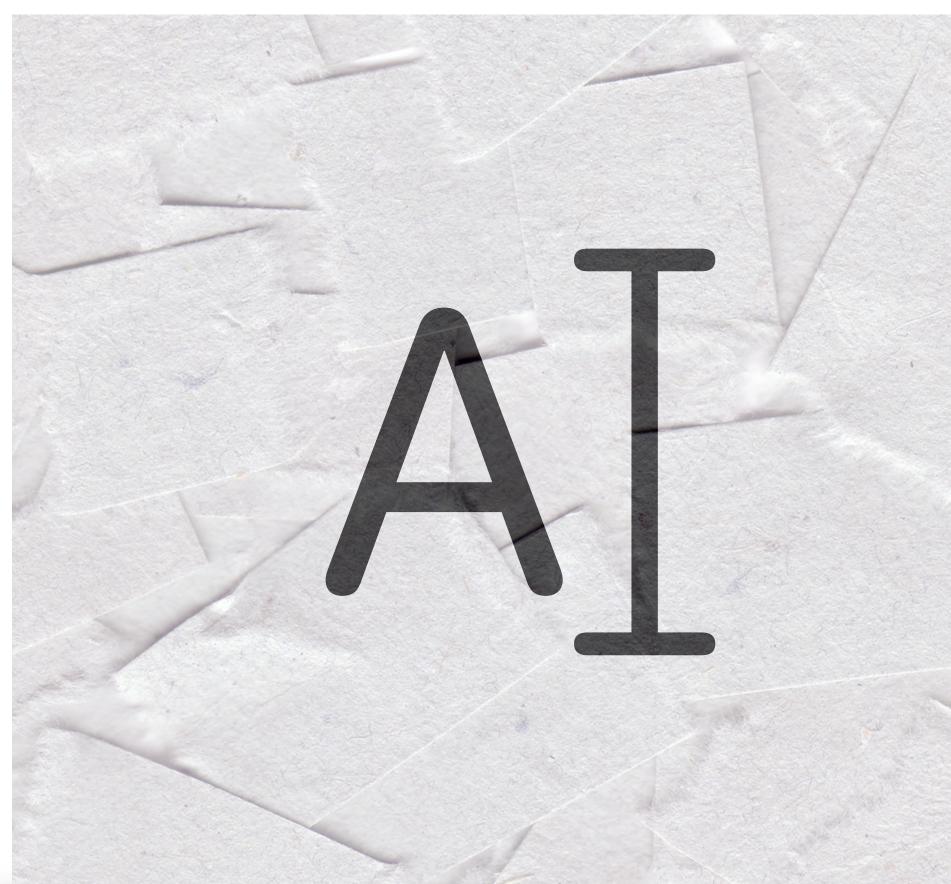
tell application "System Events" key down {command} keystroke "," key up {command} end tell



Selecting and filling text fields

tell *application* "Microsoft Word" activate end tell tell application "System Events" set focused of *text field* 1 of group 2 of *toolbar* 1 **of** *window* "Word Preferences" of application process "Microsoft Word" of application "System Events" to true keystroke "spelling" key code 125 key down {return} key up {return} end tell

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Selecting and filling text fields

- **tell** *application* "Microsoft Word" activate
- end tell

tell *application* "System Events" set focused of [the thing] to true **keystroke** "spelling" key code 125 key down {return} key up {return} end tell



ARROW KEYS key code 123 LEFT key code 124 RIGHT key code 125 DOWN UP key code 126



3 - Act on your targets Selecting and filling text fields

tell *application* "Microsoft Word" activate end tell **tell** *application* "System Events" key code 123 using {*shift down*, option down, command down} end tell



ARROW KEYS key code 123 LEFT key code 124 RIGHT key code 125 DOWN key code 126 **UP**



4 - Timing

if exists (button 1 of group 2 of scroll area 1 of group 1 of group 1 of group 2 of splitter group 1 of group 1 of window "Software Update" of application process "System Settings" of application "System Events") then click button 1 of group 2 of scroll area 1 of group 1 of group 1 of group 2 of splitter group 1 of group 2 of splitter group 1 of group 1 of window "Software Update" of application process "System Settings" of application "System Events"

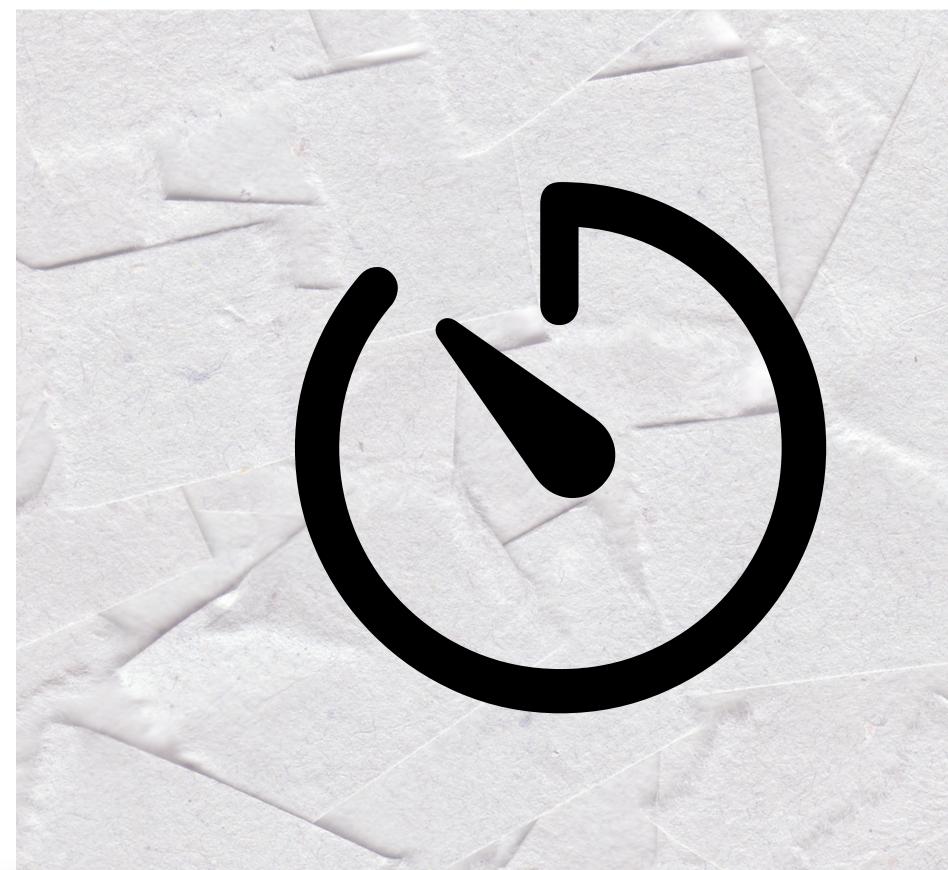
end if



4 - Timing

if exists ([the thing]) then click [the thing] end if





tell application "System Events" repeat 60 times if exists (window 1 of process "System Settings") then delay 3 exit repeat else delay 1 end if end repeat if not (exists (window 1 of process "System Settings")) then error number -128 end if end tell

tell application "System Events" **tell** *process* "System Settings" repeat 60 times if exists (button 1 of group 2 of scroll area 1 of group 1 of group 1 of group 2 of splitter group 1 of group 1 of window "Software Update" of application process "System Settings" of application "System Events") then click button 1 of group 2 of scroll area 1 of group 1 of group 1 of group 2 of splitter group 1 of group 1 of window "Software" Update" of application process "System Settings" of application "System Events" exit repeat end if **tell** *application* "System Events" if application process "System Settings" exists then **delay** 0.5 else exit repeat end if end tell delay 1 end repeat end tell

end tell

tell *application* "System Events" tell process "System Settings" repeat 60 times if exists (button 1 ...) then click button 1 ... exit repeat end if

tell application "System Events" **delay** 0.5 else exit repeat end if end tell

delay 1 end repeat end tell end tell

if application process "System Settings" exists then

4 - Timing

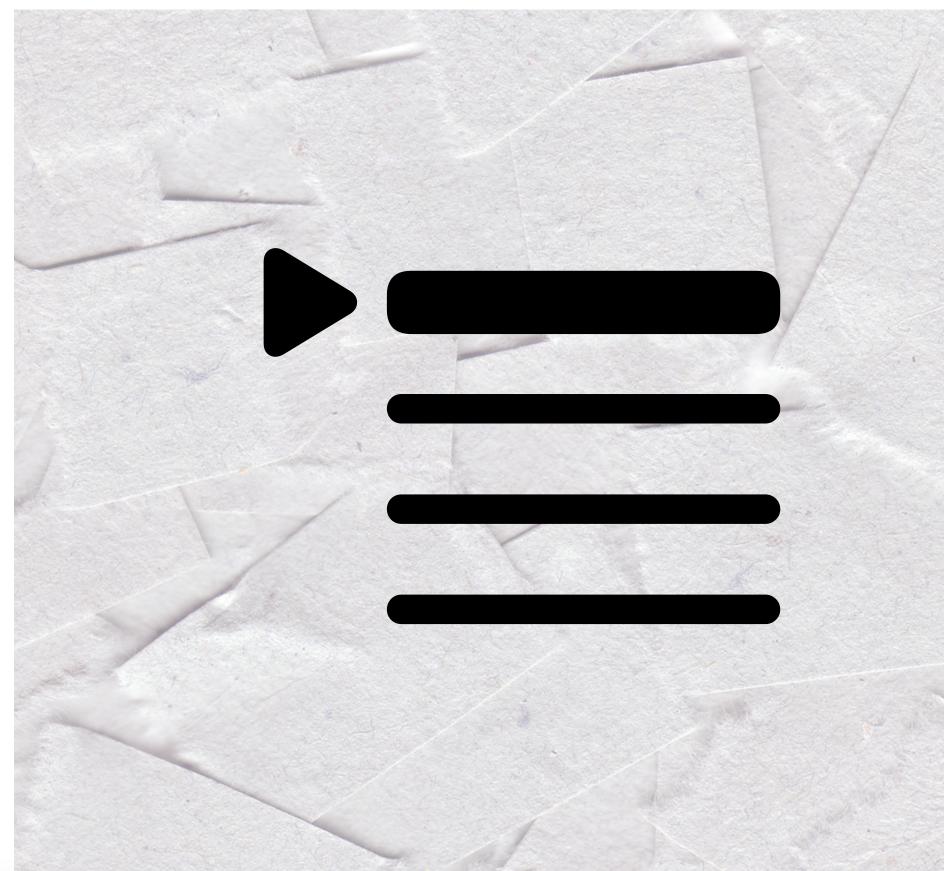
Define your timeouts Clean up your script/app to avoid duplicate processes

error number -128



5 - Versioning

macOS version commands Switch statement or ifs



Get Major OS (10, 11, 12, etc.)
set _major to system attribute "sys1"

Bailout if old version
if _major < 11 then
 log "Catalina or earlier detected"
 error number -128
end if</pre>

Monterey and Big Sur
if _major < 13 then
 log "Monterey or Big Sur detected"
end if</pre>

Ventura and Sonoma
if (_major > 12) then
 log "Ventura or Sonoma detected"
end if

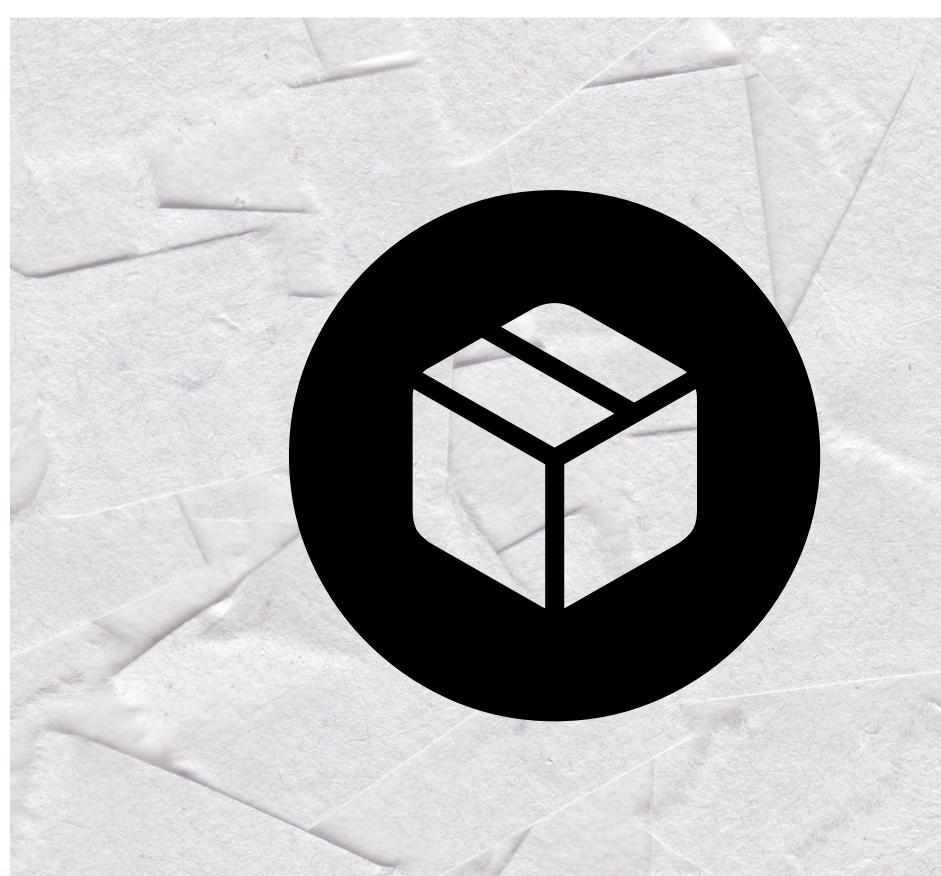
set ReadAppVersion to version of application "Keynote" log ReadAppVersion

(*13.0*)



6 - Packaging

- osascript
- Making an app



6 - Packaging

Hiding a Dock Icon and signing:

- 1. Export unsigned
- 2. Edit info.plist
- 3. Sign the app

HIDE DOCK ICON

Add this to your info.plist:

<key>LSUIElement</key><true/>



Sign your AppleScript app codesign --force --sign "Apple Development: John Doe (1234567890)" -v /path/to/bundle.app

Run this to clear errors: xattr -cr /path/to/bundle.app



Make GUI Script as small a part of your workflow as possible



- Named elements > numbered elements
- Clicks > keystrokes



Consider user communication



Update Server Bookmarks



Please do not touch your computer until the script has finished running. Are you ready to proceed?







Consistency checks:

- If process exists, activate
- Get window name
- If window name \neq desired name, act



Participate in betas for:

- Compatibility tests
- Obsolescence



- Document everything, especially version compatibility
- Limit use to builds you've tested



Resources

PPPC Utility: <u>https://github.com/jamf/PPPC-Utility</u> SF Symbols: <u>https://developer.apple.com/sf-symbols/</u> Get your Developer cert: <u>developer.apple.com</u> Sudoade | GUI Scripting with AppleScript: <u>https://www.sudoade.com/gui-scripting-with-applescript/</u>

- HIG: <u>https://developer.apple.com/design/human-interface-guidelines</u>



Feedback https://bit.ly/psumac2023-119

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