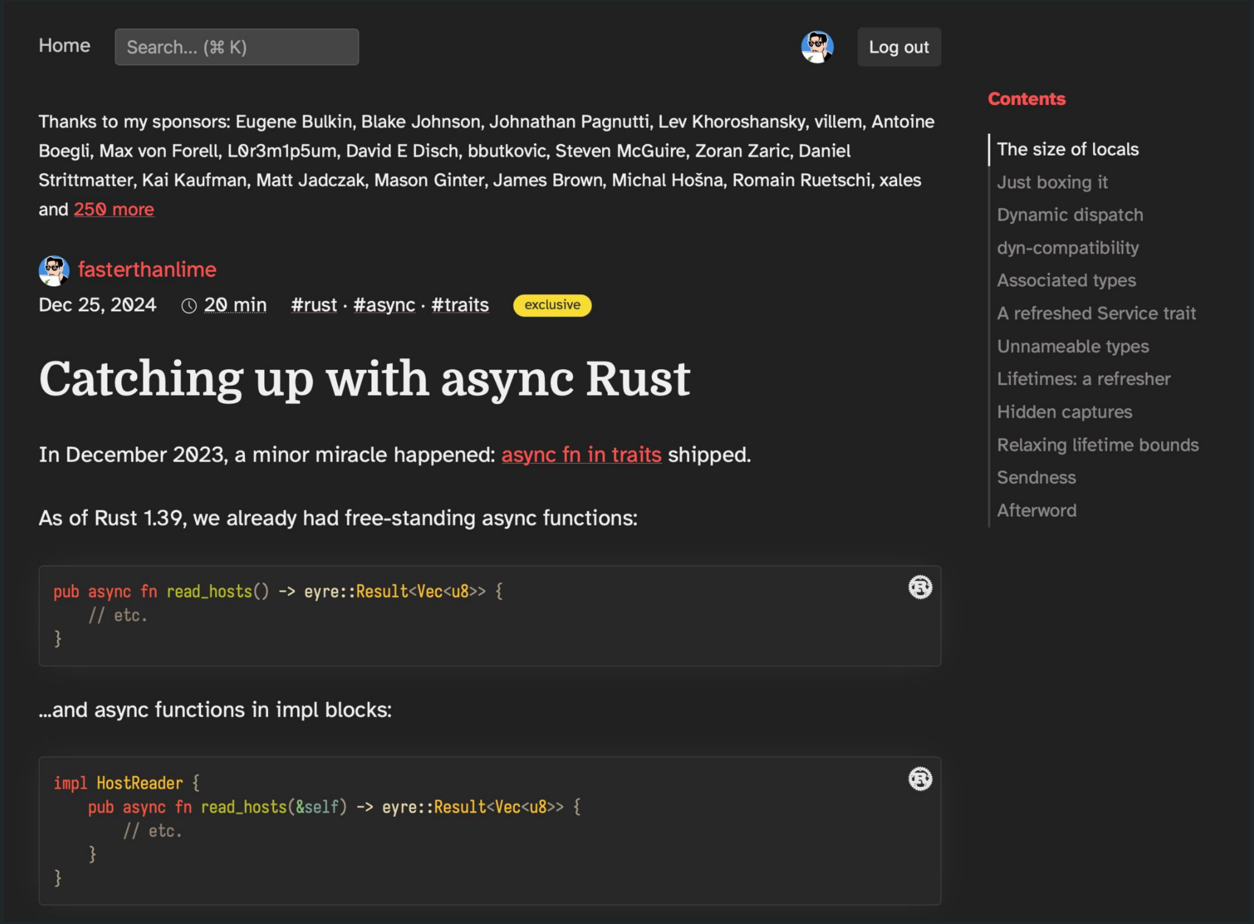
automating macOS

The quest for transparent DOM element screenshots

Making articles and videos at the same time



Thanks to my sponsors: Eugene Bulkin, Blake Johnson, Johnathan Pagnutti, Lev Khoroshansky, villem, Antoine Boegli, Max von Forell, L0r3m1p5um, David E Disch, bbutkovic, Steven McGuire, Zoran Zaric, Daniel Strittmatter, Kai Kaufman, Matt Jadczak, Mason Ginter, James Brown, Michal Hošna, Romain Ruetschi, xales and 250 more

fasterthanlime

Dec 25, 2024 · 20 min #rust · #async · #traits exclusive

Catching up with async Rust

In December 2023, a minor miracle happened: async fn in traits shipped.

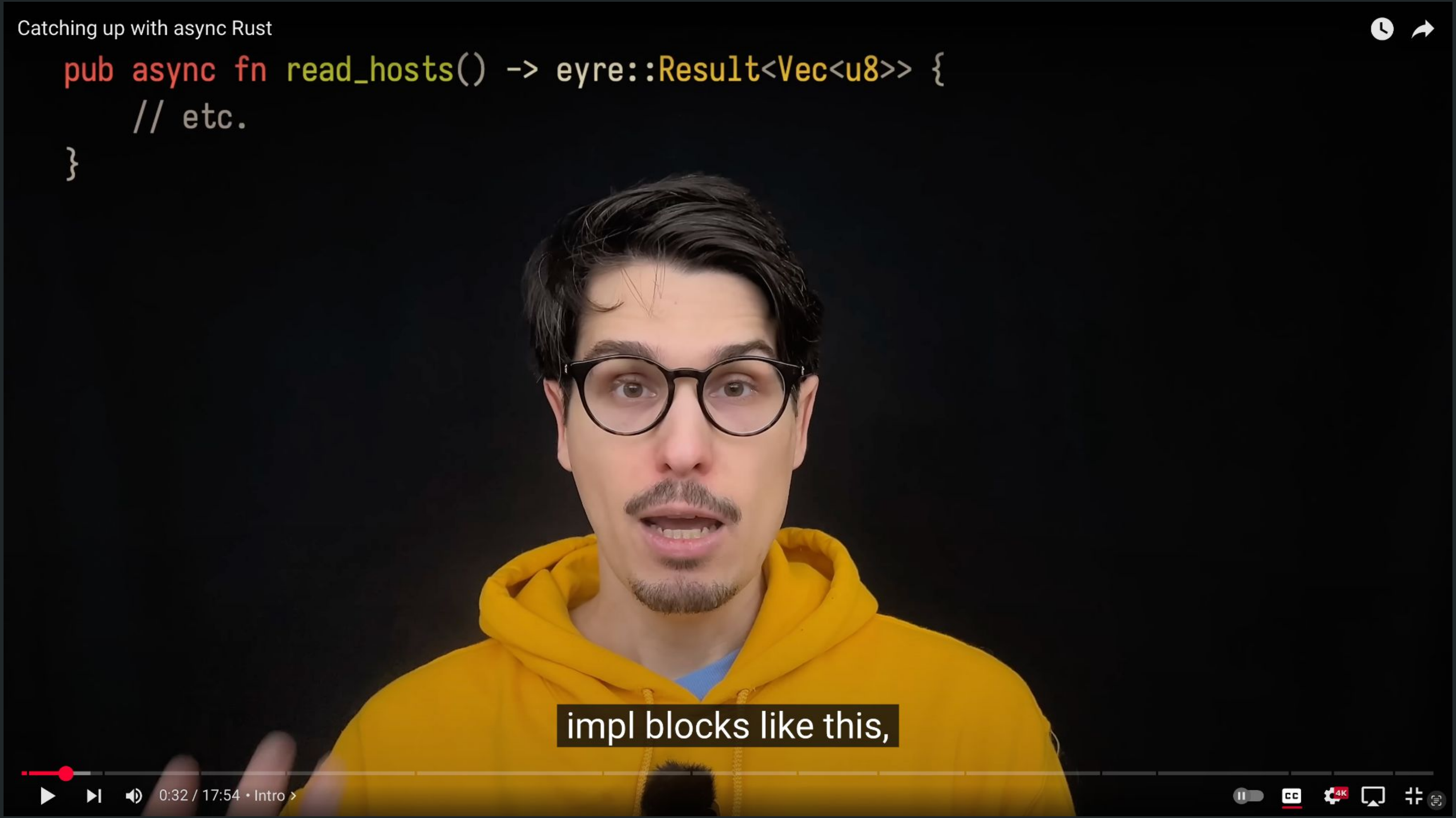
As of Rust 1.39, we already had free-standing async functions:

```rust
pub async fn read_hosts() -> eyre::Result<Vec<u8>> {
    // etc.
}
```

...and async functions in impl blocks:

```rust
impl HostReader {
    pub async fn read_hosts(&self) -> eyre::Result<Vec<u8>> {
        // etc.
    }
}
```

Contents

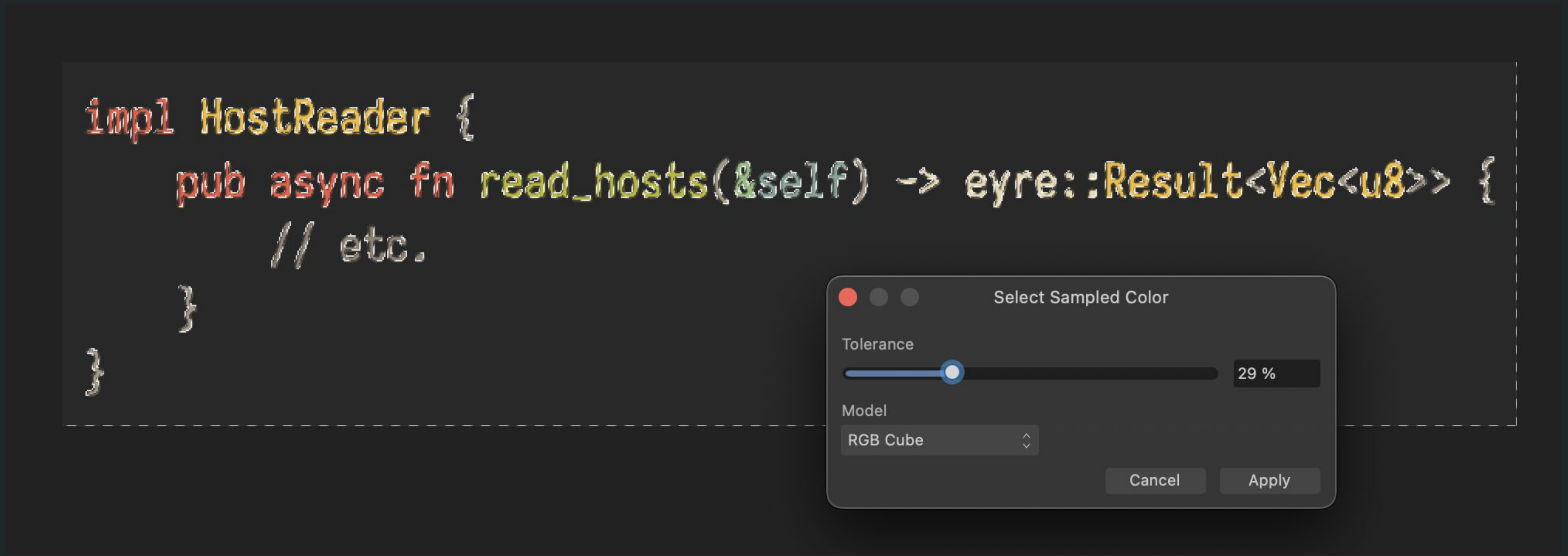


Catching up with async Rust

```rust
pub async fn read_hosts() -> eyre::Result<Vec<u8>> {
    // etc.
}
```

impl blocks like this,

Strategy 1: Rectangle screenshots



```
impl HostReader {
    pub async fn read_hosts(&self) -> eyre::Result<Vec<u8>> {
        // etc.
    }
}
```

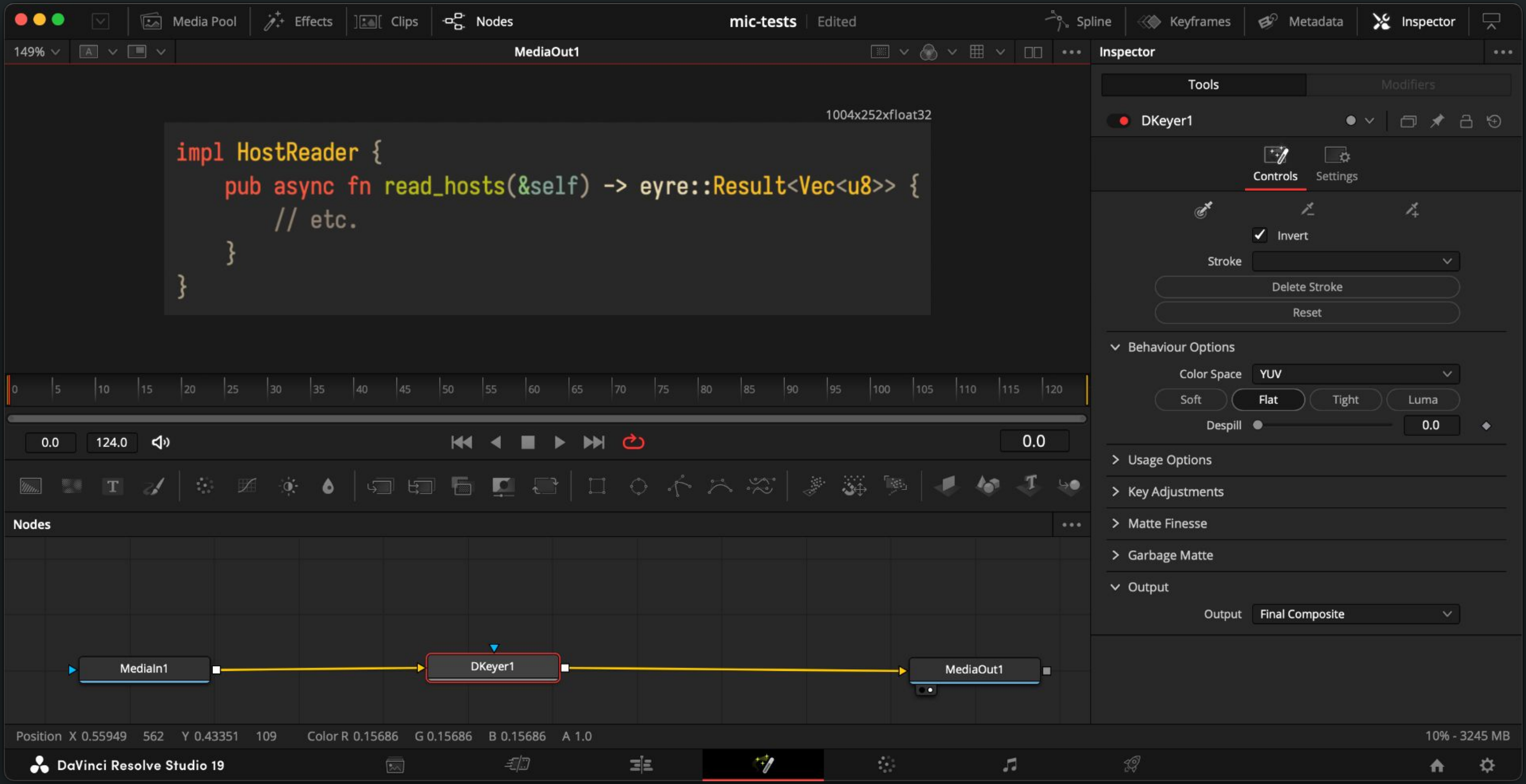
Select Sampled Color

Tolerance: 29 %

Model: RGB Cube

async fn

self-directed research



```
impl HostReader {
    pub async fn read_hosts(&self) -> eyre::Result<Vec<u8>> {
        // etc.
    }
}
```

mic-tests Edited

MediaOut1

1004x252xfloat32

Inspector: DKeyer1

☑ Invert

Stroke

Behaviour Options

Color Space: YUV

Soft [✓ Flat] Tight Luma

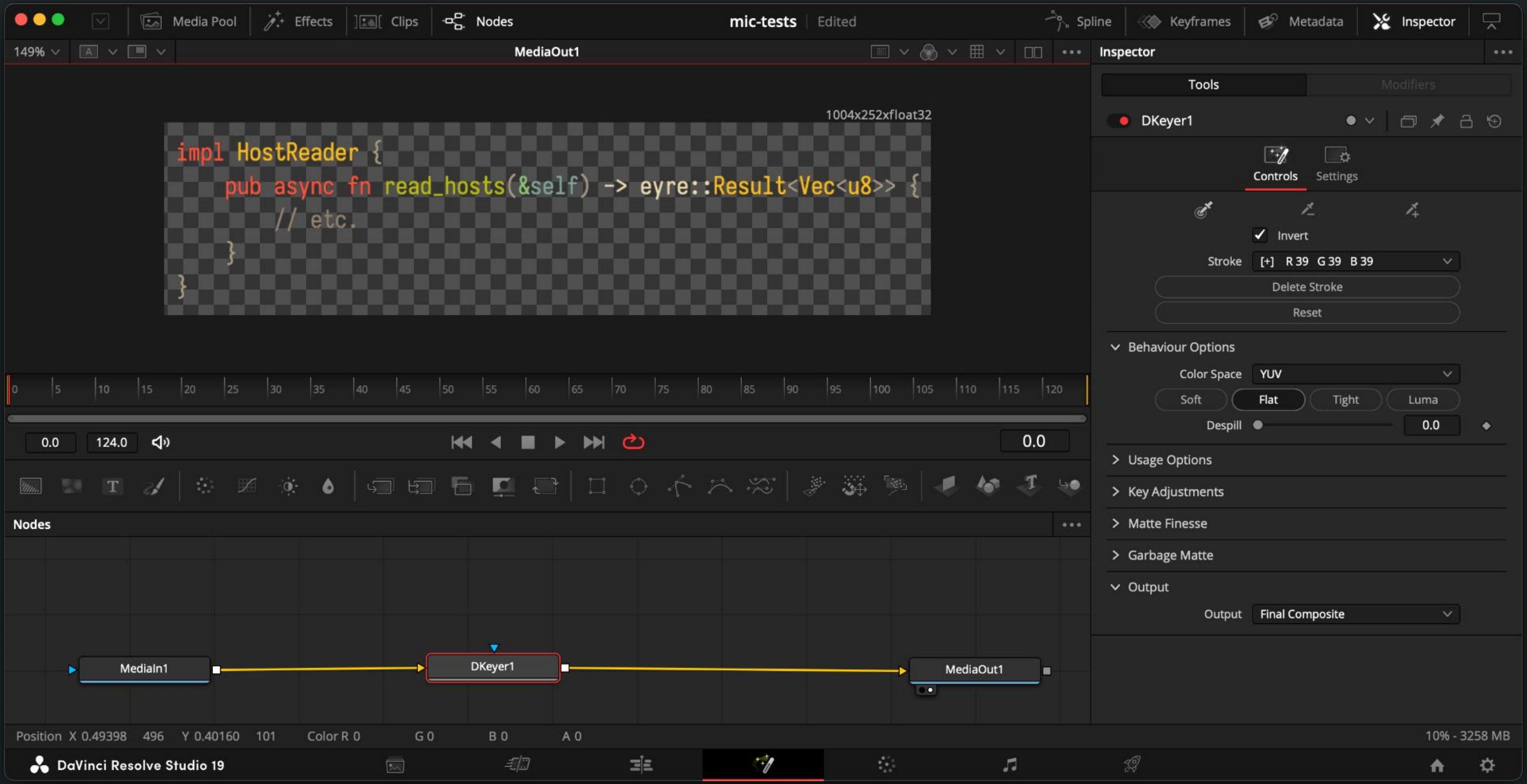
Despill: 0.0

Output: Final Composite

Nodes: MediaIn1 → DKeyer1 → MediaOut1

Position X 0.55949 562 Y 0.43351 109 Color R 0.15686 G 0.15686 B 0.15686 A 1.0

10% - 3245 MB



mic-tests Edited

MediaOut1

1004x252xfloat32

```
impl HostReader {
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        // etc.
    }
}
```

Inspector — DKeyer1

☑ Invert

Stroke: [+] R 39 G 39 B 39

Behaviour Options

Color Space: YUV

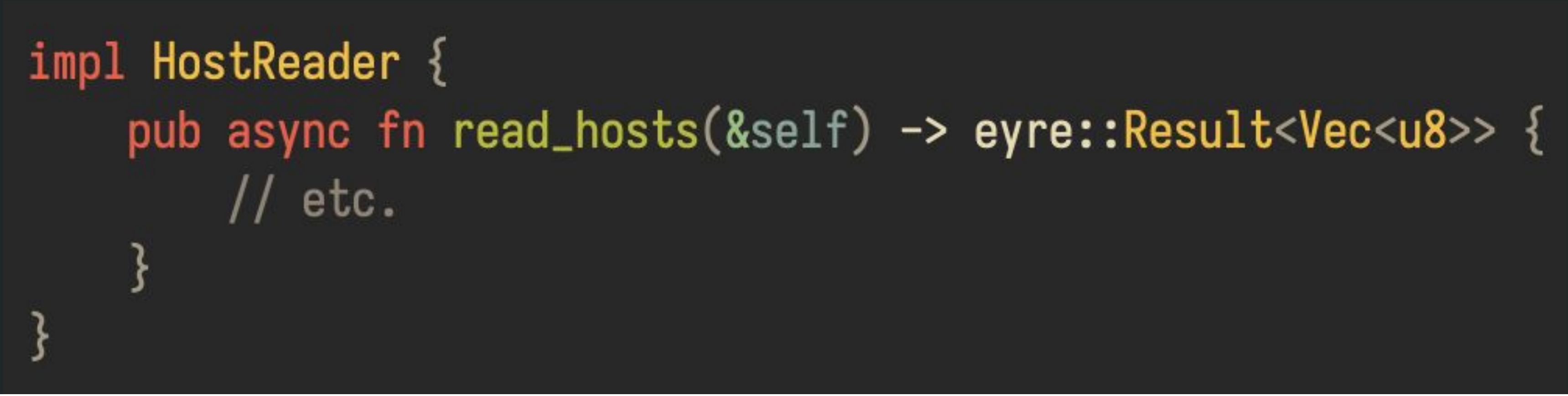
Soft [✓ Flat] Tight Luma

Despill: 0.0

Output: Final Composite

Position X 0.49398 496 Y 0.40160 101 Color R 0 G 0 B 0 A 0

10% - 3258 MB



```rust
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    }
}
```

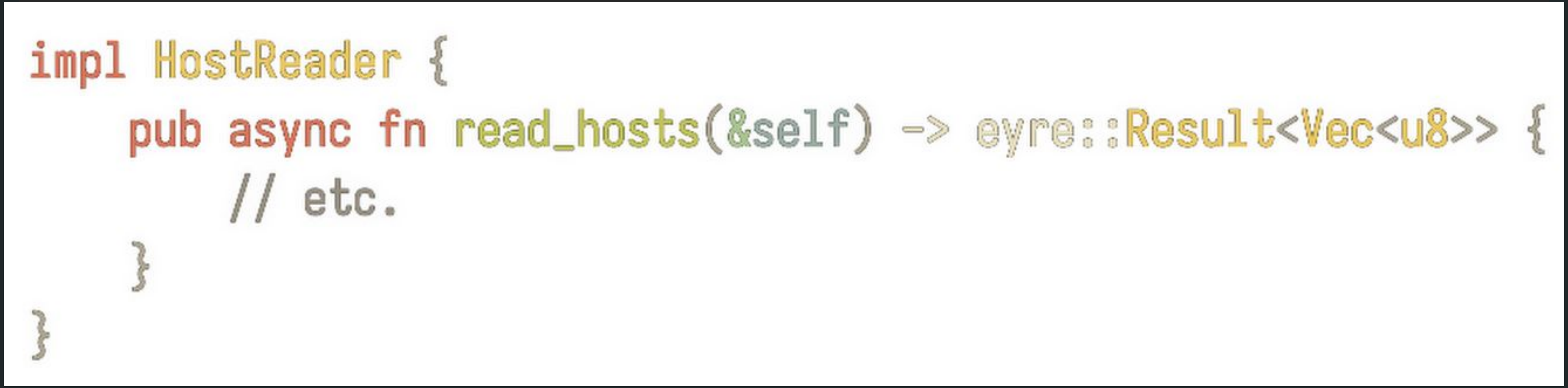

```rust
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}
```

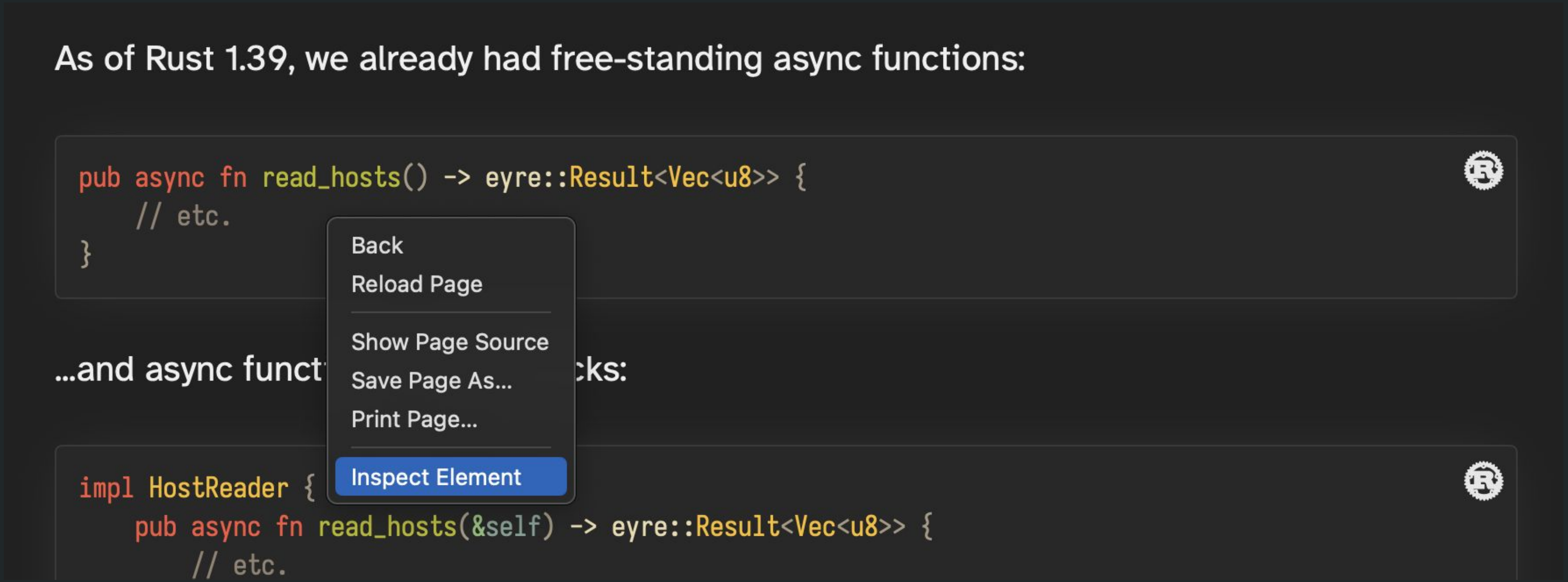

As of Rust 1.39, we already had free-standing async functions:

```rust
pub async fn read_hosts() -> eyre::Result<Vec<u8>> {
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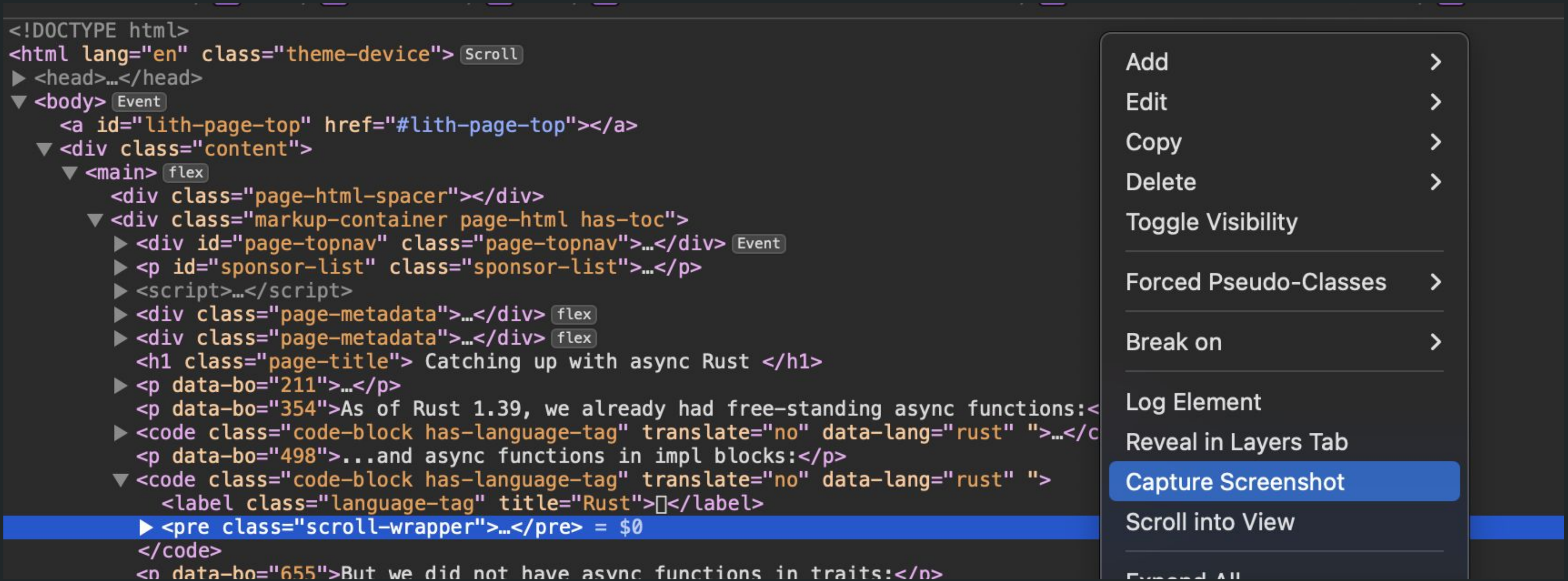
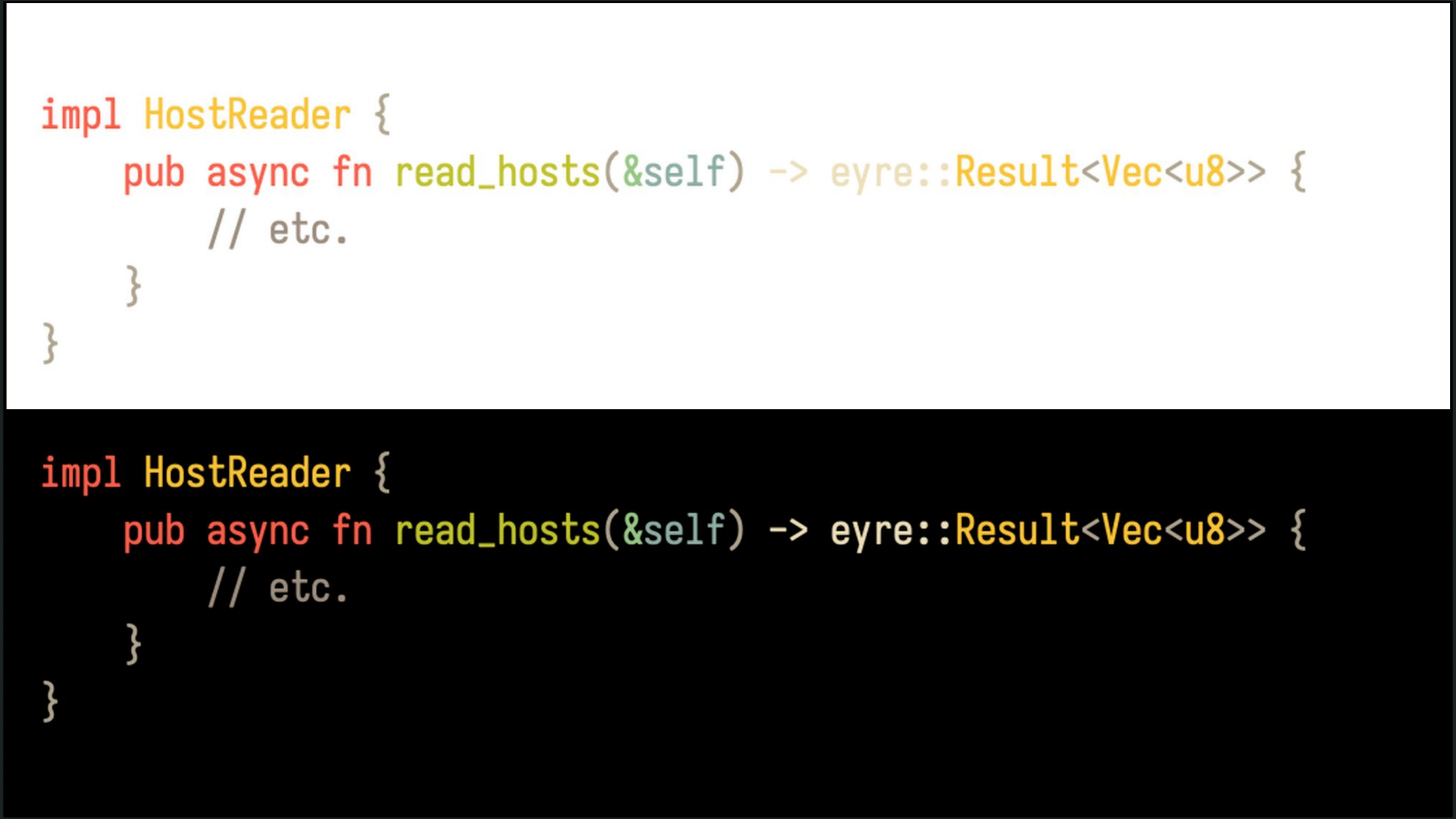


```
<!DOCTYPE html>
<html lang="en" class="theme-device"> Scroll
▶ <head>…</head>
▼ <body> Event
    <a id="lith-page-top" href="#lith-page-top"></a>
  ▼ <div class="content">
    ▼ <main> flex
        <div class="page-html-spacer"></div>
      ▼ <div class="markup-container page-html has-toc">
        ▶ <div id="page-topnav" class="page-topnav">…</div> Event
        ▶ <p id="sponsor-list" class="sponsor-list">…</p>
        ▶ <script>…</script>
        ▶ <div class="page-metadata">…</div> flex
        ▶ <div class="page-metadata">…</div> flex
          <h1 class="page-title"> Catching up with async Rust </h1>
        ▶ <p data-bo="211">…</p>
          <p data-bo="354">As of Rust 1.39, we already had free-standing async functions:<
        ▶ <code class="code-block has-language-tag" translate="no" data-lang="rust" ">…</c
          <p data-bo="498">...and async functions in impl blocks:</p>
        ▼ <code class="code-block has-language-tag" translate="no" data-lang="rust" ">
            <label class="language-tag" title="Rust">▯</label>
          ▶ <pre class="scroll-wrapper">…</pre> = $0
          </code>
          <p data-bo="655">But we did not have async functions in traits:</p>
```



```rust
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        // etc.
    }
}
```
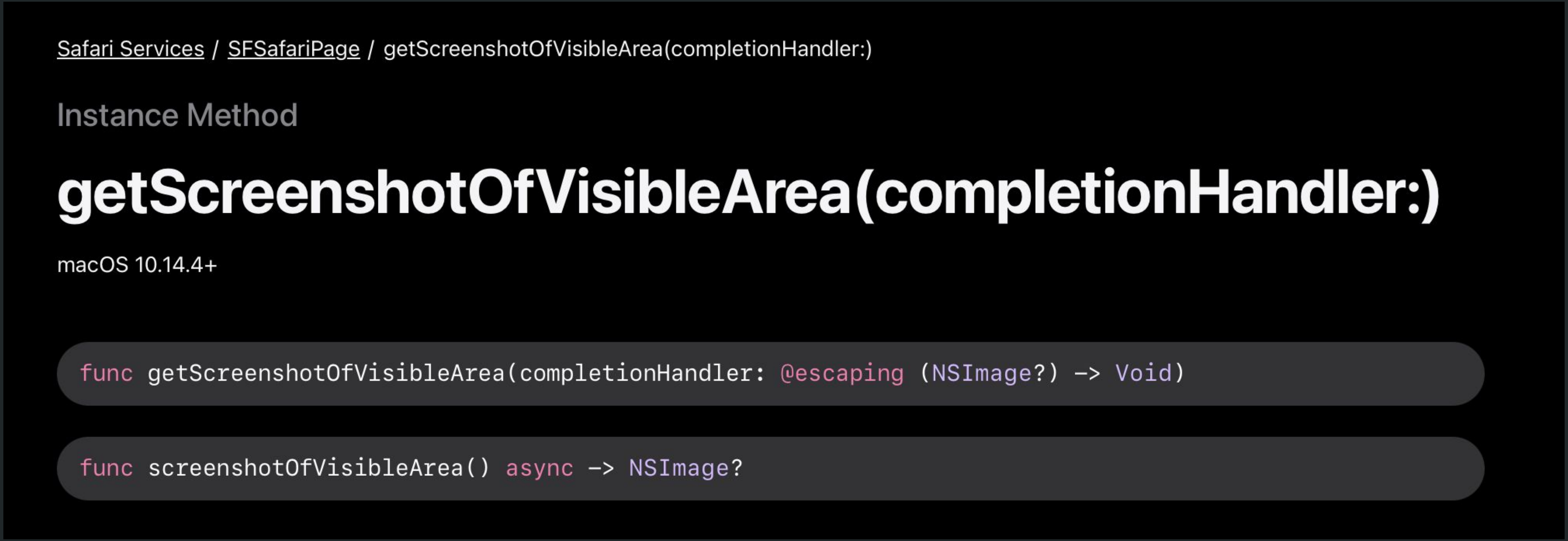

```rust
impl HostReader {
    pub async fn read_hosts(&self) -> eyre::Result<Vec<u8>> {
        // etc.
    }
}
```

Can we automate this?

Safari Extension?



Safari Services / SFSafariPage / getScreenshotOfVisibleArea(completionHandler:)

Instance Method

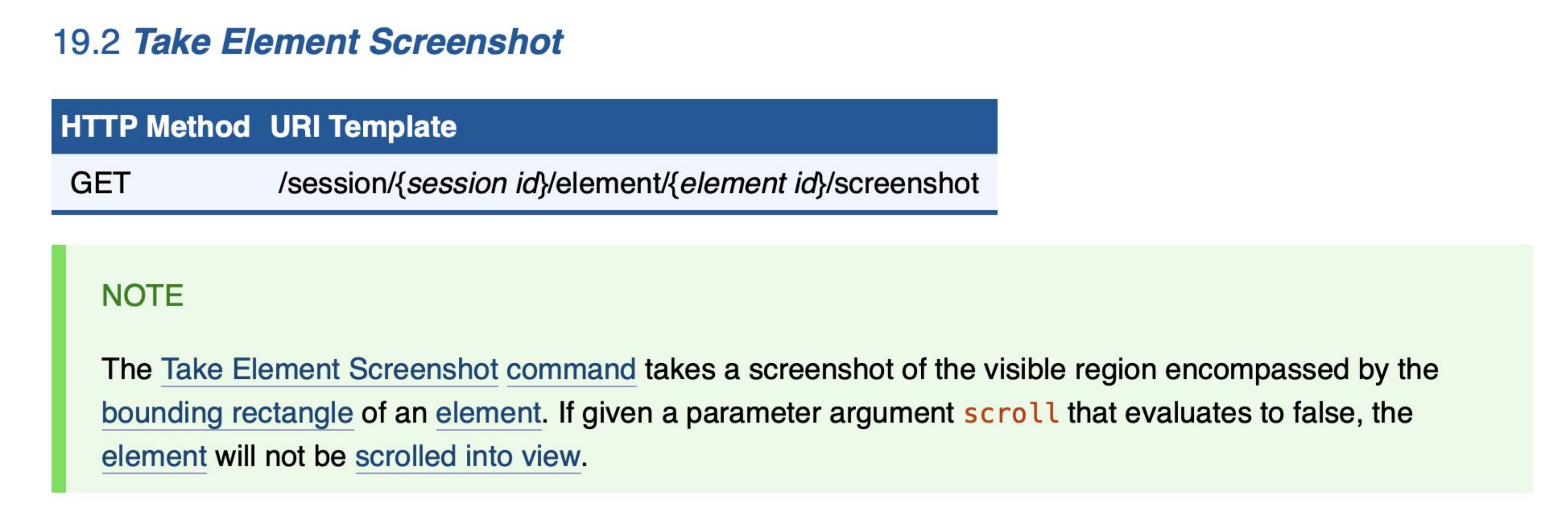
getScreenshotOfVisibleArea(completionHandler:)

macOS 10.14.4+

```
func getScreenshotOfVisibleArea(completionHandler: @escaping (NSImage?) -> Void)
```

```
func screenshotOfVisibleArea() async -> NSImage?
```

Selenium WebDriver?



19.2 *Take Element Screenshot*

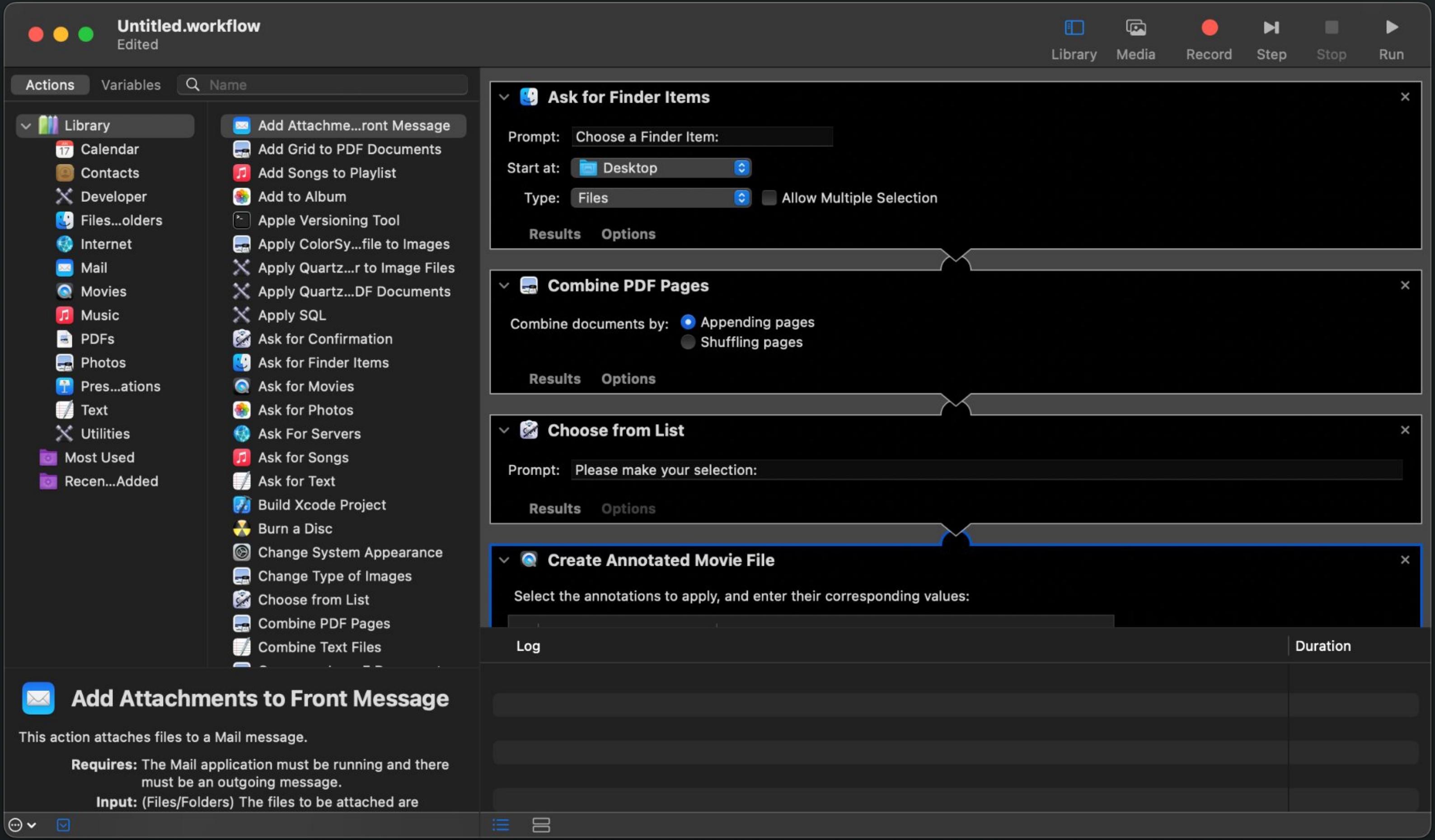
HTTP Method	URI Template
GET	/session/{*session id*}/element/{*element id*}/screenshot

NOTE

The Take Element Screenshot command takes a screenshot of the visible region encompassed by the bounding rectangle of an element. If given a parameter argument `scroll` that evaluates to false, the element will not be scrolled into view.

Build WebKit/Chromium yourself?

Automator?



Ask for Finder Items

Prompt: Choose a Finder Item:

Start at: Desktop

Type: Files

□ Allow Multiple Selection

Combine PDF Pages

Combine documents by: ● Appending pages ○ Shuffling pages

Choose from List

Prompt: Please make your selection:

Create Annotated Movie File

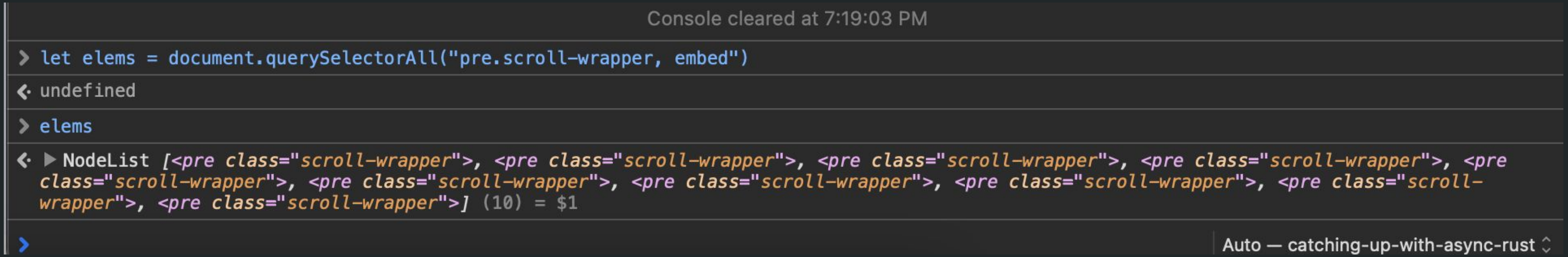
Select the annotations to apply, and enter their corresponding values:

Add Attachments to Front Message

This action attaches files to a Mail message.

Requires: The Mail application must be running and there must be an outgoing message.

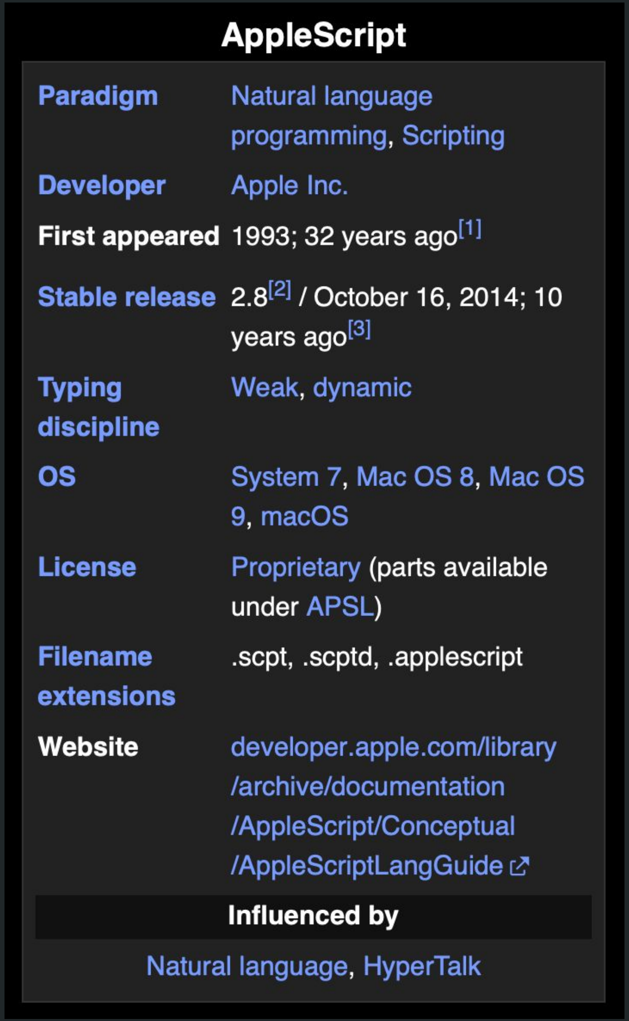
Input: (Files/Folders) The files to be attached are



Console cleared at 7:19:03 PM

```
> let elems = document.querySelectorAll("pre.scroll-wrapper, embed")
<· undefined
> elems
<· ▶ NodeList [<pre class="scroll-wrapper">, <pre class="scroll-wrapper">, <pre class="scroll-wrapper">, <pre class="scroll-wrapper">, <pre
  class="scroll-wrapper">, <pre class="scroll-wrapper">, <pre class="scroll-wrapper">, <pre class="scroll-wrapper">, <pre class="scroll-
  wrapper">, <pre class="scroll-wrapper">] (10) = $1
>
```

AppleScript!

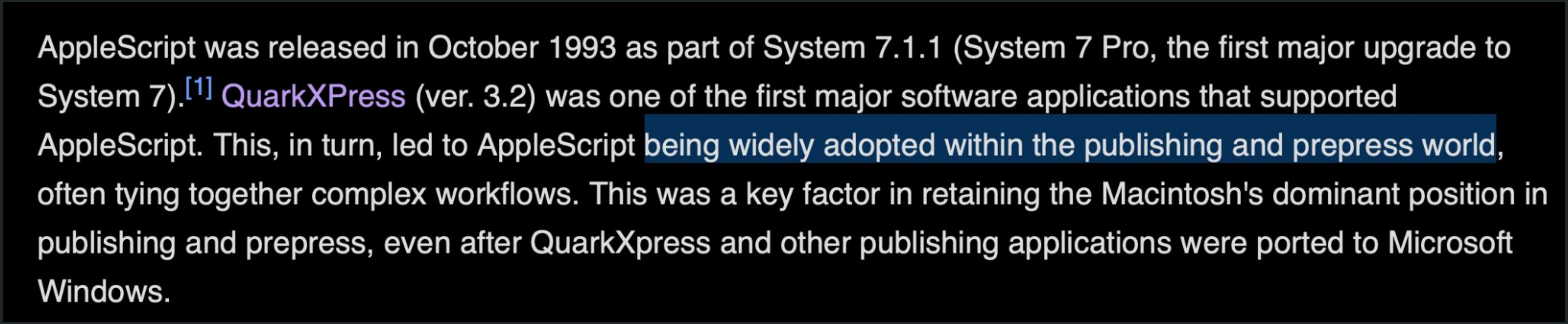


AppleScript

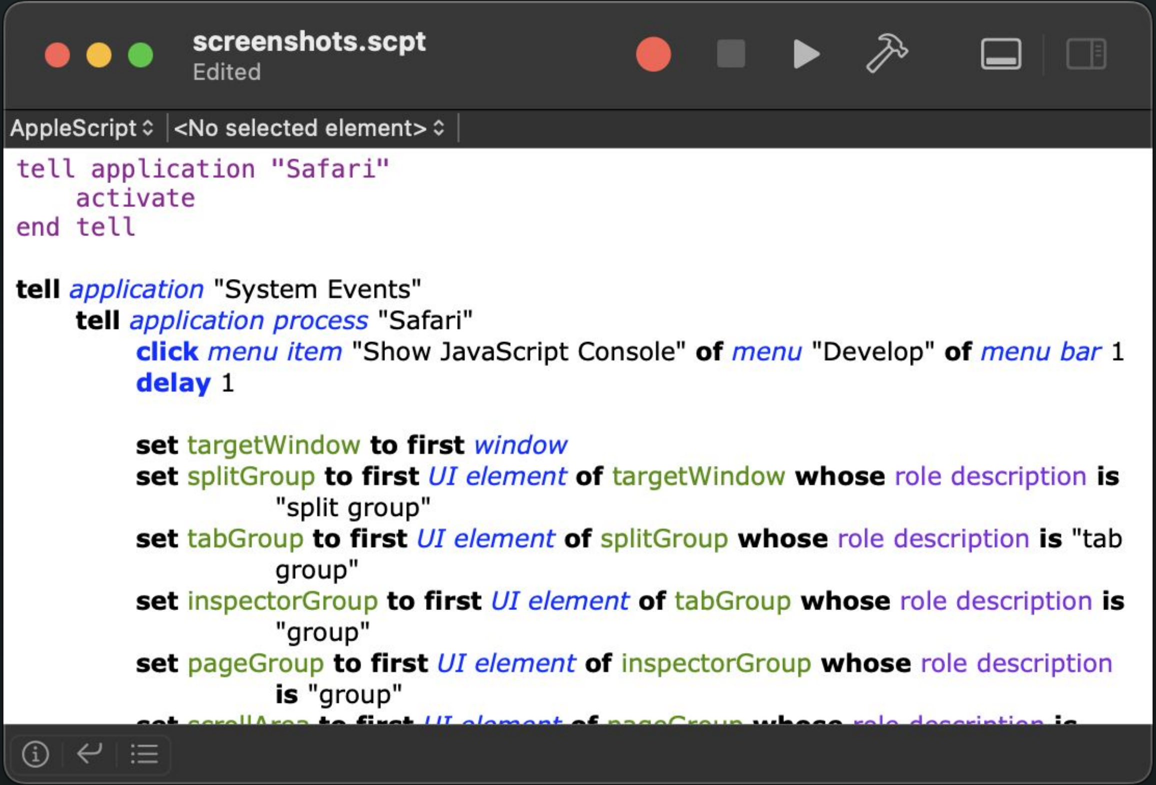
Paradigm	Natural language programming, Scripting
Developer	Apple Inc.
First appeared	1993; 32 years ago[1]
Stable release	2.8[2] / October 16, 2014; 10 years ago[3]
Typing discipline	Weak, dynamic
OS	System 7, Mac OS 8, Mac OS 9, macOS
License	Proprietary (parts available under APSL)
Filename extensions	.scpt, .scptd, .applescript
Website	developer.apple.com/library/archive/documentation/AppleScript/Conceptual/AppleScriptLangGuide

Influenced by

Natural language, HyperTalk



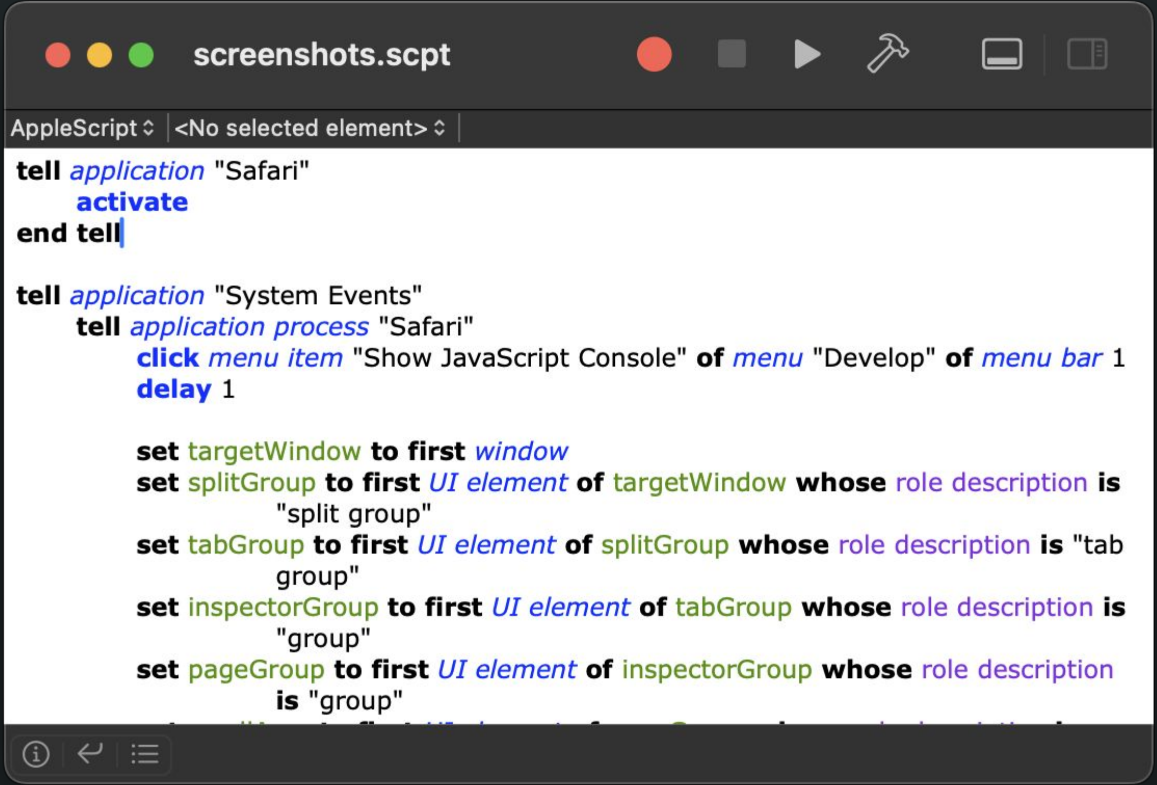
AppleScript was released in October 1993 as part of System 7.1.1 (System 7 Pro, the first major upgrade to System 7).[1] QuarkXPress (ver. 3.2) was one of the first major software applications that supported AppleScript. This, in turn, led to AppleScript being widely adopted within the publishing and prepress world, often tying together complex workflows. This was a key factor in retaining the Macintosh's dominant position in publishing and prepress, even after QuarkXpress and other publishing applications were ported to Microsoft Windows.



```
tell application "Safari"
    activate
end tell

tell application "System Events"
    tell application process "Safari"
        click menu item "Show JavaScript Console" of menu "Develop" of menu bar 1
        delay 1

        set targetWindow to first window
        set splitGroup to first UI element of targetWindow whose role description is
                "split group"
        set tabGroup to first UI element of splitGroup whose role description is "tab
                group"
        set inspectorGroup to first UI element of tabGroup whose role description is
                "group"
        set pageGroup to first UI element of inspectorGroup whose role description
                is "group"
        set scrollArea to first UI element of pageGroup whose role description is
```



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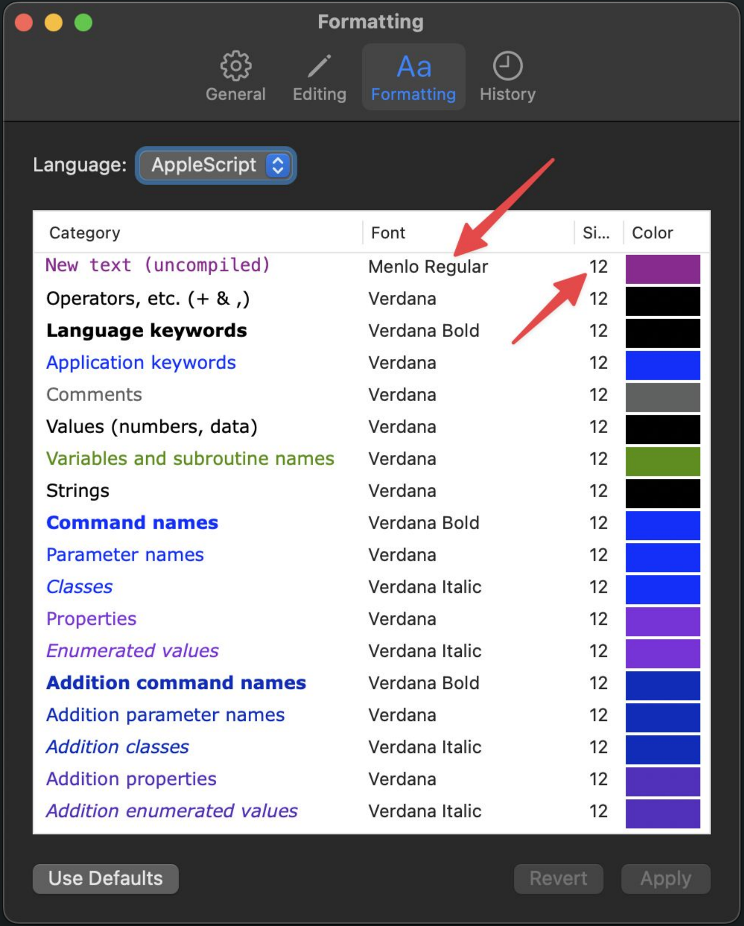
                is "group"
```

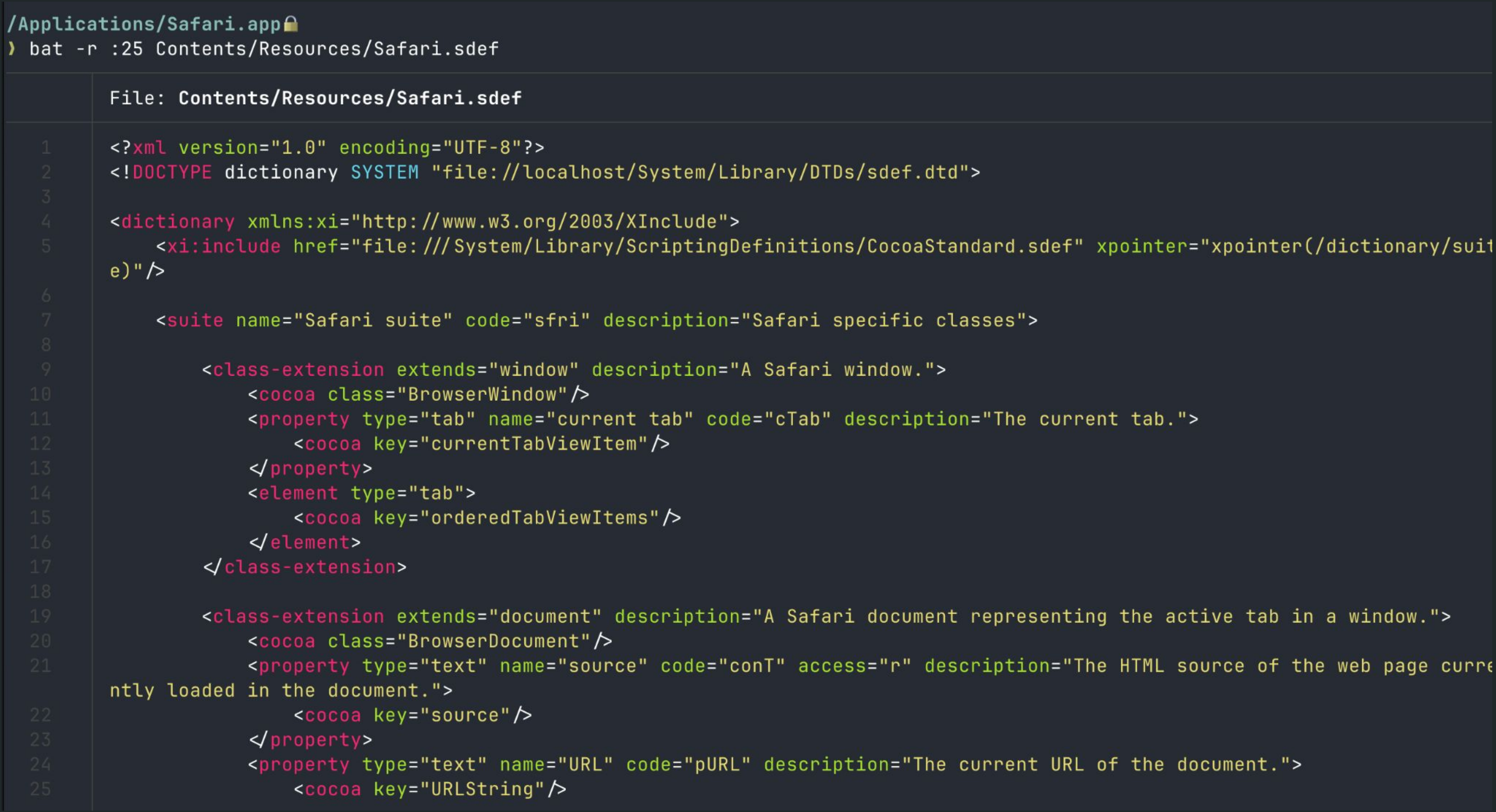


Language: AppleScript

Category	Font	Si...	Color
New text (uncompiled)	Menlo Regular	12	🟪
Operators, etc. (+ & ,)	Verdana	12	⬛
Language keywords	Verdana Bold	12	⬛
Application keywords	Verdana	12	🟦
Comments	Verdana	12	◼
Values (numbers, data)	Verdana	12	⬛
Variables and subroutine names	Verdana	12	🟩
Strings	Verdana	12	⬛
Command names	Verdana Bold	12	🟦
Parameter names	Verdana	12	🟦
Classes	Verdana Italic	12	🟦
Properties	Verdana	12	🟪
Enumerated values	Verdana Italic	12	🟪
Addition command names	Verdana Bold	12	🟦
Addition parameter names	Verdana	12	🟦
Addition classes	Verdana Italic	12	🟦
Addition properties	Verdana	12	🟪
Addition enumerated values	Verdana Italic	12	🟪

tell apps to do things

```
tell application "Safari"
	activate
end tell
```



```
/Applications/Safari.app🔒
❯ bat -r :25 Contents/Resources/Safari.sdef
```

```
File: Contents/Resources/Safari.sdef

<?xml version="1.0" encoding="UTF-8"?>
<!DOCTYPE dictionary SYSTEM "file://localhost/System/Library/DTDs/sdef.dtd">

<dictionary xmlns:xi="http://www.w3.org/2003/XInclude">
    <xi:include href="file:///System/Library/ScriptingDefinitions/CocoaStandard.sdef" xpointer="xpointer(/dictionary/suit
e)"/>

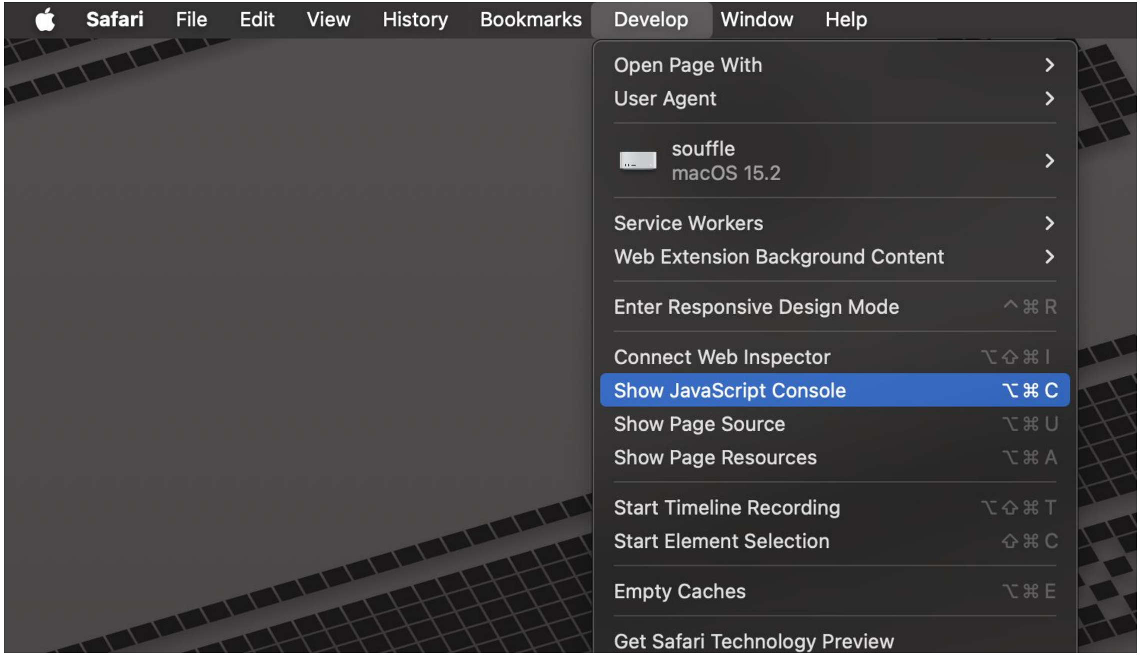
    <suite name="Safari suite" code="sfri" description="Safari specific classes">

        <class-extension extends="window" description="A Safari window.">
            <cocoa class="BrowserWindow"/>
            <property type="tab" name="current tab" code="cTab" description="The current tab.">
                <cocoa key="currentTabViewItem"/>
            </property>
            <element type="tab">
                <cocoa key="orderedTabViewItems"/>
            </element>
        </class-extension>

        <class-extension extends="document" description="A Safari document representing the active tab in a window.">
            <cocoa class="BrowserDocument"/>
            <property type="text" name="source" code="conT" access="r" description="The HTML source of the web page curre
ntly loaded in the document.">
                <cocoa key="source"/>
            </property>
            <property type="text" name="URL" code="pURL" description="The current URL of the document.">
                <cocoa key="URLString"/>
```

click menus

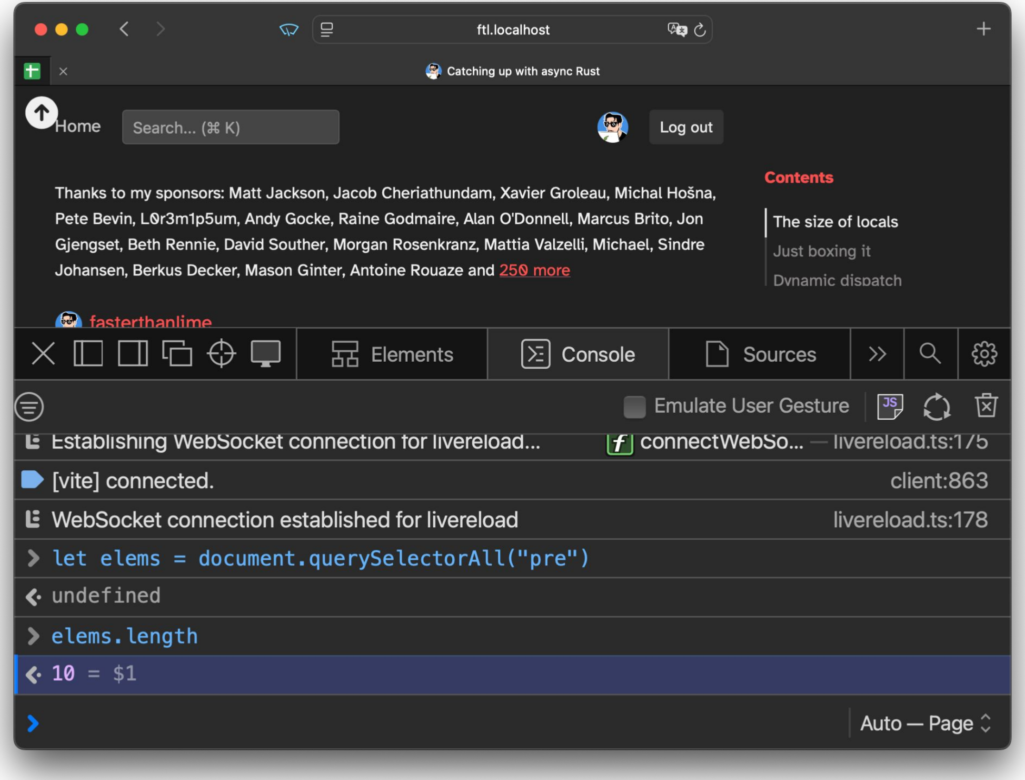
```
tell application "System Events"
        tell application process "Safari"
              click menu item "Show JavaScript Console" of menu "Develop" of menu bar 1
              delay 1
        end tell
end tell
```


Safari
File
Edit
View
History
Bookmarks
Develop
Window
Help
Open Page With
User Agent
souffle
macOS 15.2
Service Workers
Web Extension Background Content
Enter Responsive Design Mode ⌃⌘R
Connect Web Inspector ⌥⇧⌘I
Show JavaScript Console ⌥⌘C
Show Page Source ⌥⌘U
Show Page Resources ⌥⌘A
Start Timeline Recording ⌥⇧⌘T
Start Element Selection ⇧⌘C
Empty Caches ⌥⌘E
Get Safari Technology Preview

send keystrokes

```
tell application "System Events"
        keystroke "let elems = document.querySelectorAll(\"pre\")"
        key code 36 -- Enter
        delay 0.3

        keystroke "elems.length"
        key code 36
        delay 0.3
end tell
```

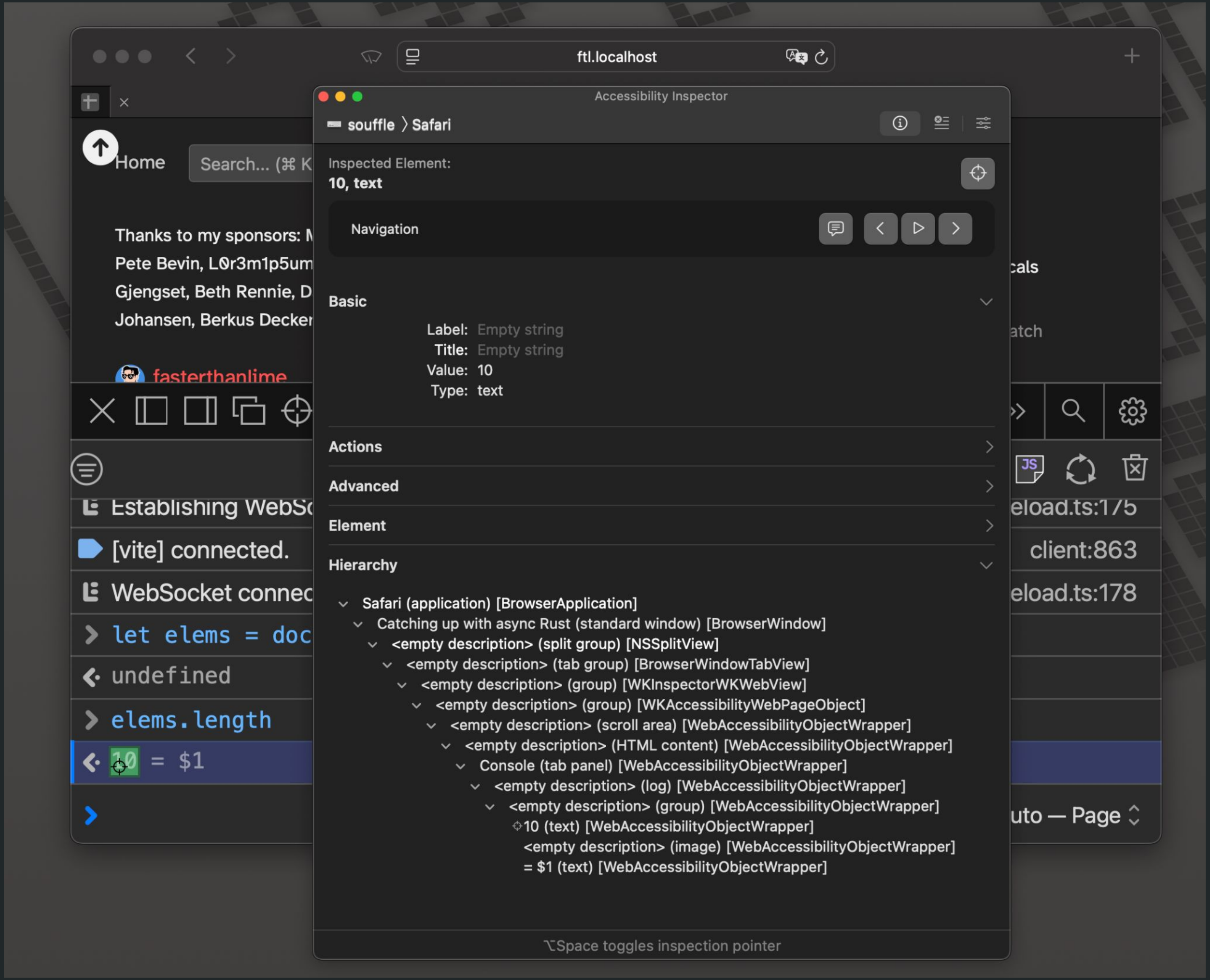


Thanks to my sponsors: Matt Jackson, Jacob Cheriathundam, Xavier Groleau, Michal Hošna, Pete Bevin, L0r3m1p5um, Andy Gocke, Raine Godmaire, Alan O'Donnell, Marcus Brito, Jon Gjengset, Beth Rennie, David Souther, Morgan Rosenkranz, Mattia Valzelli, Michael, Sindre Johansen, Berkus Decker, Mason Ginter, Antoine Rouaze and 250 more

```
Establishing WebSocket connection for livereload...   connectWebSo... — livereload.ts:175
[vite] connected.                                                  client:863
WebSocket connection established for livereload               livereload.ts:178
> let elems = document.querySelectorAll("pre")
< undefined
> elems.length
< 10 = $1
>
```

a11y

(accessibility)



Accessibility Inspector

souffle 〉Safari

Inspected Element:
10, text

Navigation

Basic

Label: Empty string
Title: Empty string
Value: 10
Type: text

Actions

Advanced

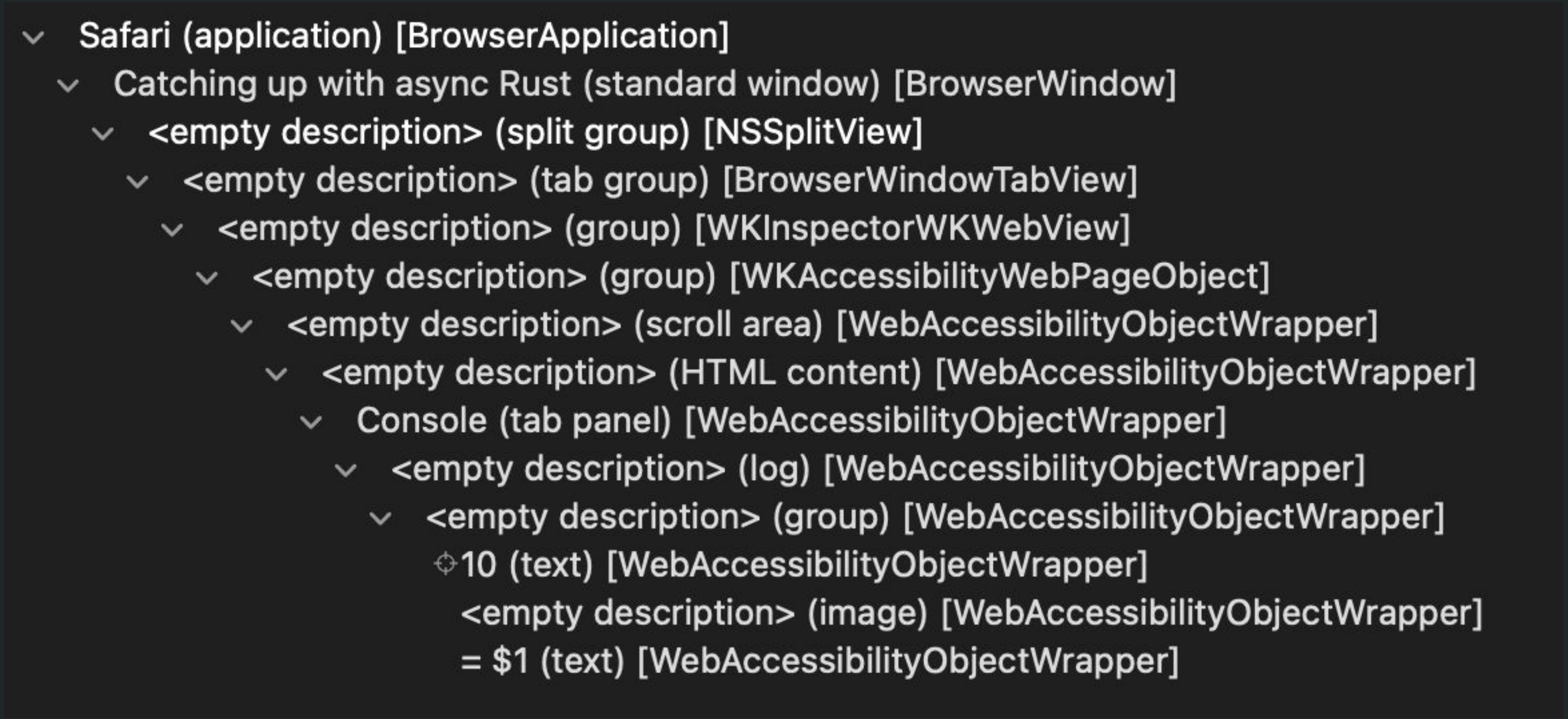
Element

Hierarchy

```
⌄ Safari (application) [BrowserApplication]
  ⌄ Catching up with async Rust (standard window) [BrowserWindow]
    ⌄ <empty description> (split group) [NSSplitView]
      ⌄ <empty description> (tab group) [BrowserWindowTabView]
        ⌄ <empty description> (group) [WKInspectorWKWebView]
          ⌄ <empty description> (group) [WKAccessibilityWebPageObject]
            ⌄ <empty description> (scroll area) [WebAccessibilityObjectWrapper]
              ⌄ <empty description> (HTML content) [WebAccessibilityObjectWrapper]
                ⌄ Console (tab panel) [WebAccessibilityObjectWrapper]
                  ⌄ <empty description> (log) [WebAccessibilityObjectWrapper]
                    ⌄ <empty description> (group) [WebAccessibilityObjectWrapper]
                        10 (text) [WebAccessibilityObjectWrapper]
                        <empty description> (image) [WebAccessibilityObjectWrapper]
                        = $1 (text) [WebAccessibilityObjectWrapper]
```

⌥Space toggles inspection pointer

```
Establishing WebSc          eload.ts:175
[vite] connected.           client:863
WebSocket connec            eload.ts:178
> let elems = doc
< undefined
> elems.length
< 10 = $1
```



```
Safari (application) [BrowserApplication]
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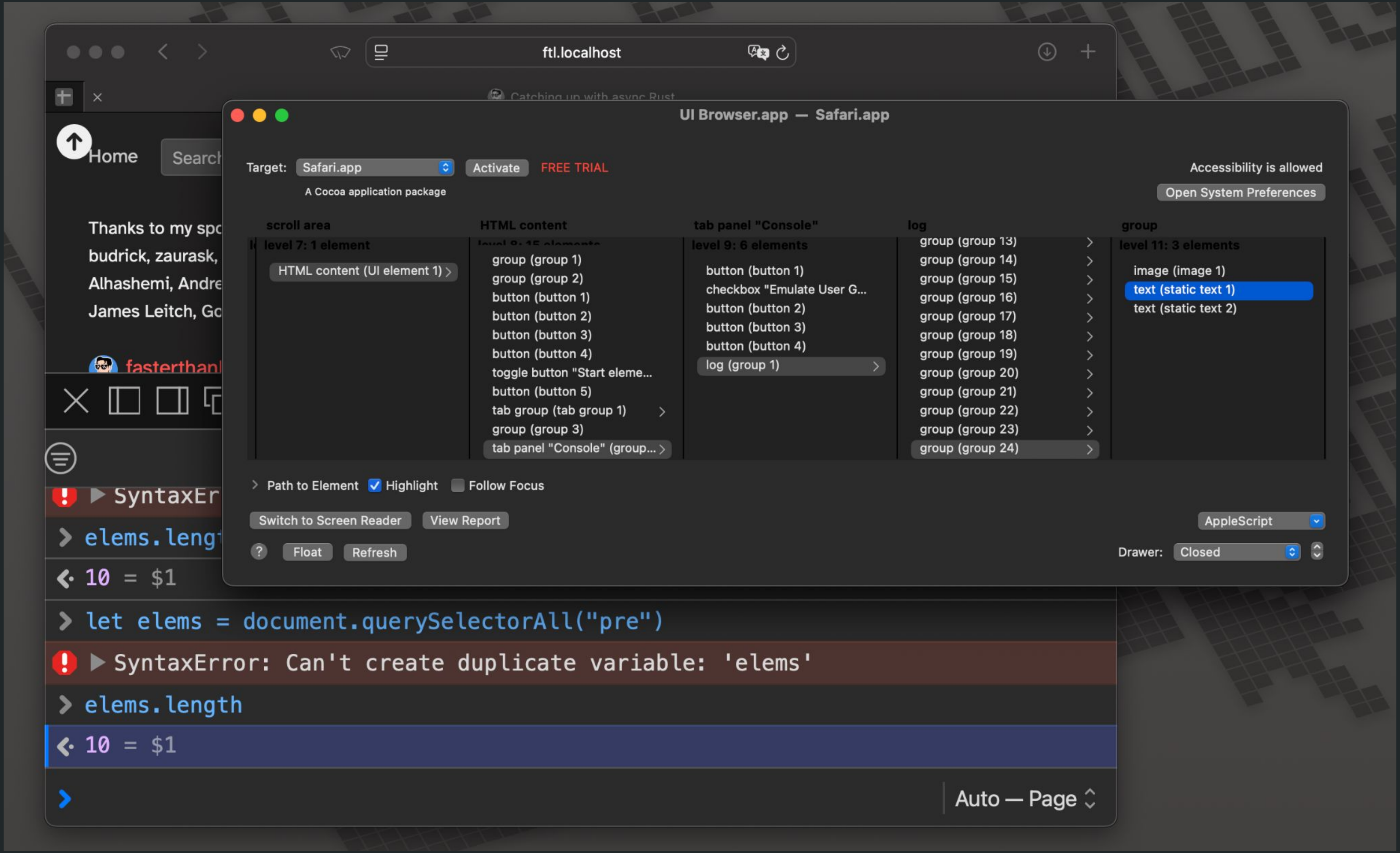
          <empty description> (group) [WKAccessibilityWebPageObject]
            <empty description> (scroll area) [WebAccessibilityObjectWrapper]
              <empty description> (HTML content) [WebAccessibilityObjectWrapper]
                Console (tab panel) [WebAccessibilityObjectWrapper]
                  <empty description> (log) [WebAccessibilityObjectWrapper]
                    <empty description> (group) [WebAccessibilityObjectWrapper]
                      10 (text) [WebAccessibilityObjectWrapper]
                      <empty description> (image) [WebAccessibilityObjectWrapper]
                      = $1 (text) [WebAccessibilityObjectWrapper]
```

```
set targetWindow to first window
set splitGroup to first UI element of targetWindow whose role description is "split group"
set tabGroup to first UI element of splitGroup whose role description is "tab group"
set inspectorGroup to first UI element of tabGroup whose role description is "group"
set pageGroup to first UI element of inspectorGroup whose role description is "group"
set scrollArea to first UI element of pageGroup whose role description is "scroll area"
set htmlContent to first UI element of scrollArea whose role description is "HTML content"
set consoleTabPanel to first UI element of htmlContent whose role description is "tab panel"
set logElement to (first UI element of consoleTabPanel whose role description is "log")
set lastLogItem to last UI element of logElement whose role description is "group"
set textElement to first UI element of lastLogItem whose role description is "text"
log value of textElement as integer
```

there (was) a better way



Thanks to my spo
budrick, zaurask,
Alhashemi, Andre
James Leitch, Go

fasterthanl

UI Browser.app — Safari.app

Target: Safari.app Activate FREE TRIAL
A Cocoa application package

Accessibility is allowed
Open System Preferences

scroll area
level 7: 1 element
HTML content (UI element 1)

HTML content
level 8: 15 elements
group (group 1)
group (group 2)
button (button 1)
button (button 2)
button (button 3)
button (button 4)
toggle button "Start eleme...
button (button 5)
tab group (tab group 1)
group (group 3)
tab panel "Console" (group...

tab panel "Console"
level 9: 6 elements
button (button 1)
checkbox "Emulate User G...
button (button 2)
button (button 3)
button (button 4)
log (group 1)

log
group (group 13)
group (group 14)
group (group 15)
group (group 16)
group (group 17)
group (group 18)
group (group 19)
group (group 20)
group (group 21)
group (group 22)
group (group 23)
group (group 24)

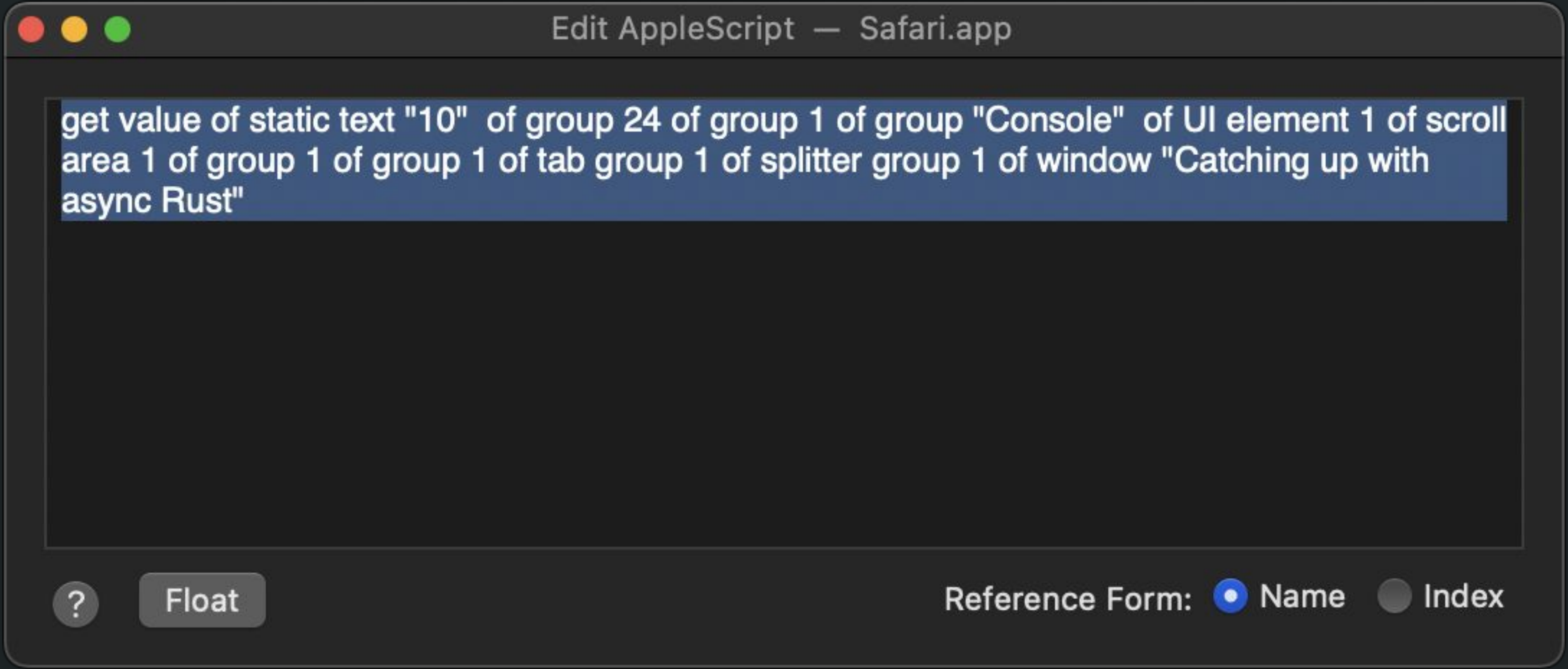
group
level 11: 3 elements
image (image 1)
text (static text 1)
text (static text 2)

Path to Element ☑ Highlight □ Follow Focus

Switch to Screen Reader View Report AppleScript

? Float Refresh Drawer: Closed

```
SyntaxEr
> elems.lengt
< 10 = $1
> let elems = document.querySelectorAll("pre")
SyntaxError: Can't create duplicate variable: 'elems'
> elems.length
< 10 = $1
```

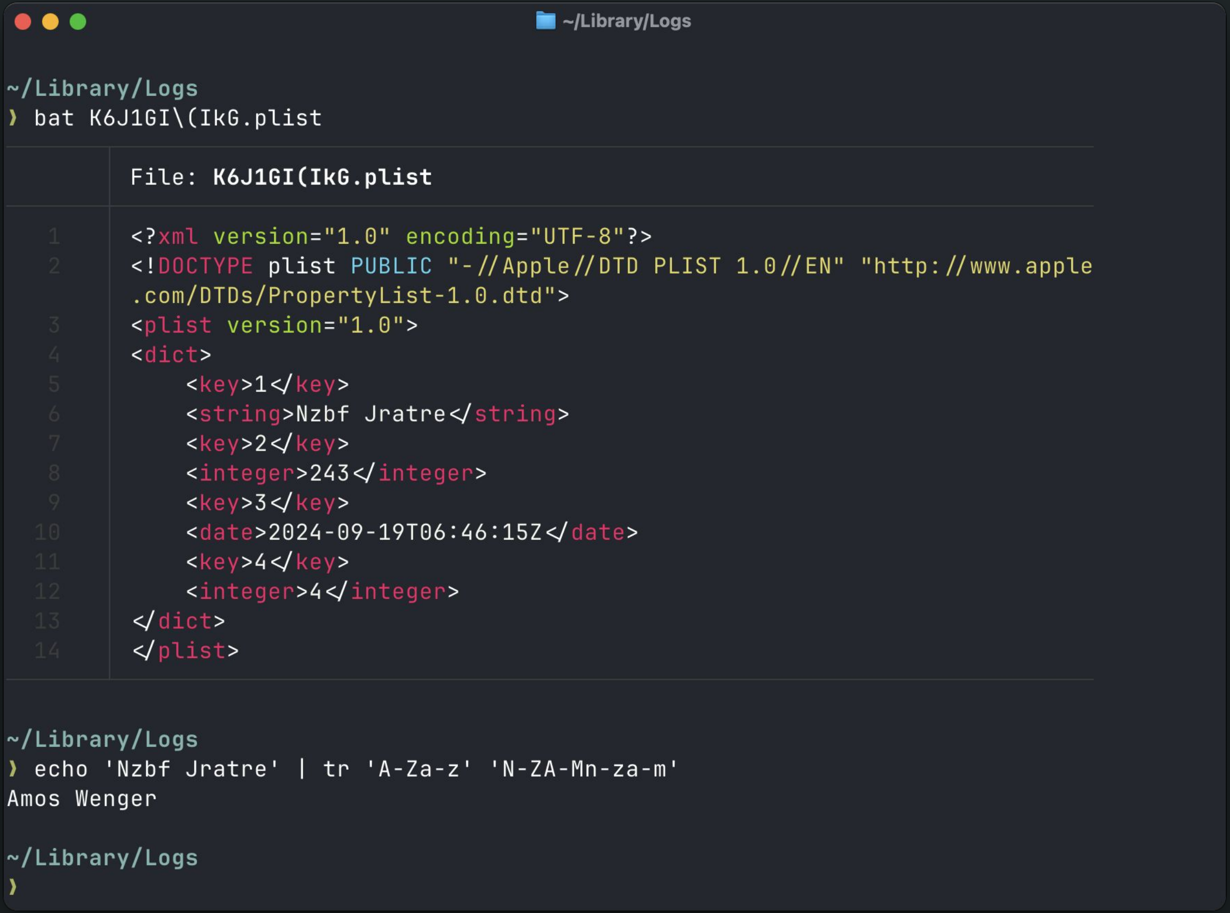


Edit AppleScript — Safari.app

```
get value of static text "10"  of group 24 of group 1 of group "Console"  of UI element 1 of scroll area 1 of group 1 of group 1 of tab group 1 of splitter group 1 of window "Catching up with async Rust"
```

Reference Form: ● Name ○ Index

UI Browser 3 EOL'd on October 17, 2022



```
~/Library/Logs
❯ bat K6J1GI\(IkG.plist

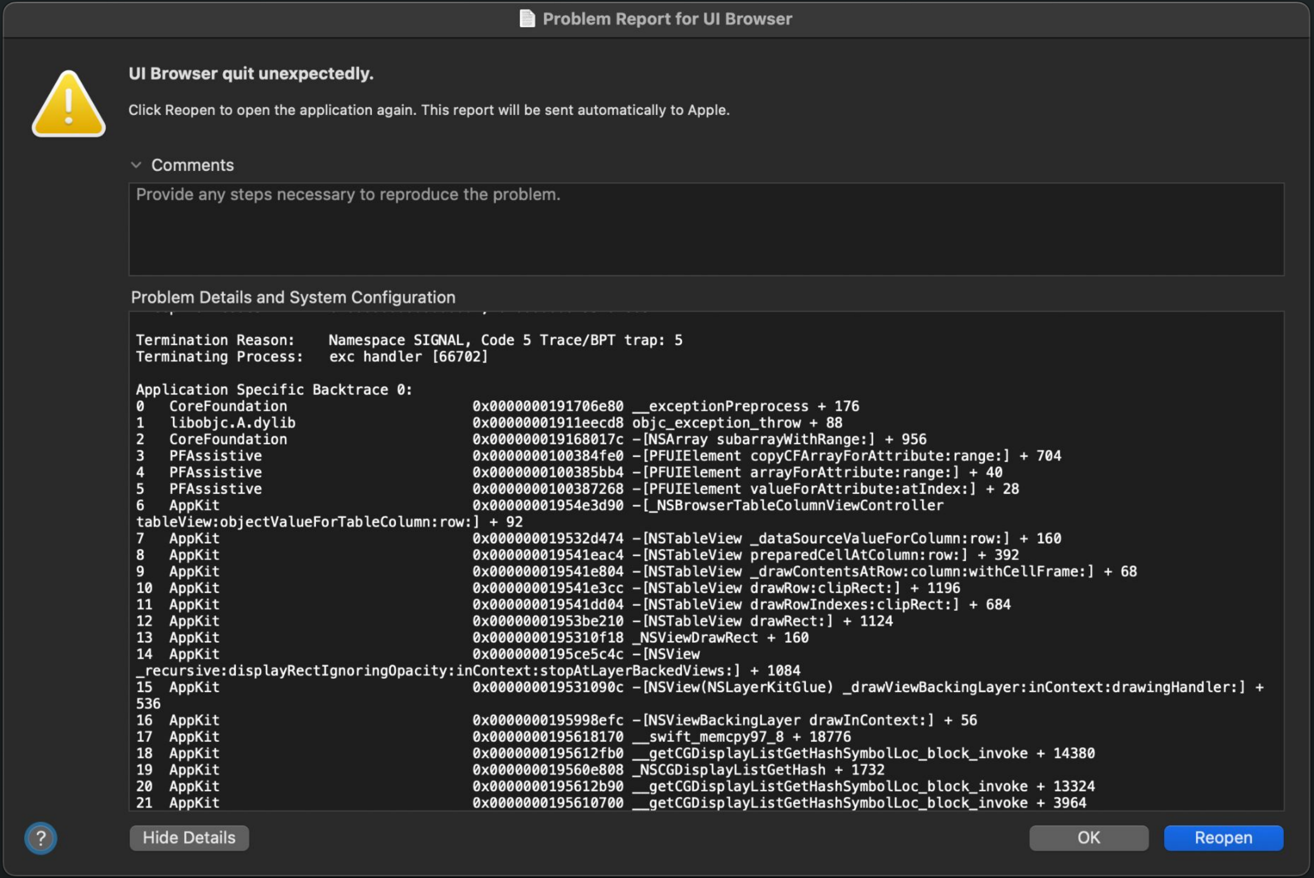
       File: K6J1GI(IkG.plist

       <?xml version="1.0" encoding="UTF-8"?>
       <!DOCTYPE plist PUBLIC "-//Apple//DTD PLIST 1.0//EN" "http://www.apple
       .com/DTDs/PropertyList-1.0.dtd">
       <plist version="1.0">
       <dict>
           <key>1</key>
           <string>Nzbf Jratre</string>
           <key>2</key>
           <integer>243</integer>
           <key>3</key>
           <date>2024-09-19T06:46:15Z</date>
           <key>4</key>
           <integer>4</integer>
       </dict>
       </plist>


~/Library/Logs
❯ echo 'Nzbf Jratre' | tr 'A-Za-z' 'N-ZA-Mn-za-m'
Amos Wenger

~/Library/Logs
❯
```

self-directed research



Problem Report for UI Browser

UI Browser quit unexpectedly.

Click Reopen to open the application again. This report will be sent automatically to Apple.

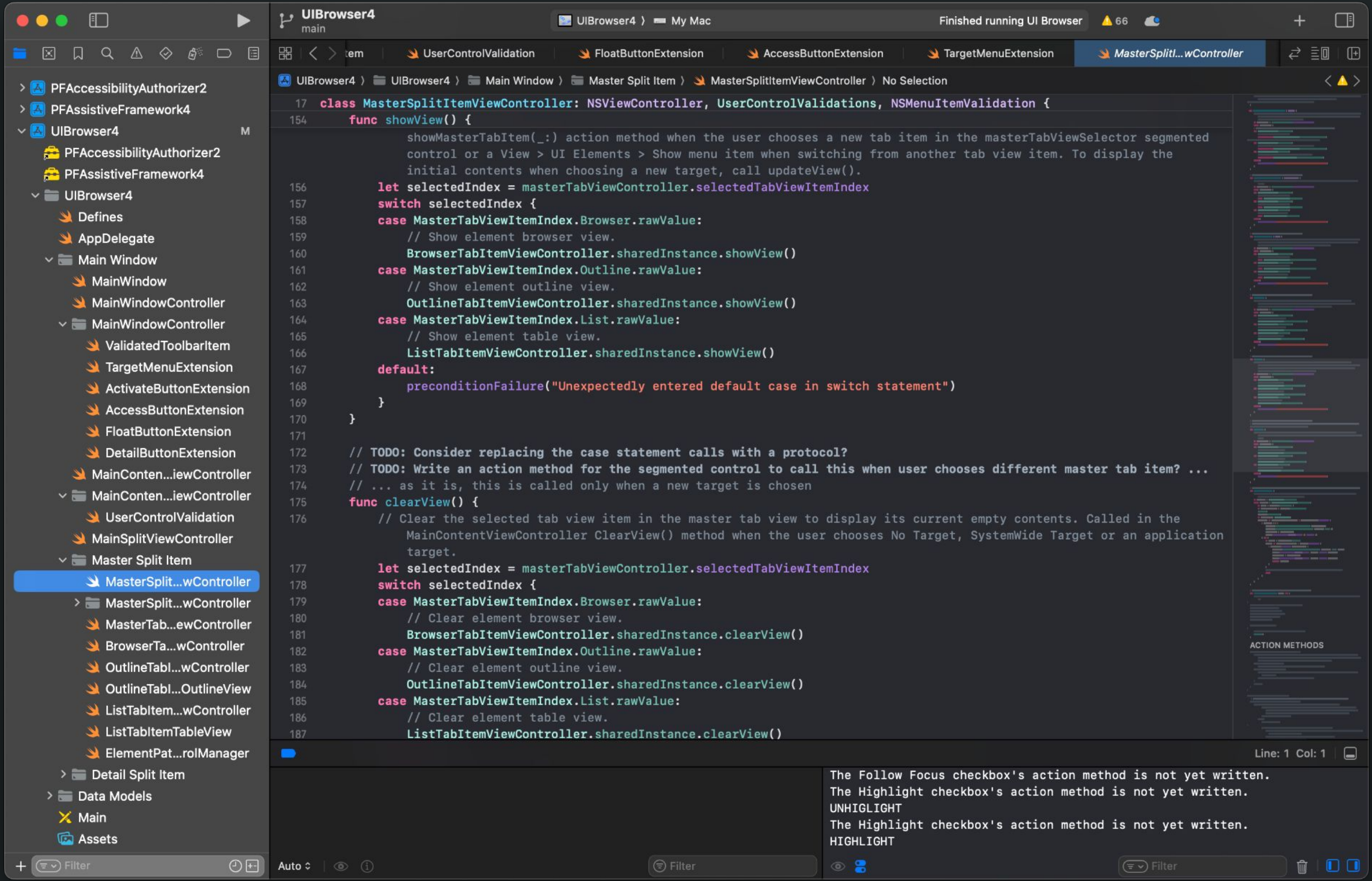
Comments
Provide any steps necessary to reproduce the problem.
Problem Details and System Configuration

```
Termination Reason:    Namespace SIGNAL, Code 5 Trace/BPT trap: 5
Terminating Process:   exc handler [66702]

Application Specific Backtrace 0:
0   CoreFoundation                      0x0000000191706e80 __exceptionPreprocess + 176
1   libobjc.A.dylib                     0x00000001911eecd8 objc_exception_throw + 88
2   CoreFoundation                      0x000000019168017c -[NSArray subarrayWithRange:] + 956
3   PFAssistive                         0x0000000100384fe0 -[PFUIElement copyCFArrayForAttribute:range:] + 704
4   PFAssistive                         0x0000000100385bb4 -[PFUIElement arrayForAttribute:range:] + 40
5   PFAssistive                         0x0000000100387268 -[PFUIElement valueForAttribute:atIndex:] + 28
6   AppKit                              0x00000001954e3d90 -[_NSBrowserTableColumnViewController
tableView:objectValueForTableColumn:row:] + 92
7   AppKit                              0x000000019532d474 -[NSTableView _dataSourceValueForColumn:row:] + 160
8   AppKit                              0x000000019541eac4 -[NSTableView preparedCellAtColumn:row:] + 392
9   AppKit                              0x000000019541e804 -[NSTableView _drawContentsAtRow:column:withCellFrame:] + 68
10  AppKit                              0x000000019541e3cc -[NSTableView drawRow:clipRect:] + 1196
11  AppKit                              0x000000019541dd04 -[NSTableView drawRowIndexes:clipRect:] + 684
12  AppKit                              0x00000001953be210 -[NSTableView drawRect:] + 1124
13  AppKit                              0x0000000195310f18 _NSViewDrawRect + 160
14  AppKit                              0x0000000195ce5c4c -[NSView
_recursive:displayRectIgnoringOpacity:inContext:stopAtLayerBackedViews:] + 1084
15  AppKit                              0x000000019531090c -[NSView(NSLayerKitGlue) _drawViewBackingLayer:inContext:drawingHandler:] +
536
16  AppKit                              0x0000000195998efc -[NSViewBackingLayer drawInContext:] + 56
17  AppKit                              0x0000000195618170 __swift_memcpy97_8 + 18776
18  AppKit                              0x0000000195612fb0 __getCGDisplayListGetHashSymbolLoc_block_invoke + 14380
19  AppKit                              0x000000019560e808 _NSCGDisplayListGetHash + 1732
20  AppKit                              0x0000000195612b90 __getCGDisplayListGetHashSymbolLoc_block_invoke + 13324
21  AppKit                              0x0000000195610700 __getCGDisplayListGetHashSymbolLoc_block_invoke + 3964
```

UI Browser 4: open source, swift, unfinished

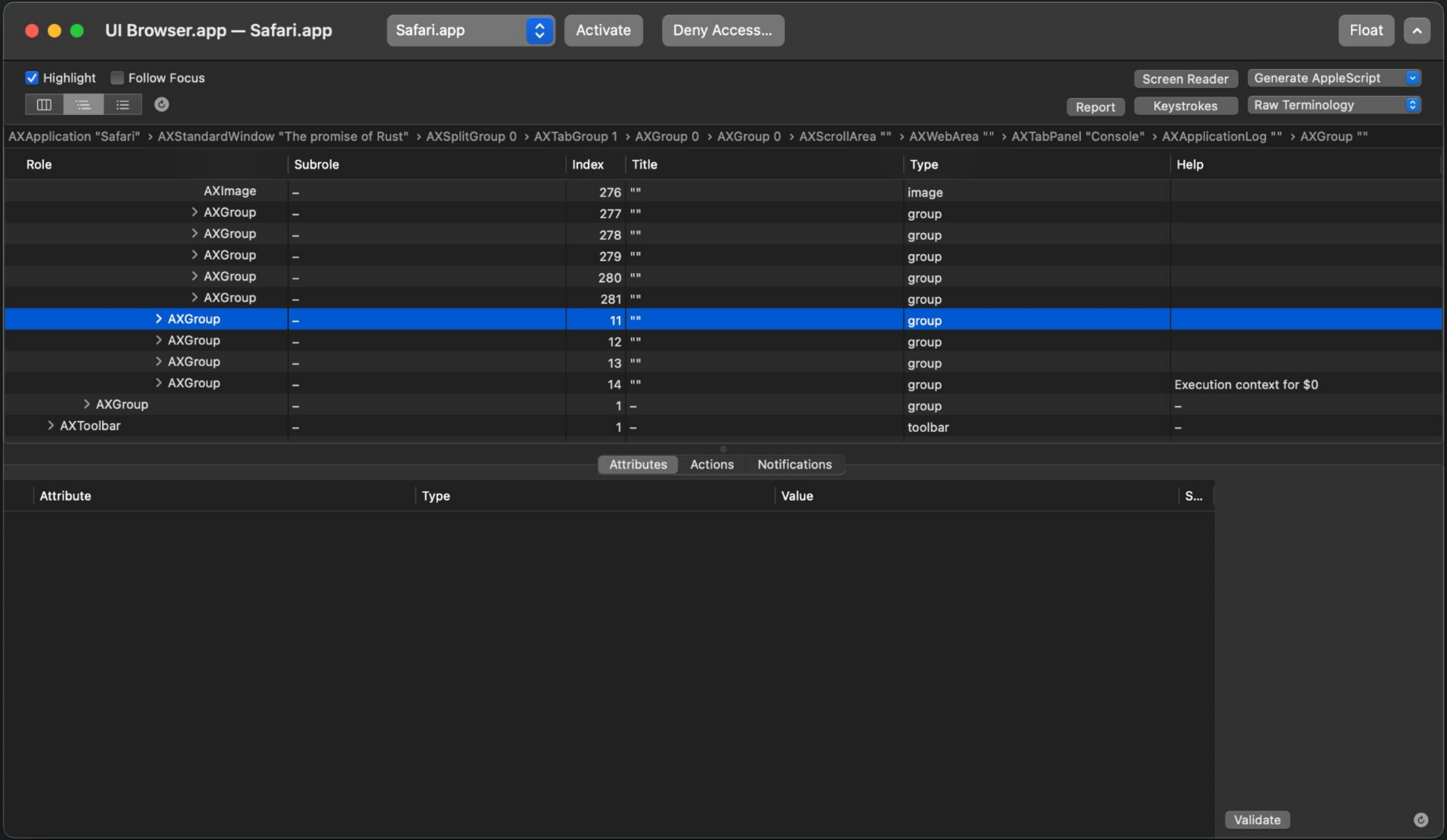
self-directed research



```
class MasterSplitItemViewController: NSViewController, UserControlValidations, NSMenuItemValidation {
    func showView() {
            showMasterTabItem(_:) action method when the user chooses a new tab item in the masterTabViewSelector segmented
            control or a View > UI Elements > Show menu item when switching from another tab view item. To display the
            initial contents when choosing a new target, call updateView().
        let selectedIndex = masterTabViewController.selectedTabViewItemIndex
        switch selectedIndex {
        case MasterTabViewItemIndex.Browser.rawValue:
            // Show element browser view.
            BrowserTabItemViewController.sharedInstance.showView()
        case MasterTabViewItemIndex.Outline.rawValue:
            // Show element outline view.
            OutlineTabItemViewController.sharedInstance.showView()
        case MasterTabViewItemIndex.List.rawValue:
            // Show element table view.
            ListTabItemViewController.sharedInstance.showView()
        default:
            preconditionFailure("Unexpectedly entered default case in switch statement")
        }
    }

    // TODO: Consider replacing the case statement calls with a protocol?
    // TODO: Write an action method for the segmented control to call this when user chooses different master tab item? ...
    // ... as it is, this is called only when a new target is chosen
    func clearView() {
        // Clear the selected tab view item in the master tab view to display its current empty contents. Called in the
            MainContentViewController ClearView() method when the user chooses No Target, SystemWide Target or an application
            target.
        let selectedIndex = masterTabViewController.selectedTabViewItemIndex
        switch selectedIndex {
        case MasterTabViewItemIndex.Browser.rawValue:
            // Clear element browser view.
            BrowserTabItemViewController.sharedInstance.clearView()
        case MasterTabViewItemIndex.Outline.rawValue:
            // Clear element outline view.
            OutlineTabItemViewController.sharedInstance.clearView()
        case MasterTabViewItemIndex.List.rawValue:
            // Clear element table view.
            ListTabItemViewController.sharedInstance.clearView()
```

```
The Follow Focus checkbox's action method is not yet written.
The Highlight checkbox's action method is not yet written.
UNHIGLIGHT
The Highlight checkbox's action method is not yet written.
HIGHLIGHT
```

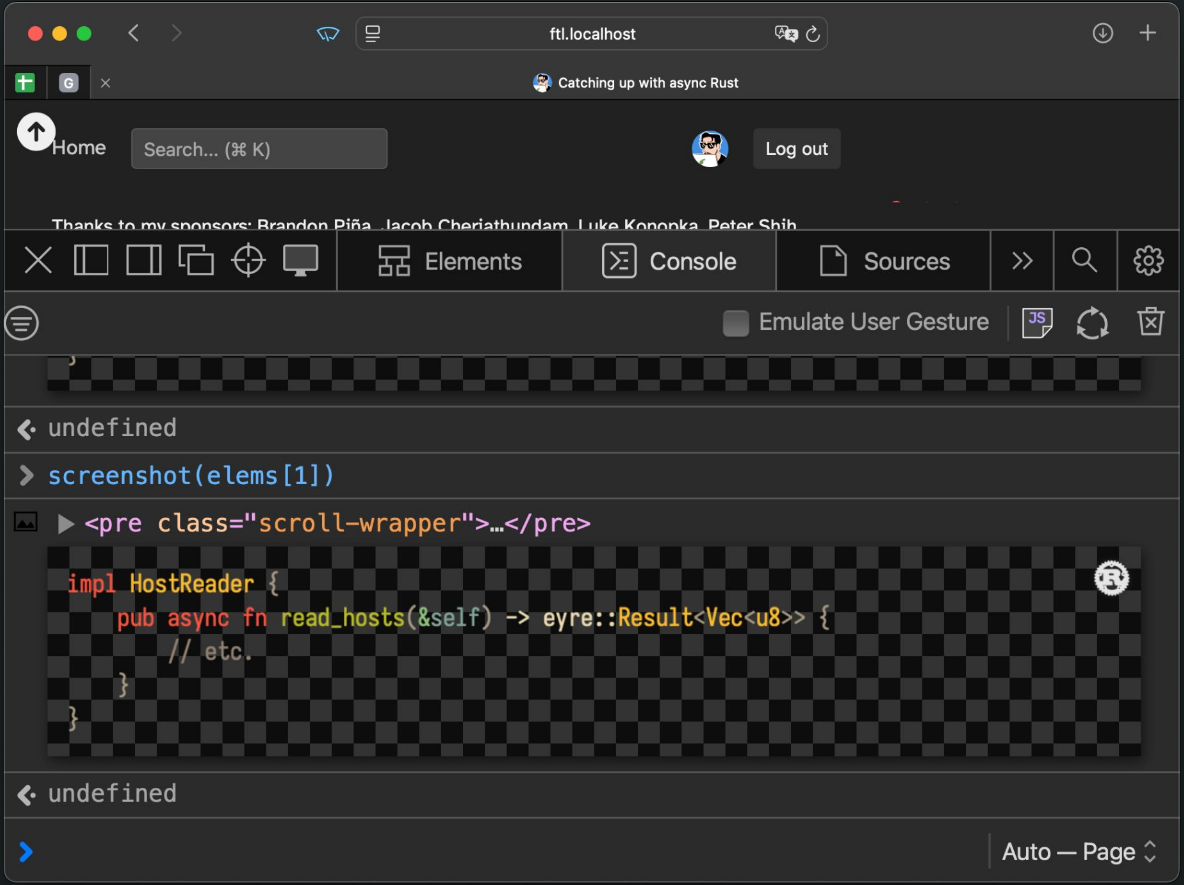


AXApplication "Safari" › AXStandardWindow "The promise of Rust" › AXSplitGroup 0 › AXTabGroup 1 › AXGroup 0 › AXGroup 0 › AXScrollArea "" › AXWebArea "" › AXTabPanel "Console" › AXApplicationLog "" › AXGroup ""

Role	Subrole	Index	Title	Type	Help
AXImage	–	276	""	image	
› AXGroup	–	277	""	group	
› AXGroup	–	278	""	group	
› AXGroup	–	279	""	group	
› AXGroup	–	280	""	group	
› AXGroup	–	281	""	group	
› AXGroup	–	11	""	group	
› AXGroup	–	12	""	group	
› AXGroup	–	13	""	group	
› AXGroup	–	14	""	group	Execution context for $0
› AXGroup	–	1	–	group	–
› AXToolbar	–	1	–	toolbar	–

Attribute	Type	Value	S...

Safari devtools "secrets"

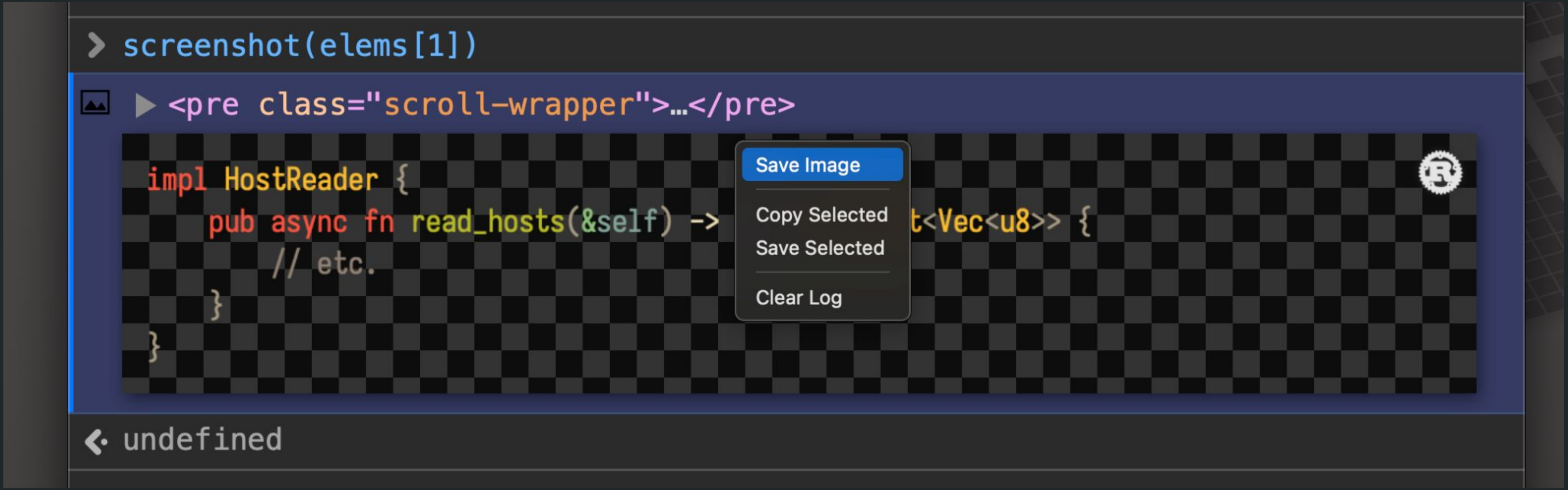


Thanks to my sponsors: Brandon Piña, Jacob Cheriathundam, Luke Kononka, Peter Shih

```
< undefined
> screenshot(elems[1])
▶ <pre class="scroll-wrapper">…</pre>
```

```rust
impl HostReader {
    pub async fn read_hosts(&self) -> eyre::Result<Vec<u8>> {
        // etc.
    }
}
```

```
< undefined
>
```



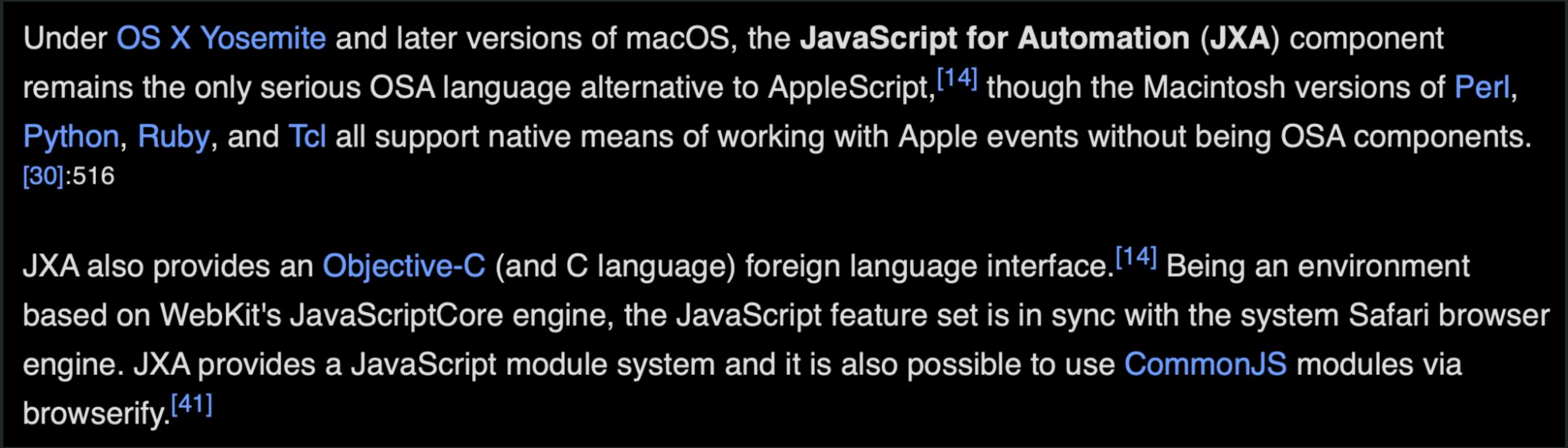
```
> screenshot(elems[1])
▶ <pre class="scroll-wrapper">…</pre>
```

```
impl HostReader {
    pub async fn read_hosts(&self) -> t<Vec<u8>> {
        // etc.
    }
}
```

```
← undefined
```

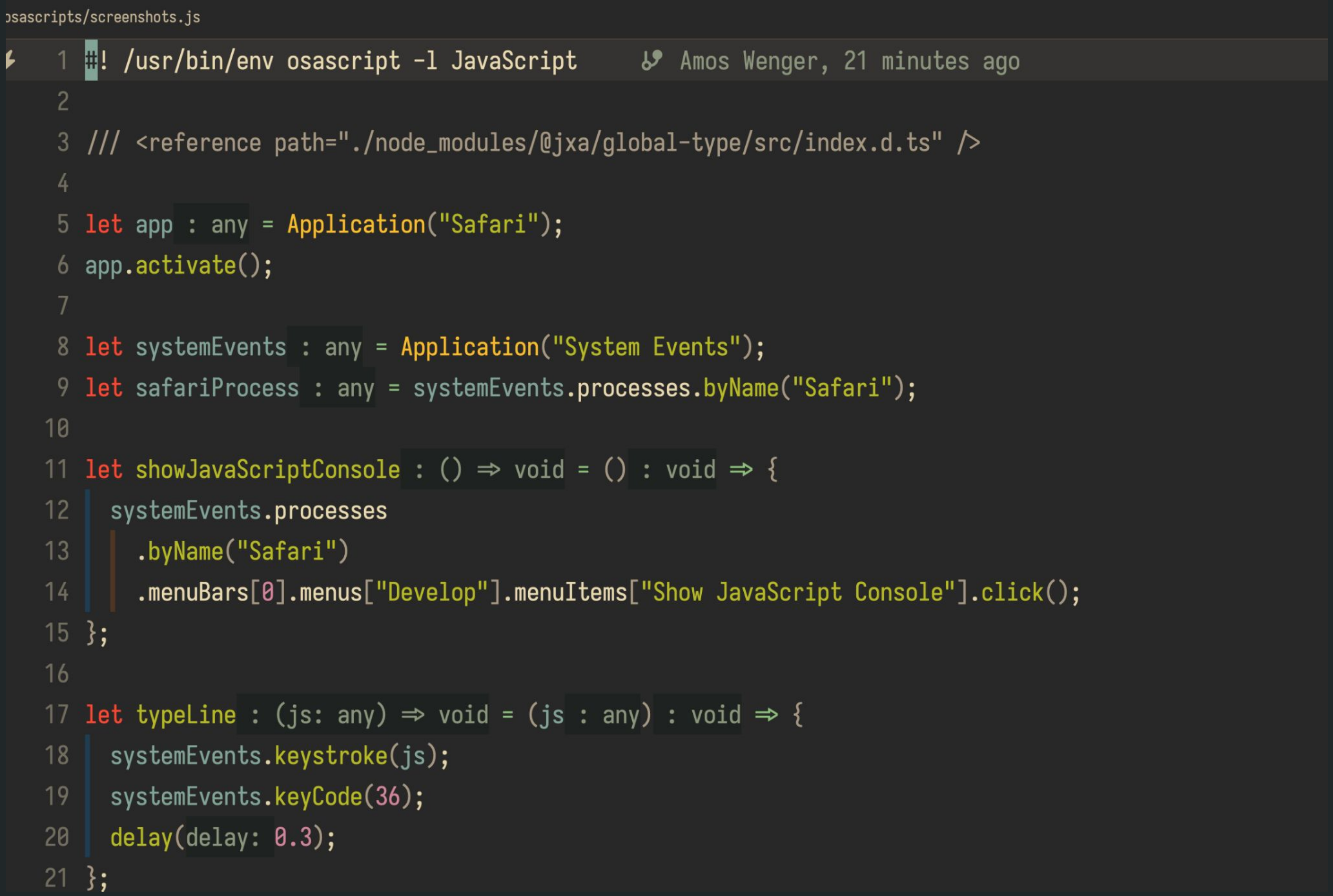
```
-- Perform a for loop
repeat with i from 1 to loopCount
    set userCmd to "screenshot(elems[" & i & "])"
    keystroke userCmd
    key code 36

    set lastLogItem to (last UI element of logElement whose role description is "group")
    set lastImage to (last UI element of lastLogItem whose role description is "image")
    perform action "AXShowMenu" of lastImage

    delay 0.3
    key code 125 -- down arrow (highlights 'Save image')
    key code 36 -- enter
    delay 1.5

    -- now enter the file name
    set imageNumber to 10000 + i
    set imageName to "image-" & imageNumber & ".png"
    keystroke imageName
    key code 36

    click menu item "Show JavaScript Console" of menu "Develop" of menu bar 1
end repeat
```

but wait, JXA!



Under OS X Yosemite and later versions of macOS, the **JavaScript for Automation** (**JXA**) component remains the only serious OSA language alternative to AppleScript,[14] though the Macintosh versions of Perl, Python, Ruby, and Tcl all support native means of working with Apple events without being OSA components.[30]:516

JXA also provides an Objective-C (and C language) foreign language interface.[14] Being an environment based on WebKit's JavaScriptCore engine, the JavaScript feature set is in sync with the system Safari browser engine. JXA provides a JavaScript module system and it is also possible to use CommonJS modules via browserify.[41]



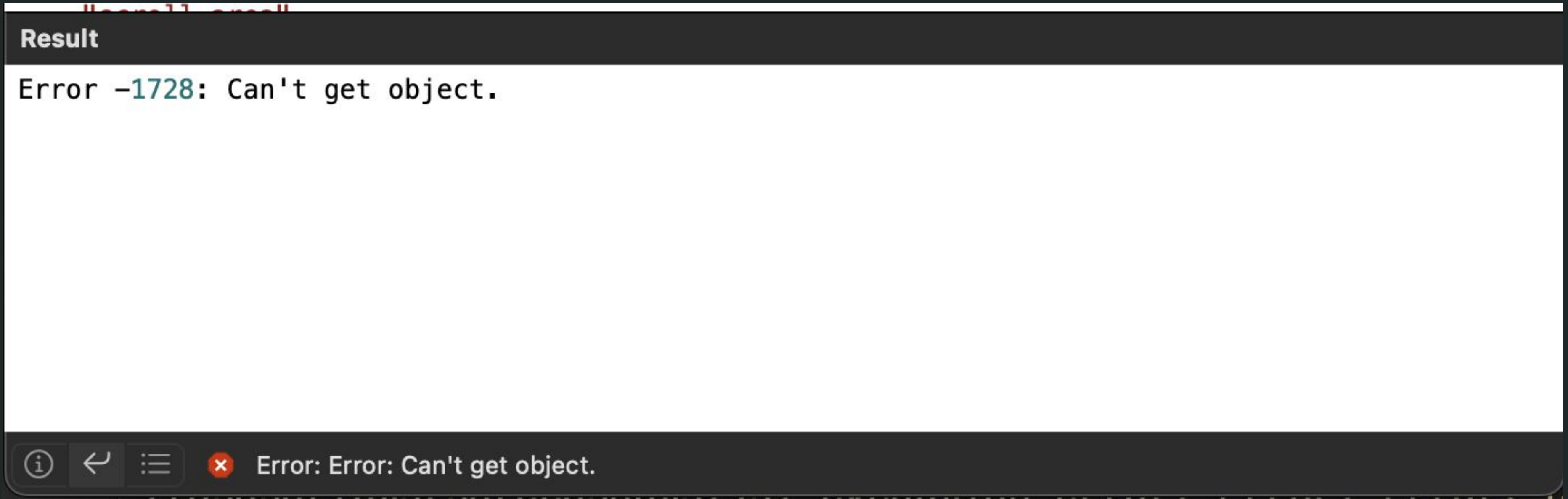
osascripts/screenshots.js

```
#! /usr/bin/env osascript -l JavaScript     Amos Wenger, 21 minutes ago

/// <reference path="./node_modules/@jxa/global-type/src/index.d.ts" />

let app : any = Application("Safari");
app.activate();

let systemEvents : any = Application("System Events");
let safariProcess : any = systemEvents.processes.byName("Safari");

let showJavaScriptConsole : () => void = () : void => {
  systemEvents.processes
    .byName("Safari")
    .menuBars[0].menus["Develop"].menuItems["Show JavaScript Console"].click();
};

let typeLine : (js: any) => void = (js : any) : void => {
  systemEvents.keystroke(js);
  systemEvents.keyCode(36);
  delay(delay: 0.3);
};
```

pros: familiar language

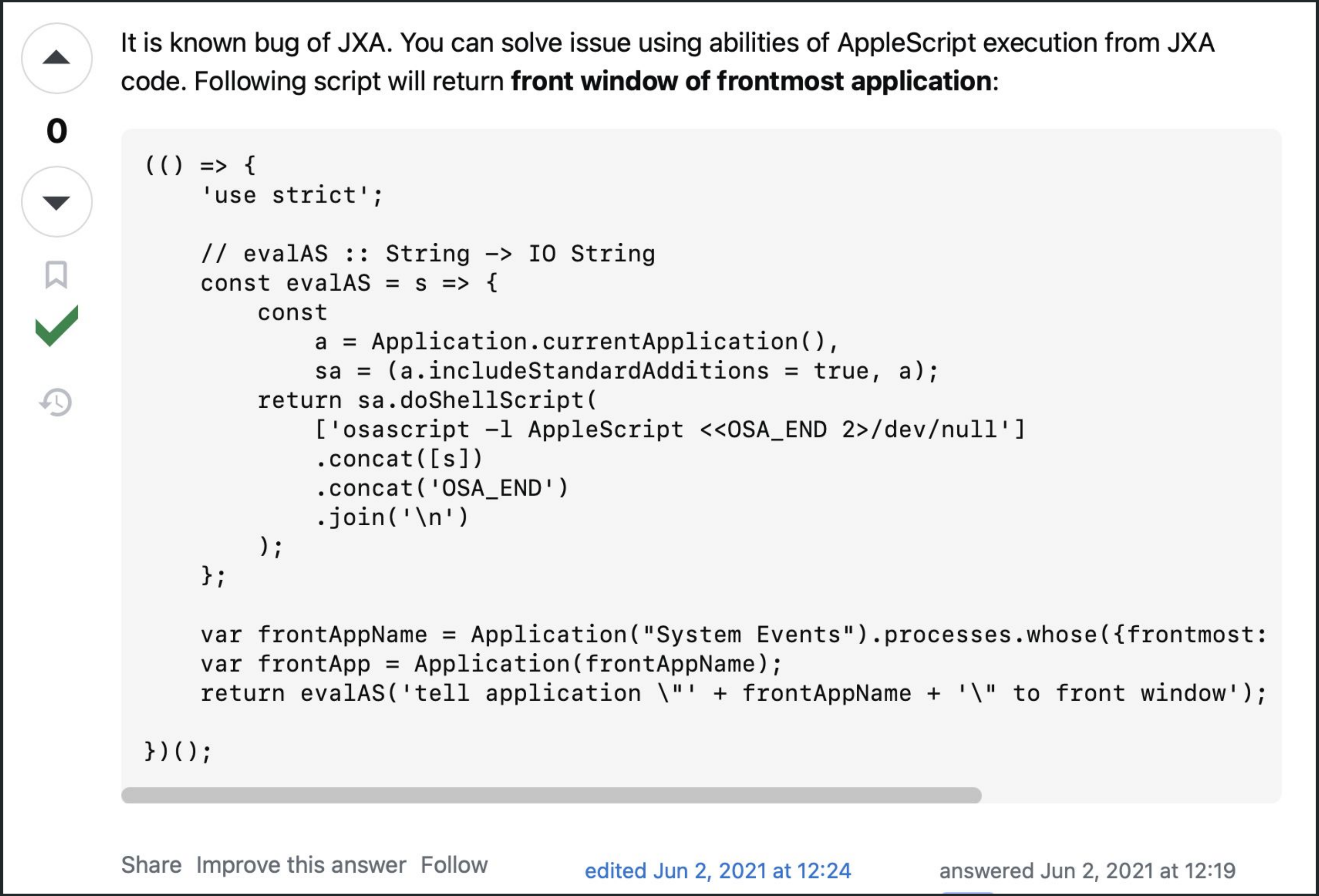
cons: bye dev tools

```
Window
Menu 9 is being inspected
Help
./osascripts/screenshots.js: execution error: Error: Error: Can't get object. (-1728)
```



```
Error -1728: Can't get object.
```

Error: Error: Can't get object.

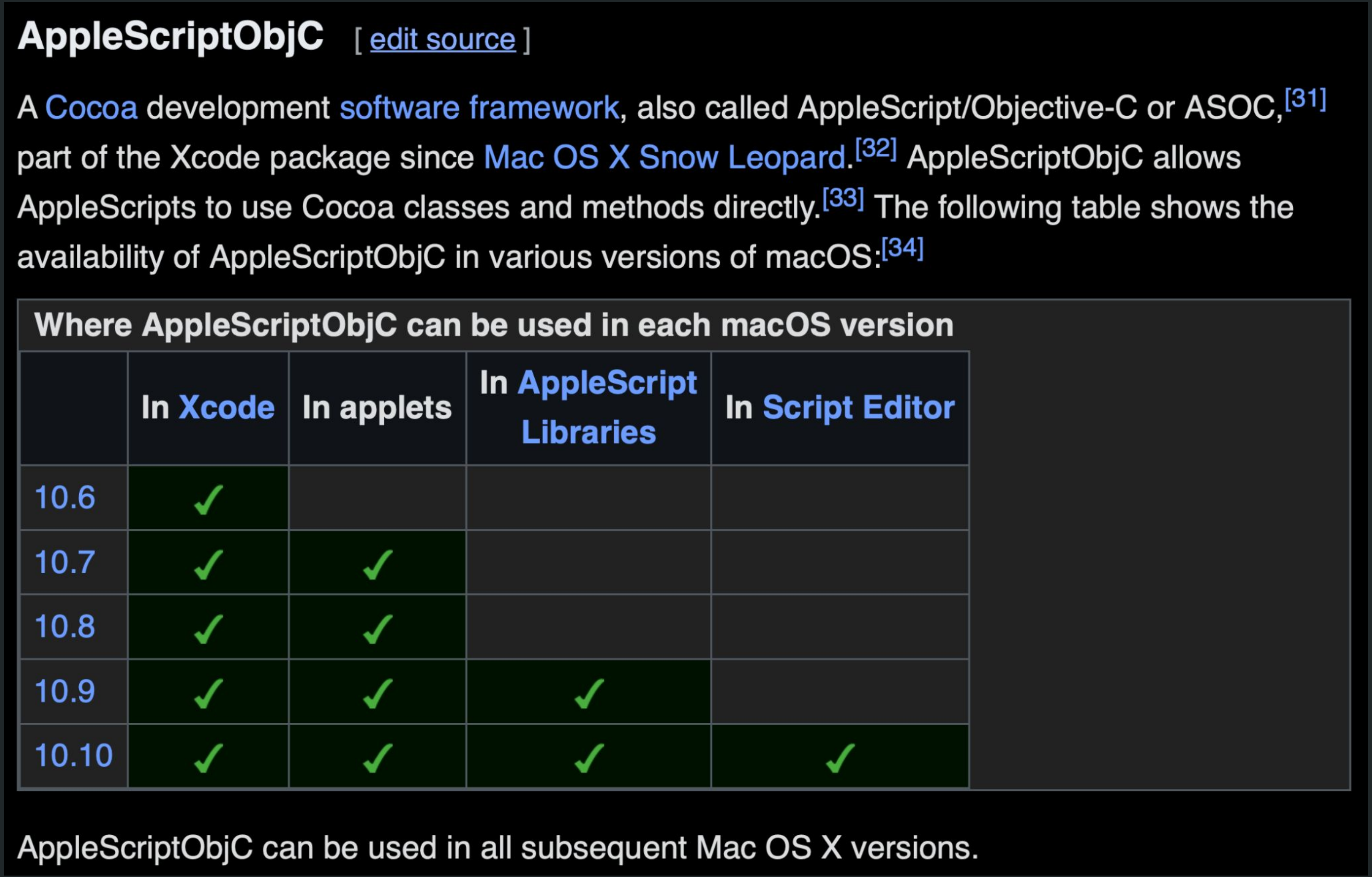


It is known bug of JXA. You can solve issue using abilities of AppleScript execution from JXA code. Following script will return **front window of frontmost application**:

```
(() => {
    'use strict';

    // evalAS :: String -> IO String
    const evalAS = s => {
        const
            a = Application.currentApplication(),
            sa = (a.includeStandardAdditions = true, a);
        return sa.doShellScript(
            ['osascript -l AppleScript <<OSA_END 2>/dev/null']
            .concat([s])
            .concat('OSA_END')
            .join('\n')
        );
    };

    var frontAppName = Application("System Events").processes.whose({frontmost:
    var frontApp = Application(frontAppName);
    return evalAS('tell application \"' + frontAppName + '\" to front window');

})();
```

edited Jun 2, 2021 at 12:24

answered Jun 2, 2021 at 12:19



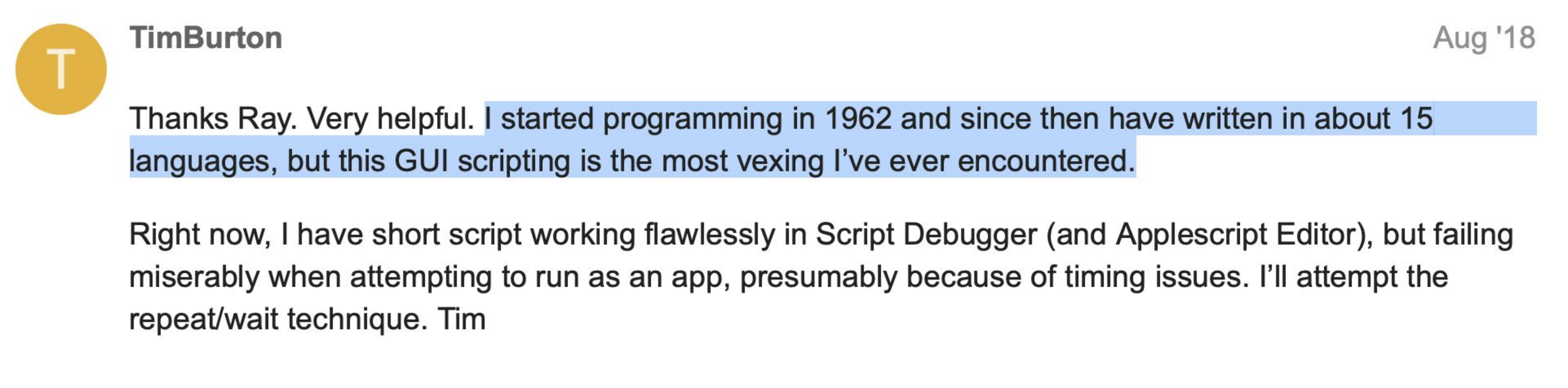
AppleScriptObjC [edit source]

A Cocoa development software framework, also called AppleScript/Objective-C or ASOC,[31] part of the Xcode package since Mac OS X Snow Leopard.[32] AppleScriptObjC allows AppleScripts to use Cocoa classes and methods directly.[33] The following table shows the availability of AppleScriptObjC in various versions of macOS:[34]

Where AppleScriptObjC can be used in each macOS version

	In Xcode	In applets	In AppleScript Libraries	In Script Editor
10.6	✓			
10.7	✓	✓		
10.8	✓	✓		
10.9	✓	✓	✓	
10.10	✓	✓	✓	✓

AppleScriptObjC can be used in all subsequent Mac OS X versions.



T

TimBurton Aug '18

Thanks Ray. Very helpful. I started programming in 1962 and since then have written in about 15 languages, but this GUI scripting is the most vexing I've ever encountered.

Right now, I have short script working flawlessly in Script Debugger (and Applescript Editor), but failing miserably when attempting to run as an app, presumably because of timing issues. I'll attempt the repeat/wait technique. Tim

I got it working

[link to gist]