

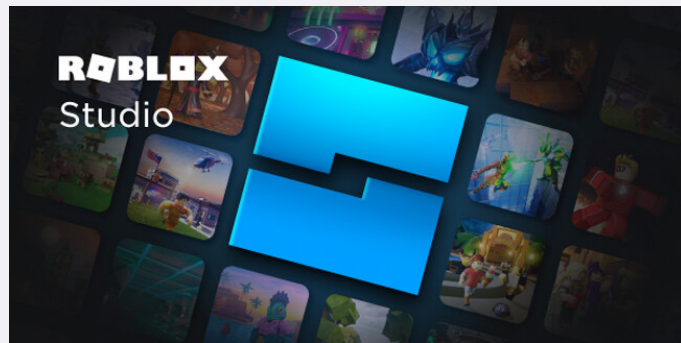
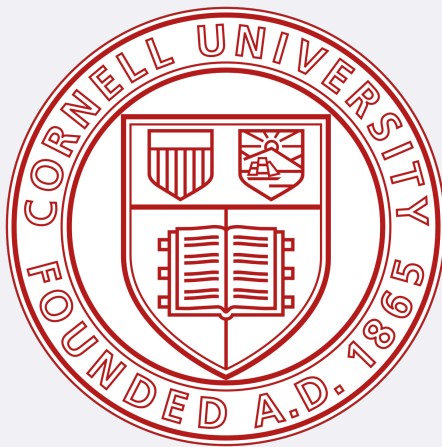


Studio's External Login Flow

Shubham Goda

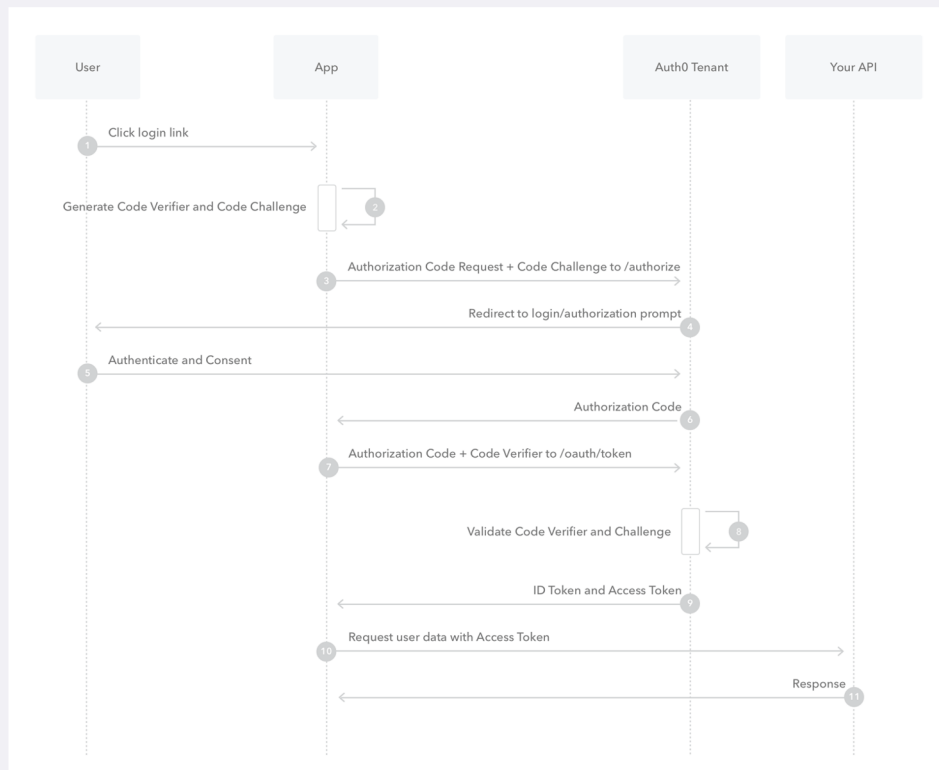
About Me

- Senior at Cornell University
- Majoring in Computer Science
- Interned at Roblox this summer in the Studio Platform Team
- Built an external login system for the Roblox Studio application



My Project

- Studio external login flow
- Provides browser-based login flow when the internal login fails
- Utilizes PKCE-based OAuth 2.0 protocol
- Proof Key for Code Exchange
- Facilitates login process for ~5% of users
- Done in C++
- Individual project

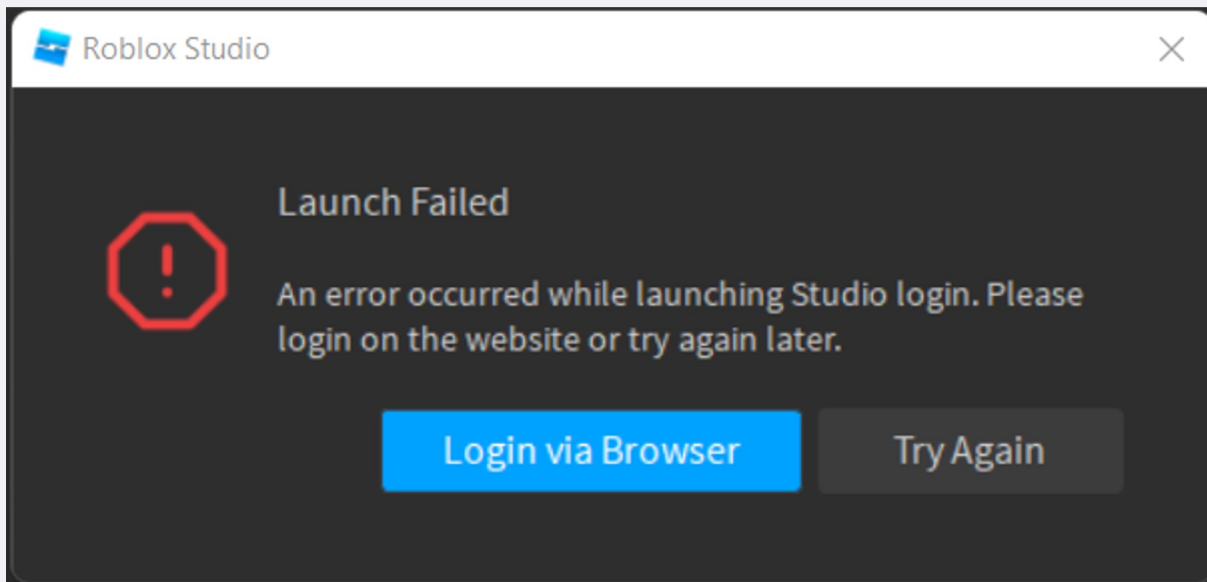


<https://auth0.com/docs/get-started/authentication-and-authorization-flow/authorization-code-flow-with-proof-key-for-code-exchange-pkce>

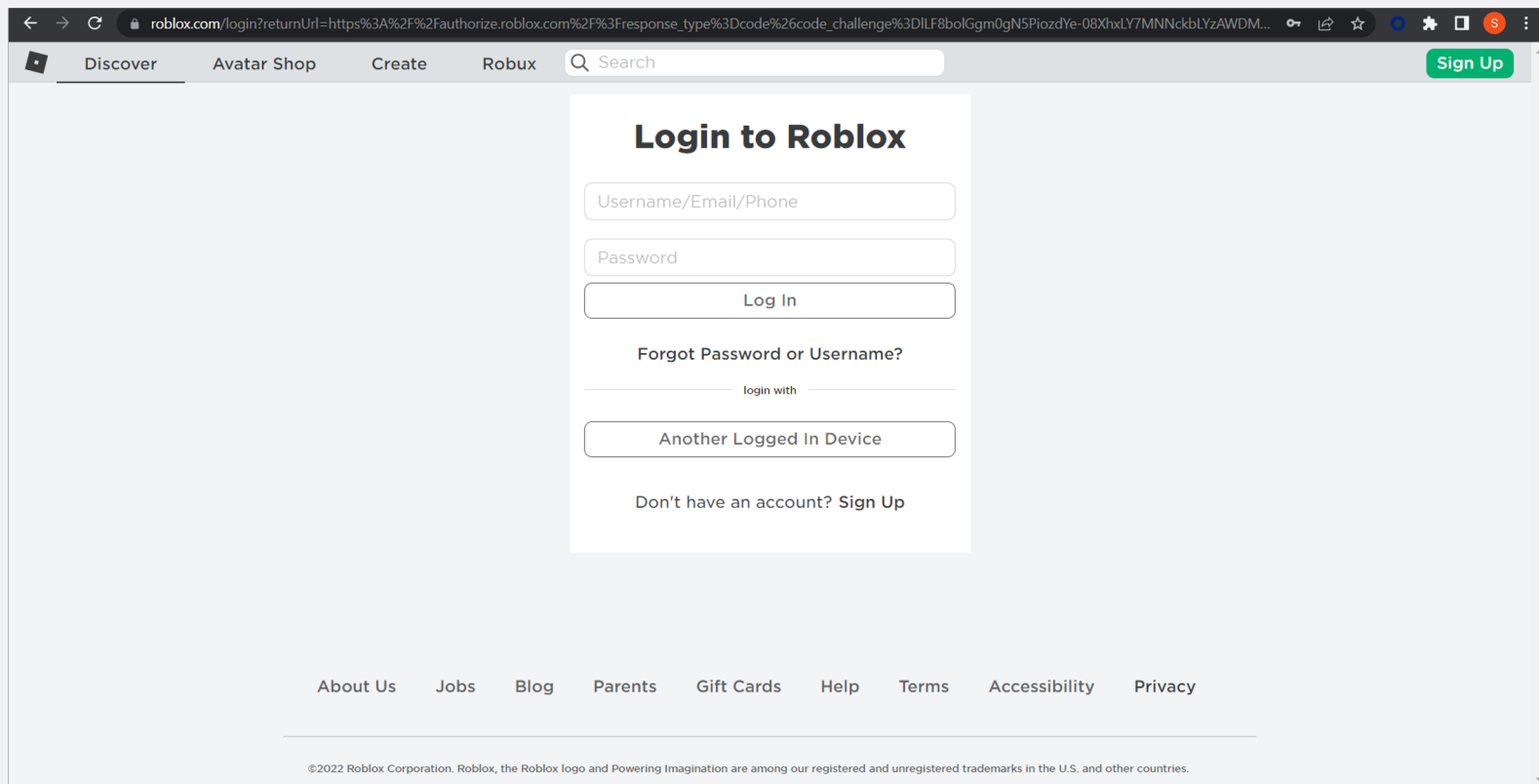
What Users See

Error Dialog

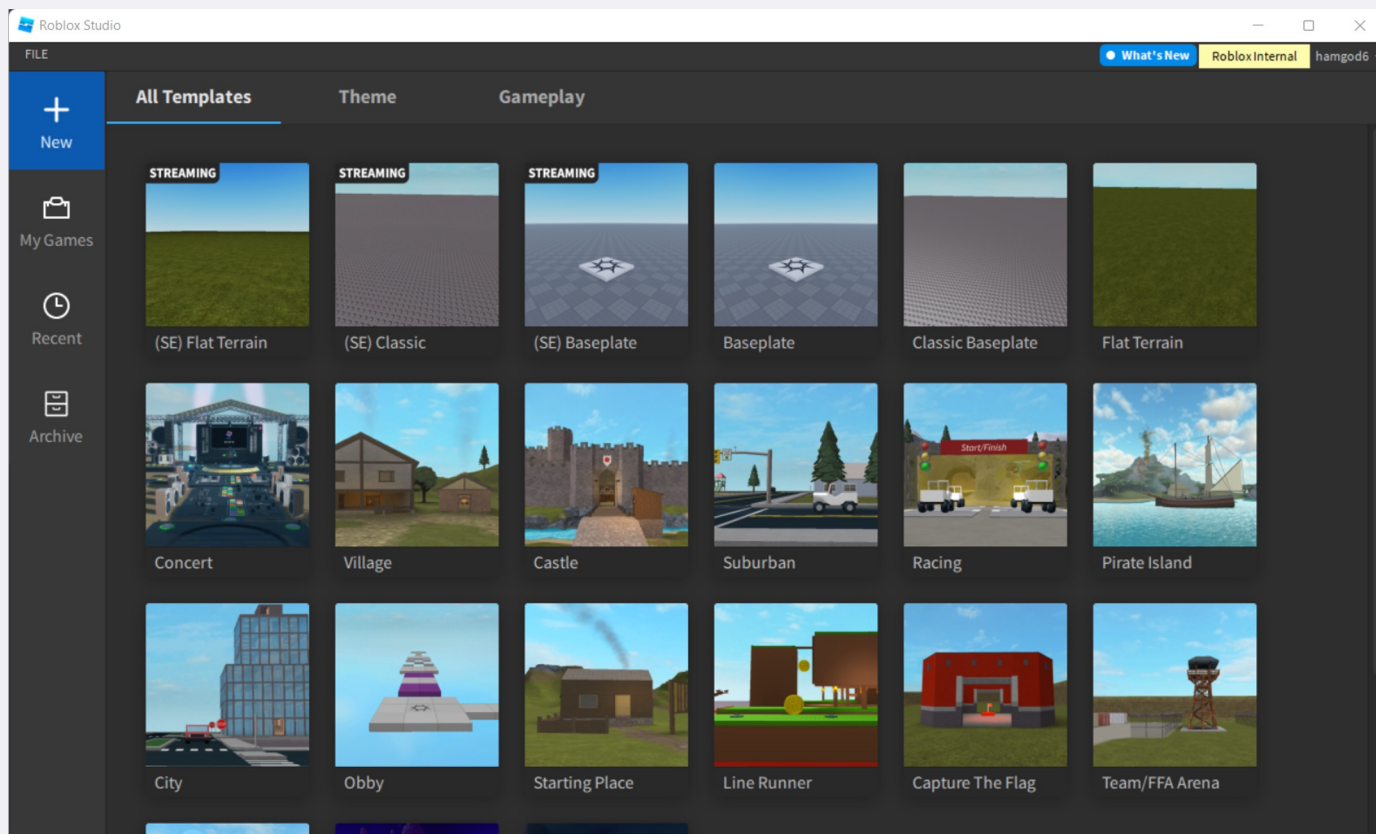
When the internal Webview-based login fails three times:

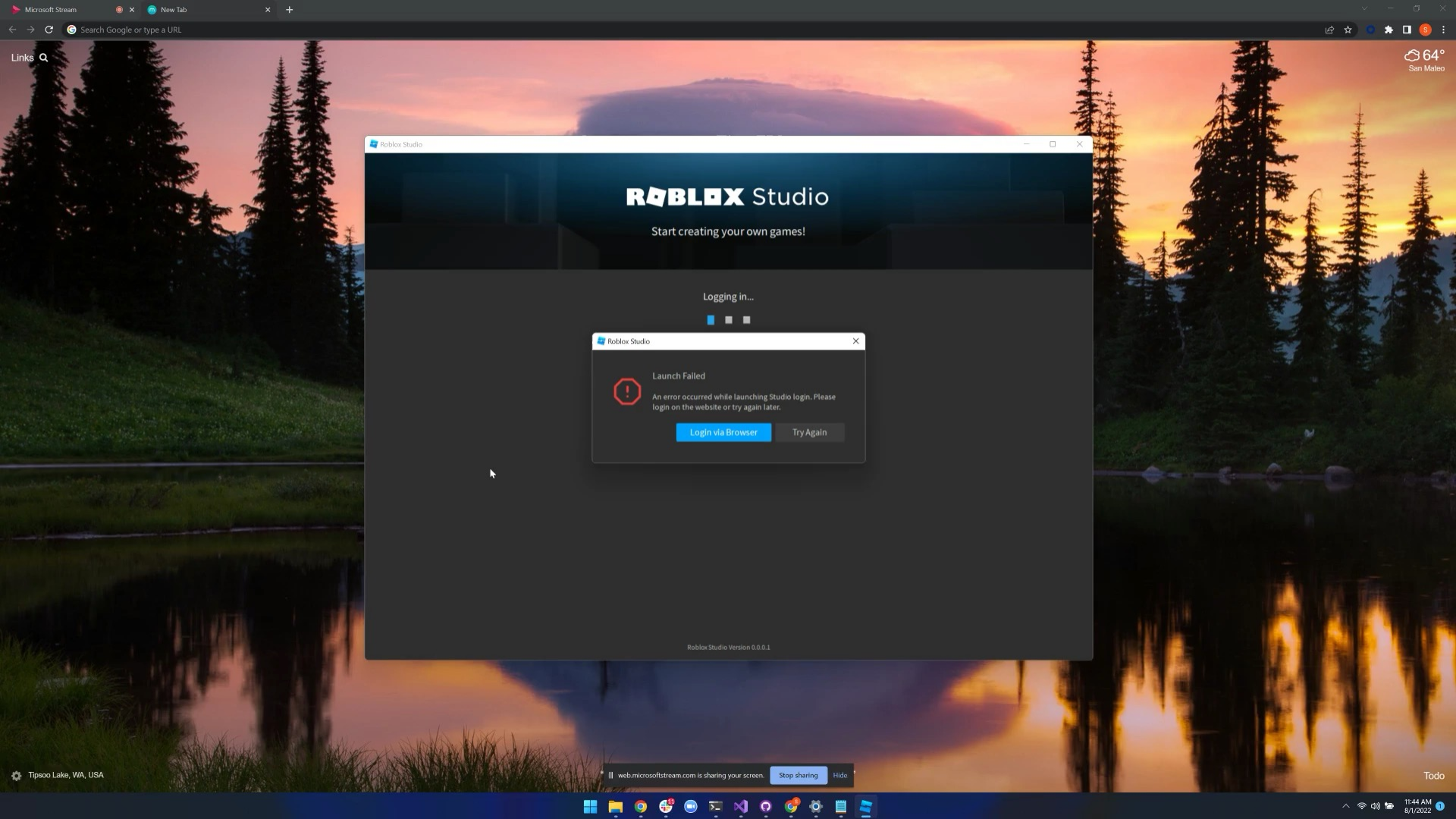


Login Page

A screenshot of the Roblox login page in a web browser. The browser's address bar shows a URL with a return URL. The page has a navigation bar with links to Discover, Avatar Shop, Create, and Robux, along with a search bar and a green Sign Up button. The main content area features a white login box with the title 'Login to Roblox'. Inside the box, there are input fields for 'Username/Email/Phone' and 'Password', a 'Log In' button, a link for 'Forgot Password or Username?', a 'login with' separator, a button for 'Another Logged In Device', and a link for 'Don't have an account? Sign Up'. The footer contains links to About Us, Jobs, Blog, Parents, Gift Cards, Help, Terms, Accessibility, and Privacy, followed by a copyright notice for 2022 Roblox Corporation.

Done!





ROBLOX Studio

Start creating your own games!

Logging in...

Launch Failed

An error occurred while launching Studio login. Please login on the website or try again later.

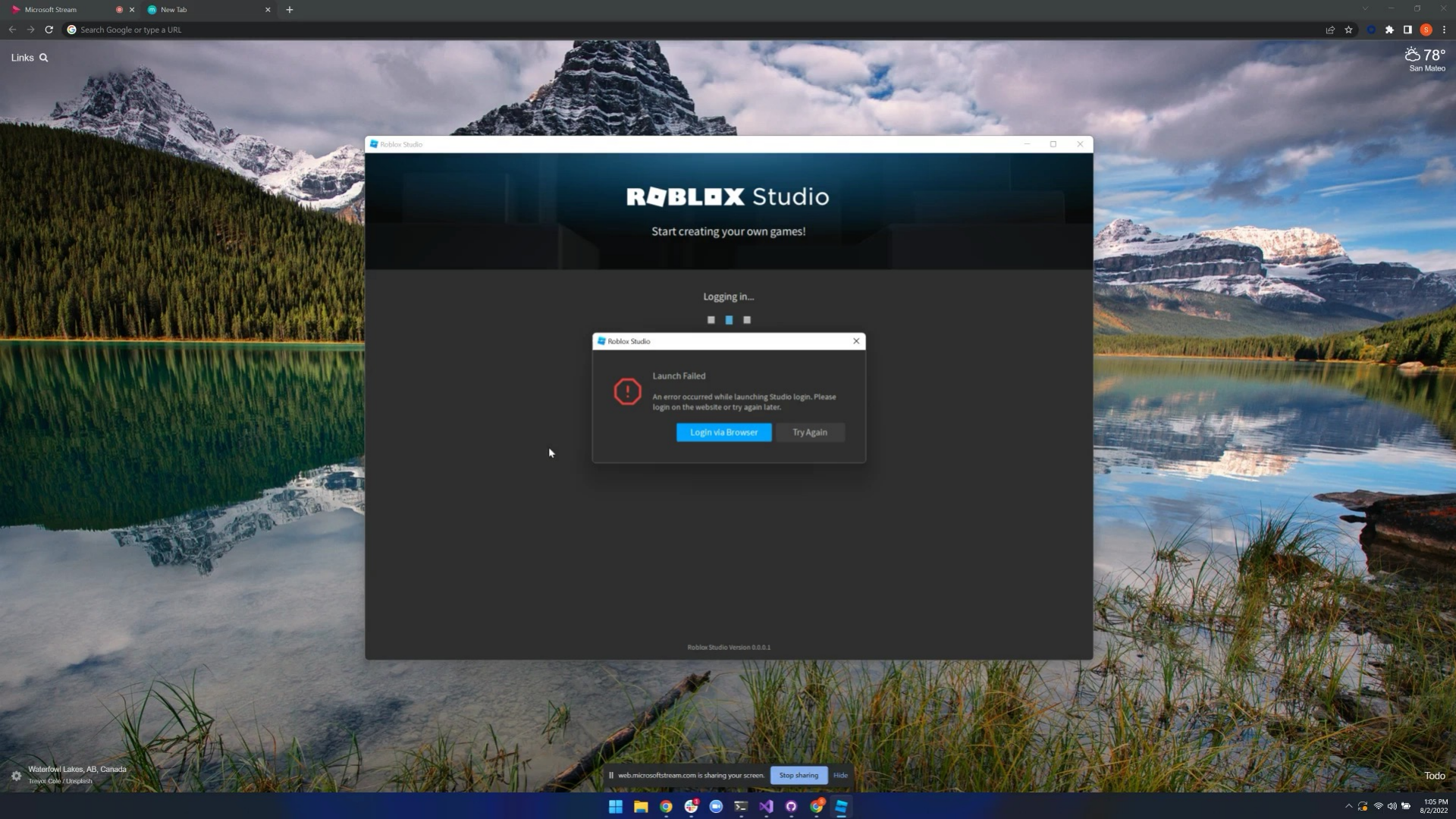
Login via Browser Try Again

Roblox Studio Version 0.0.0.1

web.microsoftstream.com is sharing your screen. Stop sharing Hide

Todo

64°
San Mateo



Roblox Studio

ROBLOX Studio

Start creating your own games!

Logging in...

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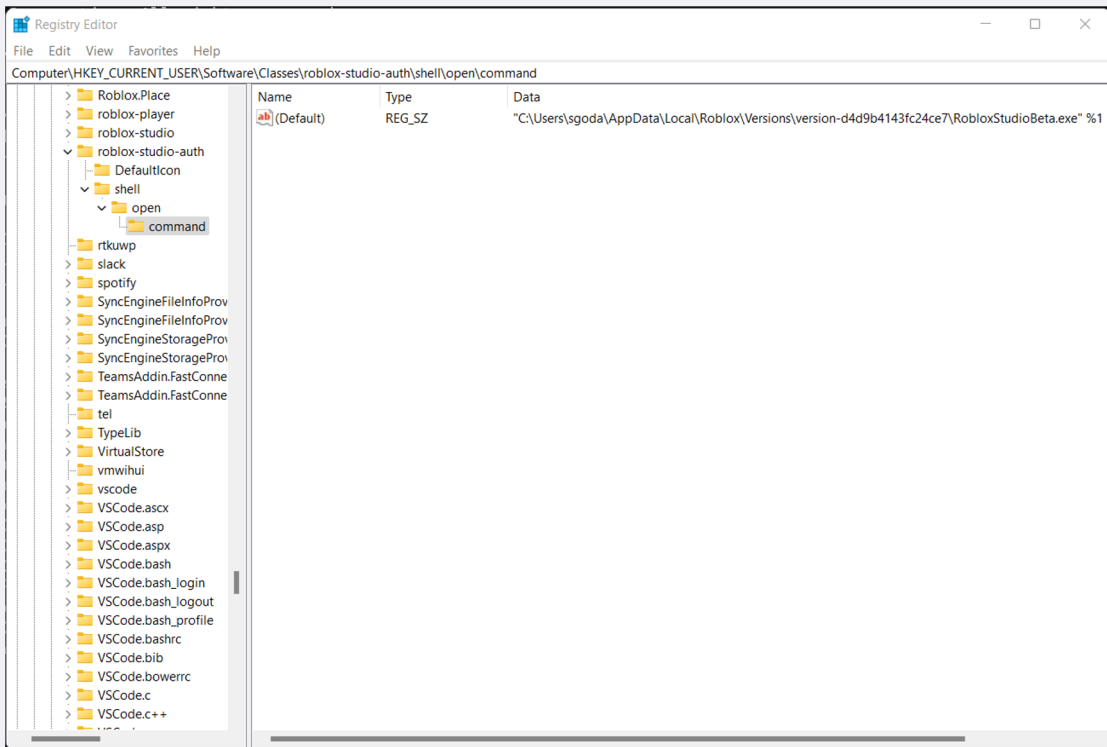
Login via BrowserTry Again

Roblox Studio Version 0.0.0.1

What I Built

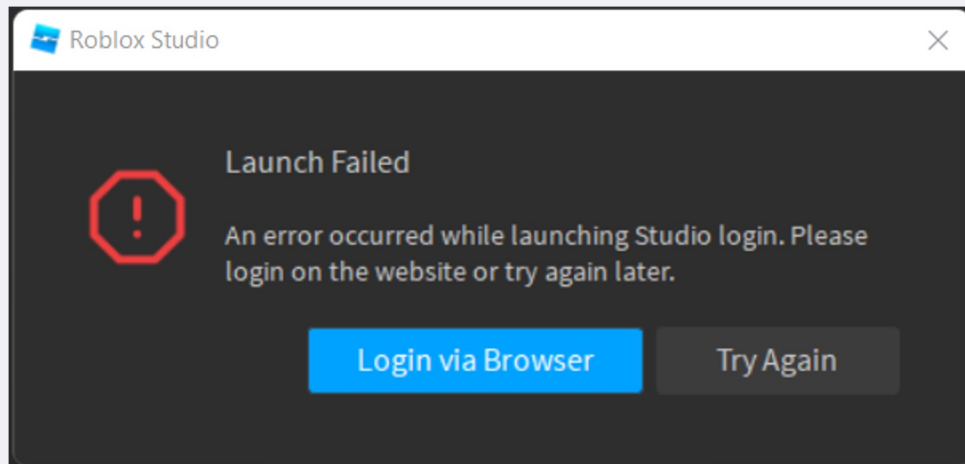
Protocol Handler

- roblox-studio-auth
- Registers and unregisters in Bootstrapper
- Directly opens Studio
- Uses modern Win32 API
- Mac implementation uses Objective-C to edit plist file



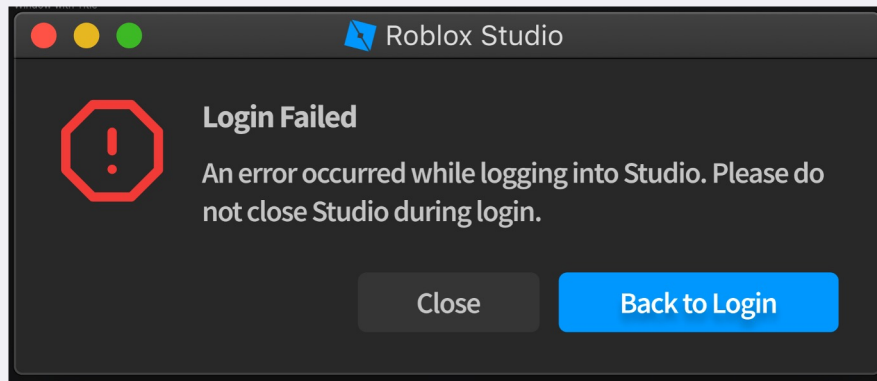
Launch External Flow

- Registers notification service to receive data
- Encodes PID of Studio into state parameter of URL
- Points redirect URI to new protocol scheme



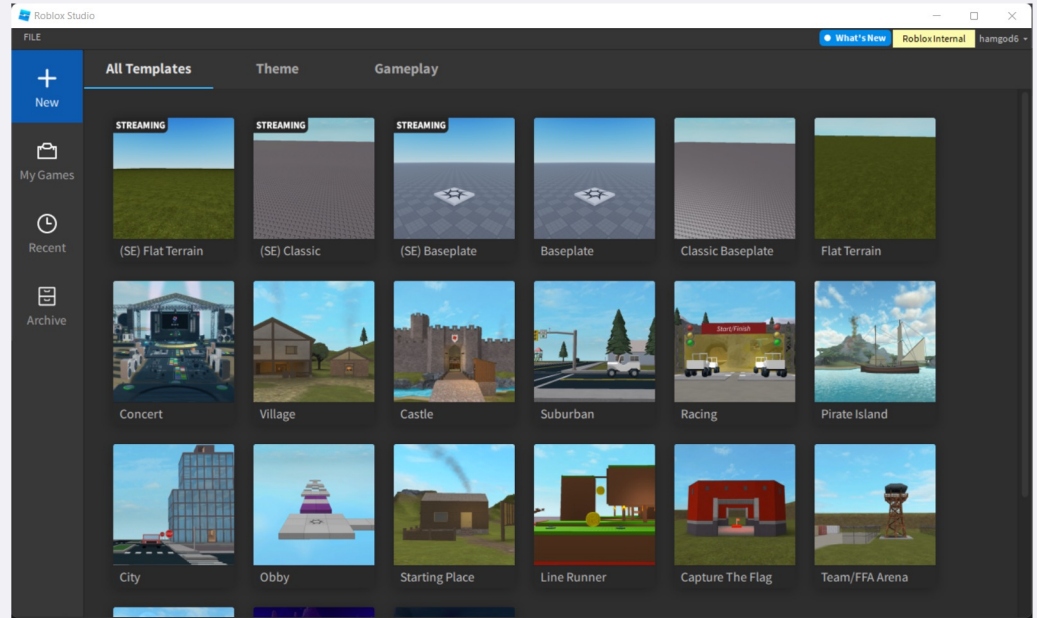
New Instance Launched

- Receives and parses data: state and authorization code
- Obtains PID from state
- Uses PID to find original Studio
- Sends state and auth code using notification service
- Error dialog if original instance is not found, can try login in new instance
- New instance closes

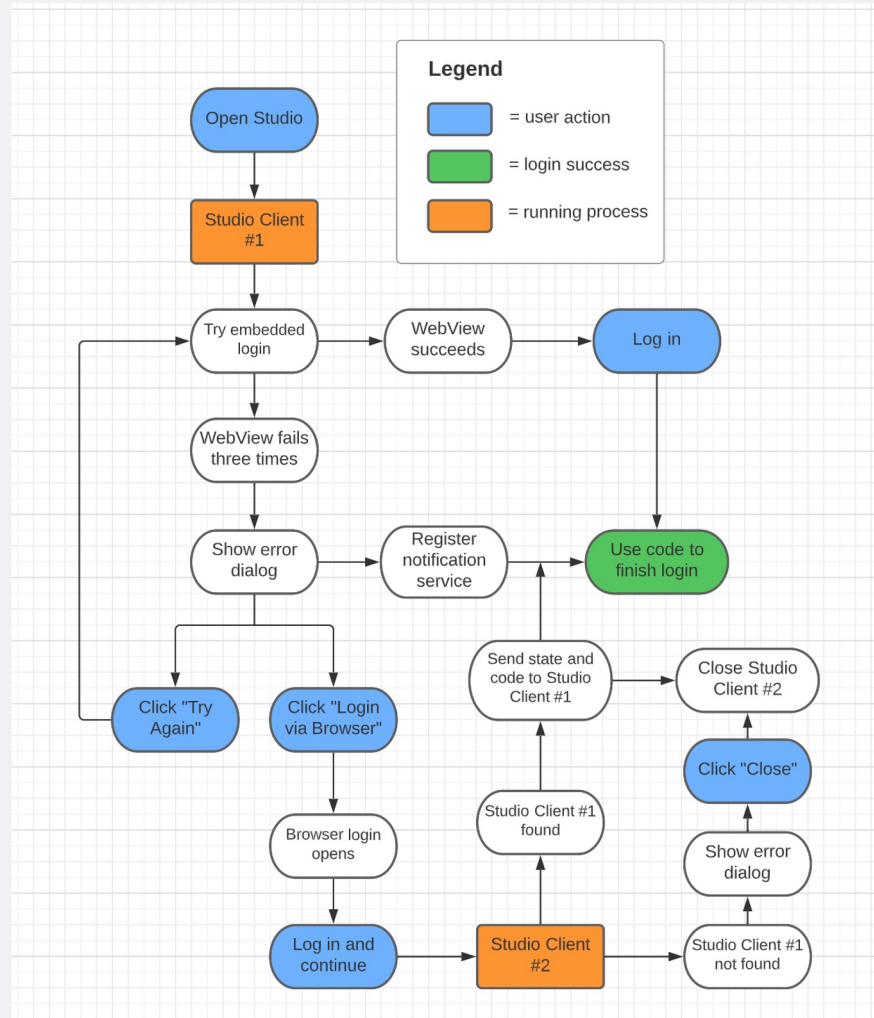


Back to Original Instance

- Receives data through notification service event
- Validates state and closes dialog box
- Uses authorization code to attempt log in
- Brings Studio to front or flashes its icon to inform user of successful login



Flowchart



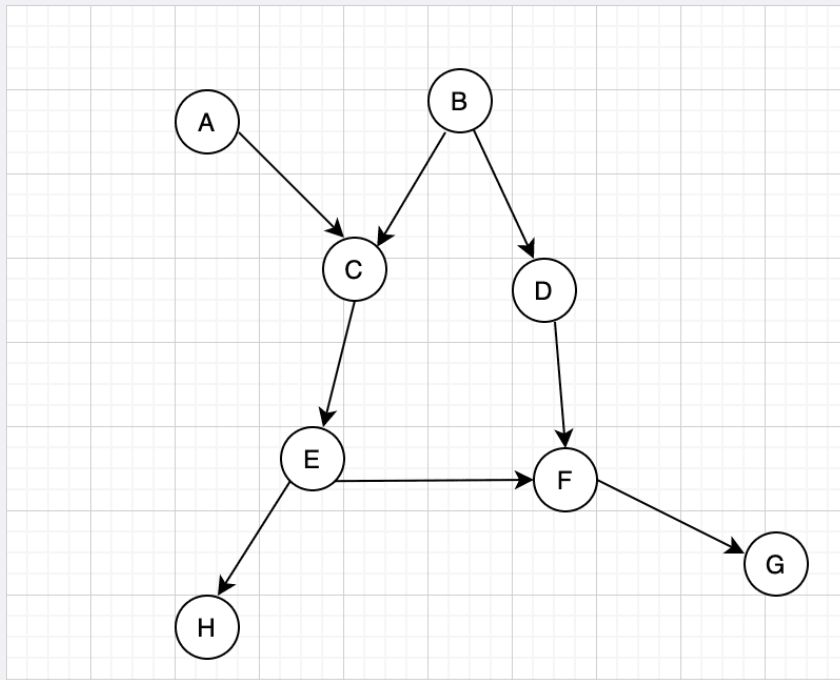
Testing

- Tested isolated pieces including protocol scheme, encoding/decoding, etc.
- Difficult to test entire system
- Tested through use
- Alternatives?



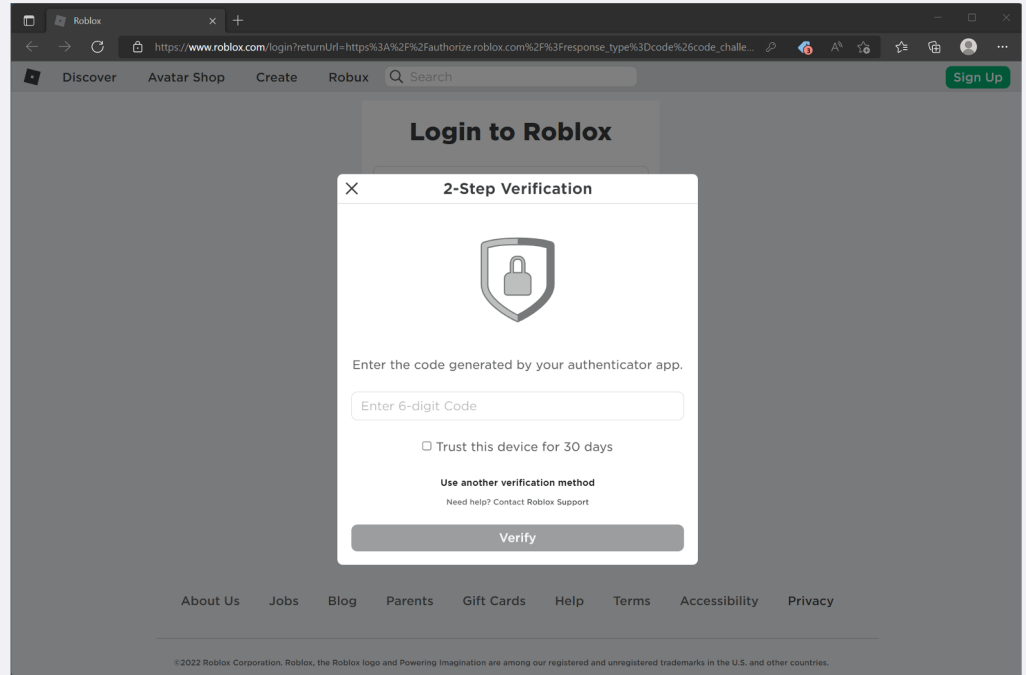
Challenges

- Authorization code too long, OS-imposed, used compression
- Took multiple tries from web for login to complete, identified issue in pre-existing notification service
- Learned about software interdependence



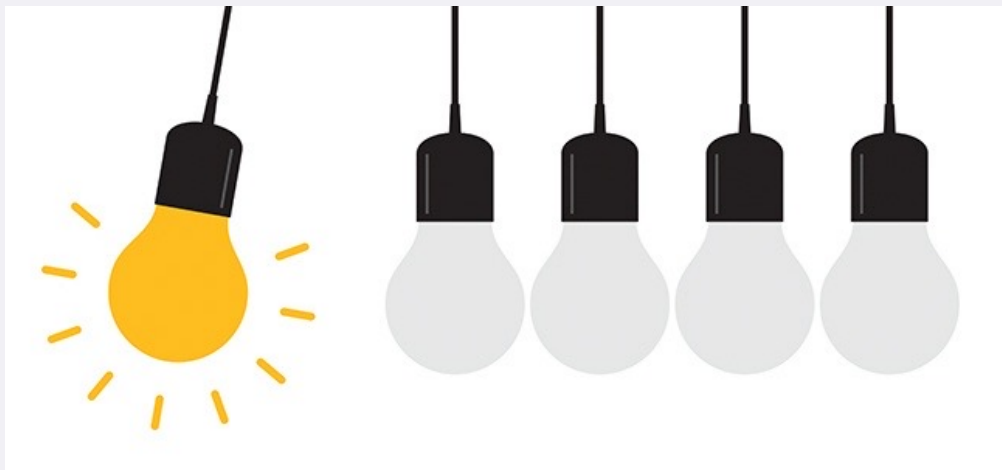
Impact

- Improved security through PKCE and including two factor and captcha
- Improved user experience compared to old external flow
- Ensures that all users can easily login to Studio
- Part of the Studio Unified Login initiative
- In production!



Learnings

- How to work on software that interacts with lots of moving parts
- Check other features even if not in my scope
- Build more robust testing plan



Thank you!

Questions?