Stateful Workload Orchestration with Selkies

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SCaLE 19x
What 4 Years at B Taught Me
Final Exams are Hard
Why is it so hard to just “start programming”

Why is hell full of Java dependencies?

Why is left-pad broken?

Why won’t this build on my Macbook?
What 8 Years at JPL Taught Me
Operations is Hard
Processes and Bureaucracy Impedes Productivity

...and eats your soul
Company Hardware
Anti-Virus Software
VPNs
Work from Home
Productivity Nightmare
What 4 Years at Google Taught Me
The Free Food is Great
Welcome to the Future

Enjoy our Alien Technology
Developer Experience

No Code On Laptops

No VPNs

Code Reviews that work - Readability, OWNERS files

Fully Integrated Monorepo, Toolchain, and CI/CD

SRE to the Rescue
Works for Google

Because they started that way
THE REST OF US
What I really learned from
Secure

Productivity

From Anywhere
3 Problems to Solve
1. Access
2. Delivery
3. Orchestration
1. Access

Remote is better
Make the Thin Client great again
Developers get better hardware
Creators are more collaborative
Gamers can play from anywhere
1. Access Problems

Identity and Authentication

Networks and Firewalls

Security and Endpoint Isolation
Access Solutions

Identity and Authentication Web SSO

Networks and Firewalls Web Proxies/WebRTC

Security and Endpoint Isolation Pixel Streaming
2. Streaming - Why

Deliver Graphical Applications as-is

Recover where you left off

No Local Dependencies

Endpoint Isolation
2. Streaming Problems

- Latency
- Bandwidth
- Image Quality/Protocols
- Networks and Firewalls
2. Streaming Problems

Browser-Based Challenges

**Latency** - No direct socket connections, no UDP

**Latency** - TCP congestion control

**Image Quality and Bandwidth** - Limited Codecs

**Native Interactions** - Keyboard shortcut keys
2. Streaming Solutions

Browser-Based Challenges

**Latency** — No direct socket connections, no UDP [WebRTC]

**Latency** — TCP congestion control [WebRTC]

**Image Quality and Bandwidth** — Limited Codecs [Web Codecs, Local GPUs]

**Native Interactions** — Keyboard shortcut keys [PWAs]
Welcome to Selkies

Stateful workload orchestration on Kubernetes
Selkies Demo
Good enough for games
::
Good enough for developers
WebRTC
NoVNC is just... No..
WebRTC Architecture

NoVNC / WebSockets

Server

Firewall

TCP WebSocket

Firewall

Client

Client-Server WebRTC

Signaling

Peer (Server)

STUN/TURN

Firewall

TCP WebSocket

UDP/DTLS

TCP/UDP

Peer (Client)
GStreamer Pipeline

X11 Application

ximagesrc → cudaconvert → nvh264enc → webrtcbin

Nvidia GPU

Python App
Kubernetes Sidecars

Pod

Containers

- Streaming application
- X11 server
- GStreamer app

NVIDIA device mount
/dev/nvidia0

NVIDIA driver mount
/usr/local/nvidia
3. Orchestration Problems

Pod Templating

Pod Lifecycle Management

Per-User Routing
Kubernetes Operator

Inputs

- YAML Manifest
- Templates Bundle
- ConfigMap
- BrokerAppConfig
- with Template Values
- CustomResource

Outputs

- StatefulSet
- Service
- VirtualService

Controller
3. Orchestration Solutions

- Pod Templating Operator
- Pod Lifecycle Management Operator
- Per-User Routing Istio
Remote Apps In a Browser

Visual Studio Code
Editing evolved

Start
- New File...
- Open File...
- Open Folder...
- Clone Git Repository...

Recent
- spaces-images ~/project
- images ~/project/totopia-sekiles-platform/components/sekiles-ext...
- proxy ~/project/totopia-sekiles-env-main/environments/gpod-dev...
- code /usr/share/cosmic/color/72x72/stock
- xpra.html5 ~/project
- More...

Walkthroughs
- Get Started with VS Code
  Discover the best customizations to make VS Code yours.
- Learn the Fundamentals
  Jump right into VS Code and get an overview of the must-have features.
- Customize Cloud Code Sidebar
  Customize the visualization of code in VS Code.
- Get started with jupyter Notebooks
  Learn how to use jupyter Notebooks in VS Code.
- Boost your Productivity
  Increase your productivity with VS Code.

More...
Re-Imagined Access

Company Hardware BYOD

Anti-Virus Software

VPNs Web Based SSO

Work from Home Anywhere

Productivity Nightmare Dream
Bringing Containers to DevX

Consistent Development Environments

Pre-Installed Dependencies and Tools

DevOps Your Environments As Code
A secure, serverless platform where developers code from anywhere in powerful containerized spaces, and enterprises increase security and productivity.
Meet Developers Where They Are

Server-Side Integration of Tools Creates Opinions and Consistent Workflows

**DevX Stack**

- Access Layer
- Environment Layer
- Tools Layer
- Systems Integration Layer

**Existing Tools**

- Modern Web Browsers
  - IDEs, compilers, frameworks, libraries, and personalization
  - SCM, Code Reviews, Readability, Unit Testing, CI/CD
  - Browser and IDE Extensions, commit-hooks

**Benefits**

- Portability, DLP, SSO
- IDE flexibility, consistent environments
- Increase reliability, supply chain integrity
- Google-like Developer Experience
Works on My Everyone’s Machine
Thank You

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