

# Stateful Workload Orchestration with Selkies

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SCaLE 19x

What 4 Years at  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**

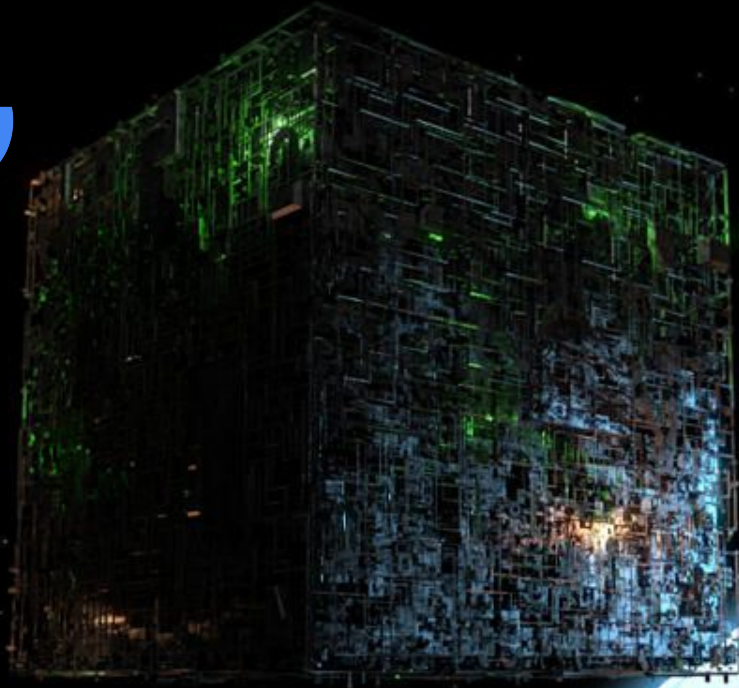
**Productivity Nightmare**

What 4 Years at  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**



Code - OSS

<https://github.com/cdr/code-server>

# Welcome to Selkies

LAUNCH SHUTDOWN



Jupyter Notebook

Jupyter Notebook

LAUNCH SHUTDOWN

Stateful workload orchestration on Kubernetes



Ubuntu 1910

ubuntu1910-

LAUNCH



Heaven Demo

Heaven 3D benchmark demo b

LAUNCH SHUTDOWN



Car Configurator



Unreal Editor 4

# Selkies Demo

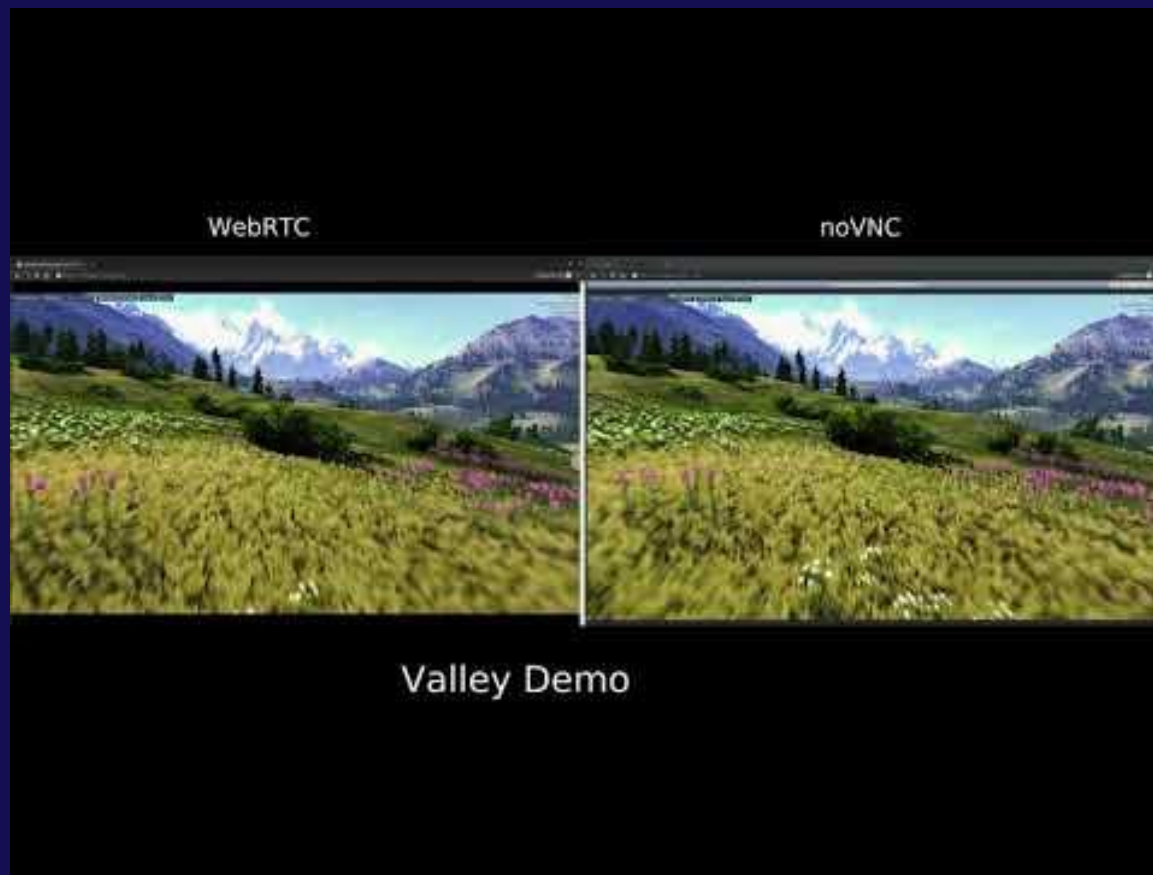
**Good enough for games**

**::**

**Good enough for developers**

**WebRTC**

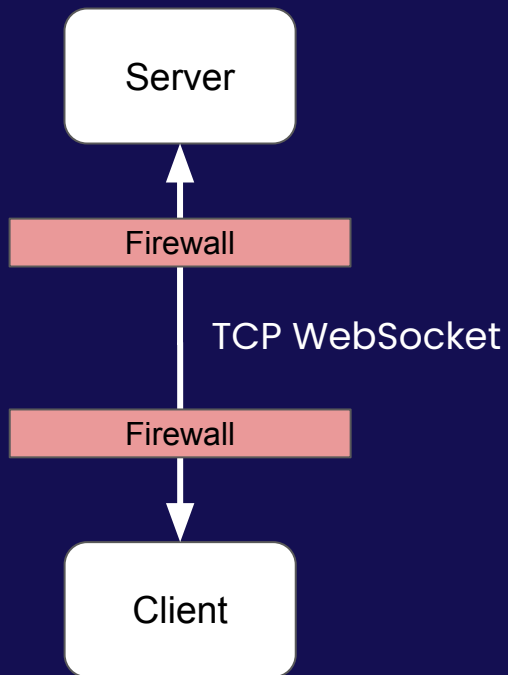
# NoVNC is just... No..



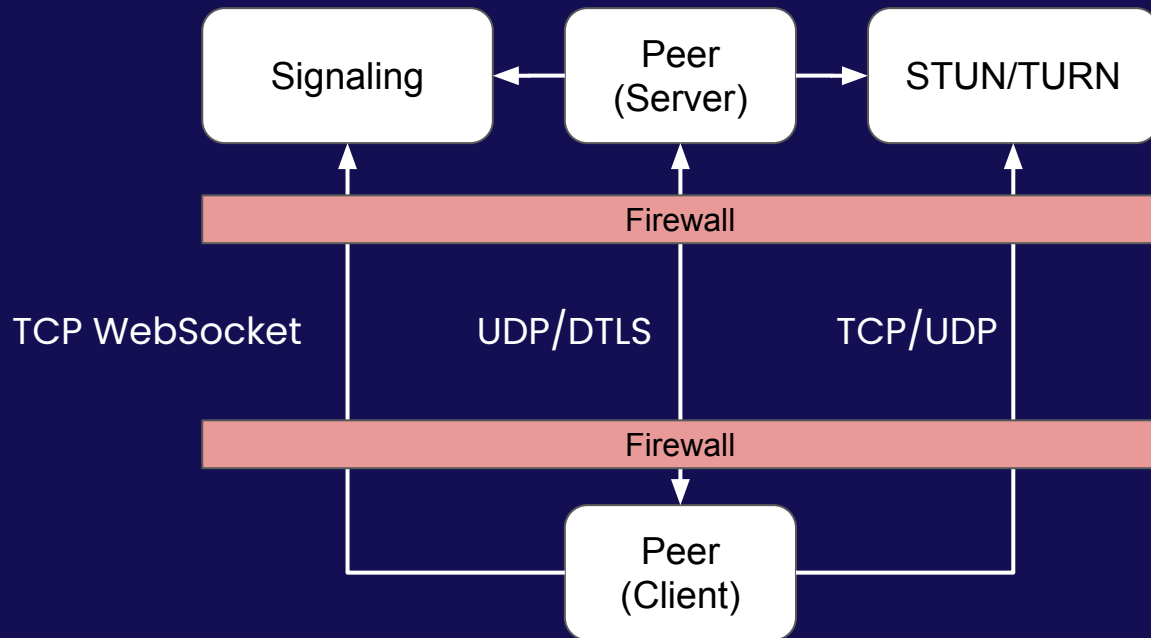


# WebRTC Architecture

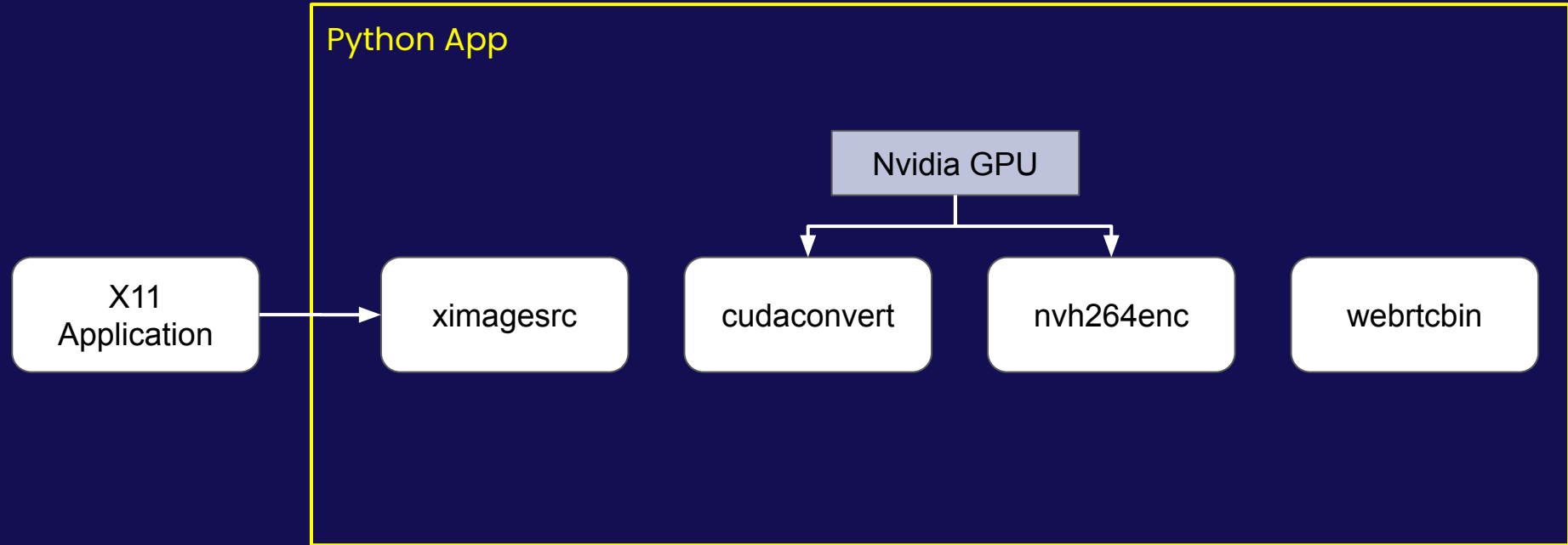
## NoVNC / WebSockets



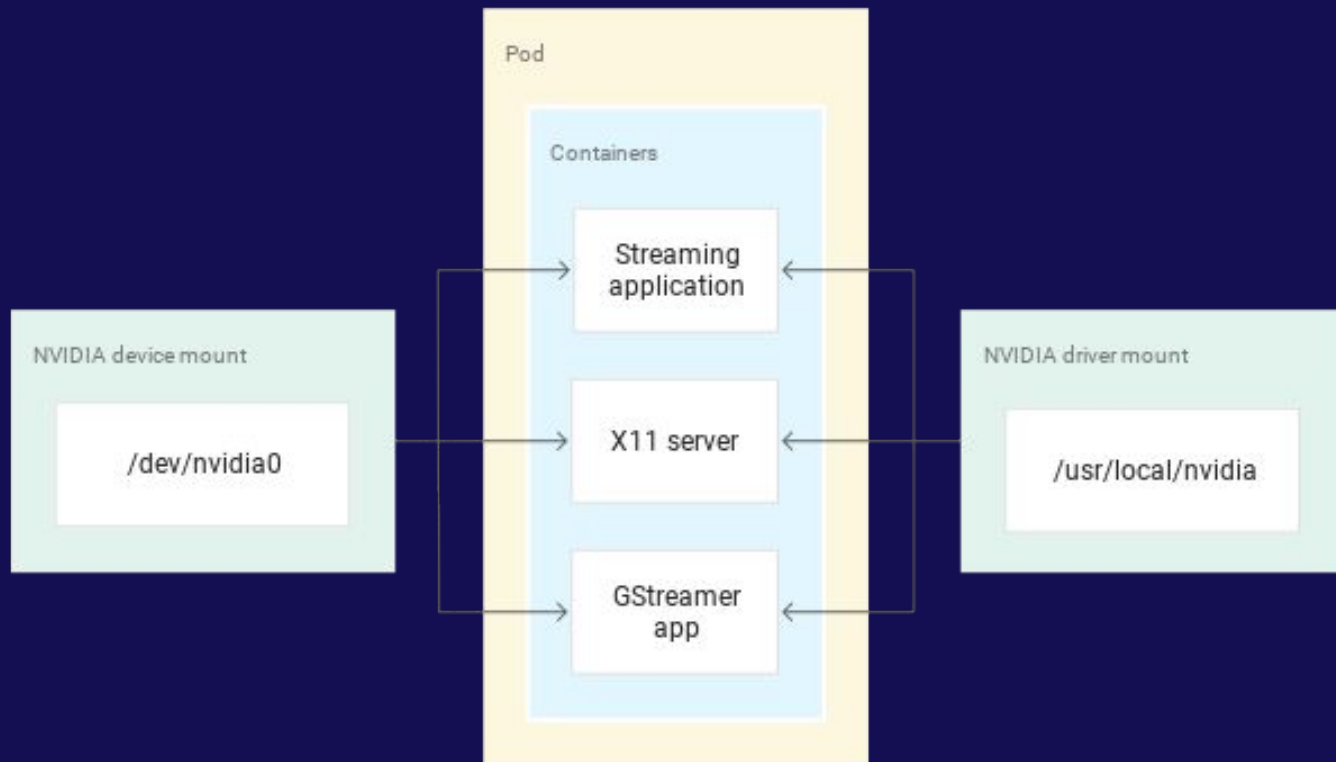
## Client-Server WebRTC



# GStreamer Pipeline



# Kubernetes Sidecars



# 3. Orchestration Problems

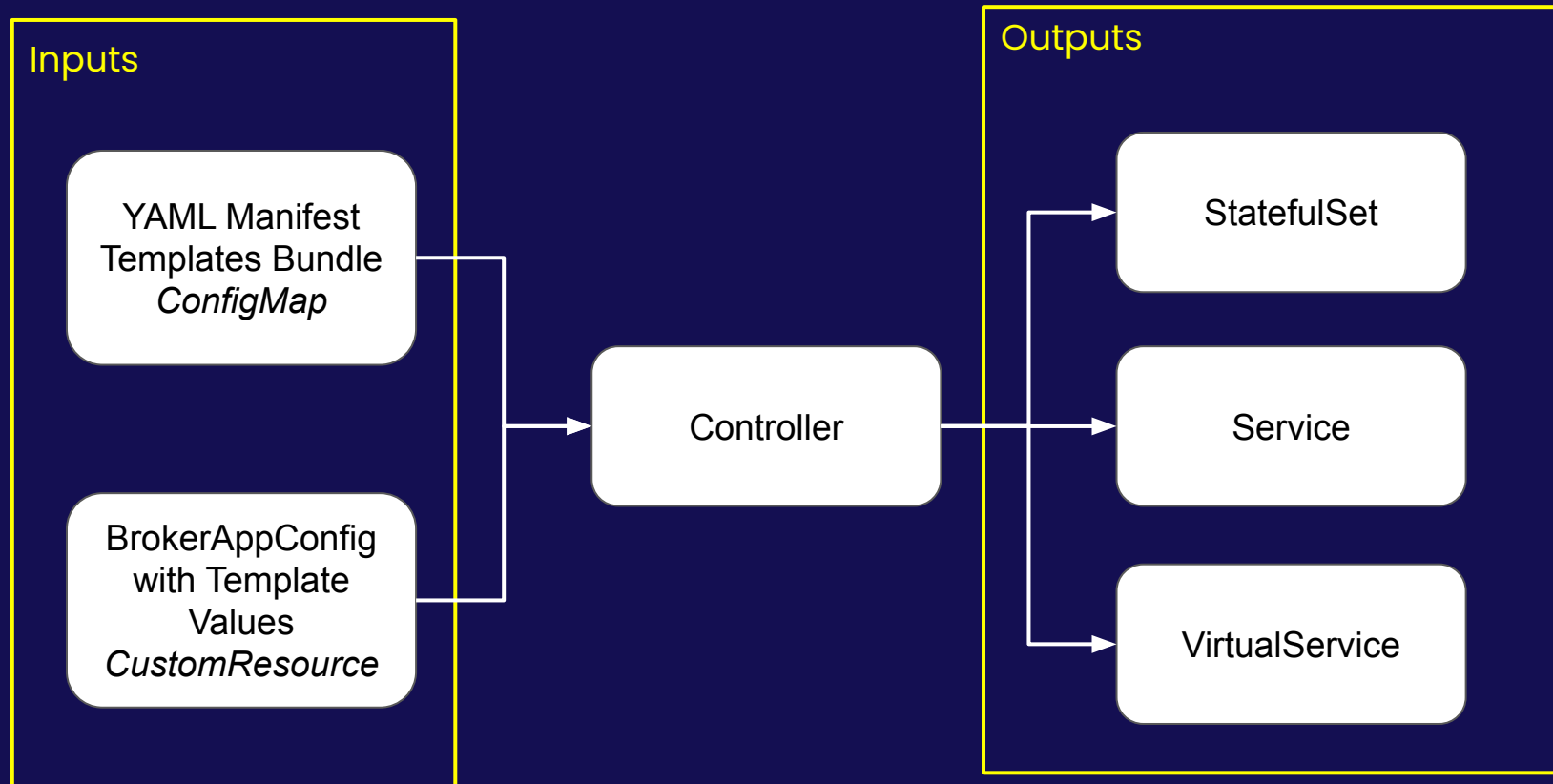
**Pod Templating**

**Pod Lifecycle Management**

**Per-User Routing**

# Selkies Broker

# Kubernetes Operator



## 3. Orchestration **Solutions**

~~Pod Templating~~ **Operator**

~~Pod Lifecycle Management~~ **Operator**

~~Per-User Routing~~ **Istio**

# Remote Apps In a Browser

The image shows a browser window displaying the Visual Studio Code interface. The browser's address bar shows the URL `ubuntu-dev: Visual Studio Code`. The Visual Studio Code interface includes a menu bar (File, Edit, Selection, View, Go, Run, Terminal, Help), a toolbar, and a sidebar on the left for Extensions. The Extensions sidebar is open, showing a search bar and a list of installed extensions (15 total). The main editor area displays the 'Visual Studio Code' welcome page with the following sections:

- Start**: Includes links for 'New File...', 'Open File...', 'Open Folder...', and 'Clone Git Repository...'.
- Walkthroughs**: Includes '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' (New), 'Get started with Jupyter Notebooks' (New), and 'Boost your Productivity'.
- Recent**: Lists recent files such as `spaces-images ~/project`, `images ~/project/itopia-selkies-platform/components/selkies-ex...`, `proxy ~/project/itopia-selkies-env-main/environments/gpod-dev...`, `code /usr/share/icons/hicolor/72x72/stock`, and `xpra-html5 ~/project`.

The status bar at the bottom shows the current workspace as `remote-apps*` and various tool status indicators: `Go 1.14.2`, `0 0 0`, `Live Share`, `Cloud Code`, `gpod-dev01`, `Analysis Tools Missing`, and `Go Update Available`.



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**

# ✦ itopia Spaces



- ✦ 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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