

Cloudy with a chance of Simulation

ROSCon 2016

October 2016
Ian Chen, OSRF



Open Source Robotics Foundation



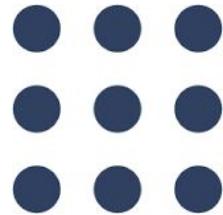
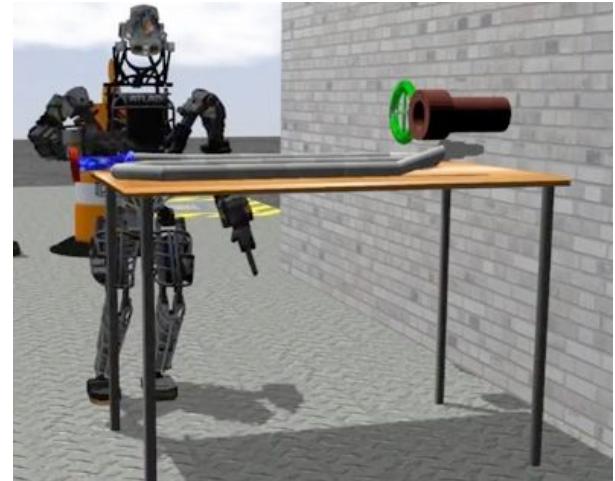
Simulation on the Cloud

DARPA Virtual Robotics Challenge

- Birth of CloudSim



Rich Hardware / Software
Resources available



Open Source Robotics Foundation

Upcoming Projects

Space Robotics Challenge (SRC)
NASA



Agile Robotics for Industrial
Automation Competition (ARIAC)
NIST



Upcoming Swarm Competition
TBA



Open Source Robotics Foundation

Cloudsim.io

The screenshot shows a web browser window for CloudSim.io. The title bar reads "CloudSim" and the address bar shows "https://dev.cloudsim.io". The user "Chen" is logged in, indicated by a "LOG IN" button. The main content features a large banner with the text "CLOUD-HOSTED ROBOT SIMULATION" over a background of mechanical tools and a robotic arm. A blue button labeled "STAY IN TOUCH" with an envelope icon is visible. Below the banner, the section "WHAT IS CLOUDSIM?" is introduced, followed by a detailed description of the service.

WHAT IS CLOUDSIM?

CloudSim provides robot simulation as a web application. Through the combination of advanced simulation software and cloud computing, CloudSim makes it easy to simulate robots and environments. In addition to simulation management, CloudSim offers the ability to visualize and interact with the simulated 3D worlds right in your browser. Try out CloudSim and discover a low-cost way to use robot simulation technology.

Cloudsim.io - What's New?

Architectural Design

- Frontend: Web components
- Backend: Servers as micro-services

Flexible configuration of machine instances

Permissions / Resource Sharing

User software setup

Frontend: Cloudsim-Widgets

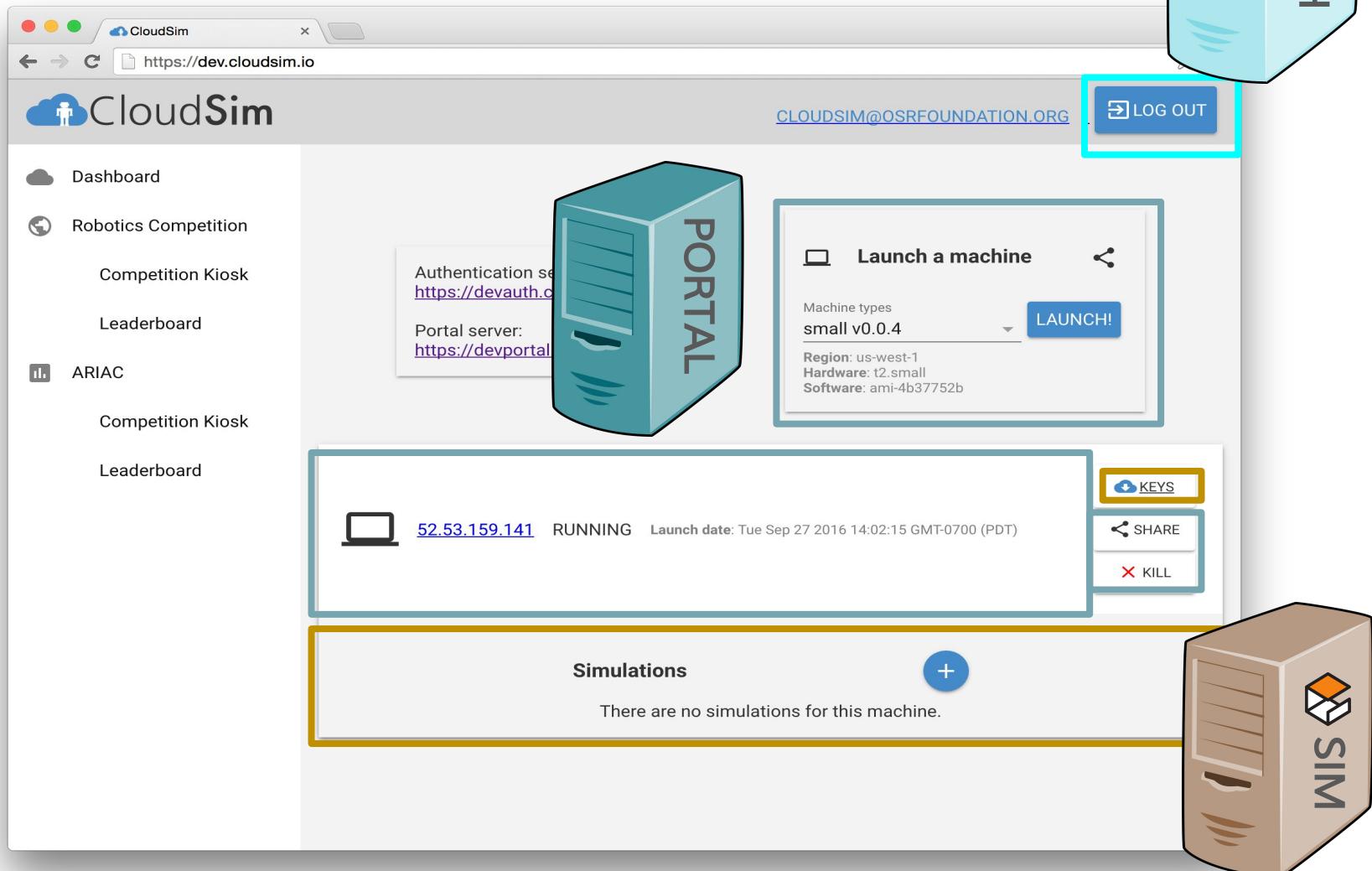
Web-app pieced together by web components

The screenshot shows a web browser window for the CloudSim application at <https://dev.cloudsim.io>. The interface is a single-page application (SPA) composed of various web components.

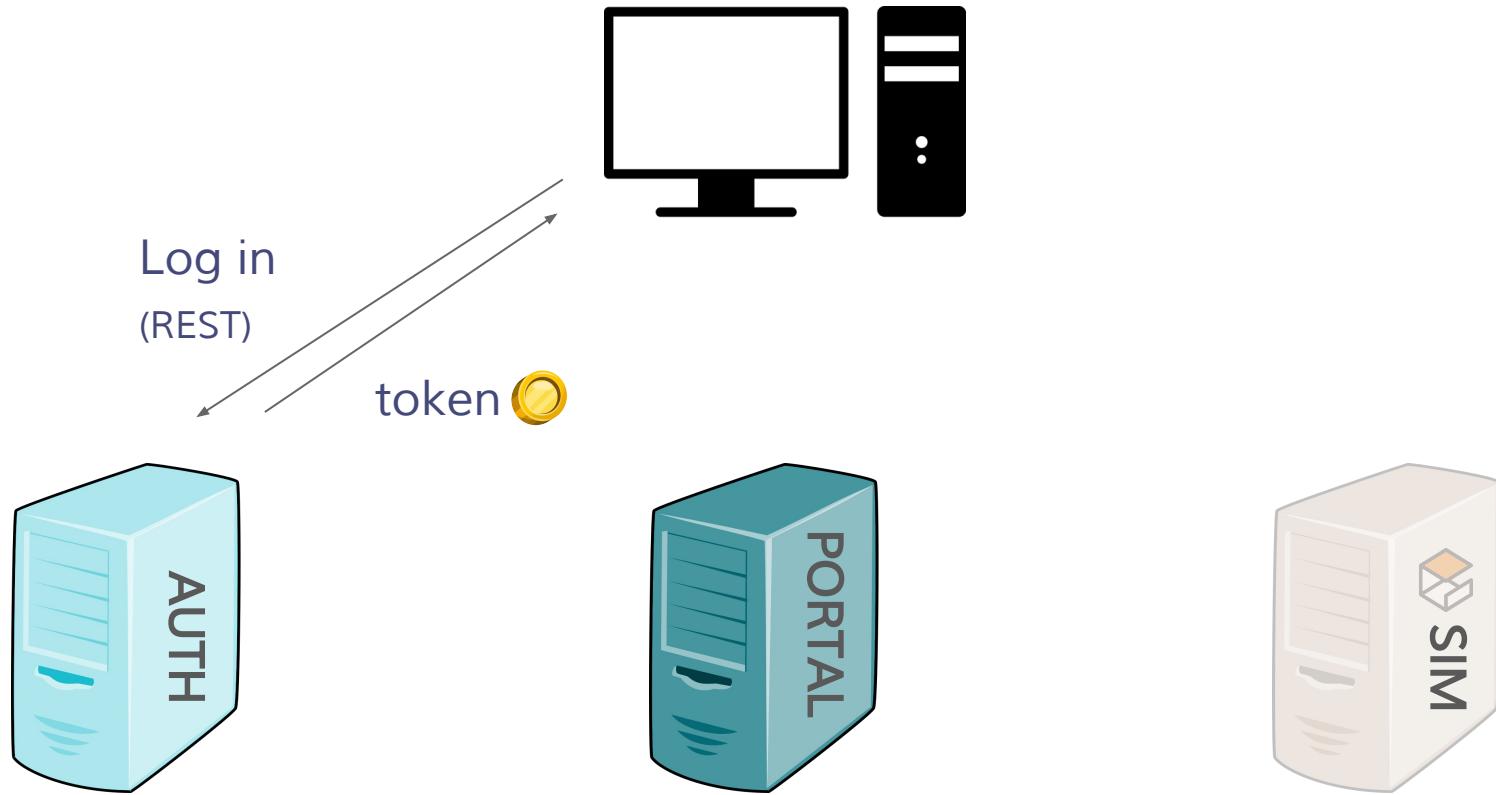
- Header:** A top navigation bar with a user profile icon and the name "Chen".
- Left Sidebar:** A sidebar menu with the following items:
 - Dashboard
 - Robotics Competition
 - Competition Kiosk
 - Leaderboard
 - ARIAC
 - Competition Kiosk
 - Leaderboard
- Authentication Information:** A box containing:
 - Authentication server: <https://devauth.cloudsim.io>
 - Portal server: <https://devportal.cloudsim.io>
- Launch a machine:** A component with a "Launch a machine" heading, a dropdown for "Machine types" set to "small v0.4", and a "LAUNCH!" button. It also displays region, hardware, and software details:
 - Region: us-west-1
 - Hardware: t2.small
 - Software: ami-4b37752b
- Machine Status:** A component showing a running machine with IP 52.53.159.141, status RUNNING, and launch date Tue Sep 27 2016 14:02:15 GMT-0700 (PDT). It includes "KEYS", "SHARE", and "KILL" buttons.
- Simulations:** A component titled "Simulations" with a plus sign icon. It displays the message: "There are no simulations for this machine."

Cloudsim-Widgets

Web components talks directly to back-end



Authentication



Authentication Server

- Log in/out
- token

AWS Portal

- Launch/Kill instances
- Permissions (instances)

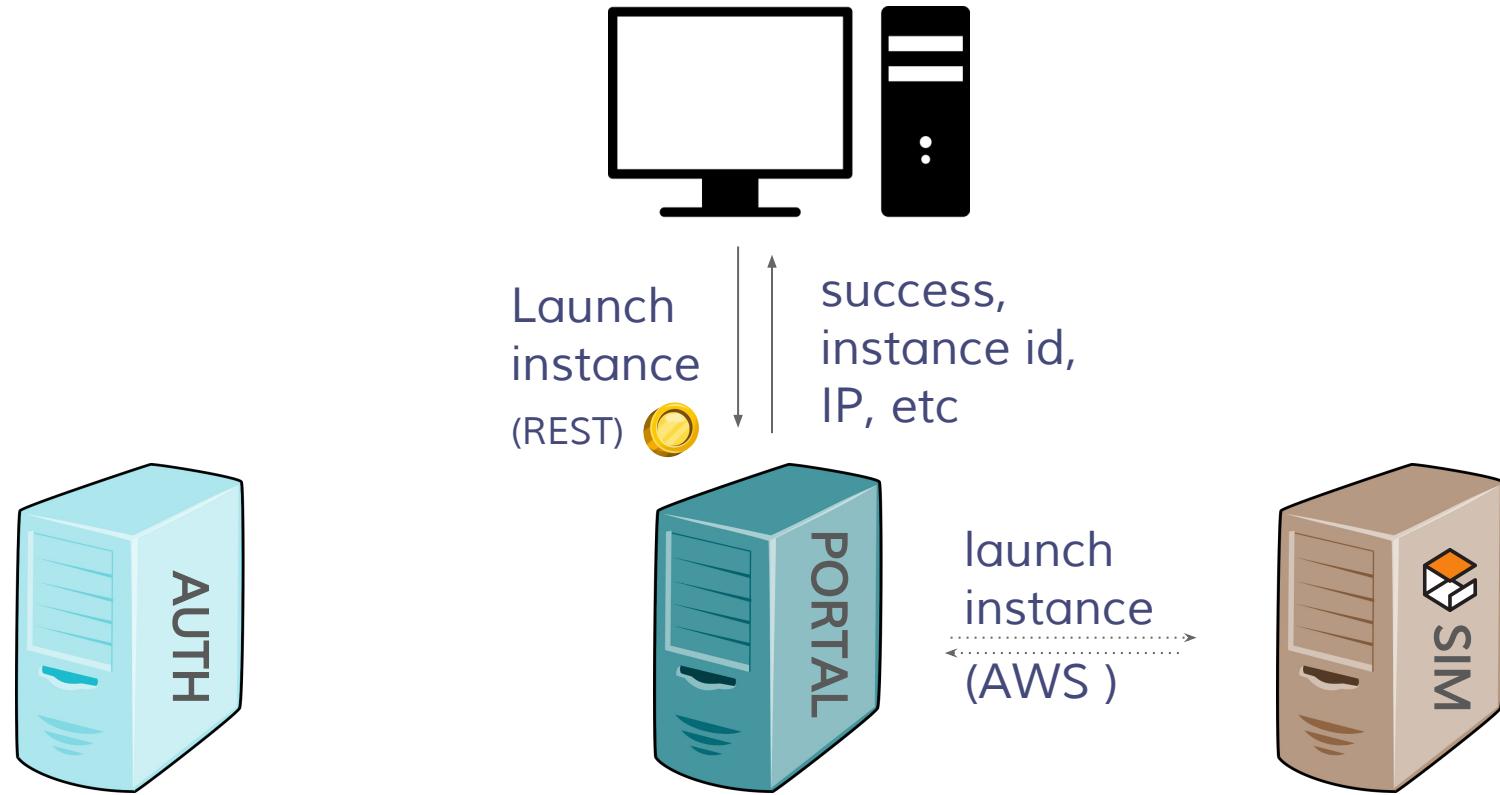
Simulation Server

- Create/Remove simulation tasks
- Start/Stop/Play/Pause
- Permissions (simulations)



Open Source Robotics Foundation

Back-end Servers



Authentication Server

- Log in/out
- token



Open Source Robotics Foundation

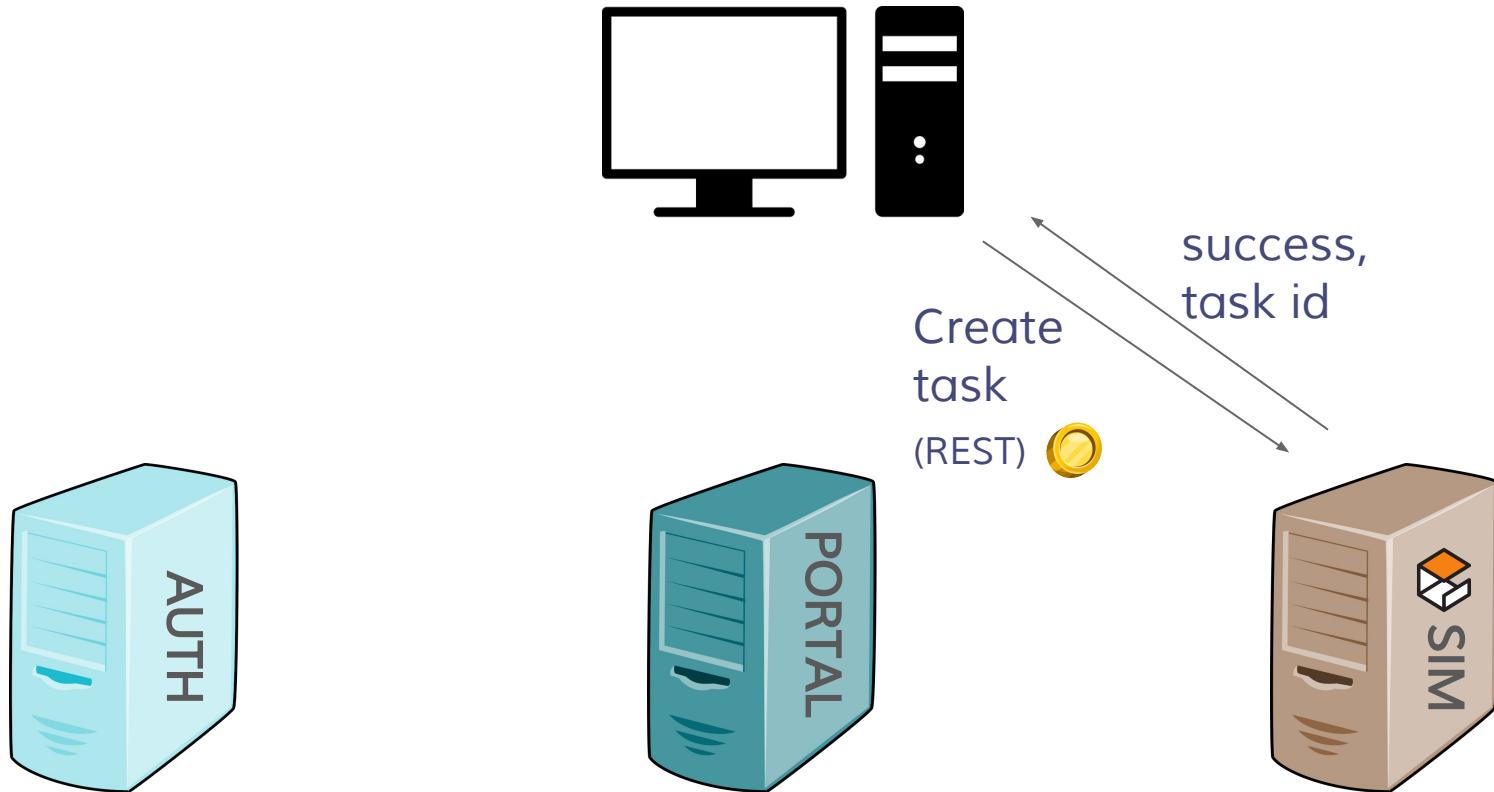
AWS Portal

- Launch/Kill instances
- Permissions (instances)

Simulation Server

- Create/Remove simulation tasks
- Start/Stop/Play/Pause
- Permissions (simulations)

Back-end Servers



Authentication Server

- Log in/out
- token



Open Source Robotics Foundation

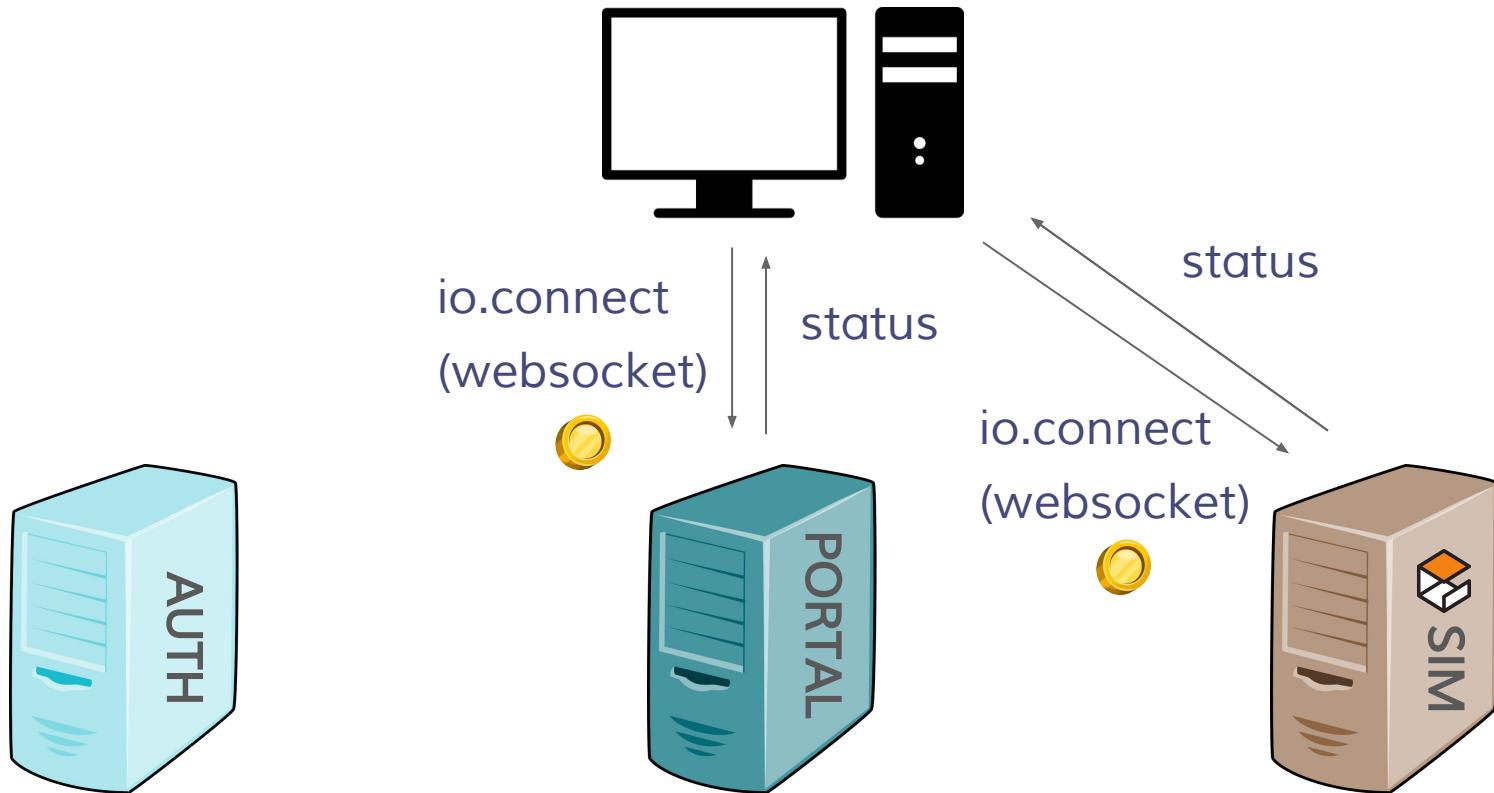
AWS Portal

- Launch/Kill instances
- Permissions (instances)

Simulation Server

- Create/Remove simulation tasks
- Start/Stop/Play/Pause
- Permissions (simulations)

Back-end Servers



Authentication Server

- Log in/out
- token



Open Source Robotics Foundation

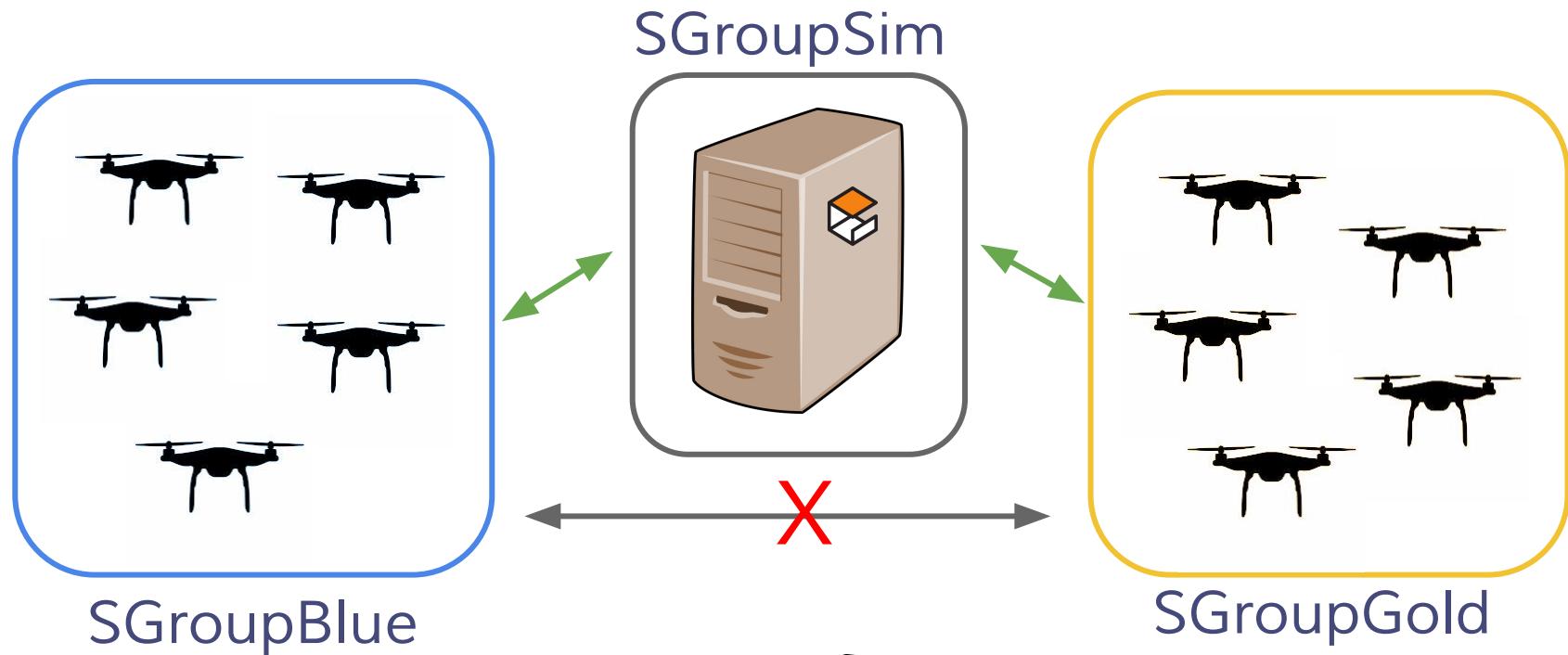
AWS Portal

- Launch/Kill instances
- Permissions (instances)

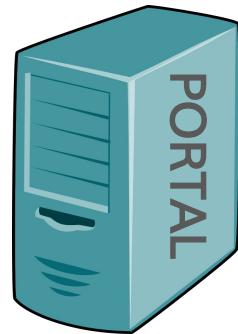
Simulation Server

- Create/Remove simulation tasks
- Start/Stop/Play/Pause
- Permissions (simulations)

Security Groups: Swarm Competition Case Study



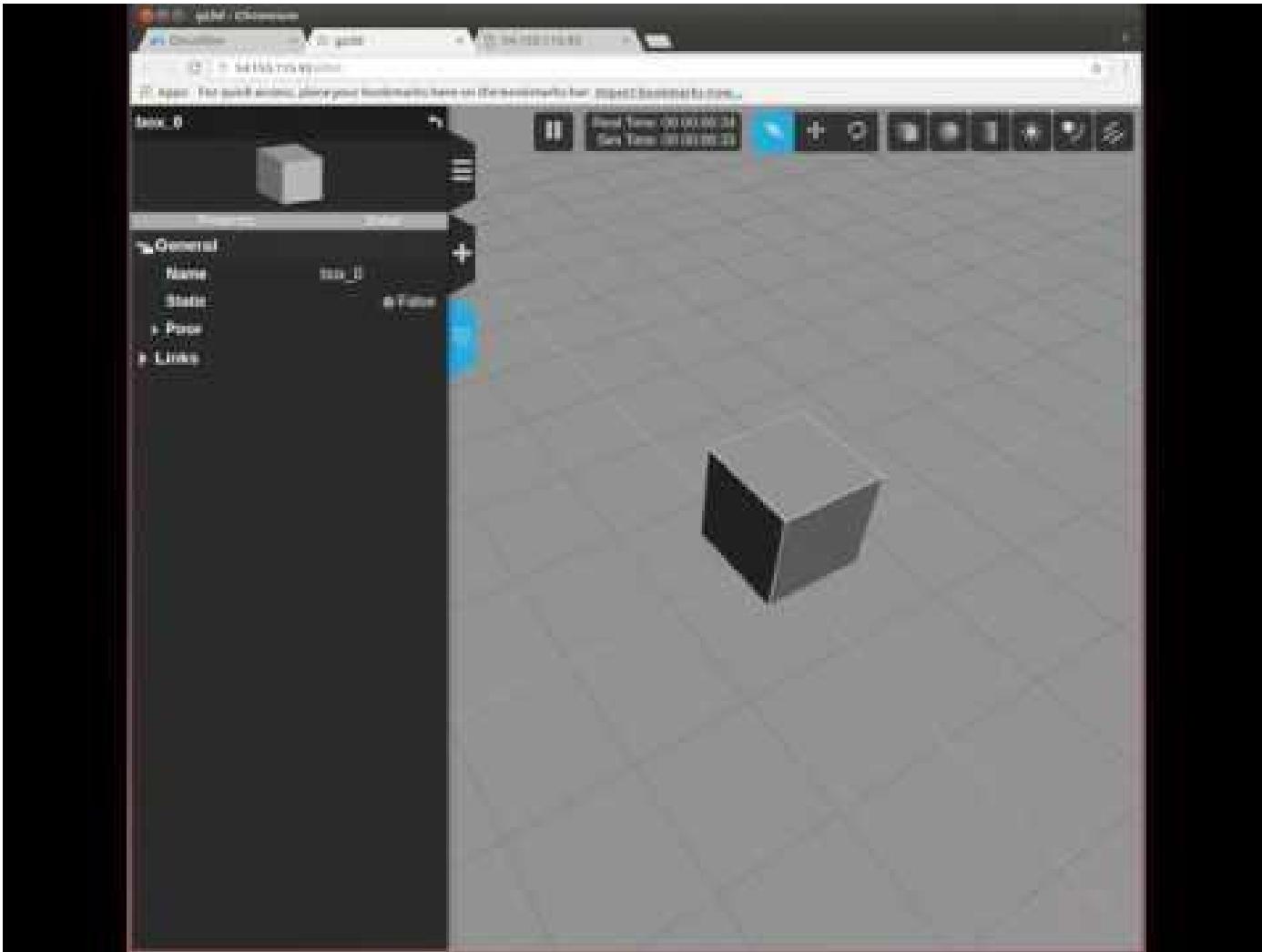
- Traffic Control managed by Portal



1. Create sgroup
name: SGroupGold
rules: type: inbound
src: sgroupsim
2. Launch instance
sgroup: SGroupGold



Demo / Video



Open Source Robotics Foundation

Thank you - Questions?

Cloudsim developers:

Ian Chen, Louise Poubel, Hugo Boyer

Contributions:

Gazebo/ROS team @ OSRF

Mohamid Ayman (GSOC student for gazebojs / gzweb)

CloudSim Repo:

<https://bitbucket.org/osrf/cloudsim>



Open Source Robotics Foundation