Cloudy with a chance of Simulation
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Ian Chen, OSRF
Simulation on the Cloud

DARPA Virtual Robotics Challenge
- Birth of CloudSim

Rich Hardware / Software Resources available
Upcoming Projects

Space Robotics Challenge (SRC)
NASA

Agile Robotics for Industrial Automation Competition (ARIAC)
NIST

Upcoming Swarm Competition
TBA
CLOUD-HOSTED ROBOT SIMULATION

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
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)
Back-end Servers

- **Authentication Server**
  - Log in/out
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- **AWS Portal**
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  - Permissions (simulations)

Launch instance (REST)

Launch instance (AWS)

success, instance id, IP, etc
Back-end Servers

- **Authentication Server**
  - Log in/out
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- **AWS Portal**
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- **Simulation Server**
  - Create/Remove simulation tasks
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  - Permissions (simulations)

Create task (REST) → success, task id
Back-end Servers

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Simulation Server
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Security Groups: Swarm Competition Case Study

1. Create sgroup
   name: SGroupGold
   rules: type: inbound
   src: SGroupSim

2. Launch instance
   src: SGroupSim
   sgroup: SGroupGold

- Traffic Control managed by Portal
Demo / Video
Thank you - Questions?

Cloudsim developers:
Ian Chen, Louise Poubel, Hugo Boyer

Contributions:
Gazebo/ROS team @ OSRF
Mohamd Ayman (GSOC student for gazebojs / gzweb)

CloudSim Repo:
https://bitbucket.org/osrf/cloudsim