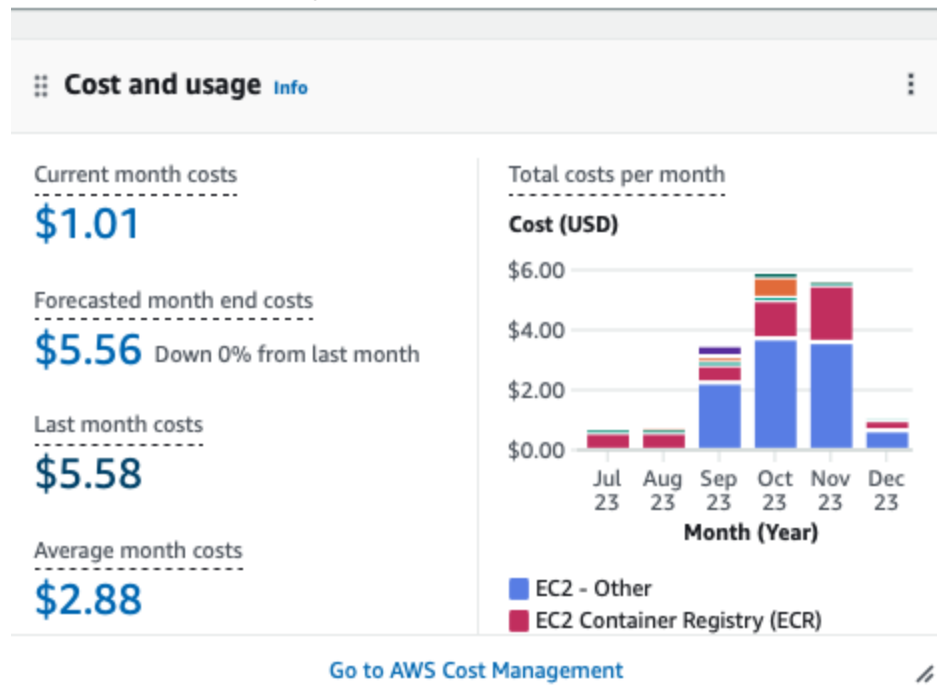


RoboMaker Discussion

12-06-23

**1. Introduction

- Brief overview of AWS RoboMaker
 - "AWS RoboMaker is a cloud-based simulation service that enables robotics developers to run, scale, and automate simulation without managing any infrastructure." - AWS
 - This hides the complexities of spinning up and down compute/storage infrastructure, logging all simulation output, etc.
 - Pay as you go: Cost per SU **simulation unit**;
 - Minimum of 1vCPU and 2 GB memory = \$0.40 per hour. Typically, a simulation may need 7 SU
 - GPUs are available too at \$1.50 per hour
 - Costs for experimenting peaked at \$6 in October



- Dashboard view

The screenshot shows the AWS RoboMaker console. On the left is a navigation menu with sections: Development (Robot applications, Simulation applications), Simulation WorldForge (World templates, Worlds, Generation jobs, Export jobs), Simulation run (Simulation jobs, Simulation job batches), and Resources (Robotics software). The main content area has three tabs: 'Create a robot application', 'Create a simulation application' (selected), and 'Create a simulation job'. Below the tabs is a 'Simulation jobs (14)' section with a search bar and a table of jobs.

ID	Status	Robot applicati...	Simulation applicati...
sim-3b5brptm2fpx	Completed	-	hector_quadrotor_simul...
sim-36www2c10ckx	Cancelled	-	hector_quadrotor_simul...
sim-jmd9wppqhj84	Failed	-	hector_quadrotor_simul...
sim-02fx36bh20lj	Failed	-	hector_quadrotor_simul...
sim-y573jnrbh8bw	Failed	-	hector_quadrotor_simul...
sim-pq3h801kq19n	Failed	-	hector_quadrotor_simul...
sim-2sdmbky05ghg	Failed	-	hector_quadrotor_simul...
sim-p0c439hgq3p	Failed	-	hector_quadrotor_simul...
sim-vzl06993swmc	Failed	-	hector_quadrotor_simul...
sim-v3gjgs2dyr6c	Completed	helloworld_foxy_g...	helloworld_foxy_g11_si...

- Why is this important? What are the current limitations of bigtuna machine in the lab?
- Agenda - walk-through of helloworld app followed by Q&A.**

**2. Setting Up Your Environment

- Overview of required AWS services (RoboMaker, S3, IAM)
 - RoboMaker - managed service
 - S3 - Simple storage service (to log your results)
 - IAM - Identity Access management (to control who can do what)
- MBARI AWS account setup
 - IS setup and MBARI SSO - single sign-on at <https://mbari.awsapps.com/start> use your MBARI login ***Note that we can add local* users to this account to extend to collaborators**
 - Select **902204-scalable-robotics**, then select Management Console. This has a unique sub-account number **731784785618**, but still in the MBARI account.

Amazon Web Services (AWS)

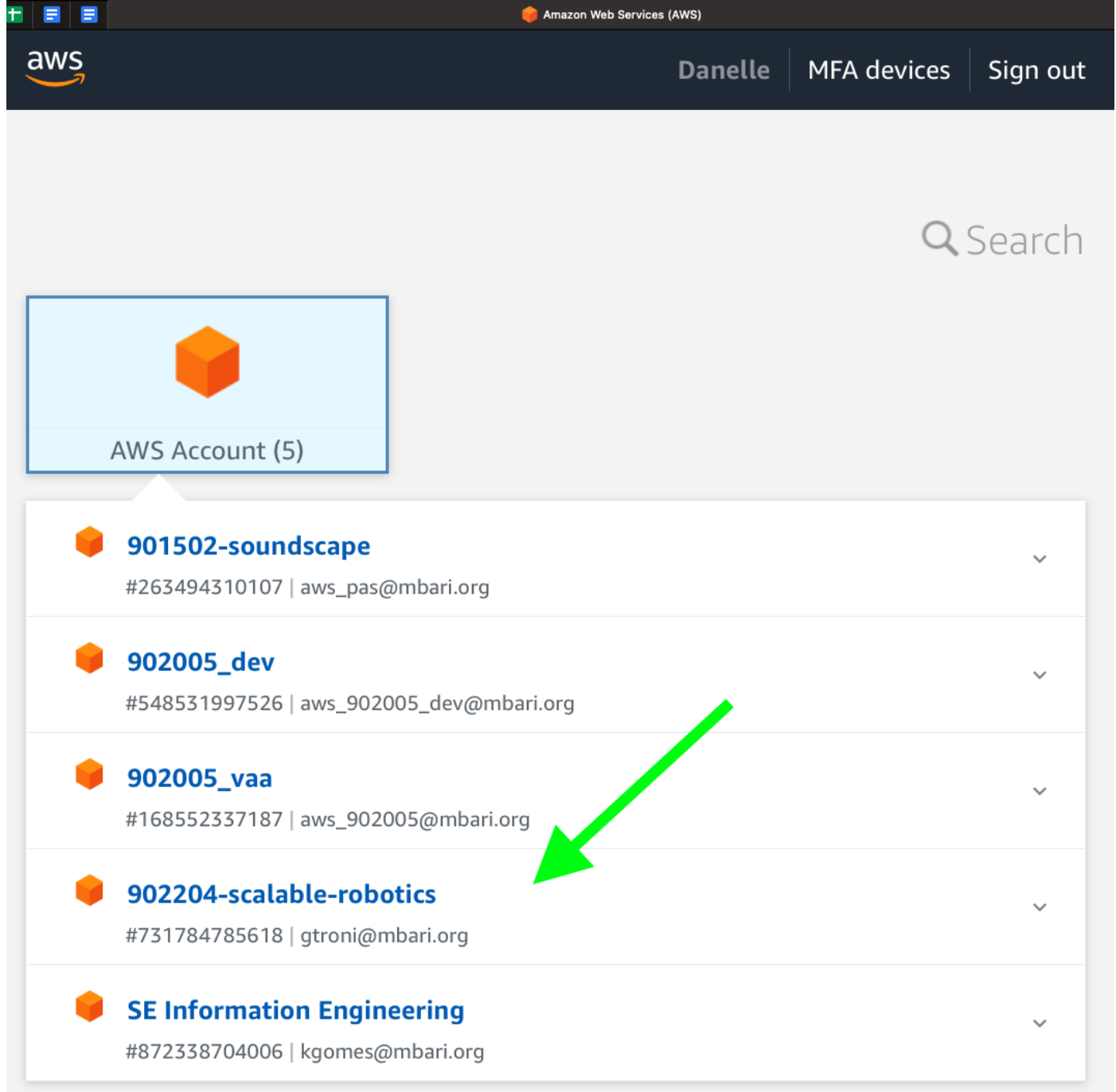
aws

Danella | MFA devices | Sign out

Search

AWS Account (5)

- 901502-soundscape**
#263494310107 | aws_pas@mbari.org
- 902005_dev**
#548531997526 | aws_902005_dev@mbari.org
- 902005_vaa**
#168552337187 | aws_902005@mbari.org
- 902204-scalable-robotics**
#731784785618 | gtroni@mbari.org
- SE Information Engineering**
#872338704006 | kgomes@mbari.org



**3. Creating Your First Robot Application

- Use RoboMaker IDE to create a simple **helloworld** robot application
 - Assume docker images are created and ready for use in the ECR (**Elastic Container Registry**). See the `build_and_push_aws.sh` in the [robomaker-helloworld](#) repo.
 - Can add tags to track costs
 - Each application creates has a unique ARN, e.g., `arn:aws:robomaker:us-west-2:731784785618:robot-application/helloworld-dryrun/1701896830289` . *This is used when creating the simulation*

Service Amazon SageMaker S3 Elastic Container Registry Simple Queue Service Billing and Cost Management Cloud9 CloudWatch Batch EC2

✓ A new robot application was created. ✕

[AWS RoboMaker](#) > [Robot applications](#) > [helloworld-dryrun](#) > \$LATEST

helloworld-dryrun

[Info](#)

Update

Details

Name	helloworld-dryrun	ARN	arn:aws:robomaker:us-west-2:731784785618:robot-application/helloworld-dryrun/1701896830289
Last updated	December 6, 2023 1:07:10 PM	Robot software suite	General
Version	\$LATEST		

Environment container image

Repository URI	Image tag
731784785618.dkr.ecr.us-west-2.amazonaws.com/mbari/helloworld_foxy_g11_app	1fe1cac

DISCUSSION

- Adding new features to the robot application
- Understanding robot application dependencies

4. Configuring Simulation

- Use RoboMaker IDE to create a simple **helloworld** robot simulation. Similarly to the application, there is a unique **ARN**. This is used in the **Simulation Job** (more on that later)

- Default storage is in a 128 GB partition

The screenshot shows the AWS RoboMaker console interface. At the top, a green banner indicates 'A new simulation application was created.' Below this, the breadcrumb navigation shows 'AWS RoboMaker > Simulation applications > helloworld-dryrun > \$LATEST'. The main heading is 'helloworld-dryrun' with an 'Info' link and an 'Update' button. The 'Details' section contains a table with the following information:

Details	
Name	helloworld-dryrun
Last updated	December 6, 2023 1:23:31 PM
Version	\$LATEST
ARN	arn:aws:robomaker:us-west-2:731784785618:simulation-application/helloworld-dryrun/1701897811863
Robot software suite	General
Simulation software suite	
Simulation runtime	

The 'Environment container image' section contains a table with the following information:

Environment container image	
Repository URI	731784785618.dkr.ecr.us-west-2.amazonaws.com/mbari/helloworld_foxy_g11_sim
Image tag	1fe1cac

DISCUSSION

- **Logging**
 - Can adjust what is logged and what S3 bucket to store in the **Simulation Job**
 - Can query and tail stdout/err that is logged to the [AWS Cloudwatch](#) service
- **IP address assignment**
 - Can assign a public IP during simulation (just like the elastic inference engines).
- Configuring simulation settings in RoboMaker
- Adjusting simulation parameters

**5. Launching Simulation

- Deploying the robot application to the simulation environment as a **Simulation Job**
- Monitoring simulation progress in Cloud Watch
- D.Cline setup an IAM role called **robomaker-jobs** for this with appropriate permissions

**6. Q&A Session

**7. Conclusion and Next Steps

- Recap of key takeaways
 - RoboMaker can accelerate simulation
 - There is some overhead to putting your containers into a RoboMaker-compliant format
 - These docker images can be run locally
 - There is some overhead to managing the output, e.g., in S3 and viewing the logs

- What do we want to do ?
 - Shelf the exploration
 - Scale caleucheenv_rl simulations
 - Others