AWS SideQICK

Simple Cloud Batching for QICK

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Amazon Braket

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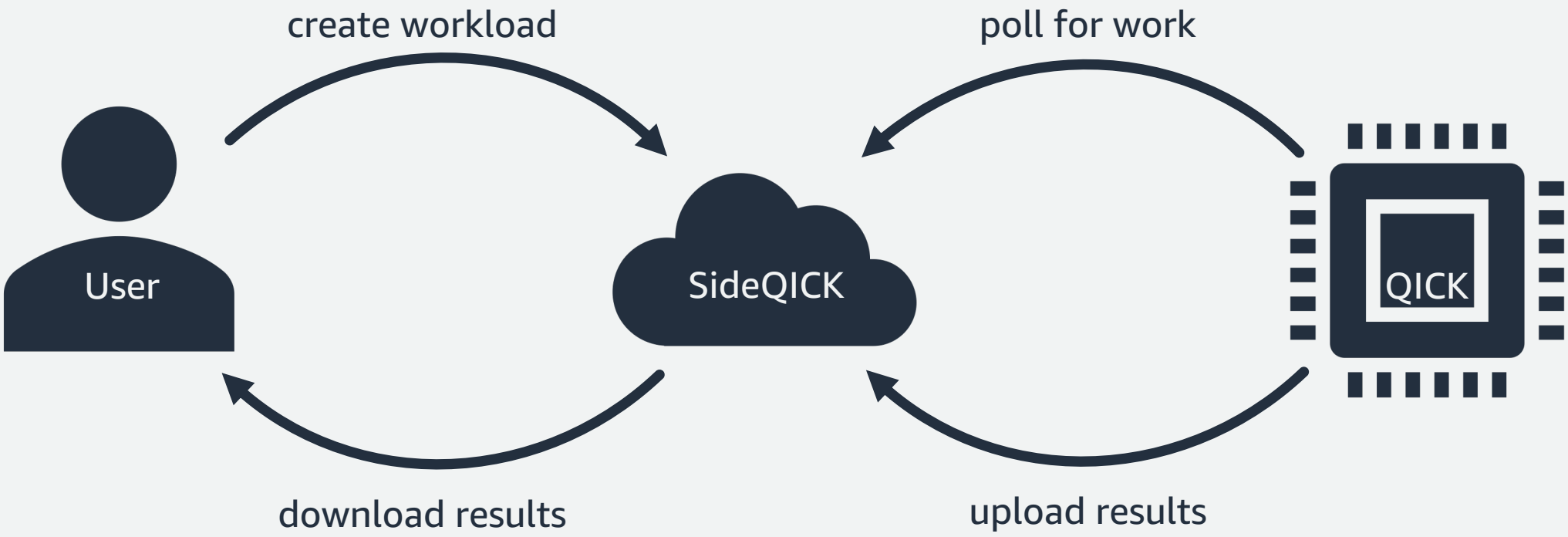
SideQICK at a glance



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Deploy

1. Download code from GitHub

   (link pending AWS AppSec review)

2. Run install script

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Add a new QICK device

add a device (and start the device client)

```
In [3]: client.add_device("QICK Demo Device AAA")

        # this is equivalent:
        # ./user_client.py add_device "QICK Demo Device"

        initial auth for suemura@fnal.gov:
        ........
        Device successfully added!

        Put the following in the config file /etc/qick/config:
        [service]
        api_url = https://fpj5uufrz2.execute-api.us-east-1.amazonaws.com/prod
        oauth_url = https://qickworkloadmgmt-prod.auth.us-east-1.amazoncognito.com/oauth2/token
        [device]
        name = QICK Demo Device AAA
        id = 664279d8-f236-4e28-83f4-27cce968d643

        If using UserClient for workload submission, the [devices] block is needed in the client config as we

        Put the following in the device credentials file /etc/qick/credentials:
        [credentials]
        id = 11splignbpnt52ktpcg347kco5
        secret = 5cvb4i47jv54ap0la55ck01p7ne2cgm2t8tpdhdoh9sijqv2rh2
```

```
me/xilinx/jupyter_notebooks/qick/aws# systemctl start qick
me/xilinx/jupyter_notebooks/qick/aws# journalctl -f -u qick.service
 Wed 2022-02-02 11:04:44 CST. --
pynq216 start_qick_client.sh[79158]: INFO:root:GetDeviceWork: no work for device
pynq216 start_qick_client.sh[79158]: INFO:root:UpdateDevice with status ONLINE
pynq216 start_qick_client.sh[79158]: INFO:root:GetDeviceWork: no work for device
pynq216 start_qick_client.sh[79158]: INFO:root:UpdateDevice with status ONLINE
pynq216 start_qick_client.sh[79158]: INFO:root:GetDeviceWork: no work for device
pynq216 systemd[1]: Stopping QICK service...
pynq216 systemd[1]: qick.service: Succeeded.
pynq216 systemd[1]: Stopped QICK service.
pynq216 systemd[1]: Starting QICK service...
pynq216 systemd[1]: Started QICK service.
pynq216 start_qick_client.sh[79301]: library loaded!
pynq216 start_qick_client.sh[79301]: INFO:root:Got OAuth2 token, expires in 3600 seconds
pynq216 start_qick_client.sh[79301]: INFO:root:UpdateDevice with status ONLINE
pynq216 start_qick_client.sh[79301]: INFO:root:UpdateDevice: uploading soccfg
pynq216 start_qick_client.sh[79301]: INFO:root:s3 upload success
pynq216 start_qick_client.sh[79301]: INFO:root:GetDeviceWork: no work for device
pynq216 start_qick_client.sh[79301]: INFO:root:UpdateDevice with status ONLINE
pynq216 start_qick_client.sh[79301]: INFO:root:GetDeviceWork: no work for device
pynq216 start_qick_client.sh[79301]: INFO:root:UpdateDevice with status ONLINE
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pynq216 start_qick_client.sh[79301]: INFO:root:GetDeviceWork: no work for device
pynq216 start_qick_client.sh[79301]: INFO:root:UpdateDevice with status ONLINE
pynq216 start_qick_client.sh[79301]: INFO:root:GetDeviceWork: no work for device
```

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Add a user

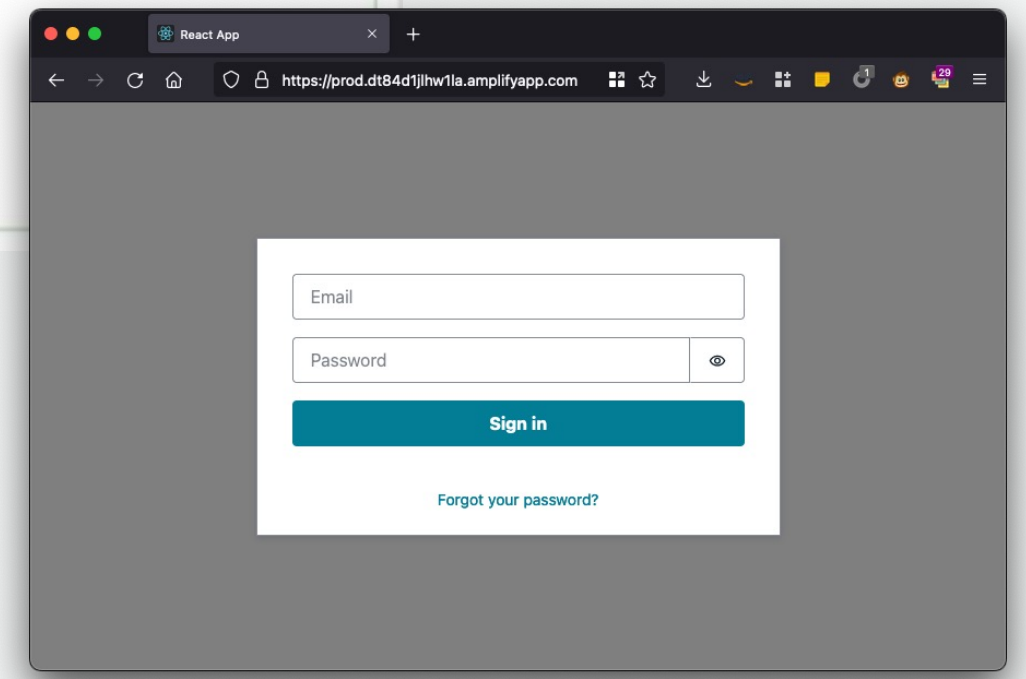
add a user (and log in to the web UI)

```
In [4]: client.add_user("supersho+asdfasdf@gmail.com", "Sho Uemura Test")

        # this is equivalent:
        # ./user_client.py add_user supersho+test@gmail.com "Sho Uemura Test"

        User successfully added! They should check their e-mail for a temporary password.

        They should put the following in ~/.config/qick.conf:
        [service]
        api_url = https://fpj5uufrz2.execute-api.us-east-1.amazonaws.com/prod
        cognito_url = https://cognito-idp.us-east-1.amazonaws.com/
        cognito_clientid = 4rel748p9u3um049g61h22jr6
        cognito_userpool = us-east-1_4BveQjp8o
        [user]
        username = supersho+asdfasdf@gmail.com
```



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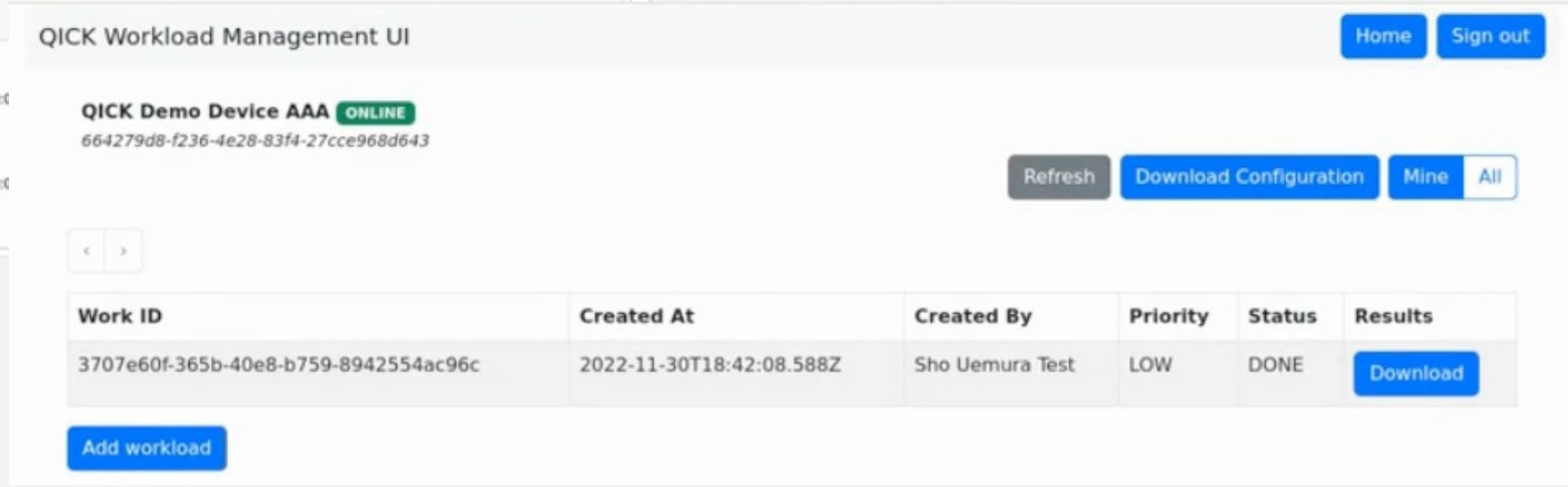
Running a Workload

```
In [*]: print("initializing WorkloadManager:")
        expt = SweepWorkload(soccfg, start=1, stop=10000, n_pts=1001)

        print("writing programs to workload file:")
        with expt.write_progs() as workloadfile:
            print("submitting workload:")
            work_id = client.create_work(workloadfile, priority="LOW")
        print("workload is submitted, work ID " + work_id)

        client.wait_until_done(work_id, progress=True)

        print("reading results:")
        with client.get_results(work_id) as resultsfile:
            expt.read_results(resultsfile)

        print("plotting results")
        expt.display()

initializing WorkloadManager:

100% 1001/1001 [00:0

writing programs to workload file:

100% 1001/1001 [00:0

submitting workload:
```



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Thank you!

Dustin Liukkonen – AWS
Sho Uemura – FermiLab
Gustavo Cancelo – FermiLab
Sebastian Hassinger – AWS

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Supplementary slides

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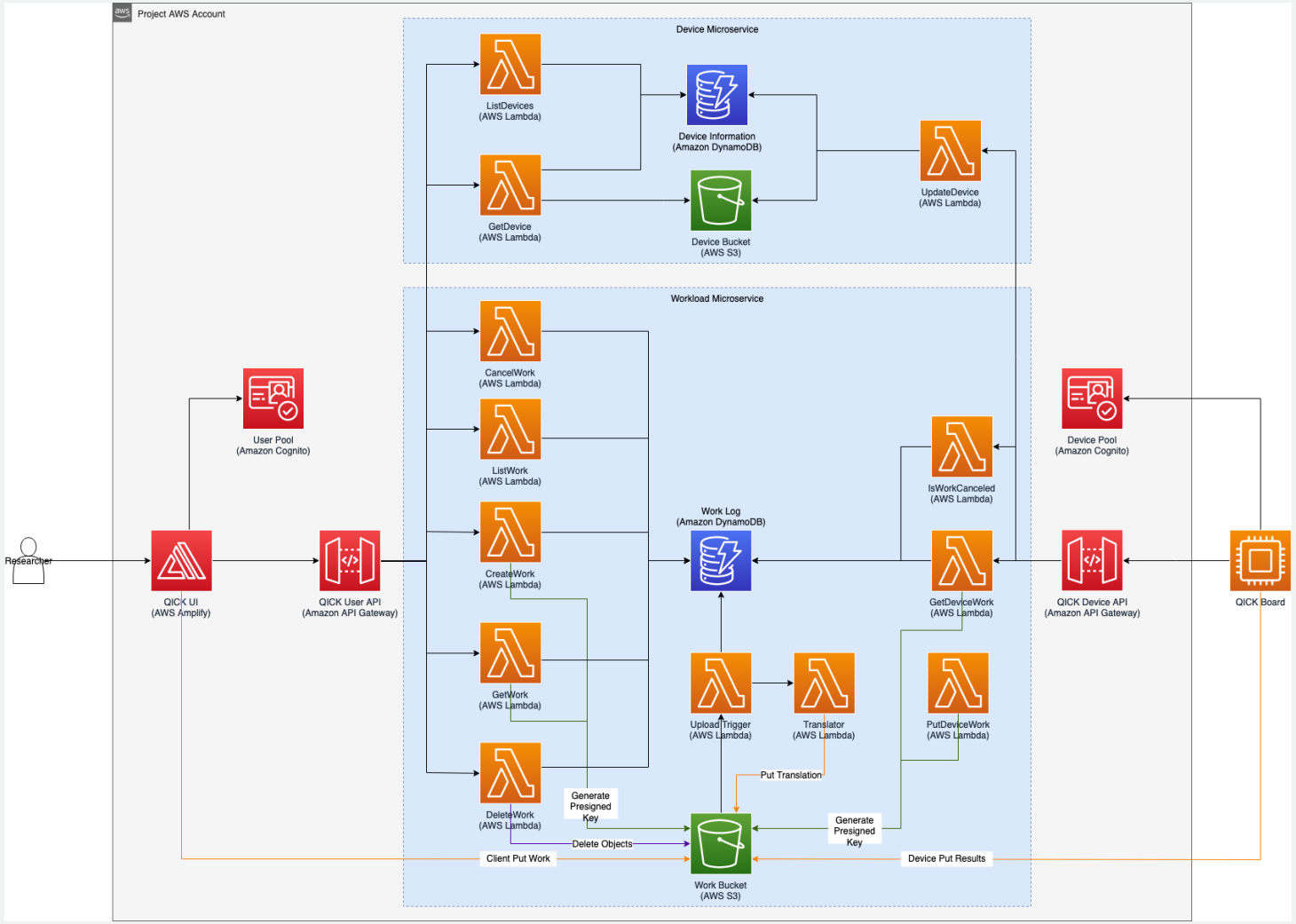
SideQICK design



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Running the workload

```
Nov 30 12:41:41 pynq216 start_qick_client.sh[79301]: INFO:root:GetDeviceWork: no work for device
Nov 30 12:41:46 pynq216 start_qick_client.sh[79301]: INFO:root:UpdateDevice with status ONLINE
Nov 30 12:41:46 pynq216 start_qick_client.sh[79301]: INFO:root:GetDeviceWork: no work for device
Nov 30 12:41:51 pynq216 start_qick_client.sh[79301]: INFO:root:UpdateDevice with status ONLINE
Nov 30 12:41:51 pynq216 start_qick_client.sh[79301]: INFO:root:GetDeviceWork: no work for device
Nov 30 12:41:57 pynq216 start_qick_client.sh[79301]: INFO:root:UpdateDevice with status ONLINE
Nov 30 12:41:57 pynq216 start_qick_client.sh[79301]: INFO:root:GetDeviceWork: no work for device
Nov 30 12:42:02 pynq216 start_qick_client.sh[79301]: INFO:root:UpdateDevice with status ONLINE
Nov 30 12:42:02 pynq216 start_qick_client.sh[79301]: INFO:root:GetDeviceWork: no work for device
Nov 30 12:42:07 pynq216 start_qick_client.sh[79301]: INFO:root:UpdateDevice with status ONLINE
Nov 30 12:42:07 pynq216 start_qick_client.sh[79301]: INFO:root:GetDeviceWork: no work for device
Nov 30 12:42:12 pynq216 start_qick_client.sh[79301]: INFO:root:UpdateDevice with status ONLINE
Nov 30 12:42:13 pynq216 start_qick_client.sh[79301]: INFO:root:GetDeviceWork: got work 3707e60f-365b-40e8-b759-8942554ac96c
Nov 30 12:42:13 pynq216 start_qick_client.sh[79301]: INFO:root:s3 download success
Nov 30 12:42:13 pynq216 start_qick_client.sh[79301]: INFO:root:Started workload
Nov 30 12:42:13 pynq216 start_qick_client.sh[79338]: INFO:root:Running workload
Nov 30 12:42:14 pynq216 start_qick_client.sh[79338]: INFO:root:unpacked 1002 programs from workload
Nov 30 12:42:18 pynq216 start_qick_client.sh[79301]: INFO:root:UpdateDevice with status BUSY
Nov 30 12:42:24 pynq216 start_qick_client.sh[79301]: INFO:root:UpdateDevice with status BUSY
Nov 30 12:42:29 pynq216 start_qick_client.sh[79301]: INFO:root:UpdateDevice with status BUSY
Nov 30 12:42:29 pynq216 start_qick_client.sh[79338]: INFO:root:Workload complete
Nov 30 12:42:29 pynq216 start_qick_client.sh[79338]: restarting readout worker
Nov 30 12:42:29 pynq216 start_qick_client.sh[79338]: worker restarted
Nov 30 12:42:34 pynq216 start_qick_client.sh[79301]: INFO:root:UpdateDevice with status BUSY
Nov 30 12:42:34 pynq216 start_qick_client.sh[79301]: INFO:root:workload completed, exit code 0
Nov 30 12:42:34 pynq216 start_qick_client.sh[79301]: INFO:root:PutDeviceWork request for work 3707e60f-365b-40e8-b759-8942554ac96c
Nov 30 12:42:44 pynq216 start_qick_client.sh[79301]: INFO:root:s3 upload success
Nov 30 12:42:44 pynq216 start_qick_client.sh[79301]: INFO:root:Uploaded results
```

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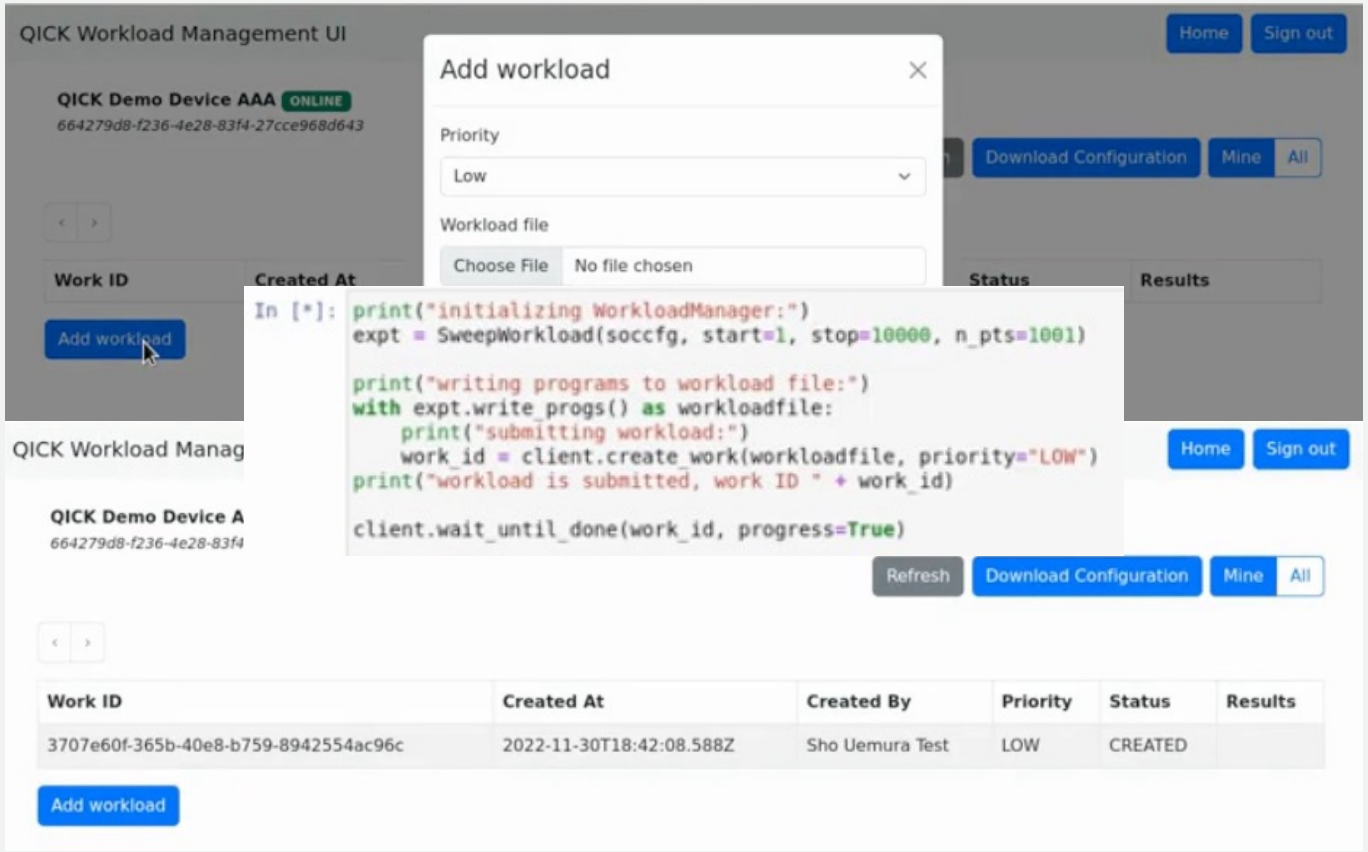
Creating a workload



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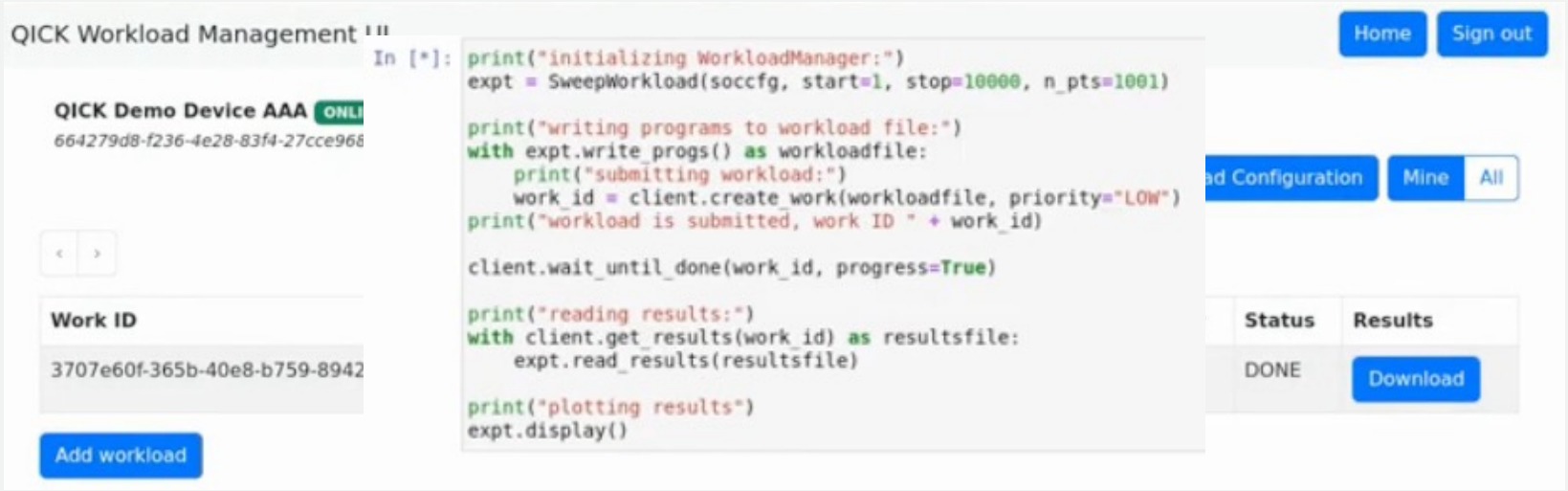
Getting results



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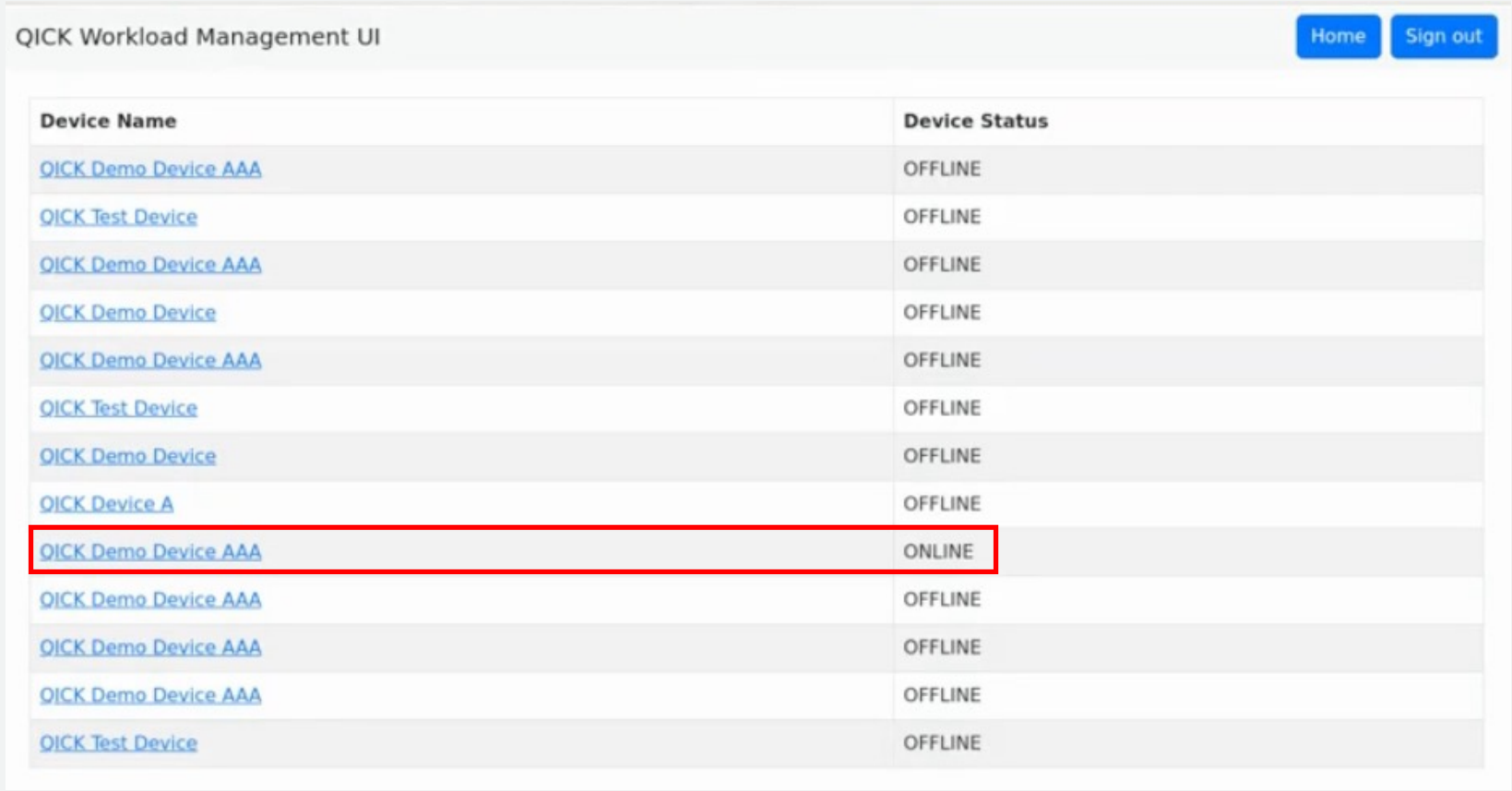
Device Status



Device Name	Device Status
QICK Demo Device AAA	OFFLINE
QICK Test Device	OFFLINE
QICK Demo Device AAA	OFFLINE
QICK Demo Device	OFFLINE
QICK Demo Device AAA	OFFLINE
QICK Test Device	OFFLINE
QICK Demo Device	OFFLINE
QICK Device A	OFFLINE
QICK Demo Device AAA	ONLINE
QICK Demo Device AAA	OFFLINE
QICK Demo Device AAA	OFFLINE
QICK Demo Device AAA	OFFLINE
QICK Test Device	OFFLINE

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Running a workload (GUI)

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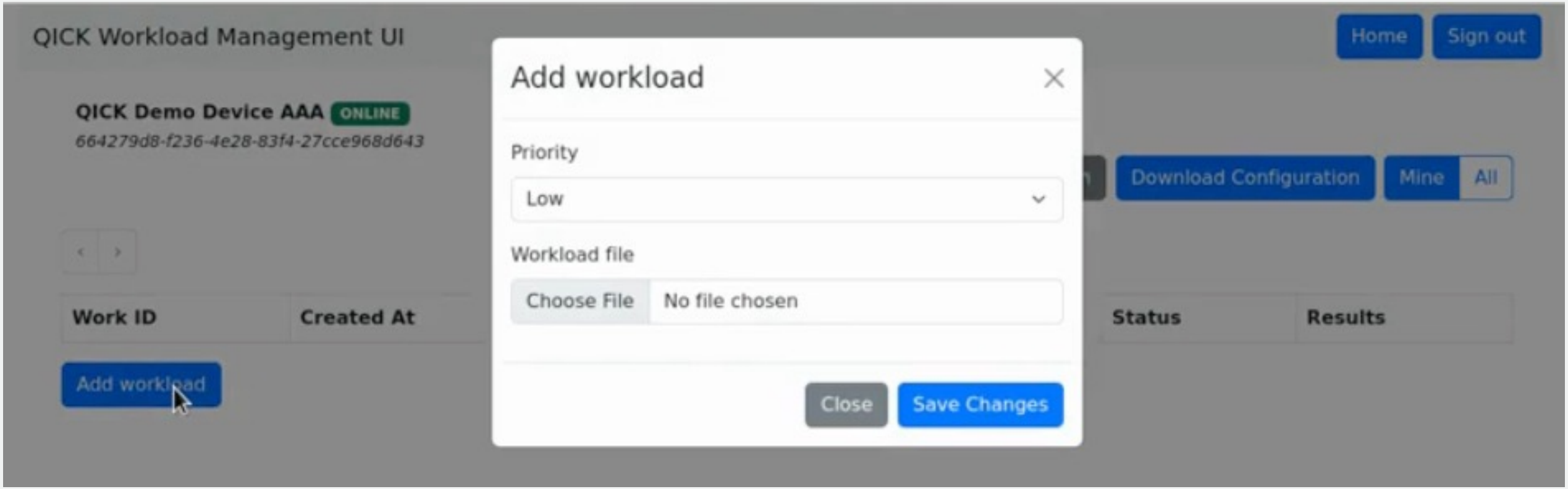
Running a workload (GUI)



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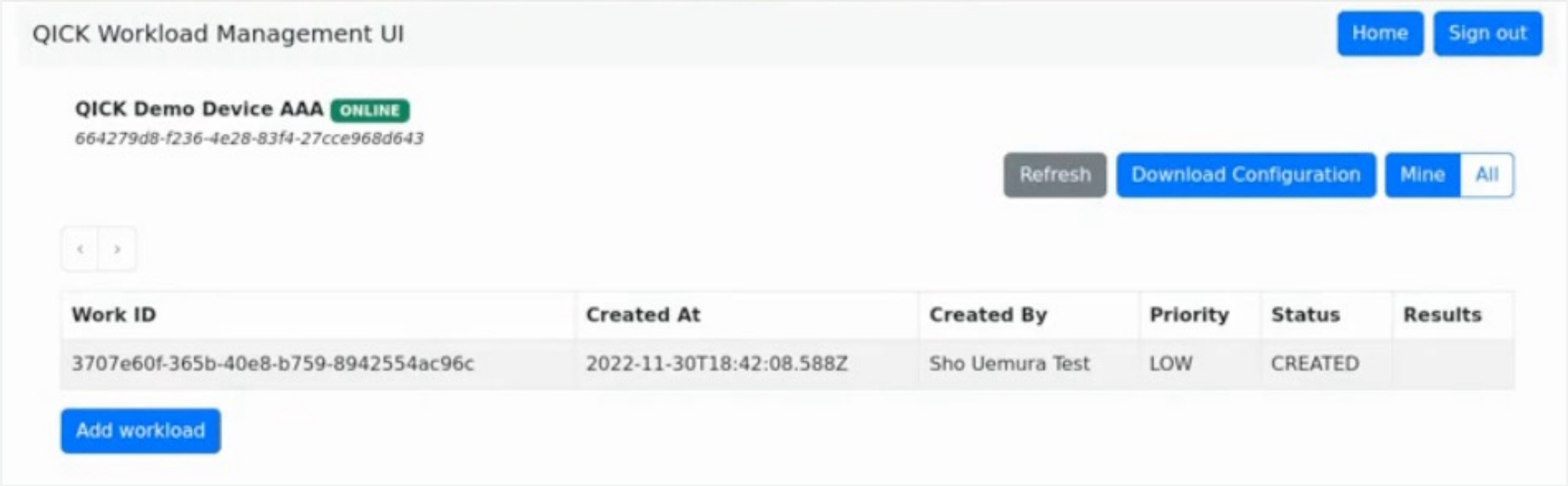
Running a workload (GUI)



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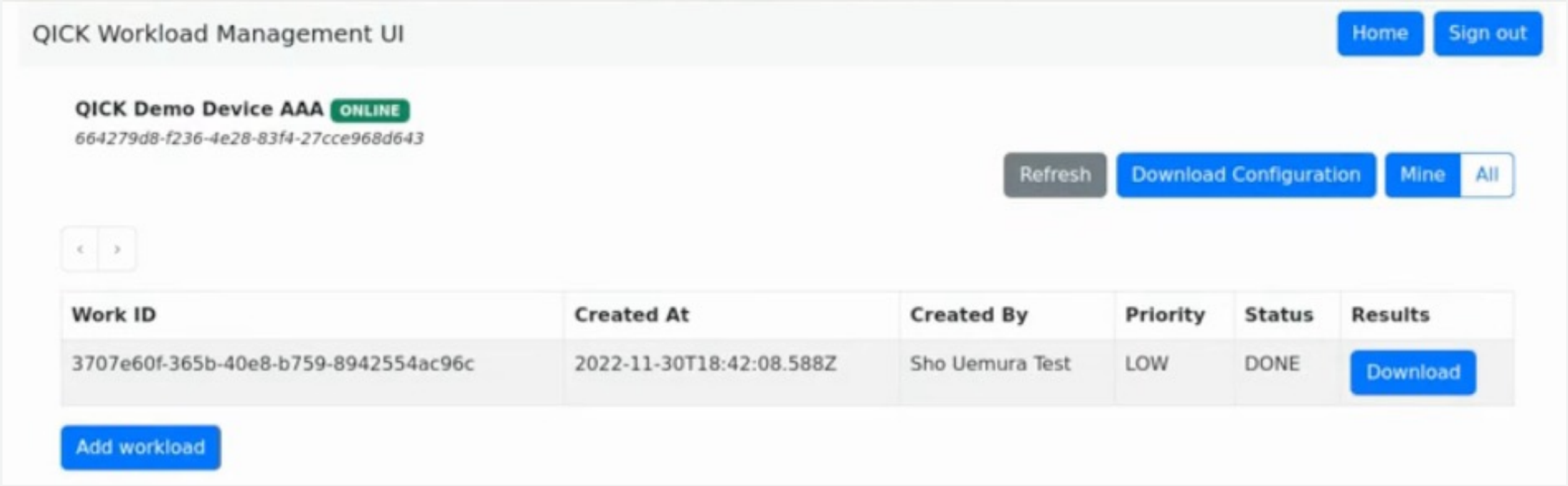
Running a workload (GUI)



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Run a workload (SDK)

```
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        print("workload is submitted, work ID " + work_id)

        client.wait_until_done(work_id, progress=True)

        print("reading results:")
        with client.get_results(work_id) as resultsfile:
            expt.read_results(resultsfile)

        print("plotting results")
        expt.display()

        initializing WorkloadManager:

        100% 1001/1001 [00:00<00:00, 3211.18it/s]

        writing programs to workload file:

        100% 1001/1001 [00:00<00:00, 59738.74it/s]

        submitting workload:
```

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Why not Braket?

	SideQICK	Braket
Application	Calibration Benchmarking Pulses	Pulses* Circuits Algorithms
Customers	Research groups	Quantum Curious and Corporate
Security	User-based	Account-based
Integration	Flexible User controlled	Standardized Optimized for automation
Timing	ASAP	Longer term Can work with SideQICK

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SideQICK Benefits

- Workloads are completely encapsulated
- Cloud connected
- Device scaling
- Transparent operation
- Simple permissions
- Improved security
- Low cost

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