



AWS SideQICK

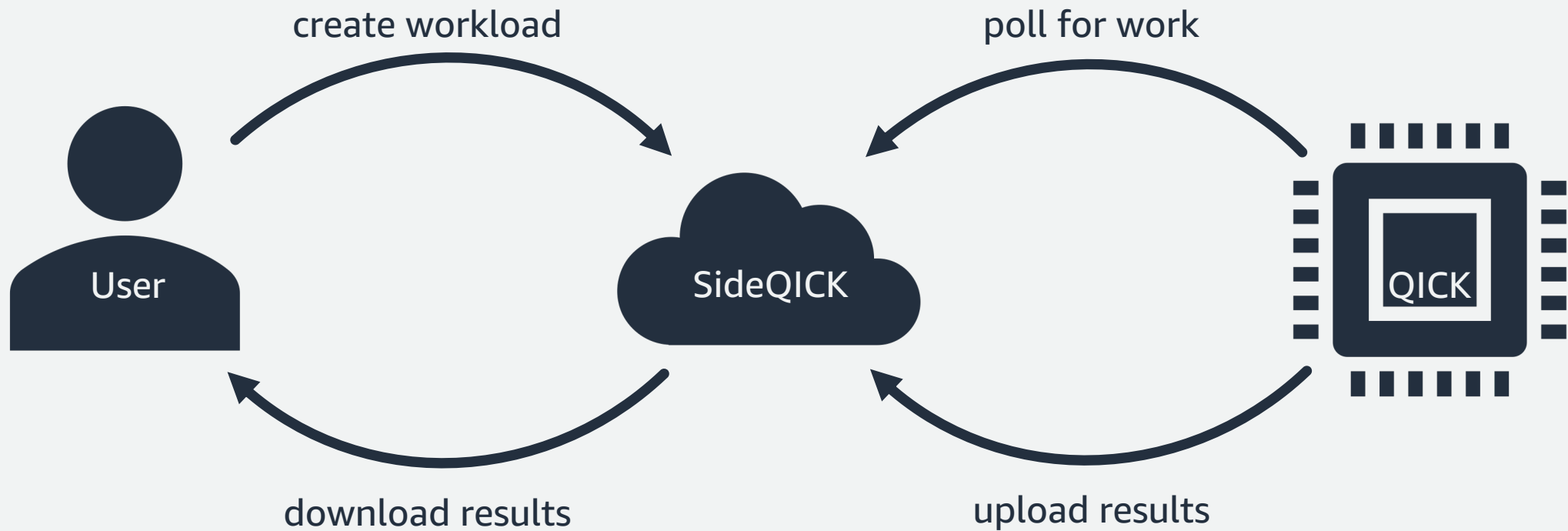
Simple Cloud Batching for QICK

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Amazon Braket

SideQICK at a glance



Deploy

1. Download code from GitHub
(link pending AWS AppSec review)
2. Run install script

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://fpj5uufzr2.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 well
```

```
Put the following in the device credentials file /etc/qick/credentials:
```

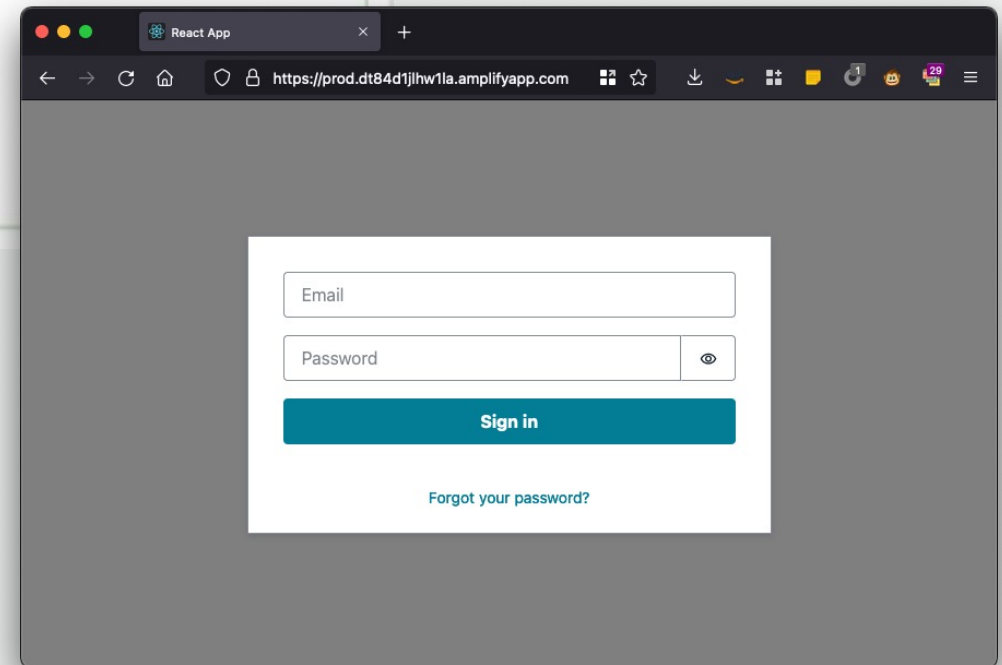
```
[credentials]
id = 11splignbpnt52ktpcg347kco5
secret = 5cvb4147jv54ap0la55ck01p7ne2cgm2t8tpdhhdoh9sijqv2rh2
```

```
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
pynq216 start_qick_client.sh[79301]: INFO:root:UpdateDevice with status ONLINE
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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
pynq216 start_qick_client.sh[79301]: INFO:root:GetDeviceWork: no work for device
```

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://fpj5uufz2.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
```



The screenshot shows a web browser window with the URL `https://prod.dt84d1jhw1la.amplifyapp.com`. The page displays a login form with the following elements:

- An "Email" input field.
- A "Password" input field with a toggle icon (an eye) to the right.
- A teal "Sign in" button.
- A link labeled "Forgot your password?" below the button.

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 [00:00]

writing programs to workload file:

100%  1001/1001 [00:00]

submitting workload:

QICK Workload Management UI

[Home](#) [Sign out](#)

QICK Demo Device AAA ONLINE

664279d8-f236-4e28-83f4-27cce968d643

[Refresh](#)

[Download Configuration](#)

[Mine](#)

[All](#)



Work ID	Created At	Created By	Priority	Status	Results
3707e60f-365b-40e8-b759-8942554ac96c	2022-11-30T18:42:08.588Z	Sho Uemura Test	LOW	DONE	Download

[Add workload](#)

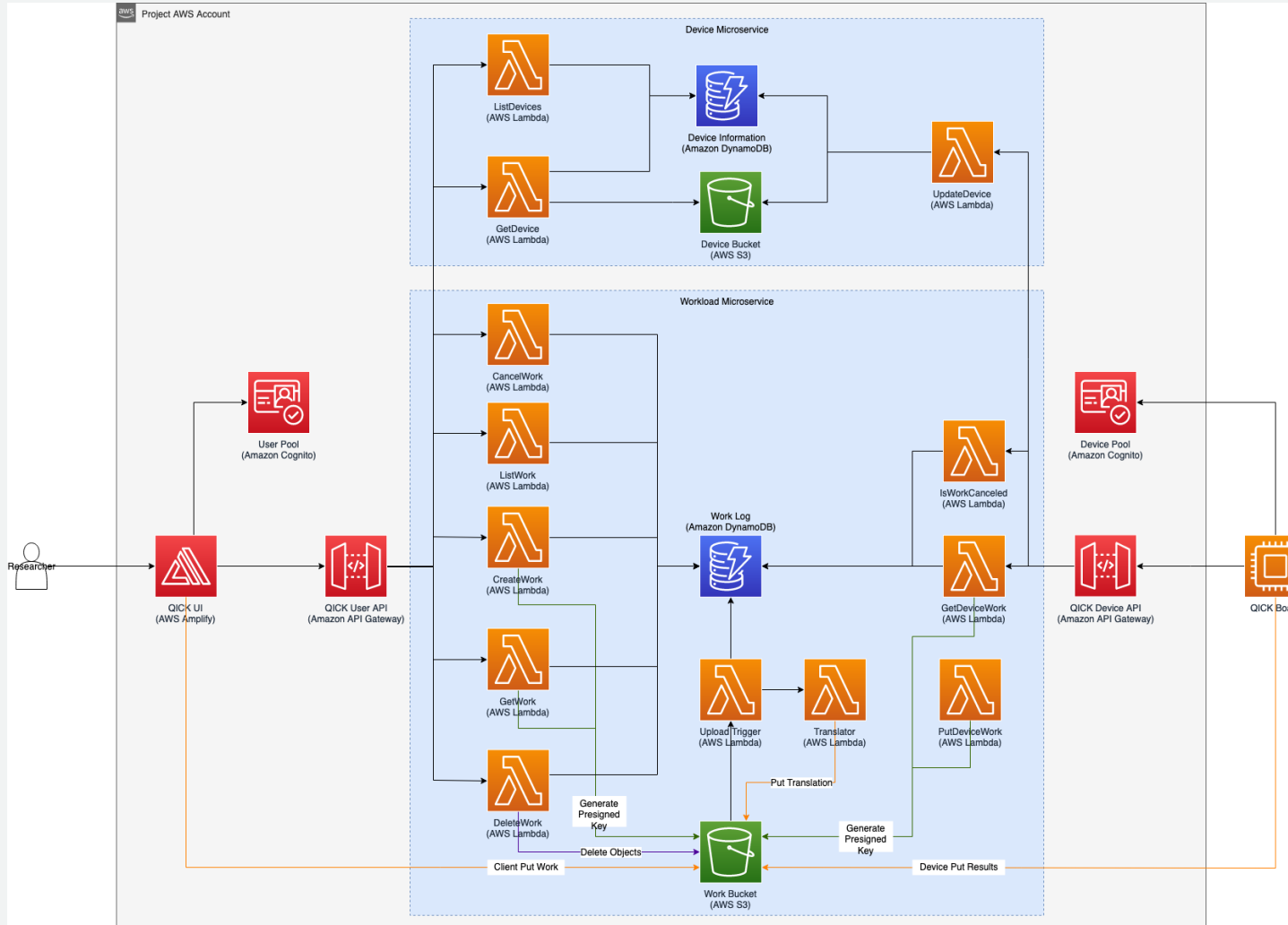


Thank you!

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

Supplementary slides

SideQICK design



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 ←

```

Creating a workload

The screenshot displays the QICK Workload Management UI. A modal dialog titled "Add workload" is open, showing a "Priority" dropdown set to "Low" and a "Workload file" field with a "Choose File" button. Below the dialog, a code editor shows the following Python code:

```
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)
```

The background UI shows a table with columns: Work ID, Created At, Created By, Priority, Status, Results. A single row is visible with the following data:

Work ID	Created At	Created By	Priority	Status	Results
3707e60f-365b-40e8-b759-8942554ac96c	2022-11-30T18:42:08.588Z	Sho Uemura Test	LOW	CREATED	

Getting results

QICK Workload Management Home Sign out

QICK Demo Device AAA ONLINE

664279d8-f236-4e28-83f4-27cce968

< >

Work ID

3707e60f-365b-40e8-b759-8942

Add 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()
```

Add Configuration

Mine

All

Status	Results
DONE	<p style="background-color: #007bff; color: white; padding: 5px; border-radius: 5px;">Download</p>

Device Status

QICK Workload Management UI Home Sign out

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

Running a workload (GUI)

QICK Workload Management UI

Home

Sign out

QICK Demo Device AAA **ONLINE**

664279d8-f236-4e28-83f4-27cce968d643

Refresh

Download Configuration

Mine

All



Work ID	Created At	Created By	Priority	Status	Results
---------	------------	------------	----------	--------	---------

Add workload



Running a workload (GUI)

The screenshot displays the QICK Workload Management UI. In the top right corner, there are 'Home' and 'Sign out' buttons. The main content area shows 'QICK Demo Device AAA' with an 'ONLINE' status and a long alphanumeric ID. Below this, there are navigation arrows and a table with columns 'Work ID' and 'Created At'. A blue 'Add workload' button is visible, with a mouse cursor hovering over it. A modal dialog box titled 'Add workload' is open in the center, featuring a close button (X) in the top right. The dialog contains a 'Priority' dropdown menu set to 'Low', a 'Workload file' section with a 'Choose File' button and the text 'No file chosen', and two buttons at the bottom: 'Close' and 'Save Changes'.

Running a workload (GUI)

QICK Workload Management UI

Home

Sign out

QICK Demo Device AAA **ONLINE**

664279d8-f236-4e28-83f4-27cce968d643

Refresh

Download Configuration

Mine

All



Work ID	Created At	Created By	Priority	Status	Results
3707e60f-365b-40e8-b759-8942554ac96c	2022-11-30T18:42:08.588Z	Sho Uemura Test	LOW	CREATED	

Add workload

Running a workload (GUI)

QICK Workload Management UI

Home

Sign out

QICK Demo Device AAA **ONLINE**

664279d8-f236-4e28-83f4-27cce968d643

Refresh

Download Configuration

Mine

All



Work ID	Created At	Created By	Priority	Status	Results
3707e60f-365b-40e8-b759-8942554ac96c	2022-11-30T18:42:08.588Z	Sho Uemura Test	LOW	DONE	Download

[Add workload](#)

Run a workload (SDK)

```
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 [00:00<00:00, 3211.18it/s]

writing programs to workload file:
100% ██████████ 1001/1001 [00:00<00:00, 59738.74it/s]

submitting workload:
```

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

SideQICK Benefits

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