MemVerge

aws PARTNER Amazon EC2 Spot Ready

aws Qualified Software

aws PARTNER

Cloud Infrastructure Setup

Ashley Tung
Solution Engineer

Contents

- AWS
  - Quick Introduction to AWS Instances
  - What are Spot Instances?
  - What are Spot Interruptions?

- MMC
  - Architecture
  - OpCenter GUI

- How MMC works with Nextflow

- Submitting a pipeline
  - Via a template
  - Via command line

- Viewing a pipeline
  - Workflow view

AWS EC2 Instances

- What is AWS?
  - Cloud infrastructure platform
  - Provides resources for cloud computing

- EC2 Instances
  - Virtual server instances in the cloud
  - Most common instances are On-Demand

What are Spot Instances?

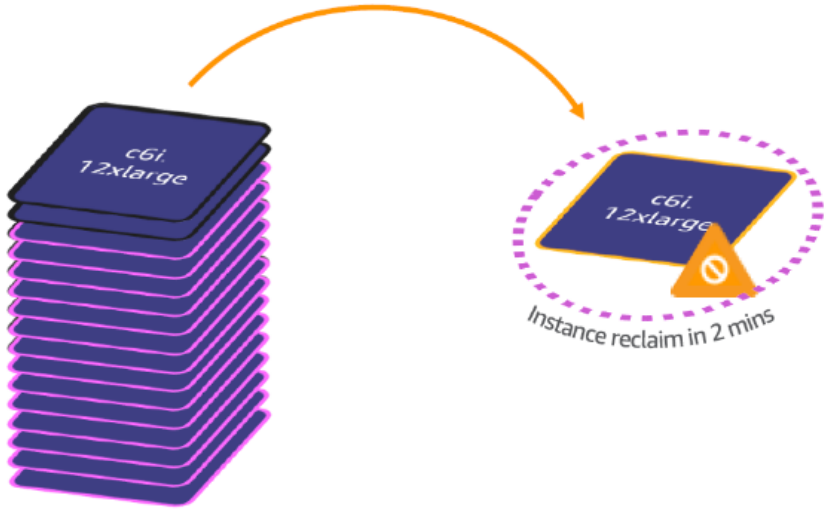
- Sold based off spare VM capacity
- Sold at up to 90% discount

Instance name	On-Demand hourly rate
m4.10xlarge	$2.0000
m4.16xlarge	$3.2000

Instance Type	Spot hourly rate
m4.10xlarge	$0.698
m4.16xlarge	$1.0405

What are Spot Interruptions?

- At any point, Spot Instances can be reclaimed

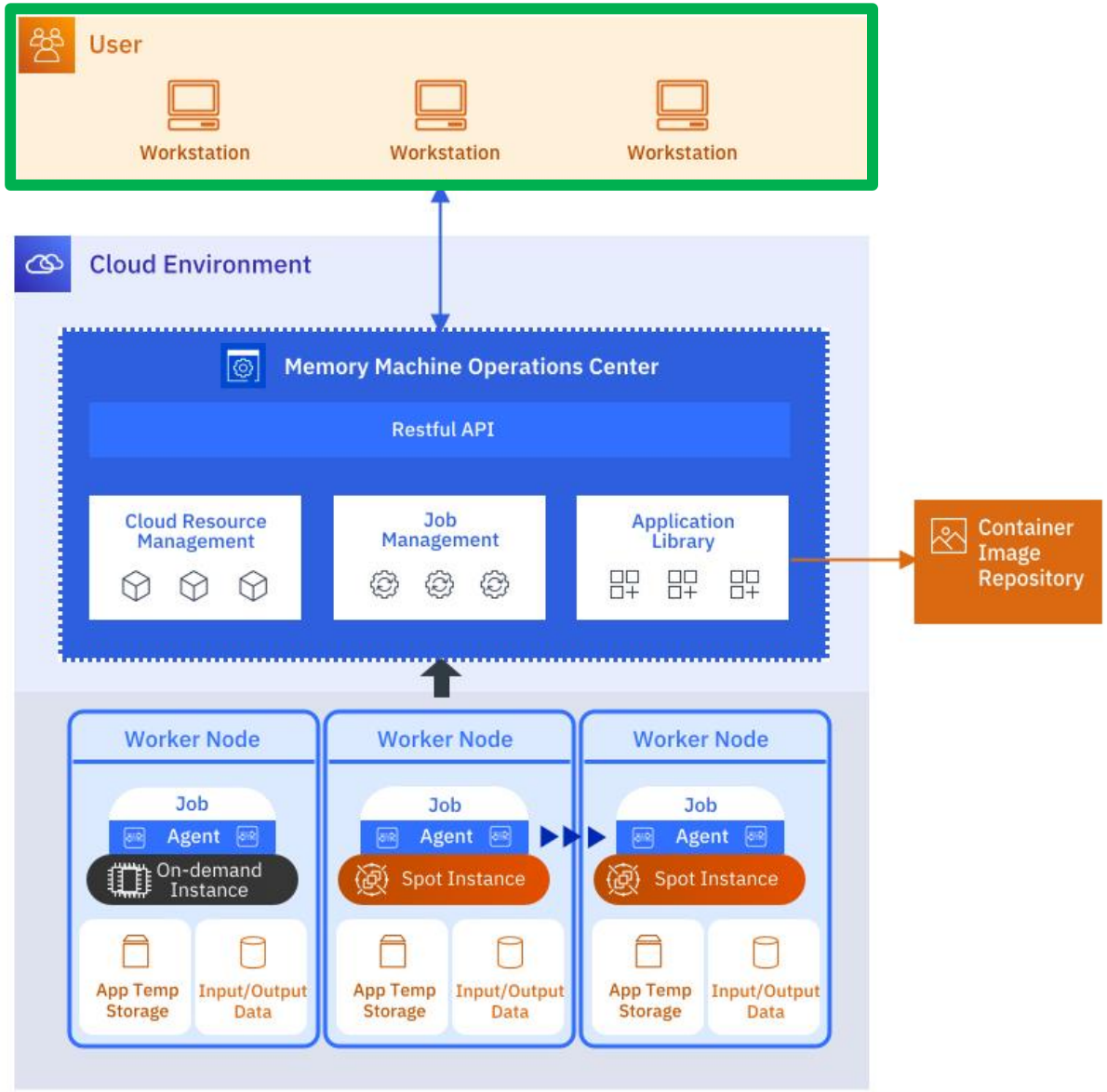


- 2-minute grace period after notification
  - Inconvenience for long-running, fault-sensitive jobs
  - ex: cellranger, rnaseq, etc..

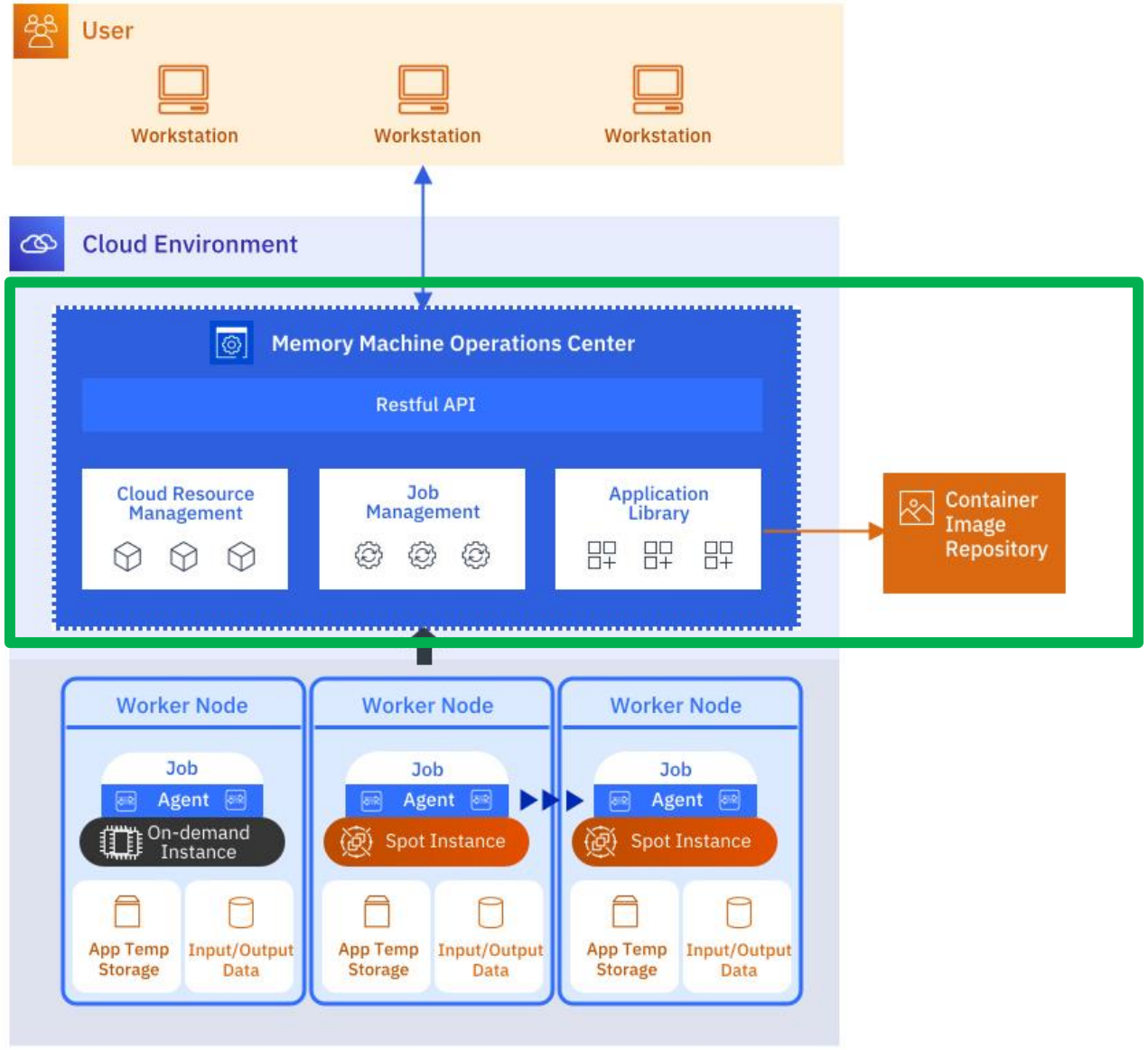
MMC – Memory Machine Cloud

- Architect your application to be fault-tolerant
- Provide automated checkpoint recovery service
- Enables long-running jobs to run on multiple, low-cost Spot instances
- Includes setup specifically for Nextflow pipelines

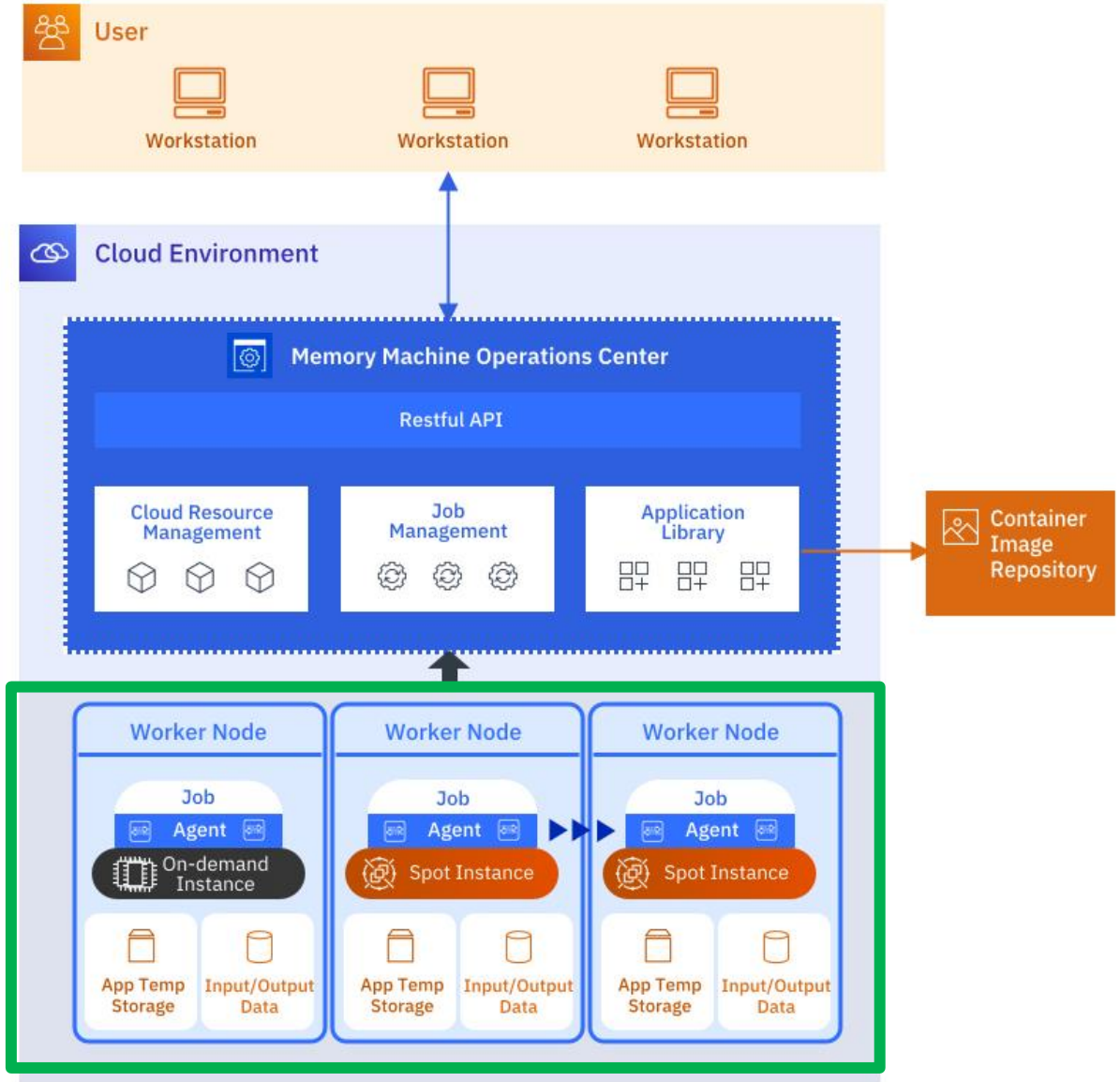
MMC – Architecture



MMC – Architecture

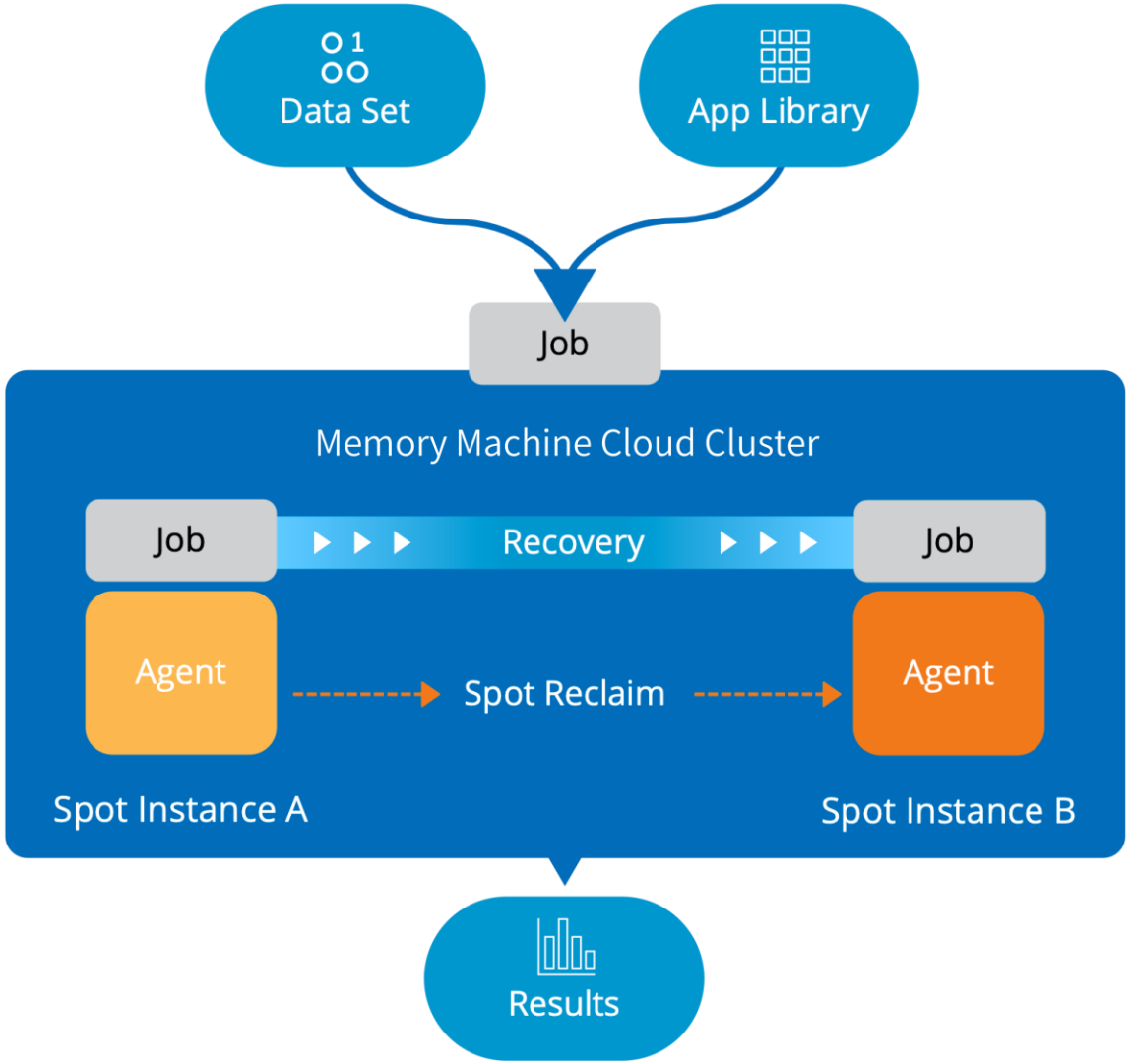


MMC – Architecture

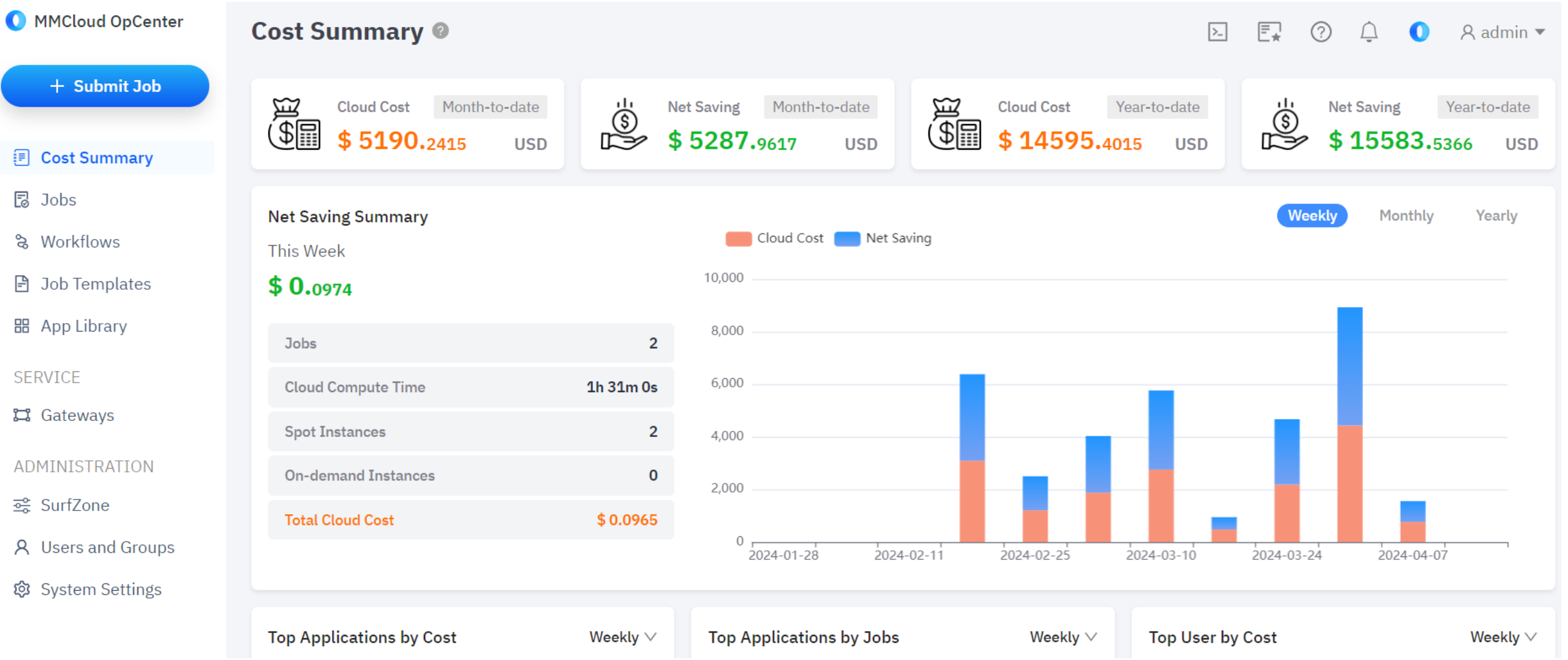


MemVerge

MMC – Architecture

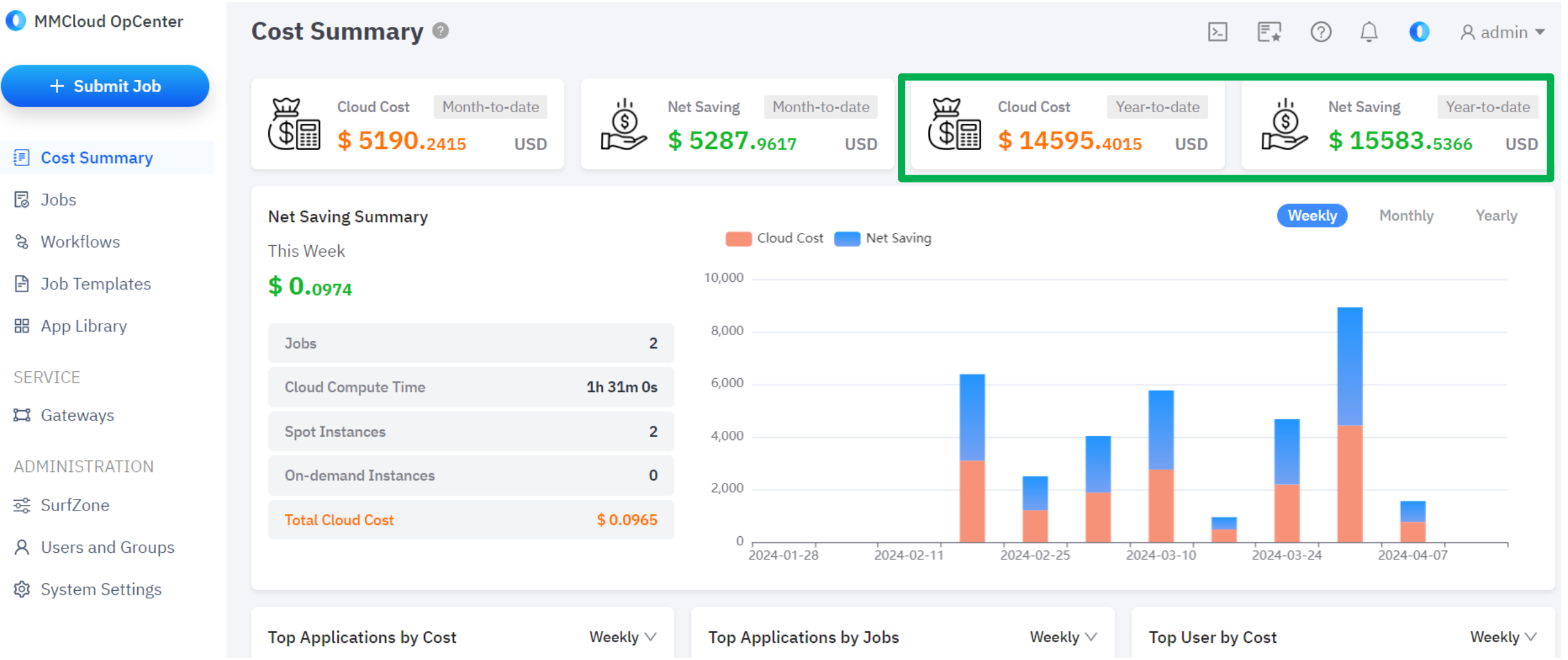


OpCenter GUI



MemVerge

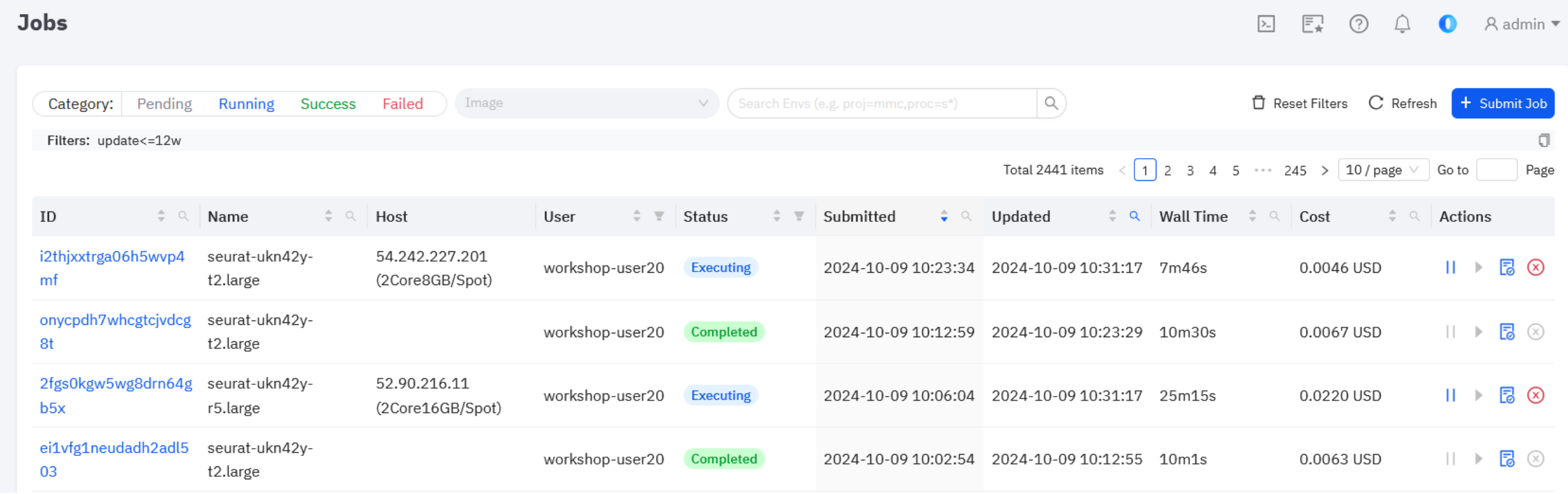
OpCenter GUI



MemVerge

Job Tab

- See Executing/Completed/Failed jobs submitted



MemVerge

Job Tab

- Each job will have further details

Job Details - seurat-ukn42y-r5.large Executing

docker.io/mdiblbiocore/seurat:latest

Refresh | Migrate | Modify | More Actions

ID	Host	User	Submitted Time	Wall Time	Cost
2fgs0kgw5wg8drn64gb5x	52.90.216.11 (2Core16GB/Spot)	workshop-user20	2024-10-09 10:06:04	26m12s (Queue Time: 0s)	0.0229 USD

Output

23

Instances (2) | Storage Volumes (2) | Settings | Attachments | WaveWatcher | Download Log Bundle

Instance ID: i-0a2c0a40a0dbc300f Logs — Zone: us-east-1b | Subnet: subnet-0ee170e07276518ad

Spot t2.large | 2 Core 8 GB

Address	Public IP	Status	Start Time	End Time	Cost
10.0.147.198:443	54.209.166.136	reclaimed	2024-10-09 10:06:06	2024-10-09 10:21:18	0.0067 USD

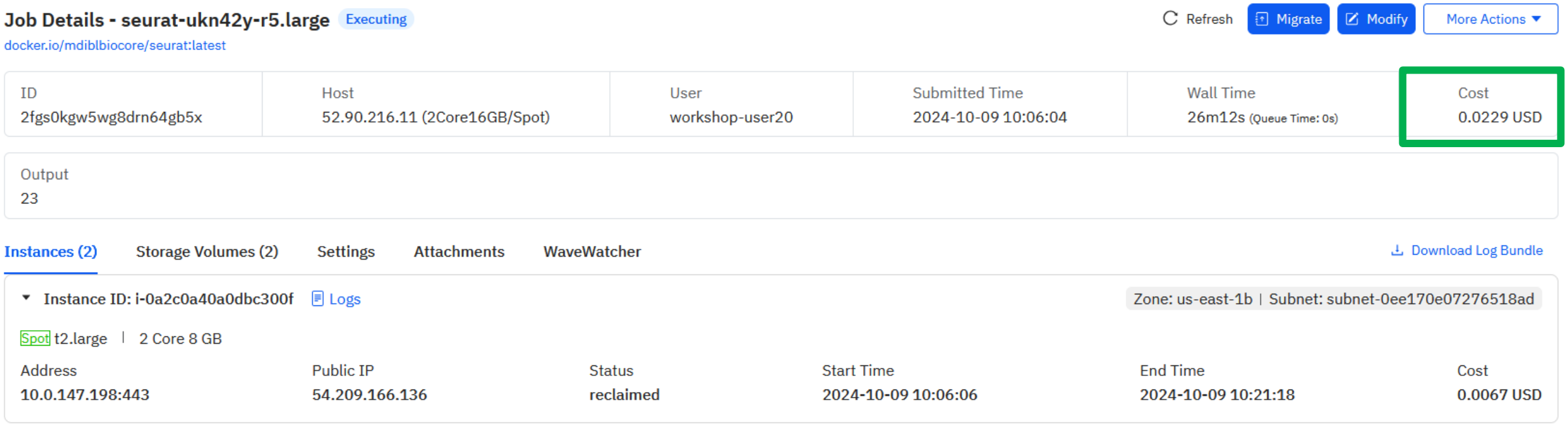
Instance ID: i-059286c327b51ce3e Logs — Zone: us-east-1b | Subnet: subnet-0ee170e07276518ad

Spot r5.large | 2 Core 16 GB

Address	Public IP	Status	Start Time	End Time	Cost
10.0.155.6:443	52.90.216.11	normal	2024-10-09 10:17:25		0.0097 USD

Job Tab

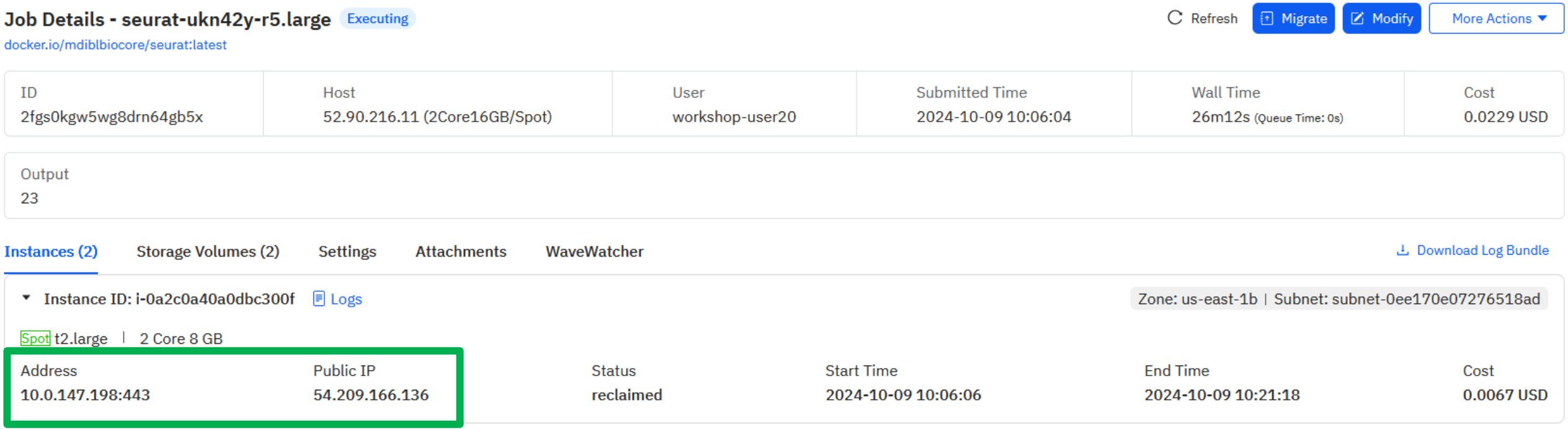
- Each job will have further details
  - Instance cost



MemVerge

Job Tab

- Each job will have further details
  - Private and public IP



MemVerge

Job Tab

- Each job will have further details
  - WaveWatcher tab shows stats on resource usage

MemVerge

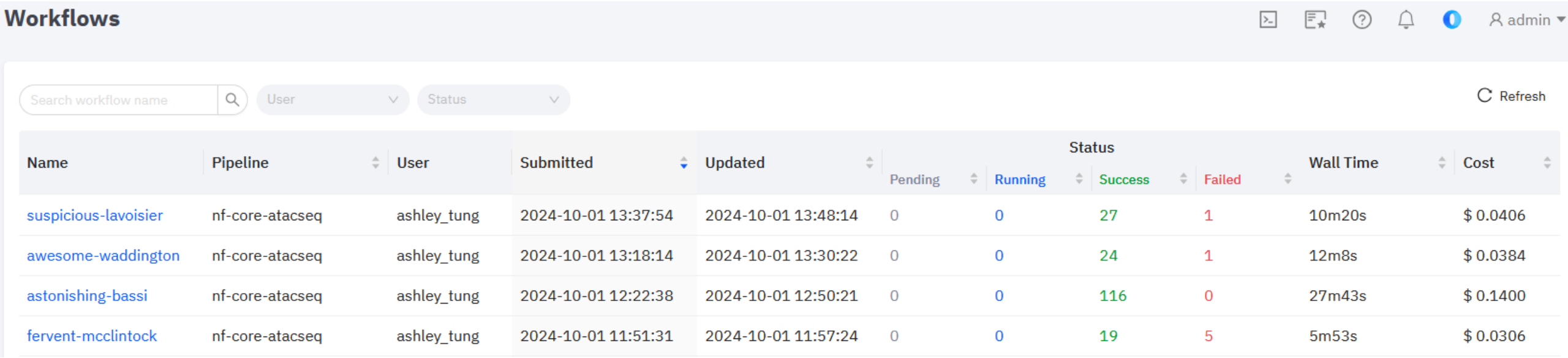
Job Tab

- Each job will have further details
  - WaveWatcher tab shows stats on resource usage

MemVerge

Workflow Tab

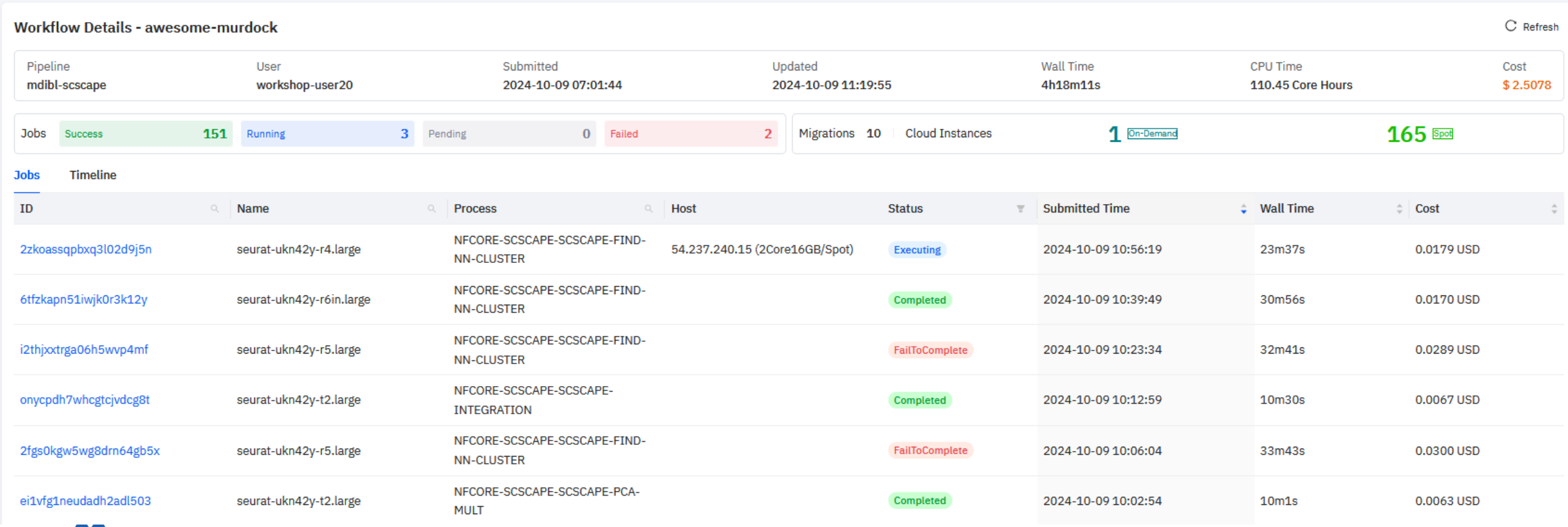
- Workflow view allows the user to examine all the tasks grouped in a single workflow
  - Feature applies to Nextflow pipelines



Name	Pipeline	User	Submitted	Updated	Status				Wall Time	Cost
					Pending	Running	Success	Failed		
suspicious-lavoisier	nf-core-atacseq	ashley_tung	2024-10-01 13:37:54	2024-10-01 13:48:14	0	0	27	1	10m20s	$ 0.0406
awesome-waddington	nf-core-atacseq	ashley_tung	2024-10-01 13:18:14	2024-10-01 13:30:22	0	0	24	1	12m8s	$ 0.0384
astonishing-bassi	nf-core-atacseq	ashley_tung	2024-10-01 12:22:38	2024-10-01 12:50:21	0	0	116	0	27m43s	$ 0.1400
fervent-mcclintock	nf-core-atacseq	ashley_tung	2024-10-01 11:51:31	2024-10-01 11:57:24	0	0	19	5	5m53s	$ 0.0306

Workflow Tab

- Workflow view allows the user to examine all the tasks grouped in a single workflow
  - Feature applies to Nextflow pipelines
  - Includes a summary of the entire pipeline



Workflow Details - awesome-murdock

Refresh

Pipeline	User	Submitted	Updated	Wall Time	CPU Time	Cost
mdibl-scscape	workshop-user20	2024-10-09 07:01:44	2024-10-09 11:19:55	4h18m11s	110.45 Core Hours	$ 2.5078

Jobs | Success 151 | Running 3 | Pending 0 | Failed 2

Migrations 10 | Cloud Instances 1 On-Demand | 165 Spot

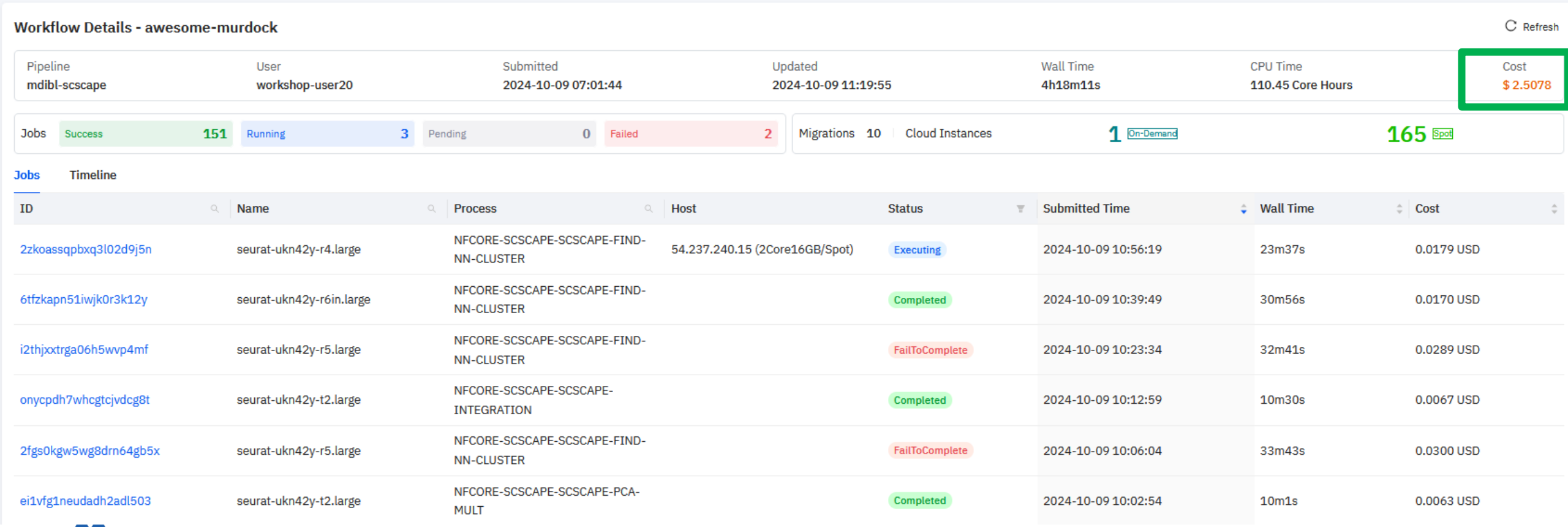
Jobs | Timeline

ID	Name	Process	Host	Status	Submitted Time	Wall Time	Cost
2zkoassqpbxq3l02d9j5n	seurat-ukn42y-r4.large	NFCORE-SCSCAPE-SCSCAPE-FIND-NN-CLUSTER	54.237.240.15 (2Core16GB/Spot)	Executing	2024-10-09 10:56:19	23m37s	0.0179 USD
6tfzkapn51iwjk0r3k12y	seurat-ukn42y-r6in.large	NFCORE-SCSCAPE-SCSCAPE-FIND-NN-CLUSTER		Completed	2024-10-09 10:39:49	30m56s	0.0170 USD
i2thjxxtrga06h5wvp4mf	seurat-ukn42y-r5.large	NFCORE-SCSCAPE-SCSCAPE-FIND-NN-CLUSTER		FailToComplete	2024-10-09 10:23:34	32m41s	0.0289 USD
onycpdh7whcgtcjvdcg8t	seurat-ukn42y-t2.large	NFCORE-SCSCAPE-SCSCAPE-INTEGRATION		Completed	2024-10-09 10:12:59	10m30s	0.0067 USD
2fgs0kgw5wg8drn64gb5x	seurat-ukn42y-r5.large	NFCORE-SCSCAPE-SCSCAPE-FIND-NN-CLUSTER		FailToComplete	2024-10-09 10:06:04	33m43s	0.0300 USD
ei1vfg1neudadh2adl503	seurat-ukn42y-t2.large	NFCORE-SCSCAPE-SCSCAPE-PCA-MULT		Completed	2024-10-09 10:02:54	10m1s	0.0063 USD

MemVerge

Workflow Tab

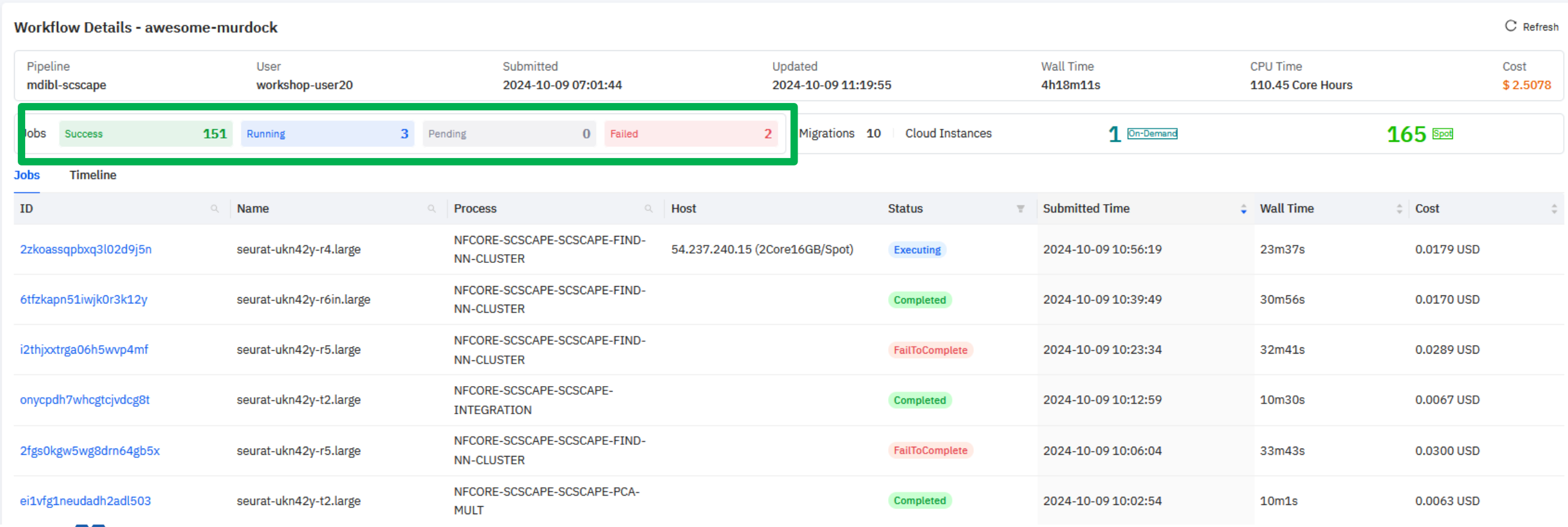
- Workflow view allows the user to examine all the tasks grouped in a single workflow
  - Feature applies to Nextflow pipelines
  - Includes a summary of the entire pipeline



MemVerge

Workflow Tab

- Workflow view allows the user to examine all the tasks grouped in a single workflow
  - Feature applies to Nextflow pipelines
  - Includes a summary of the entire pipeline



MemVerge

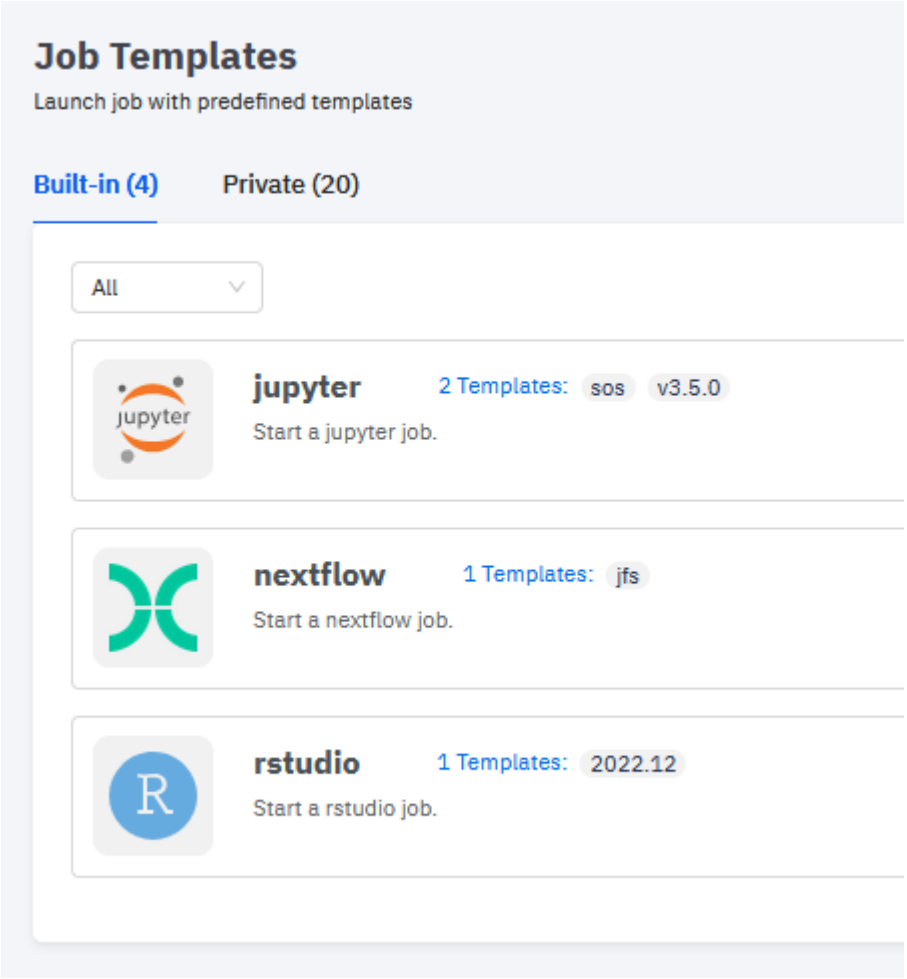
Workflow Tab

- Workflow view allows the user to examine all the tasks grouped in a single workflow
  - Feature applies to Nextflow pipelines
  - Includes a summary of the entire pipeline

MemVerge

Submitting Pipelines – Job Templates

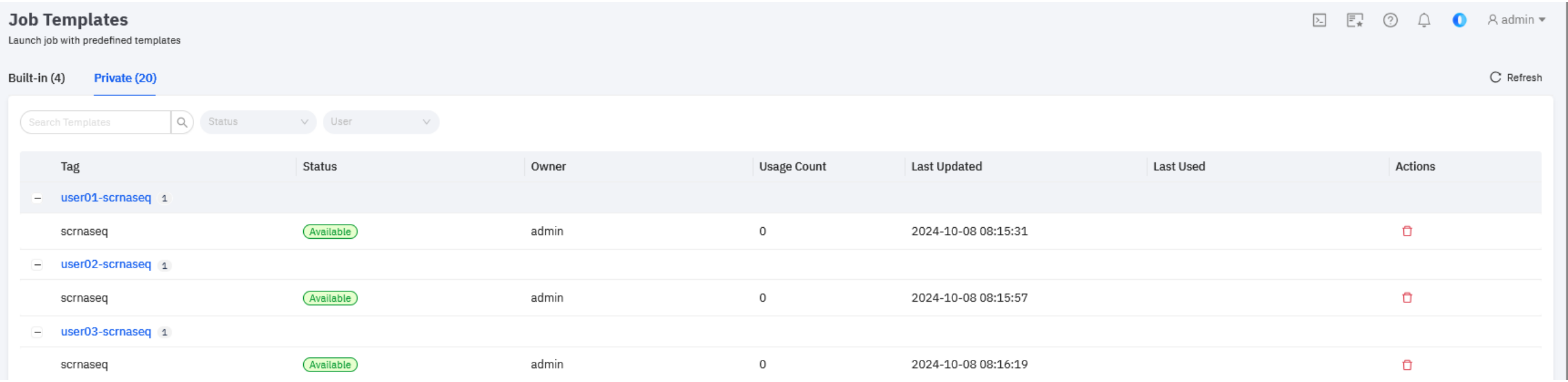
- Templates simplify the procedure for submitting jobs by having preconfigured parameters
  - OpCenter contains a library of built-in templates



MemVerge

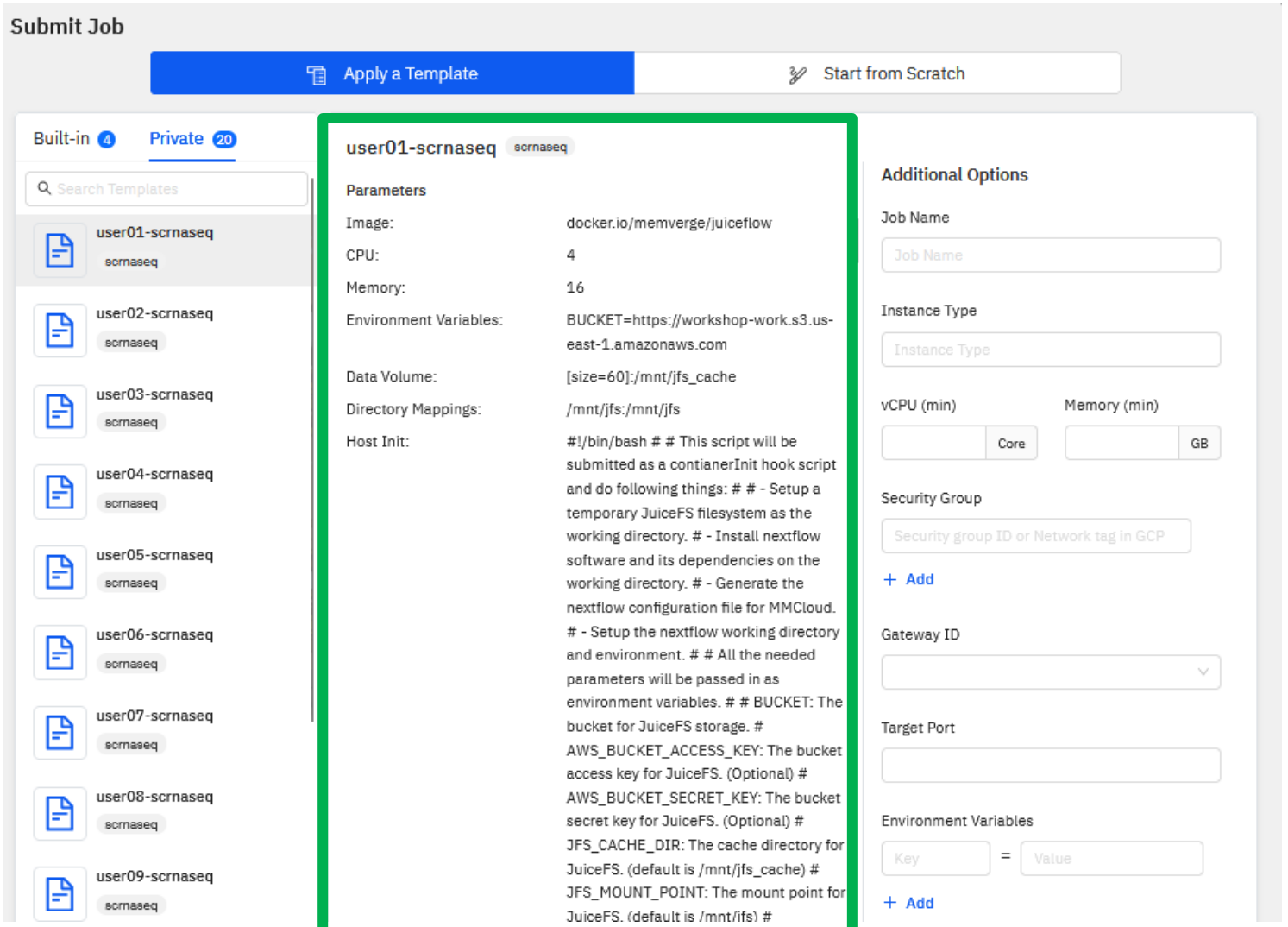
Submitting Pipelines – Job Templates

- Build private templates by saving previously-submitted job for future resubmissions



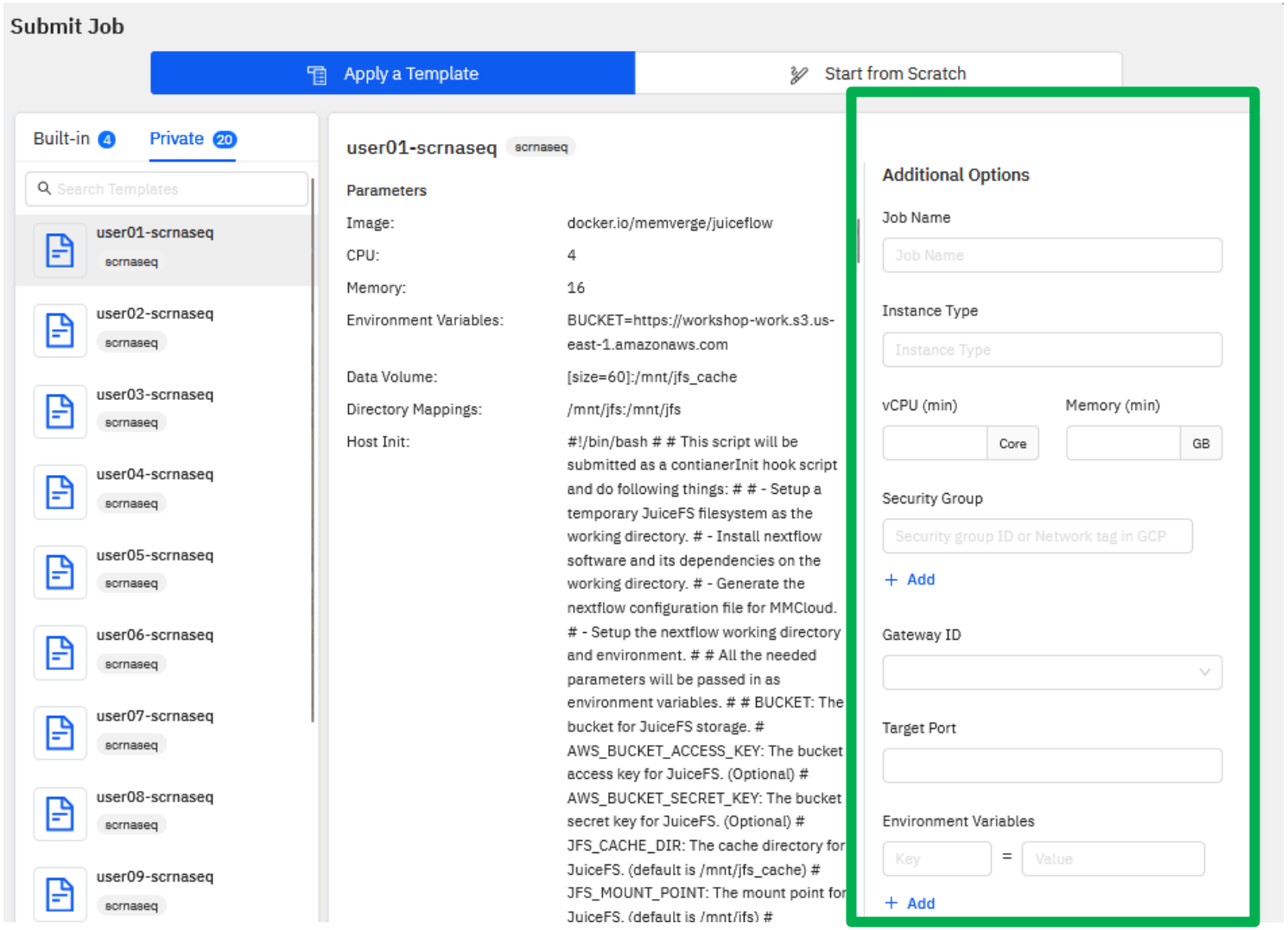
MemVerge

Submitting Pipelines – Job Templates



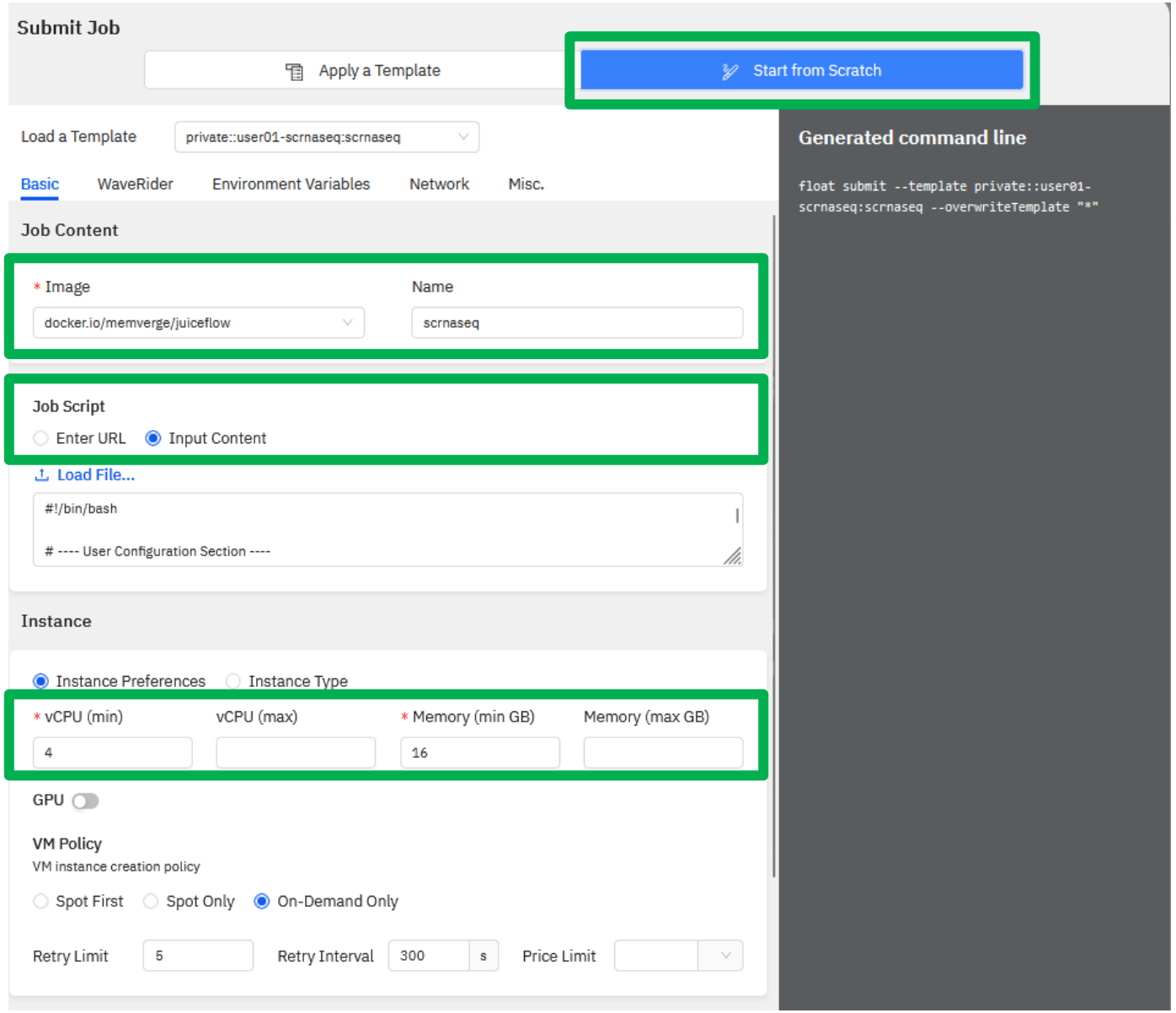
MemVerge

Submitting Pipelines – Job Templates



MemVerge

Submitting Pipelines – Job Templates



MemVerge

Submitting Pipelines – CLI

- Download the CLI to your terminal
- All job submission on the GUI can be done with CLI equivalent

```
[ashleyt@ashleyt2 ~]$ float -h
"float" is a tool supplied by MemVerge to control float service

Usage:
  float [flags]
  float [command]

Job Management
  list          show all jobs
  show          show information about a job or host
  submit        submit a new job
  cancel        cancel one job
  migrate       migrate workload
  modify        modify job attributes
  suspend       suspend a running job
  resume        resume a suspended/stopped job
  snapshot      manage job snapshots
  rerun         rerun a job
  promote       promote a job to a higher priority
  hosts         show information about hosts
```

```
[ashleyt@ashleyt2 ~]$ float submit --hostInit ~/memverge_solutions/juiceflow/aws/transient_JFS_AWS.sh \
> -c 2 -m 4 \
> -i docker.io/memverge/juiceflow \
> --dataVolume [size=60]:/mnt/jfs_cache \
> --migratePolicy [disable=true] \
> --vmPolicy [onDemand=true] \
```

MemVerge

Questions or Comments?