HPC Cloud On-Demand Data Center User Guide 6.1

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Welcome

Adaptive Computing's HPC Cloud On-Demand Data Center platform gives companies the ability to spin up temporary or persistent data center infrastructure resources quickly, inexpensively, and on-demand. This intelligent cloud management platform gives immediate access to all computational resources, whether on-premises or in the Cloud on any leading cloud provider.

Teams can automatically deploy and build clusters in the Cloud, automatically run applications on those clusters, and then terminate the Cloud resources on a daily, weekly, or even hourly basis.

The HPC Cloud On-Demand Data Center (ODDC) includes all the necessary tools to provision compute power and run workloads in the Cloud or on-premises. Access to all major cloud providers is preconfigured and built into the interface (CLI or GUI).

This guide will show you how to use the ODDC user interface and command line interface.

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Revision History

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September 2020	NODUS Cloud OS 5.1
January 2021	NODUS Cloud OS 5.2
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Related Documentation

- Cloud Business Value Process Spreadsheet http://support.adaptivecomputing.com/Cloud-Business-Value-Process-Spreadsheet.xlsx
- Persistent vs. On-Demand Cost Comparison Spreadsheet https://support.adaptivecomputing.com/Persistent-vs.-On-Demand-Cost-Comparison.xlsx
- HPC Cloud On-Demand Data Center Quick Start Guide HPC Cloud On-Demand Data Center Quick Start Guide (Adaptive Computing Support Portal / Product Documentation / HPC Cloud On-Demand Data Center)

Chapter 1: HPC Cloud On-Demand Data Center Platform Installation

This chapter provides information about the installer, which contains the entire ODDC platform, along with dependencies to install it.

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1.1 Prerequisites

This section contains the following information:

- Operating System
- Supported Browsers
- Linux Packages
- Traffic
- Credentials
- Stacks
- Site Availability

1.1.1 Operating System

The ODDC platform can be installed on many different Linux distributions and has been tested on these operating systems:

- CentOS 7
- Oracle 7.7
- Red Hat 7

Note: Refer to the chosen operating system's product specifications for minimum requirements.

1.1.2 Supported Browsers

The ODDC UI supports these web browsers:

- Google Chromium (latest version)
- Google Chrome (latest version)
- Mozilla Firefox (latest version)
- Microsoft Edge (two latest major versions)
- Apple Safari (two latest major versions)

1.1.3 Linux Packages

The following Linux packages must be installed on the ODDC platform server prior to the software installation:

- mongodb-server [version 4.4]
- nginx [version 1.16]

Caution! Using a version other than the ones specified is unsupported and may result in an unstable environment.

(optional) If you want to mount/unmount a remote file system over SSH, you can use the command **nodus cluster:sshfs**.

Environment Modules can be incorporated into clusters to help manage your Linux shell environment. Environment Modules enable your environment to be modified by dynamically adding or removing settings.

1.1.4 Traffic

To enable access to the ODDC platform server, the following ports need to be open with external access:

- 22 (SSH) user direct access / Moab job routing
- 80 (HTTP) connection to the ODDC UI
- 443 (HTTPS) optional, if you secure your HTTP connection
- 12001 (Cluster API) RESTful API that communicates with the clusters
- 12345 (ODDC web API) the ODDC platform API server that communicates with your UI

Note: The ODDC platform server installation will enable these ports on the server. Ports 80 and 443 are used for the UI, but can be changed to reflect your requirements.

InfiniBand networks are configured when identified in the server instance. InfiniBand is a scalable networking communications standard used in HPC and provides high data throughput with low latency.

1.1.5 Credentials

This section contains information about obtaining credentials from the cloud service providers.

These are the supported cloud service providers:

- 🔿 Google Cloud
- Microsoft Azure
- ORACLE Oracle Cloud
- 🍊 Open Telekom Cloud (OTC)

Note: For unsupported cloud service providers, please contact us at oddcsupport@adaptivecomputing.com to inquire about adding the provider into the ODDC.

The ODDC requires programmatic access to deploy nodes and cluster networks on your cloud provider's resources. The steps below will help you obtain the proper cloud credentials.

Important! The following sections are intended to be used for reference only -- refer to the providers' support pages for detailed information. If you need a private IP address created within a provider or you cannot get provider credentials / correct admin level credentials, please contact us at oddcsupport@adaptivecomputing.com.



HPC Cloud On-Demand Data Center Overview

Continue with the steps for your chosen provider below to obtain credentials:

- Google Cloud
- AWS
- Microsoft Azure
- Oracle Cloud
- Open Telekom Cloud

Google Cloud

- 1. Go to https://cloud.google.com.
- 2. Select IAM & Admin / Service Accounts.
- 3. From the Service account list, select New service account.
- 4. In the Service account name field, enter a name, and then click Create.
- 5. From the Role list, select Project / Owner.

- 6. Click Add Key / Create new key.
- 7. Click Create. A JSON file that contains your key downloads to your computer.
- **8.** After you have your credentials, continue with the section Stacks.

See https://cloud.google.com/docs/authentication/production for additional information.

AWS

AWS has two forms of credentials; both require admin privileges to set up:

- Programmatic access (access key, secret key) is a floating set of coupled values.
- EC2 roles only exist within AWS and are attached to AWS instances.

These accounts must have valid permissions associated in order to use the ODDC. The ODDC can deploy clusters using either programmatic access or EC2 roles. However, stack builds can only be done with programmatic access.

The ODDC requires programmatic access to access the provider's resources. For example, if the ODDC is outside of the AWS environment, access keys are required. If the ODDC is running inside AWS, the best practice is to use IAM roles instead. An IAM role is a defined set of permissions. It is not associated with a specific user or group and any trusted entity can assume the role to perform a specific business task. The ODDC supports both access methods.

When creating a cluster via **nodus cluster:aws:create**, the flag --role can be used to set the cluster to use EC2 role instead of programmatic access. If the cluster entry already exists, then **nodus cluster:aws:update** can be used with flag --role or --no-role to switch on EC2 role use or turn it off, respectfully.

- 1. Go to https://aws.amazon.com and open the IAM dashboard.
- 2. In the navigation pane, select Users.
- **3.** Select the name of the user whose access keys you want to create, and then select the **Security Credentials** tab.
- 4. Add user permissions.
- 5. In the Access keys section, select Access keys (access key ID and secret key) / Create New Access Key, then download the file with the access key and secret key. Note: If you forget the secret key, you will have to delete it and create a new one.
- **6.** To view the new access key pair, select **Show**. You will not have access to the secret access key again after this dialog box closes.

- **7.** To download the key pair, select **Download** .csv file. Store the keys in a secure location. You will not have access to the secret access key again after this dialog box closes.
- **8.** After you download the .csv file, click **Close**. When you create an access key, the key pair is active by default, and you can use the pair right away.
- 9. After you have your credentials, continue with the section Stacks.

See https://docs.aws.amazon.com/general/latest/gr/aws-sec-cred-types.html for additional information.

Microsoft Azure

- **1.** Go to https://azure.microsoft.com/.
- 2. Run the script account-scripts_azure.sh.
- **3.** After you have your credentials, continue with the section Stacks.

See https://docs.microsoft.com/en-us/azure/automation/shared-resources/credentials for additional information.

Oracle Cloud

- **1.** From a terminal, install OpenSSL.
 - **A.** Run the command **openssl genrsa -out private-key.pem <xxxx>**. Where xxxx is the number of bits in the generated key, for example 2048.
 - B. Run the command openssl rsa -in private-key.pem -pubout -out public-key.pem.
- 2. Go to https://www.oracle.com/cloud/.
 - A. On the Oracle account to be used, click Profile / User Settings.
 - **B.** On the API Key page, under **Resources**, select **API Keys**, and then click **Add API Key**.
 - C. Select the option Choose Public Key File, select the public-key.pem generated previously, and then click Add.
 - **D.** Copy the contents of private-key.pem into a text editor and format as in the appendix Credential JSON Examples, and save as a JSON file.
 - **E.** Under the **Capabilities** section, click **View Configuration file**, and then copy the contents into the JSON file created previously and format as in the appendix example. **Note:** Do not include the = signs or the text to the left of the = signs.

- **3.** From the Oracle Cloud menu, select **Identity & Security**, and then under **Identity**, click **Compartments**.
 - **A.** Create a compartment and then within that compartment, create a VPC (virtual private cloud) network.
- **4.** From the Oracle Cloud menu, select **Networking** and then click **Virtual Cloud Networks**.

Note: All procedures in this step should be done in the root compartment.

- A. Create a VCN in the root compartment (under List Scope / Compartment).
- **B.** Within that VCN, create at least one subnet.
- **C.** Click the subnet and then in the **Compartment Information**, save the **OCID**: info because it will be needed to create stacks.
- **D.** Click the VCN, under **Resources**, select **Security Lists**, and then click **Create Security List**. Provide the required information and also add these rules:

Ingreos Ruics	Ingress	Rul	es
---------------	---------	-----	----

Stateless	Source	IP Protocol	Source Port Range	Destination Port Range	Type and Code	Allows	Description
No	0.0.0/0	ТСР	All	7946		TCP traffic for ports: 7946	
No	0.0.0.0/0	ТСР	All	12001		TCP traffic for ports: 12001	
No	0.0.0.0/0	ТСР	All	15001-15003		TCP traffic for ports: 15001- 15003	
No	0.0.0.0/0	ТСР	All	1-65535		TCP traffic for ports: 1-65535	
No	0.0.0.0/0	ТСР	All	7946		UDP traffic for ports: 7946	
No	0.0.0/0	ТСР	All	7373		TCP traffic for ports: 7373	

Egress Rules

Stateless	Source	IP Protocol	Source Port Range	Destination Port Range	Type and Code	Allows	Description
No	0.0.0/0	ТСР	All	All		TCP traffic for ports: All	

E. Add rules to the default security list, by selecting **Security Lists**, clicking **Default Security List for VCN**, and then adding these rules:

Stateless	Source	IP Protocol	Source Port	Destination Port	Type and	Allows	Description
			Range	Range	Code		
No	0.0.0.0/0	ТСР	All	22		TCP traffic for	
						ports: 22 SSH	
						Remote Login	
						Protocol	
No	0.0.0.0/0	ICMP			3, 4	ICMP traffic for:	
	-					3, 4 Destination	
						Unreachable:	
						Fragmentation	
						Needed and Don't	
						Fragment was Set	
No	10.0.0.0/16	ICMP			3	ICMP traffic for: 3	
	_					Destination	
						Unreachable	

Ingress Rules

Egress Rules

Stateless	Source	IP Protocol	Source Port Range	Destination Port Range	Type and Code	Allows	Description
No	0.0.0.0/0	All Protocols				All traffic for all ports	

F. Create another security list by selecting **Security Lists**, clicking **Create Security List**. We recommend naming the security list something like nodus-server. Provide the required information, and also add these rules:

Ingress Rules

Stateless	Source	IP Protocol	Source Port	Destination Port	Type and	Allows	Description
			Range	Range	Code		
No	0.0.0.0/0	ТСР	All	7946		TCP traffic for ports: 7946	
No	0.0.0.0/0	ТСР	All	12001		TCP traffic for ports: 12001	
No	0.0.0.0/0	ТСР	All	15001-15003		TCP traffic for ports: 15001- 15003	
No	0.0.0.0/0	ТСР	All	1-65535		TCP traffic for ports: 1-65535	

Stateless	Source	IP	Source	Destination	Туре	Allows	Description
		Protocol	Port	Port	and		
			Range	Range	Code		
No	0.0.0.0/0	ТСР	All	7946		UDP traffic for	
						ports: 7946	
No	0.0.0.0/0	ТСР	All	7373		TCP traffic for	
						ports: 7373	

- **G.** Under **Resources**, click **Internet Gateways**, click **Create Internet Gateway**. We recommend naming the internet gateway something like nodus-cluster. Provide the required information, and then click **Create Internet Gateway**.
- H. Under Resources, click NAT Gateways, click Create NAT Gateway. We recommend naming the NAT gateway something like nat_gateway. Provide the required information, and then click Create NAT Gateway.
- I. Under Resources, click Route Tables, click Create Route Table. Create two route tables. We recommend naming them something like nodus-server and nodus-cluster.
 - a. Click the nodus-server route table, click Add Route Rules, and add these rules:

Destination	Target Type	Target	Description
0.0.0.0/0	Internet Gateway	nodus-cluster	

b. Click the nodus-cluster route table, click **Add Route Rules**, and add these rules:

Destination	Target Type	Target	Description
0.0.0.0/0	NAT Gateway	nat_gateway	

- J. Click Virtual Cloud Networks click the VCN, click the subnet, click Add Security List, and then add the nodus-server and default security lists created above.
- **5.** From the Oracle Cloud menu, select **Developer Services**, and then under **Resource Manager**, click **Stacks**.
 - **A.** Click **Create a Stack**, provide the required information for each section, and then click **Create**.
- 6. After you have your credentials, continue with the section Stacks.

See https://docs.oracle.com/enus/iaas/Content/Identity/Tasks/managingcompartments.htm for additional information.

Open Telekom Cloud

- 1. Go to https://open-telekom-cloud.com/en.
- 2. Create an account and for the Access Type, select Programmatic Access.
- 3. On the Open Telekom Cloud (OTC) account to be used, create a VPC.
- 4. Within that VPC, create a subnet.
- 5. Create a Connection, create a Virtual Gateway, and then create a Virtual Interface.
- 6. Under Access Control, on the default Security Group, select Inbound Rules and then Allow Common Ports, and also select Outbound Rules and then Allow Common Ports.
- 7. Continue with the section Stacks.

See https://open-telekom-cloud.com/en/support/first-steps for additional information.

1.1.6 Stacks

The Cloud Security Administrator must be part of the install/implementation team in order to gain proper authorization to spin up instances/images in the Cloud.

To launch instances in the Cloud, a stack must first be created/built using credentials with appropriate cloud permissions and policies. The stack consists of the base OS (CentOS 7), services, libraries, applications, and any data that is needed so that once the instance starts up, it is ready to begin processing jobs. The ODDC allows customization options to conform to cloud configurations (proxy, vpc, subnet, etc.). See the section Stack Manager for information on creating a stack, and see the CLI Commands section Stacks for stack commands.

The stack build process generates two images: a base OS image and a prebuilt/configured image snapshot. You can use a stock image from the marketplace or account to build a private image. Cluster software used is Torque, Ansible, Maui, and Serf.

These options are also available in the ODDC:

- Create an advanced image by adding a customer's application to the stock image.
- Create a derived (deployment) image by adding a customer's application to a cluster (using a stock image), which then can be used as an advanced image.

See the section Building Stacks into Images for additional information.

1.1.7 Site Availability

Before building a stack or deploying a cluster, make sure that the site hashicorp.com (the supplier of Terraform) is not blocked by a firewall as this will prevent the Terraform process from completing.

1.2 Installation Steps

Important! If upgrading from a previous version of ODDC, you must first delete all jobs and destroy all clusters.

- 1. In a browser, access the server via the IP or hostname (e.g., http://x.x.x/) to verify that nginx is started and the default port is available. If the site is unreachable, then the firewall may be enabled or the nginx server is not running.
 - A. Connect to the server via a command line and run sudo systemctl start nginx.
 - **B.** Access http://x.x.x/ once again:
 - If you get a Welcome to CentOS message, the default port number is available and you can proceed with the installation. Or if the site is still unreachable, then the firewall may be enabled and the ODDC install cannot proceed.
 - If any other data is displayed on the browser, the default port may be in use and your administrator should assign you another port number that will be used in step **6**.
- **2.** Download the install file from adaptivecomputing.com (Support Portal Home / Product Download / HPC Cloud On-Demand Data Center) and then copy the file to the installation user.
- **3.** Untar the distribution file with the command **tar xf <ODDC_install_file-version>.tgz**. This will produce a directory with the installation files needed to install the ODDC.
 - A. Look at the files via ls. You should see a file called nodus-<version>.
 - B. Change to the installation directory with the command cd nodus-<version>.
- **4.** Because a license key is needed to install the ODDC, save the license key (provided by Adaptive Computing) in a file on the server. When using a Multi-User license, rather than a Site-User license, each user also needs a user key, so you need to obtain the user keys along with the license key. You will also need to provide a username that will be

used to access the web server files; for security purposes, never use $\verb"root"$ as the username.

- **5.** Install the ODDC with the command **sudo** ./install-nodus.sh <username> file>.
- **6.** (optional) If there is already a process using port 80 (from step 1), change the nginx port number with the command **sudo <edit> /etc/nginx/nginx.conf**.
 - **A.** Replace these lines:

```
listen 80 default_server;
listen [::] :80 default_server;
With these lines:
listen <new port> default_server;
listen [::] :<new port> default_server;
```

- 7. Restart the nginx server with the command sudo systemctl restart nginx.
- 8. The ODDC services use the file /NODUS/.nodusrc to modify the functionality of the ODDC. This file contains the following parameters:

```
MONGO HOST=localhost
```

This parameter defines the Mongo DB server that is hosting the ODDC database. The default value is localhost.

MONGO PORT=27017

This parameter defines the port that the Mongo DB server is listening on. The default value is 27017.

MONGO_DATABASE=nodus

This parameter defines the database in the Mongo DB and saves the information. The default value is nodus.

MONGO_USER=

This REQUIRED parameter defines the user in the Mongo DB that is authorized to access the ODDC information. This value is configured at installation.

MONGO_PASSWORD=

This REQUIRED parameter defines the password for the MONGO_USER in the Mongo DB that is authorized to access the ODDC information. This value is configured at installation.

LICENSE_PATH=/NODUS/.license

This parameter defines the location of the license key that is needed to use the ODDC. The default value is /NODUS/.license.

BURST_INTERVAL_MS=60000

This parameter defines the number of milliseconds for the ODDC to check all the clusters that are set to Bursting. The default value is 60000 (1 minute).

PARALLEL_TRANSACTIONS=10

This parameter defines the maximum parallel transaction for deploying/destroying nodes. The default value is 10.

EMAIL_HOST=

This parameter defines the host name of your email server.

EMAIL_PORT= This parameter defines the sending port for email.

EMAIL_USER= This parameter defines a valid email address on the EMAIL_HOST.

EMAIL_PASS= This parameter defines the password for the EMAIL_USER.

Note: If a parameter does not exist in the file, the default value is used.

1.3 Verifying the Installation

1. Check the UI configuration files by editing /NODUS/nodus-webui/build/assets/config.json. This file tells the UI the address and port of the API, and which providers will be used. You can edit the providers to only show which ones you will supply licenses to. The file looks similar to this:

```
{
"server": "http://<public_ip>:12345",
"providers": ["aws", "gcp", "azure", "oracle", "otc"],
"register": true,
"idleTimer": false
}
```

Notes: The public IP must be used, or the ODDC web API will not work, and the license will not apply. You can change the idleTimer default value of false by adding a number (in seconds).

- 2. Verify the API in a browser by entering http://<server_address>:12345/. The browser should display { "reason": "unknown", "message": "Not Found" } or Unauthorized. If not, rerun step 1 and/or step 2.
- **3.** Verify the UI in a browser by entering **http://<server_address>/**. You should be prompted to enter a license or to log in. If not, rerun step 1 and/or step 2.

1.4 Adding the Server License Key

If your license key has expired or is invalid, follow one of the procedures below to add a license key:

- Adding the License Key via the ODDC GUI
- Adding the License Key from a Terminal

Adding the License Key via the ODDC GUI

1. Go to http://<web_server_address> and enter the license key that was provided. Note: web_server_address refers to the server where the ODDC platform is installed.

Adding the License Key from a Terminal

- 1. Log in to the <user name>@<web_server_address> that you installed the ODDC as in the section Installation Steps.
- 2. Add the license key that was provided to /NODUS/.license. Note: If the license type is Multi-User, then add the user license to ~/.nodus/.userKey.
- 3. Verify that the license is working by running command **nodus license**.

1.5 Modifying the Code

Modification of the code without the approval of Adaptive Computing is discouraged as this may result in an unstable environment.

1.6 Disaster Recovery

The ODDC helps facilitate disaster recovery by enabling you to back up and restore your database by using the following commands.

- To back up the ODDC database to file, use \$ nodus db:backup [OPTIONS]
- To restore the ODDC database from backup, use **\$ nodus db:restore [OPTIONS]**

See the section Misc in the chapter ODDC CLI Commands for additional information.

Chapter 2: Using the HPC Cloud On-Demand Data Center GUI

This chapter provides information about using the ODDC GUI to run your workloads in the Cloud.

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2.1 Creating an ODDC Account

You can have one of two different types of accounts, depending on how your server is set up: Site-User Account or Multi-User Account.

- To create an account, go to http://<web_server_address> and click Create an Account.
 Note: web_server_address refers to the server where the ODDC platform is installed.
- **2.** Follow the instructions and complete the registration process. Your username and password are required for future logins. The password must be at least 8 characters long, contain at least 1 lowercase, 1 uppercase, 1 numeric, and 1 special character such as !@#\$%^&*.

Site-User Account

Upon successful registration, you will be logged in to http://<web_server_address>.

Multi-User Account

This message appears: Account Creation Successful! In order to access the On-Demand Data Center, you will need a USER KEY. If you do not already have one, please contact Adaptive Computing at license@adaptivecomputing.com!

2.2 User Profile

From your user profile at the top right of the screen, these options are available:

- **Settings** Add new users and/or edit profiles, depending on whether you are an admin or a user. Your user profile shows whether you are an admin or a user.
- **User SSH Key** Download a pem file to access the head node of a cluster via SSH. This provides you full control over the cluster.
- Logout.

2.2.1 Settings - Admins

Admins can maintain users' information/roles and create new users. The first user created has an administrator role and all others have a user role.

Users have limited ODDC features permissions:

- Cluster Manager View clusters.
- Stack Manager No permissions.
- Credentials Manager No permissions.
- Job Manager Add and submit jobs.
- File Manager View, download, and delete jobs.

2.2.1.A Editing User Profiles

1. To change a user's name/email or change an admin to a user and vice versa, click **Settings**, and then on the **Users** tab, click **Edit**. You can also change a user's password, download the SSH Key, and delete a user.

Users New User S	rvices		
search user Q		Onpremadmin	
> Onpremadmin Nihuser Hguser Testuser Pduser Htguser Persuser	ID Ro First Ve Last Cr Email: Ma	ie: Admin rffled: Yes Noted: Mar 16, 2021 3:57 PM diffled: Mar 16, 2021 3:57 PM	UPDATE USER: EDIT PASSWORD: CHANGE SSH KEY: DOWNLOAD DELETE USER

2.2.1.B Adding a New User

1. To add a new user, on the New User tab, complete the fields and then click Register.

Users	New User	_		
			Username *	٢
			First Name *	٤
			Last Name *	2
			Email *	
			Password *	উন্য
			Confirm Password *	Su
			Register	

2.2.1.C Changing the Bursting Service Burst Cycle Time

1. To dynamically change the Bursting Service burst cycle time, on the **Services** tab, enter the desired time and then click **Done**.

Users	New User	Services		
		Burs Burst Cycle Time — 60	ting Service Seconds	

2.2.2 Settings - Users

Users can edit their name/email and change their password.



2.3 Credentials Manager

Credentials are required by the Cloud service providers in order to access their environment and resources. Adding and saving them now means that you can easily select them with just one click when creating a cluster.

- 1. To add credentials, log in to your ODDC user account at http://<web_server_address>. The Cluster Manager screen opens.
- 2. On the Applications menu, click Credentials Manager:

Credentials Manager		Q Search		€
In Use	Name	Provider	Date/Time Created	Actions
Ø	awscredential	Winners.	July 21, 2021 9:12 AM	
\odot	googlecredential	O	July 21, 2021 9:13 AM	
${ \oslash }$	azurecredential	Marriel Acar	July 21, 2021 9:14 AM	
\oslash	oraclecredential	OFIACLE	July 21, 2021 9:14 AM	
\oslash	otccredential	۵	July 21, 2021 9:15 AM	
				Rows per page: 10 ▼ 1-5 of 5 < >

The **Credentials Manager** screen shows this information: In Use, Name, Provider, Date/Time Created, and Actions (…) Edit Collaborators, Set, & Delete. **Note:** For Edit Collaborators, the License Type must be Site.

Note: From the **Applications** menu, you can also create clusters, build stacks, submit jobs, view a job's output file, view an accounting of all the jobs run, and estimate the cost of running a job. See the sections Cluster Manager, Stack Manager, Job Manager, File Manager, Accounting Manager, and Instance Prices for information.

- 3. Select the appropriate cloud service provider.
- 4. On the New Credential screen, enter the desired name for the credentials.
- **5.** Enter your account credentials: Access Key, Secret Key, Session Token, and Description. Alternatively, click **Upload Credential**.
- 6. Click **Save** to finish adding the credentials for this provider.

Note: Clicking the name of a credential shows information about it.

Repeat the steps in this section to add credentials for another provider if desired.

2.4 Stack Manager

This section contains the following information:

- Viewing Stacks
- Creating a Stack
- Building a Stack

2.4.1 Viewing Stacks

1. On the Applications menu, click Stack Manager:

Stack M	Manager			Q Search						•
Built	Name	Provider	Owner	Instance Size	Prefix	Туре	Credential	Builder	Last Built	Actions
None	aws	Canazon.	qauser1	t2.nano	core	centos-7	awscredential	market	N/A	

On the **Stack Manager** screen, you can create new stacks and see a list of all your current stacks and information such as: Built (Success / Failed / None), Name, Provider, Owner, Instance Size, Prefix, Type, Credential, Builder, Last Built, and Actions (Edit Collaborators, Edit, Build, Build GPUs, Build Server, Build Node, Logs, & Delete).

Notes:

- For Edit Collaborators, the License Type must be Site.
- Build GPUs creates a stack with a node with a GPU.
- Build Server creates a stack with just a server.
- Build Node creates a stack with just a node.

2.4.2 Creating a Stack

1. To create a new stack, on the **Stack Manager** screen, click the add icon (•). The **New Stack** screen shows the Cloud service providers that you have credentials for:

New Stack ^{Provider}				SAVE CLOSE
Amazon Web Services	Google Cloud	Microsoft Azure	Oracle Cloud	Open Telekom Cloud
webservices™	\bigcirc	Microsoft Azure		
	Pleas	se select a provi	der	

- 2. Select the Cloud service provider that you want to create a stack in.
- **3.** Enter the desired information for the new stack: Name, Type, Prefix, Credential, Head Node Size, Subnet Network / Network ID, and Description. **Advanced**

Clicking the **Advanced** button shows these additional fields: Private IP, Proxy, Source Image, SSH Username, Security, Volume Size, Server Provisioner, Node Provisioner, and Files. **Note:** The available fields vary based on the provider.

- 4. Click Save. The Built state shows None until it is built.
- 5. Repeat the steps in this section to create additional stacks as desired.

2.4.3 Building a Stack

1. To build a stack, under Actions, click Build. The state changes to Success. If it fails, the state changes to Failed.

2.5 Building Stacks into Images

This section contains the following information:

- Customizing your Stack with a Provisioner Script
- Building Customized Stacks
- Building Customer Defined Images

2.5.1 Customizing your Stack with a Provisioner Script

This step adds custom user provisioning to the ODDC stack building process. You can create your own custom scripts and run them as a user-defined provisioner during the server and node stack build. Supplemental dataFiles can be added to expand and simplify the provisioning scripts.

Example Usage

```
$ nodus stack:<provider>:create myStack centos-7 myCred -p myPre-
fix --serverProvisioner ~/myServerScript --nodeProvisioner
~/myNodeScript --dataFile ~/myDataFile1 --dataFile ~/myDataFile2
```

-D	dataFile	These files are copied and written to the provisioning root directory and can be called by the main provisioning scripts. Multiple files are supported.
-N	nodeProvisioner	User-defined provisioning script to be run on the head node of the cluster. This script is run from the present working directory (pwd) directory, so all dataFiles can be called from the \$(pwd).
-S	serverProvisioner	User-defined provisioning script to be run on the compute node of the cluster. The script is run from the present working directory (pwd) directory, so all dataFiles can be called from the \$(pwd).

During the stack build, all provisioner files are located in the \$(pwd) directory on the server or node instances.

Note: If any user provisioning script fails, the stack build process will abort and the image artifacts will be deleted. It is a best practice to ensure the scripts run successfully before testing them on a stack build.

2.5.2 Building Customized Stacks

ODDC cluster stacks need to be built for your provider and in the regions you want to use with an ODDC cluster.

If you just want to deploy another cluster in the same region using the same credentials, then stack rebuilds should not be necessary.

By default, ODDC images are built on top of the marketplace image CentOS 7. Alternatively, it can be configured to build ODDC images on top of an existing image. **Note:** See https://wiki.centos.org/About/Product for minimum requirements for CentOS 7.

Successful Build

A successful stack build looks like this:

```
==> Builds finished. The artifacts of successful builds are:
--> market-server: AMIs were created:
us-east-1: ami-00d17452c46306a94
--> market-server:
--> market-node: AMIs were created:
us-east-1: ami-082631c41bb6b0761
--> market-node:
=== BUILD COMPLETE :: Wed Jun 17 2020 09:19:34 GMT-0400 ===
```

2.5.3 Building Customer Defined Images

This process enables you to create custom stacks and install all the software you need to run your jobs and to customize the cluster nodes to be able to spin up and burst a cluster to meet the needs of the jobs to be run. You will need to create a custom head and compute node image, which enables you to test the cluster before creating the cloud provider images. After testing, always prepare the compute node before preparing the head node for imaging.

Follow the steps below to modify the compute node to install the software and modifications you need to run your jobs.

Creating a Cluster and Downloading the SSH Key

- **1.** From the ODDC UI, create a 1 node cluster and then deploy it. See the section Creating a Cluster for information about creating clusters.
- 2. Click the information icon at the end of the row of the created cluster and note the following: Cluster ID, SSH Username, and Head Node Public IP.
- **3.** At the top right of the UI, next to your user name, click **User SSH Key** to download a .pem file to access the head node of a cluster via SSH.

Connecting to the ODDC Server CLI

4. Connect to the ODDC server CLI by using the SSH key with the command ssh -i <ssh_key> <gui_user>@<oddc_server> (for example, ssh -i nodus5-SSH-Key oddc6@oddc60.oddcplatform.com).

5. (optional) This step enables you to transfer files, if needed, to the head node for use in configuring the head node and the compute node. To send files to a cluster, use the command scp -ir ~/.nodus/clusters/<id_string> <ssh_username>@<head_node_public_ip>: (for example, scp -ir ~/.nodus/clusters/5f50f2b67b54c0573864e4b2/keys/id_rsa MPI2/linux@15.236.191.137:).

Preparing the Compute Node Image

- 6. Log in to the cluster head node by using the command **nodus cluster:ssh <cluster_ name> --admin**.
- **7.** (optional) This step enables you to transfer files, if needed, from the head node to the compute node for use in configuring the compute node. Transfer files to the compute node by copying the files needed to the non-shared directory by using **/NODUS/share**.
- **8.** Find the compute node's IP address by using the command **cat /etc/hosts**.
- **9.** Find the line that has **NODUS-<example>-0**. The start of the line is the IP address.
- **10.** Connect to the compute node by using **ssh <ip_address>**.
- **11.** Modify the compute node to install the software and modifications you need to run your jobs. The /NODUS/share directory has all of the transferred files.
- **12.** When you are finished installing software, test the installation by running jobs through the cluster that you just modified. **Warning:** Do not turn on bursting on the cluster that you are modifying! Bursting will delete compute nodes that are idle, and delete all your configuration changes. See the section Job Manager for information on running jobs.
- **13.** When you are ready to image the cluster, prepare it for imaging with the script **/NODUS/scripts/prepare-custom-image.sh node**.
- **14.** Exit the compute node.

Preparing the Head Node Image

- **15.** On the head node, prepare it with the script **/NODUS/scripts/prepare-custom-image.sh server**.
- **16.** Exit the head node.
- **17.** Continue creating images for your chosen provider below:
 - Creating Images for AWS
 - Creating Images for OTC

Creating Images for AWS

- **1.** Go to https://aws.amazon.com/.
- 2. On the AWS Console, click EC2 Dashboard.
- 3. Search for the Cluster ID string by Name. This finds the node and server.
- **4.** Select the node instance.
 - A. Select Actions / Image tab / Create Image.
 - **B.** Enter the **Image Name** as **<prefix>-node-<number>**. The number is revision or date.
 - C. Click Create Image.
- **5.** Select the server instance.
 - A. Select Actions / Image tab / Create Image.
 - **B.** Enter the **Image Name** as **<prefix>-server-<number>**. The number is revision or date.
 - C. Click Create Image.
- 6. From the ODDC UI, now you can create a cluster with the exact same image that was modified previously. When creating a cluster, replace core with the <prefix> defined in the previous steps.

Creating Images for OTC

- 1. Go to https://open-telekom-cloud.com/en and click Open Telekom Cloud Console.
- 2. On the OTC Console, under Computing, click Elastic Cloud Server.
- 3. Search for the Cluster ID string by Name. This finds the node and server.
- 4. Select the node entry, and then from the More drop-down, click Create Image.
 - A. On the Image Information panel, in the Name field, specify the name as <prefix>node. Where <prefix> is the user defined name for the image, for example custom-node. The <prefix> for the node and server must be the same.
 - B. Click Create Now and then click Submit.
- **5.** Select the server head node entry, and then from the **More** drop-down, click **Create Image**.
 - A. On the Image Information panel, in the Name field, specify the name as <prefix>server. Where <prefix> is the user defined name for the image, for example custom-server. The <prefix> for the node and server must be the

same.

- B. Click Create Now and then click Submit.
- 6. From the ODDC UI, now you can create a cluster with the exact same image that was modified previously. When creating a cluster, replace core with the <prefix> defined in the previous steps.

2.6 Cluster Manager

This section contains the following information:

- Viewing Clusters
- Creating a Cluster
- Deploying a Cluster
- Deleting a Cluster

2.6.1 Viewing Clusters

1. On the Applications menu, click Cluster Manager:

🍕 On-Demand Data Center 🛛 🚍										9	User Name 🗸
APPLICATIONS	nager Q. Search										C +
Job Manager	oviders		State	Name	Provider	Owner	Bursting	Nodes	Credential	Uptime	Actions
□ File Manager 愈 Accounting	lers Services e Cloud	5	合 Available	google	\bigcirc	qauser1	Off	0	googlecredential	4 minutes	(i) ····
\$ Instance Prices		1 1 1 1	🔁 Down	aws	egramazon webservices-	qauser1	Off	0	awscredential	N/A	····
			🔁 Down	azure	Mcrosoft Azure	qauser1	Off	0	azurecredential	N/A	(i) ····
			🔁 Down	otc		qauser1	Off	0	otccredential	N/A	(i) ···
			🕑 Down	oracle		qauser1	Off	0	oraclecredential	N/A	· ···
									Rows	per page: 10 💌 1-5	of 5 < >

On the **Cluster Manager** screen, you can configure new clusters and see a list of all your current clusters and information such as their State (Available / Down / Failed), Name, Provider, Bursting, Nodes, Credential, Uptime, and Actions (Edit / Edit Collaborators, Deploy, Destroy, Configuration, Logs, Plan, Save Config, Delete, and Cluster SSH Key). The Actions vary based on the State and License Type (see the notes below for additional information).

Notes:

- Clicking **User SSH Key** next to your user name will download a .pem file that can be used to access the head node of a cluster via SSH. This provides you full control over the cluster.
- Clicking the refresh icon (③) at the top right of the cluster list, refreshes the list.
- Clicking the add icon (•) at the top right opens the **New Cluster** screen.
- Clicking the name of a cluster shows cluster details (see the section Adding a New Job for information).
- Clicking the information icon (i) at the end of the row shows additional details about the cluster, including: Cluster ID, SSH Username, Manager, Created, Modified, Expected Deploy Time, Actual Deploy Time, Uptime, Head Node Public IP, Prefix, Region, Head Node Size, and Compute Node Sizes. The buttons **Deploy/Destroy** and **Logs** also show.
- Clicking the horizontal ellipsis (···) at the end of the cluster row shows actions that you can take regarding the cluster:
 - $\circ~$ Edit Modifies the configuration of the cluster. The cluster must be in a Down state to edit.
 - **Configuration** Open the Configuration screen to view/modify Cluster Information, Cluster Compute Nodes, Bursting Service, and Disks Information.
 - **Deploy** Deploys the cluster into an available state.
 - Destroy Destroys the head node and the linked compute nodes so that they are no longer in a state to do work. This also means that you will not be billed further for these cloud resources. After a cluster is destroyed, the state shows as Down. Make sure you back up any files before proceeding because you will lose all files in File Manager once the cluster is destroyed.
 - **Logs** Shows information about the provisioning. A screen shows information in real-time about the cluster's state. Additionally, these logs contain information for deploy and destroy.
 - Delete Permanently deletes the cluster. The cluster must be down before it can be deleted. Removing a failed cluster before destroying it from ODDC removes all cluster data from the ODDC database, not the provider account. Doing this may leave behind abandoned resources that require manual removal (in the provider account). To avoid this, destroy the cluster first and try again.
 - Cluster SSH Key Downloads the cluster SSH key.
 - Edit Collaborators Shares the cluster. The License Type must be Site.
2.6.2 Creating a Cluster

If you have already added your cloud credentials for the chosen provider, follow the steps below to create a new cluster, which can then be deployed at any time. If you have not yet added your credentials, you must first follow the steps in the section Credentials Manager.

1. To create a new cluster, on the **Cluster Manager** screen, click the add icon (•). The **New Cluster** screen shows the Cloud service providers that you have credentials for:



- **2.** Select the Cloud service provider that you want to deploy a cluster in. You can also click the **Import** button to import a cluster configuration file that was previously saved, to easily create a new cluster.
- **3.** Enter the desired information for the new cluster, such as: Name, OS Type, Prefix, Credential, Head Node Size, Manager, Region, Availability Zone, Bursting Configuration (Off, Min, Max, All), Compute Nodes, Size, Count, and Description. **Advanced**

Clicking the **Advanced** button shows these additional fields: Subnet, VPC, Security Group, Elastic IP Address, Private IP, Server Volume (GB), Node Volume (GB), Idle Purge Time, User Script / Upload Script, Share (NFS/BeeGFS), OpenVPN, and Packages.

Notes:

- The available fields vary based on the provider.
- Multiple Compute Node Instances of different sizes can be added.
- When entering the Count, if you exceed the specified number, a message similar to this displays: The quota of CPUs/Instances established by the provider is exceeded. This must first be configured in the provider.json file (/NODUS/nodus-webui/build/assets/provider.json) inside of regions/zones/quotas/instance according to the provider's quota.

- The minimum Idle Purge Time cannot be less than 180 seconds (3 minutes). When selecting Bursting Configuration: All, we recommend setting the Idle Purge Time to at least 1,800 seconds (30 minutes).
- The available Regions, Availability Zones, Server Instance Sizes, Compute Node Instance Sizes, and quantity of instances may vary based on your provider account status.
- When creating a cluster with a greater number of nodes, we recommend using large instance types to ensure that the cluster deploys successfully.
- 4. Click Save. The state shows Down until it is deployed.
- **5.** Repeat the steps in this section to create additional clusters as desired.

2.6.3 Deploying a Cluster

1. To deploy a cluster, click the ellipsis and then click **Deploy**.

While deploying, a % completion bar shows an estimate of the progress. When successfully deployed, the state changes to Available.

2.6.4 Deleting a Cluster

To delete a cluster, the state must first be Down.

- **1.** Click the ellipsis for the desired cluster and then click **Destroy**.
- 2. After the state changes to Down, click Delete.

2.7 Job Manager

You can add jobs and submit them to either an existing cluster or a temporary on demand cluster by using Job Manager.

This section contains the following information:

- Adding a New Job
- Adding a Temporary On Demand Job

2.7.1 Adding a New Job

1. To add a new job, on the **Applications** menu, click **Job Manager**. The **Job Manager** screen opens:

ĉ	Job Manager		Q Search				•
	Name	Nodes	Cores	Data Files	Walltime	Submit	Actions
Ô	stdout-stderr	1	1		01:00:00	♪	
						Rows per page: 10 💌	1-1 of 1 < >

This screen shows this information: Name, Nodes, Cores, Data Files, Walltime, Submit, and Actions (Edit, Copy, & Delete).

- 2. Click the add icon (•) at the top right to open the **New Job** screen:
 - **A.** On the **Job Info** panel, enter the desired information for the new job: Name, Walltime, Number of Nodes, Cores per Node, GPUs per Node, On Demand, and Description. This can be edited after the job is saved by clicking the name of the job.
 - **B.** On the **Script** panel, either edit the script for this job or click **Upload Script**. This can be edited after the job is saved by clicking the name of the job.
 - **C.** (optional) On the **Data Files** panel, click **Upload Data** to upload any data files that the job may require. This can be edited after the job is saved by clicking the name of the job.
 - D. Click Save.
- **3.** Click the submit (▷) icon, then select the cluster to run the job on. If there are no created clusters or ones that meet the hardware requirements of the job, then certain clusters may not appear.
- **4.** Click **Submit**. The job is queued and runs on the selected cluster. The cluster details screen shows the submitted job information:
 - **Cluster Info** Jobs Submitted (Total, Today, This Month, This Year), Queue (Running, Queued), Nodes (Available, Busy, Down, Offline), Activities Log (All, Job), and Nodes/Workload graph (see below).



This graph shows the status of Available Nodes, Busy Nodes, & Down Nodes, and the status of the Running Jobs, Queued Jobs, & Blocked Jobs. Click to deselect nodes and jobs to narrow the display results. Hover over the graph to see the number of nodes or jobs.

- **Queue** ID, Name, State (Queued, Running, Completed), Submitted, Cores, Nodes, and Actions ((2)). **Note:** After a job completes, it only shows here temporarily, but can be viewed in File Manager.
- Nodes
 (Deploy, Destroy), Name, State (All Nodes, Busy, Available, Deploying, Offline, Destroying, and Down), Cores, Load Avg, and Actions (Details, Deploy, Destroy). These are the Actions / Details that display: State, Power State, Processors, Type, Service Port, Manager Port, Total Sockets, Total Nodes, Total Cores, Total Threads, Dedicated Sockets, Dedicated Nodes, Dedicated Cores, Dedicated Threads, Operating System, User, Sessions, N Sessions, Idle Time, Total Memory, Available Memory, Physical Memory, CPUs, Load Average, Net Load, State, CPU Clock, MAC Address, Torque Version, REC Time, and Jobs.

Notes: Nodes are available by default, but can be taken down by selecting **Destroy**. A node that is down has been deprovisioned in the Cloud service provider and does not count as a billable resource. A node that is offline is still provisioned in the Cloud service provider and isn't being used to run jobs at the moment, but counts as a billable resource.

• **Configuration** - **Cluster Information** (Cluster ID, Head Node Size, Image Name, Cluster IP, SSH Username, Created, Download Cluster SSH Key, and Install/Uninstall OpenVPN), **Cluster Compute Nodes** (Size, Count, and Resize Cluster), and **Bursting Service** (Min/Max, View Logs, Burst Once), and Disks Information (Manager Disks). The Manager Disks feature enables ODDC Administrators to add extra drives to the head node. When the cluster is deployed, another drive is attached to the head node that can be shared. When the cluster is destroyed, the drive is also destroyed. **Notes:** Resize requires bursting service to be disabled. See the sections **Bursting** Configurations and **Bursting Service** for information about bursting.

Note: Jobs can also quickly be run from any screen at any time by clicking the **Quick Launch / Briefcase** icon (i) near the top left of the screen.

5. (optional) To add extra drives to the head node, click **Configuration** / **Manager Disks**, and then click the add icon (•). Select the desired information and then click **Close/Do**.

2.7.2 Adding a Temporary On Demand Job

Follow one of the options below to add a temporary on demand job:

- Using the Add Icon
- Using the Quick Launch Icon
- Using the Submit Icon

Using the Add Icon

- 1. On the Applications menu, click Job Manager.
- **2.** Click the add icon (•) at the top right to open the **New Job** screen.
- **3.** On the **Job Info** panel, enter the desired information for the new job. This can be edited after the job is saved by clicking the name of the job.
- **4.** On the **Script** panel, either edit the script for this job or click **Upload Script**. This can be edited after the job is saved by clicking the name of the job.
- **5.** On the **Data Files** panel, click **Upload Data** to upload any data files that the job may require. This can be edited after the job is saved by clicking the name of the job.
- 6. To run an on demand job, select On Demand, which will add On Demand Configuration options:

mpi-test CLOSE Job Info Script Data Files mpi-test 01:00:00 # of Nodes Cores per Node On Demand 2 1 On Demand Configuration Prefix * Provider * • Type * Credential * Head Node Size * Manager * -Region * Description

7. Complete the required fields.

These are the **On Demand Types**:

- Destroy Cluster The full cluster is destroyed including the head node.
- **Destroy Compute Nodes** The head node stays active and the compute nodes are destroyed.
- **Offline Compute Nodes** The head node stays active and the compute nodes go offline.
- Persist Cluster The head and compute nodes stay active.
- 8. Click **Save** to finish adding the job.
- **9.** On the **Job Manager** screen, click the arrow on your newly created job to submit your job. The ODDC will create a system-defined cluster name. **Note:** If you want to define your own cluster name, use the option just below before submitting your job, selecting your job defined here.

The defined cluster and node will be deployed, the job will run, and then your defined cluster will be destroyed based on your on demand type chosen.

Using the Quick Launch Icon

- 1. On the Applications menu, click Job Manager.
- **2.** On the **Job Manager** screen, click the **Quick Launch / Briefcase** icon () near the top left of the screen. The **Job Submit** dialog box opens:

Job Submit					
Please selected a Job	and a Clu	ster			
				A	dmin
Select Job	•	Select Cluster	•		
				BACK	SUBMIT

- **3.** Select your job from the drop-down list and then select **On Demand** from the Select Cluster drop-down.
- **4.** If you want to install software from your script before running the job or if the job requires admin rights, click the **Admin** button to be assigned admin rights.
- 5. Click Submit
- **6.** Enter the cluster configuration options:

Name * OS Type* Core Name * Centos-7 Core Head Node Size * Manager * Torque Credential * * \$1.large - vCPU: 2 * Region * Availability Zone * Availability Zone * Bursting Configuration: Persistent: Bursting Min Max	Cluster			
Credential * Head Node Size * Si.large - vCPU; 2 Torque Region * Availability Zone * Bursting Configuration: Persistent: Bursting Min Max Compute Nodes:	Name *	OS Type * centos-7	Prefix*core	
Region * Availability Zone * Bursting Configuration: Persistent: Bursting Min Max Compute Nodes: 3 Size * Count *	Credential *	s1.large - vCPU: 2	Manager* Torque	-
Bursting Configuration: Persistent: Bursting Min Max Compute Nodes:	Region *	✓ Availability Zone *		•
Compute Nodes: ① Size *				
Size*	Bursting Configuration: Persistent:	Bursting Min Max		
s1.large - vCPU: 2 • 0	Bursting Configuration: Persistent:	Bursting Min Max		ŧ

7. Click Save to finish adding the job and then click Submit.

The defined cluster and node will be deployed, the job will run, and then your defined cluster will be destroyed based on your on demand type chosen.

Using the Submit Icon

- 1. On the Applications menu, click Job Manager.
- **2.** Click the submit (>) icon:

	Name	Nodes	Cores	Data Files	Walltime	Submit	Actions
Ô	stdout-stderr	1	1		01:00:00		

- 3. Enter the cluster configuration options.
- 4. Click Save to finish adding the job and then click Submit.

The defined cluster and node will be deployed, the job will run, and then your defined cluster will be destroyed based on your on demand type chosen.

2.8 File Manager

You can view, download, and delete a job's standard output file or error file using File Manager.

1. On the **Applications** menu, click **File Manager**, and then from the **Select Cluster** dropdown list at the top right, select a cluster:

C	File Manager		Q. Search				Select Cluster google	• ©
	Manager ID	Nodus ID	Name	Status	Owner	Size(B)	Modified \downarrow	Actions
	40	40	test-stdout-stderr	🛧 Running	×.	70	June 16, 2021 9:22 AM	
				There are no Fi	es			

The **File Manager** screen shows this information: Manager ID, Nodus ID, Name, Status, Owner, Size(B), Modified, and Actions.

2. Click the ellipsis at the end of a row and select the desired option: View STD-Out, Download STD-Out, View STD-Err, Download STD-Err, or Delete.

2.9 Accounting Manager

Accounting shows an accounting of all the jobs run by each user over a period of time specified, and also the clusters. You must be an Admin to access the Accounting feature.

1. On the Applications menu, click Accounting. The Accounts screen opens:

<u>前</u> Accounts	Date Stort 08/19/2021	Det End 00/19/2021	C
Jobs Clusters			
User	Jobs	Time	Details Download
qauser1	2	0.033h	
			Rows per page: 10 🔻 1-1 of 1 < >

The Jobs panel shows this information: Users, Job, Time, Details, and Download.

Job	Start Time	Provider	Cluster	Node	Cores	Run Time
mpi-1x8	30 Jun 2021 9:29	otc	otc-moab	nodus-s2-8xlarge-1-4797-0	8	1.067h
random	30 Jun 2021 9:55	otc	otc-moab	nodus-s2-8xlarge-1-4797-0	1	0.017h
Moab.4309	30 Jun 2021 11:57	otc	otc-moab	nodus-s2-8xlarge-1-4797-2	16	0.8h
Moab.4310	30 Jun 2021 11:57	otc	otc-moab	nodus-s2-8xlarge-1-4797-3	24	1.2h
Moab.4311	30 Jun 2021 11:57	otc	otc-moab	nodus-s2-8xlarge-1-4797-1	32	1.067h
Moab.4308	30 Jun 2021 11:57	otc	otc-moab	nodus-s2-8xlarge-1-4797-2	8	1.067h
Moab.4312	30 Jun 2021 11:57	otc	otc-moab	nodus-s2-8xlarge-1-4797-2 nodus-s2-8xlarge-1-4797-3	8 8	2.4h
Moab.4320	30 Jun 2021 12:01	otc	otc-moab	nodus-s2-8xlarge-1-4797-0	8	1.067h
Moab.4321	30 Jun 2021 12:01	otc	otc-moab	nodus-s2-8xlarge-1-4797-0	16	1.067h
Moab.4313	30 Jun 2021 11:59	otc	otc-moab	nodus-s2-8xlarge-1-4797-3 nodus-s2-8xlarge-1-4797-1	16 16	1.067h

A. To see a user's jobs that ran, click **Details** on the desired user row:

This screen shows this information: Job, Start Time, Provider, Cluster, Node, Cores, and Run Time.

2. To see cluster information, click the **Clusters** tab:

Jobs C	llusters							
Name		User	Deploy	Destroy	Uptime	Costs	Details	Download
otc-moab		qauser1	12 Aug 2021 8:44	27 Jan 2022 10:24	10.40h	\$3.40		④
aws-moab		nodus	19 Aug 2021 11:50	27 Jan 2022 10:24	187.20h	\$72.93	Ē	æ
aws		nodus	19 Aug 2021 17:30	27 Jan 2022 10:24	62.40h	\$22.93		4
oracle		nodus	19 Aug 2021 17:30	27 Jan 2022 10:24	10.40h	\$2.97		æ

This screen shows this information: Name, User, Deploy, Destroy, Uptime, Costs, Details, and Download.

2.10 Instance Prices

This helps you estimate the cost of running a job in different cloud providers.

1. On the **Applications** menu, click **Instance Prices**:

Chapter 2: Using the HPC Cloud On-Demand Data Center GUI

\$ Instance Prices						1		
Cloud Providers Coud Providers Coogle Cloud Microsoft Azure Crocle Cloud Copen Telekom Cloud	Instance 12.nono - vCPU: 1, Mem (GB): 0.50 12.micro - vCPU: 1, Mem (GB): 1 12.smoll - vCPU: 1, Mem (GB): 2 12.medium - vCPU: 2, Mem (GB): 4 12.large - vCPU: 2, Mem (GB): 8 12.xlarge - vCPU: 4, Mem (GB): 16 12.xlarge - vCPU: 8, Mem (GB): 32	US East 1 0.0060 0.0120 0.0230 0.0460 0.0900 0.0920 0.3710	US West 1 0.0062 0.0120 0.0230 0.0460 0.0900 0.0920 0.3710	US West 2 0.0062 0.0120 0.0230 0.0460 0.0990 0.0920 0.3710	US Gov Enst 1 0.0063 0.0120 0.0230 0.0460 0.0990 0.0990 0.3710	CA Central 1 0.0064 0.0120 0.0230 0.0460 0.0990 0.09920 0.3710	EU Central 1 0.0065 0.0120 0.0230 0.0460 0.0990 0.0990 0.3710	EU West 1 0.0066 0.0120 0.0230 0.0460 0.0990 0.0920 0.3710

This panel shows this information: Cloud Providers, Instance, Region, and job cost per hour estimation.

Notes:

- To change the price per region estimation to match the cost from your provider, open the provider.json file (/NODUS/nodus-webui/build/assets/provider.json) and change the cost-region amount. For example, for "instance_id": "t2.nano", change "us-east-2": 0.0030 to "us-east-2": 0.0045.
- If you get a message The quota of CPUs established by the provider is exceeded, you need to manually specify the quotas established by the provider in the provider.json file, inside the zones (zones: {cpu:99, intance:99, network:10}).

2.11 Bursting

This section contains the following information:

- Bursting Configurations
- Bursting Service

2.11.1 Bursting Configurations

The ODDC burst function detects what jobs are in the queue and automatically spins up, takes offline, or shuts down nodes depending on the total requirements for the queue. If there are not enough online nodes to run all jobs, bursting will bring on as many nodes as

needed. If there are more nodes than needed, the excess nodes will be taken offline. If the job queue is empty, all nodes will be shut down after a specified period of time.

Min Burst spins up the minimum number of compute nodes required to complete all jobs in the queue, which is ideal for budgeting and controlling cloud costs.

Max Burst spins up enough compute nodes to complete all the jobs in the queue immediately; this gets results as fast as possible. Max Burst is limited by the size of the cluster and will not create new nodes.

Burst All spins up all available nodes at one time and automatically shuts down all nodes upon job completion.

Persistent (Fixed) bursting spins up all or a portion of the licensed instances in a cluster that remain persistent for a period of time and brings nodes online or shuts them down as needed. Nodes stay in the current state that they are in until bursting is turned on.

On demand bursting spins up the number of nodes required to run one job now; this is an isolated cluster, not for sharing with other jobs. The on demand types are: Destroy Compute Nodes (the head node stays active and the compute nodes are destroyed), Offline Compute Nodes (the head node stays active and the compute nodes go offline), and Destroy Cluster (the full cluster is destroyed including the head node).



See the diagram below for details.

2.11.2 Bursting Service

To manage cluster cloud bursting configurations, on the **Cluster Manager** screen, select a cluster and click the **Configuration** tab. The **Cluster Information** screen displays:

Cluster Information	Cluster Compute Nodes
Cluster ID: 6019a4e0c035a961f84f5662 Head Node Size: VM.Standard2.2 - vCPU: 2, Mem (GB): 30 Image Name: core-server Cluster IP: 158.101.177.40 SSH Username: opc Created: july 22, 2021.103 PM	Size Count VM.Standard2.2 - vCPU: 2, Mem (GB): 30 0 RESIZE CLUSTER
Bursting Service: Off	Disks Information
Bursting Service Mode Service	None
VIEW LOGS BURST ONCE	MANAGER DISKS

Bursting Service (Off/On) - Disable or enable bursting functionality for a single cluster:

- (disabled) The cluster remains in its current state. Nodes stay in the current (persistent) state that they are in until bursting is turned on.
- <=> (enabled) Jobs are run and compute nodes are provisioned to handle the jobs:
 - Min Spins up the minimum number of nodes required to complete all jobs in the queue. This is ideal for budgeting and controlling cloud costs.
 - Max Spins up enough nodes (as set from the jobs' node count) to complete all the jobs in the queue immediately. This gets results as fast as possible.
 - All Spins up all available nodes at one time and automatically shuts down all nodes upon job completion.

Burst Once - This spins up or tears down nodes as required to complete all the jobs in the queue. Select a one time bursting size - Min, Max, or All.

Note: For Google Cloud, when bursting is selected, you can select the following actions in conjunction with bursting:

- Terminate (default) Clears the node instances from the cloud service provider.
- Stop Stops the node instances on the cloud service provider, but they remain configured so they can quickly be restarted.

2.12 Cloud Budget Analysis

Now that you have successfully run one job in the Cloud by completing the steps above, you can run all your jobs in the Cloud and begin developing your cloud budget. See the appendix ODDC Workload Considerations for additional information.

Chapter 3: HPC Cloud On-Demand Data Center CLI Procedures

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3.1 Users

An ODDC user is just a registered Linux system user that enables using the ODDC in various capacities, permissions, and license permitting.

See the CLI Commands section Users for information about user commands.

3.2 Architecture



NODUS Cluster Resources



3.3 CLI Usage

This section contains the following information:

- Jobs
- Building Images

3.3.1 Jobs

Show standard error messages: \$ nodus job:output ID CLUSTER [OPTIONS]

3.3.2 Building Images

After a cluster is associated with a set of credentials and a stack file, use the command **\$** nodus stack:build STACK [OPTIONS] to create the image.

3.4 Cluster Actions

This section contains the following information:

- Connecting to a Cluster
- Destroying a Cluster
- Viewing All Clusters

3.4.1 Connecting to a Cluster

1. To connect to a deployed cluster via SSH, use the command **nodus cluster:ssh CLUSTER**.

3.4.2 Destroying a Cluster

- **1.** Assuming the cluster was deployed properly through the above CLI commands, a cluster can be destroyed using the command **\$ nodus cluster:destroy CLUSTER [OPTIONS]**.
- **2.** The cluster should be destroyed before you delete it, or you will have to destroy it manually. To remove all information about the cluster, use the command **nodus cluster:remove CLUSTER**.

3.4.3 Viewing All Clusters

1. To view all saved clusters, deployed or not, use the command **nodus cluster:list**.

3.5 Job Actions

1. To submit a job to a cluster, use the command **nodus job:submit JOB CLUSTER**.

3.6 Bursting Actions

The ODDC burst function looks at what jobs are queued on your cluster and automatically spins up or tears down nodes depending on the total requirements for the queue. If there are not enough online nodes to run all jobs, bursting will bring on as many nodes as needed. If there are more nodes than needed, the excess nodes will be destroyed. If the job queue is empty, all nodes will be destroyed.

- **1.** To start the bursting service, use the command **\$ nodus cluster:burst CLUSTER -- start**.
- **2.** To stop the bursting service, use the command **\$ nodus cluster:burst CLUSTER --stop**.
- 3. To run a single burst cycle, use the command \$ nodus cluster:burst CLUSTER.

3.7 Common CLI Commands

This section contains common ODDC CLI commands:

- Cluster Management
- Cluster Monitoring
- Cluster Jobs
- Admin Commands

See the chapter HPC Cloud On-Demand Data Center CLI Commands for detailed information.

3.7.1 Cluster Management

This section contains the following information:

- Cluster Deploy
- Cluster Destroy
- Cluster SSH
- Cluster Resize

3.7.1.A Cluster Deploy

This deploys nodes on a cluster:

\$ nodus cluster:deploy CLUSTER --target HOSTNAME

See cluster:deploy CLUSTER for additional information.

3.7.1.B Cluster Destroy

This destroys nodes on a cluster:

\$ nodus cluster:destroy CLUSTER --target HOSTNAME

See cluster:destroy CLUSTER for additional information.

3.7.1.C Cluster SSH

This connects to a cluster:

\$ nodus cluster:ssh CLUSTER [OPTIONS]

See cluster:ssh CLUSTER for additional information.

3.7.1.D Cluster Resize

This resizes a cluster:

\$ nodus cluster:resize CLUSTER [[INSTANCE COUNT] ...] [OPTIONS]

See cluster:resize CLUSTER for additional information.

3.7.2 Cluster Monitoring

This section contains the following information:

- Cluster Show
- Cluster Jobs Queue
- Cluster List
- Cluster Members
- Cluster Nodes

3.7.2.A Cluster Show

This gets general information about the cluster (i.e., cluster username, public IP, node list...):

\$ nodus cluster:show CLUSTER

3.7.2.B Cluster Jobs Queue

This displays JSON information about the jobs queue:

\$ nodus cluster:queue CLUSTER

3.7.2.C Cluster List

This lists all user clusters:

\$ nodus cluster:list

3.7.2.D Cluster Members

This displays serf members from the head node:

\$ nodus cluster:members CLUSTER [OPTIONS]

3.7.2.E Cluster Nodes

This displays a detailed description of compute nodes on the cluster:

\$ nodus cluster:nodes CLUSTER [OPTIONS]

3.7.3 Cluster Jobs

This section contains the following information:

- Cluster Burst
- Job Submit

3.7.3.A Cluster Burst

This runs a single burst cycle that spins up and tears down nodes depending on workload:

\$ nodus cluster:burst CLUSTER [OPTIONS] --mode max --start

Note: [--mode max] is optional.

3.7.3.B Job Submit

This remotely runs a local job script on a cluster:

\$ nodus job:submit JOB CLUSTER [OPTIONS]

3.7.4 Admin Commands

This section contains the following information:

• Delete User

3.7.4.A Delete User

This deletes a user from the system:

sudo nodus admin delete-users <username>

3.8 GPU Enabled Clusters

This section describes the process for running GPU jobs:

- GPU Enabled Cluster Restrictions
- GPU Stack Software
- Building a GPU Stack
- Updating a Cluster to Reference the GPU Prefix

- Creating a GPU Job
- Submitting a GPU Job

3.8.1 GPU Enabled Cluster Restrictions

These are the restrictions for creating and running GPU enabled clusters:

- Must be Nvidia-based GPUs
- Must use Torque
- Must be non-bursting clusters

3.8.2 GPU Stack Software

The GPU stack comes with the following software configured for Nvidia GPU support:

- Open MPI 4
- Torque 7
- Docker

3.8.3 Building a GPU Stack

\$ nodus stack:build myGpuStack -s gpu

Special Consideration

Use a volume greater than 10 GB for the GPU stack.

Note: See stack:build STACK for additional information.

3.8.4 Updating a Cluster to Reference the GPU Prefix

\$ nodus cluster:<provider>:update myGpuCluster --node-prefix myGpuPrefix

3.8.5 Creating a GPU Job

\$ nodus job:create /path/to/my/job/script myGpuJob -c numCores -n numNodes -g
numGpus

3.8.6 Submitting a GPU Job

\$ nodus job:submit myGpuJob myGpuCluster

Note: To reserve GPU resources, the cluster cannot be in bursting mode. If you want to use bursting with GPU instances, you can, but GPU resource isolation is not supported.

Special Consideration

Queue polling of GPU jobs is not currently supported. If you submit a job requiring GPU resources, but the resources are in use (isolated by Torque), the submission will fail and a 500 response code will be returned.

To release the job from the queue, run this command: **\$ nodus cluster:qrun myGpuCluster myGpuJobNumber**

Chapter 4: HPC Cloud On-Demand Data Center CLI Commands

This chapter contains a list of CLI commands.

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4.1 Actions

This section contains the following commands:

- action:list
- action:remove ACTION
- action:show ACTION

action:list

Des	Description				
List	action entries from da	tabase.			
Usa	Usage				
\$ no	\$ nodus action:list [OPTIONS]				
Arg	Arguments				
NAME		Name Identifier	Name Identifier		
ТҮРЕ		(centos-7) Image Type			
CLUSTER		Cluster Name or ID			
Options					
-fformat=text json			[default: text] Output Format		

Chapter 4: HPC Cloud On-Demand Data Center CLI Commands

-h	help	Show Help		
	id=id	Filter by Affected ID		
	type=action cluster credential job provider stack user	Filter by Action Type		
Examples				
\$ nodus action:list				
\$ nodus action:listformat json				

action:remove ACTION

Description				
Remove action	on entries from database.			
Usage				
\$ nodus action	on:remove ACTION [[ACTION	۱]] [OPTIONS]		
Argument				
ACTION		Action ID		
Option				
-h	help	Show Help		
Example				
action:remove 5e8f6a8ac86619500ab573da				

action:show ACTION

Description

Display details of a particular action entry from the database.

Usage

\$ nodus action:show ACTION [OPTIONS]

4.2 Users

This section contains the following commands:

- user:add USERNAME
- user:list
- user:remove USERNAME
- user:show USER
- user:update USERNAME

user:add USERNAME

Description

Registers linux user as an ODDC user.

Usage

\$ nodus user:add USERNAME [OPTIONS]

Argu	Argument				
USEF	NAME	Linux Username			
Opti	ons				
-е	email=email	Email Address			
-f	first=first	First Name (Given Name)			
-h	help	Show Help			
-l	last=last	Last Name (Family Name)			
	[no-]admin	Make User Admin			
	[no-]ui	Allow User to Login via Web App / UI			
Examples					
\$ nodus user:add jdoe					
\$ noc	\$ nodus user:add jdoeadmin				

user:list

Description
List user entries from database.
Usage
\$ nodus user:list [OPTIONS]
Options

-f	format=text json	[default: text] Output Format		
-h	help	Show Help		
Examples				
\$ nodus user:list				
\$ nodus user:listformat json				

user:remove USERNAME

Description

Remove ODDC user(s).

Usage

\$ nodus user:remove USERNAME [OPTIONS]

Argument

USERNAME

Username of the system user

Options

-h	help	Show Help
	clean	Remove User Home Directory from Filesystem
	force	Force Remove User Home Directory from Filesystem
	_	

Examples

\$ nodus user:remove jdoe

\$ nodus user:remove jdoe --clean

\$ nodus user:remove jdoe --force

user:show USER

Description				
Display details of a particular user ent	ry from the database.			
Usage				
\$ nodus user:show USER [OPTIONS]				
Argument				
USERNAME User Name or ID				
Options				
-fformat=text json	[default: text] Output Format			
-hhelp	Show Help			
Examples				
\$ nodus user:show jdoe				
\$ nodus user:show jdoeformat json				

user:update USERNAME				
Desc	cription			
Upda	ate ODDC user details.			
Usag	ge			
\$ no	dus user:update USERNAM	E [OPTIONS]		
Argu	ıment			
USEI	RNAME	Linux Username		
Opti	ons			
-е	email=email	Email Address		
-f	first=first	First Name (Given Name)		
-h	help	Show Help		
-l	last=last	Last Name (Family Name)		
-u	[no-]ui	Allow User to Login via Web App / UI		
	[no-]admin	Make User Admin		
	pass	Change Password		
	private=private	Path to Private SSH Key		
	public=public	Path to Public SSH Key		
Example				
\$ nodus user:update jdoeadmin				

4.3 Credentials

This section contains the following commands:

- credential:add FILE NAME
- credential:list
- credential:list CREDENTIAL
- credential:remove CREDENTIAL
- credential:share CREDENTIAL USERNAME
- credential:show CREDENTIAL
- credential:unshare CREDENTIAL

credential:add FILE NAME					
Des	scription	I			
Cre	ate crede	ential entry with information from file.			
Usa	ige				
\$ n	odus creo	dential:add FILE NAMEprovider PROVID	ER		
Arg	guments				
FIL	Е	Credential File (Absolute / Relative) Path			
NAME		Credential Name			
Op	tions				
-d	descri	ption=description	Description of Credential		
-h	help		Show Help		
-p	provid	ler=aws gcp azure oracle otc	(required) Provider Code		
Examples					
<pre>\$ nodus credential:add /home/user/Downloads/credential.json myCredentialprovider</pre>					
aws					
\$ nodus credential:add ~/Downloads/credential.json myCredentialprovider aws					

credential:list

Desc	Description				
List o	redential entries from database.				
Usag	Usage				
\$ noc	lus credential:list [OPTIONS]				
Options					
-f	format=text json	[default: text] Output Format			
-h	help	Show Help			
Examples					
\$ nodus credential:list [OPTIONS]					
\$ noc	\$ nodus credential:listformat json				

credential:list CREDENTIAL

Description

Update credential entry.

Usage

\$ nodus credential:list CREDENTIAL [OPTIONS]

Chapter 4: HPC Cloud On-Demand Data Center CLI Commands

Argument				
CREDENTIAL		Credential Name or ID		
Options				
-d	description=description		Description	
-h	help		Show Help	
-nname=name			Name Identifier	
Examples				
\$ nodus credential:list myCredentialname newCredential				

credential:remove CREDENTIAL

Descri	ption			
Remov	ve credential en	tries from database.		
Usage				
\$ nodu	is credential:rei	nove CREDENTIAL [OPTIONS]		
Argun	nent			
CREDE	CREDENTIAL Credential Name or ID			
Options				
-f	fforce Force Removal from Database			
-h	-hhelp Show Help			
Example				
creder	tial:remove mv	Credential		

credential:share CREDENTIAL USERNAME

P				
D	esc	rır)t1(n
~	000			

Share your credential to another user.

Share your of eachadres about				
Usage				
ITIAL USERNAME				
Arguments				
CREDENTIAL Credential Name or ID				
Linux Username				
Options				
-hhelp Show Help				
Examples				
\$ nodus credential:share myCredential otherUser				
e				

cred	credential:show CREDENTIAL				
Desc	cription				
Disp	lay details of a particular crede	ntial entry from the database.			
Usag	ge				
\$ no	dus credential:show CREDENTL	AL [OPTIONS]			
Argı	iment				
CRE	DENTIAL C	redential Name or ID			
Opti	Options				
-f	format=text json	[default: text] Output Format			
-h	help	Show Help			
Exai	Examples				
\$ nodus credential:show myCredential					
\$ no	\$ nodus credential:show myCredentialformat json				

credential:unshare CREDENTIAL

Description

Unshare your credential to another user.

Usage					
\$ nodus	credential:unsh	are CRED	ENTIAL [USERNAME] [OPTIONS]		
Argume	ents				
CREDEN	ITIAL		Credential Name or ID		
USERN A	ME		Linux Username		
Options	5				
-h	help	Show He	Show Help		
	all	Remove all shared users			
Examples					
\$ nodus credential:unshare myCredential otherUser					
\$ nodus credential:unshare myCredentialall					

4.4 Stacks

This section contains the following commands:

- stack:aws:create NAME TYPE
- stack:aws:update STACK
- stack:azure:create NAME TYPE
- stack:azure:update STACK
- stack:build STACK
- stack:gcp:create NAME TYPE
- stack:gcp:update STACK
- stack:list
- stack:log CLUSTER TYPE
- stack:oracle:create NAME TYPE
- stack:oracle:update STACK
- stack:otc:create NAME TYPE
- stack:otc:create STACK
- stack:remove STACK
- stack:set STACK CREDENTIAL
- stack:share STACK USERNAME
- stack:show STACK
- stack:unshare STACK

stack:aws:create NAME TYPE

Description

Create new Amazon Web Services (AWS) stack configuration entry.

Usage

\$ nodus stack:aws:create NAME TYPE [CREDENTIAL] [OPTIONS]

Arguments			
NAME	Associated Name		
ТҮРЕ	(centos-7) Image Type		
CREDENTIAL	Set Credential		
Options			
-DdataFile=dataFile	Path (absolute or relative) of user input files for user provisioning process (multiple files supported)		

-N	nodeProvisioner=nodeProvisioner	Path (absolute or relative) of user provisioning script to run during stack build on Compute node only
-S	 serverProvisioner=serverProvisioner	Path (absolute or relative) of user provisioning script to run during stack build on Head node only
-C	custom	Use Managed Image
-d	description=description	Description
-h	help	Show Help
-i	instance=instance	(required) [default: t2.micro] Instance Type
-p	prefix=prefix	(required) [default: nodus] Output Image Prefix
-r	region=region	(required) Region ID
-s	source=source	Source Image ID
-u	username=username	SSH Username
	private	Provision via Private IP
	proxy=proxy	HTTP(S) Proxy URL
	security=security	Security Group ID
	subnet=subnet	Subnet ID
	volume=volume	Storage Volume (GB)

Examples

\$ nodus stack:aws:create myStack centos-7 myCred --region=us-east-2

\$ nodus stack:aws:create myStack centos-7 --prefix=myNodus --region=us-east-2 -instance=t2.large

\$ nodus stack:aws:create myStack centos-7 --region us-east-2 --proxy \$http_proxy \$ nodus stack:aws:create myStack centos-7 --region=us-east-2 --custom --source=ami-04152c3a27c49a944 --username=ec2-user --instance=t2.xlarge

\$ nodus stack:aws:create myStack centos-7 --region=us-east-2 --instance=t2.xlarge -serverProvisioner ~/myServerScript --nodeProvisioner ~/myNodeScript --dataFile
~/myDataFile2

stack:aws:update STACK

Description

Update Google Cloud Platform (GCP) cluster configuration entry.

Usage

\$ nodus stack:aws:update STACK [OPTIONS]

Arguments

STACK

Stack Name or ID

Op	tions	
-D	dataFile=dataFile	Input files for user provisioning process (mul- tiple files supported)
-N	nodeProvisioner=nodeProvisioner	User provisioning script to run during stack build on Compute node only
-S	server- Provisioner=serverProvisioner	User provisioning script to run during stack build on Head node only
-C	custom	Use Managed Image
-d	description=description	Description
-h	help	Show Help
-i	instance=instance	Instance Type
-n	name=name	Name Identifier
-p	prefix=prefix	Output Image Prefix
-r	region=region	Region ID
-S	source=source	Source Image ID
-t	type=centos-7	OS Type
-u	username=username	SSH Username
	no-proxy	Remove HTTP(S) Proxy
	no-security	Remove Security Group
	no-subnet	Remove Subnet
	no-volume	Remove Extended Root Storage Volume
	[no-]private	Provision via Private IP
	proxy=proxy	HTTP(S) Proxy URL
	security=security	Security Group ID
	subnet=subnet	Subnet ID
	volume=volume	Extended Root Storage Volume (GB)
-	-	

Examples

\$ nodus stack:aws:update myStack --name newStack

\$ nodus stack:aws:update myStack --region=us-east-2

\$ nodus stack:aws:update myStack --prefix=myNodus --region=us-east-2 -instance=t2.large

\$ nodus stack:aws:update myStack --region us-east-2 --proxy \$http_proxy

\$ nodus stack:aws:update myStack --region=us-east-2 --custom --source=ami-

04152c3a27c49a944 --username=ec2-user --instance=t2.xlarge

stack:azure:create NAME TYPE

Description

Cre	Create new Microsoft Azure stack configuration entry.				
Usa	age				
\$ n	odus stack:azure:create NAME	TYPE [CREDENTIAL] [OPTIONS]		
Arg	guments				
NA	ME	Associ	ated Name		
TY	PE	(cento	s-7) Image Type		
CR	EDENTIAL	Set Cre	edential		
Op	tions				
-D	dataFile=dataFile		Path (absolute or relative) of user input files for user provisioning process (multiple files supported)		
-N	nodeProvisioner=nodeProvis	ioner	Path (absolute or relative) of user provisioning script to run during stack build on Compute node only		
-S	 serverProvisioner=serverProv	isioner	Path (absolute or relative) of user provisioning script to run during stack build on Head node only		
-C	custom		Use Managed Image		
-d	ddescription=description		Description		
-h	help		Show Help		
-i	instance=instance		(required) [default: Standard_DS2_v2] Instance Type ID		
-p	prefix=prefix		(required) [default: nodus] Output Image Prefix		
-s	source=source		Source Image ID		
-u	username=username		SSH Username		
	offer=offer		Source Image Offer		
	os-type=os-type		Source Image OS Type		
	publisher=publisher		Source Image Publisher		
	resource=resource		(required) Managed Resource Group Name		
	sku=sku		Source Image SKU		
	source-resource=source-reso	ource	Source Resource Group Name		

~

Examples

\$ nodus stack:azure:create myStack centos-7 myCred --resource=myResourceGroup -instance=Standard_DS2_v2

\$ nodus stack:azure:create myStack centos-7 myCred --resource=myResourceGroup -S ~/myServerScript -N ~/myNodeScript -D ~/myDataFile2 -D ~/myDataFile2

\$ nodus stack:azure:create myStack centos-7 --prefix=myNodus -resource=myResourceGroup --instance=Standard_DS2_v2

sta	stack:azure:update STACK			
De	scription			
Up	date Microsoft Azure stack configuration	on entry.		
Us	age			
\$ n	odus stack:azure:update STACK [OPTI	ONS]		
Arg	guments			
ST	ACK Stack Name or	ID		
Op	tions			
-D	dataFile=dataFile	Input files for user provisioning process (multiple files supported)		
-N	nodeProvisioner=nodeProvisioner	User provisioning script to run during stack build on Compute node only		
-S	 serverProvisioner=serverProvisioner	User provisioning script to run during stack build on Head node only		
-C	custom	Use Managed Image		
-d	description=description	Description		
-h	help	Show Help		
-i	instance=instance	(required) [default: Standard_DS2_v2] Instance Type ID		
-n	name=name	Name Identifier		
-p	prefix=prefix	(required) [default: nodus] Output Image Prefix		
-S	source=source	Source Image ID		
-t	type=centos-7	OS Type		
-u	username=username	SSH Username		
	os-type=os-type	Source Image OS Type		
	publisher=publisher	Source Image Publisher		
	resource=resource	(required) Managed Resource Group Name		
	sku=sku	Source Image SKU		
	source-resource=source-resource	Source Resource Group Name		

Examples

\$ nodus stack:azure:update myStack --name newStack

\$ nodus stack:azure:update myStack --resource=myResourceGroup --instance=Standard_ DS2_v2

\$ nodus stack:azure:update myStack --prefix=myNodus --resource=myResourceGroup -instance=Standard_DS2_v2

stack:build STACK

Description

Generates images compatible with NODUS clusters. Generate two images: 'nodus-server'; 'nodus-node'.

Usage				
\$ nodu	s stack:build STAC	K [OPTIONS]		
Argun	nent			
STACK		Stack Name or ID		
Option	15			
-S	slow		Sequential Builds	
-h	help		Show Help	
-S	stack=server no	de	Sub-Stack	
Examp	oles			
\$ nodus stack:build myStack				
\$ nodus stack:build myStackstack server				

stack:gcp:create NAME TYPE

Description

Create new Google Cloud Platform (GCP) stack configuration entry.

Usage

\$ nodus stack:gcp:create NAME TYPE [CREDENTIAL] [OPTIONS]

Arg	guments			
NA	ME	Associ	iated Name	
TYI	PE	(cento	s-7) Image Type	
CR	EDENTIAL	Set Cre	edential	
Op	tions			
-DdataFile=dataFile			Path (absolute or relative) of user input files for user provisioning process (multiple files supported)	
-N	NnodeProvisioner=nodeProvisioner		Path (absolute or relative) of user provisioning script to run during stack build on Compute node only	
-S	 serverProvisioner=serverProv	isioner	Path (absolute or relative) of user provisioning script to run during stack build on Head node only	
-C	ccustom		Managed Image	
-d	1disk=disk		Disk Size (GB)	
-h	help	Show Help		
----	-------------------	---		
-i	instance=instance	(required) [default: n1-standard-1] Instance Type ID		
-p	prefix=prefix	(required) [default: nodus] Output Image Prefix		
-s	source=source	Source AMI ID		
-u	username=username	SSH Username		
-z	zone=zone	(required) Availability Zone ID		
	[no-]account	Auth via Service Account		
	disk=disk	Extended Root Disk Size (GB)		
	proxy=proxy	HTTP(S) Proxy URL		
	subnet=subnet	Subnet Self Link ID		

\$ nodus stack:gcp:create myStack centos-7 myCred --zone=us-east1-b --instance=n1standard-1

\$ nodus stack:gcp:create myStack centos-7 --prefix=myNodus --zone=us-east1-b -instance=n1-standard-1

\$ nodus stack:gcp:create myStack centos-7 myCred -z us-east4-b -p myPrefix -serverProvisioner ~/myServerScript --nodeProvisioner ~/myNodeScript --dataFile
~/myDataFile1 --dataFile ~/myDataFile2

stack:gcp:update STACK

Description

Update Google Cloud Platform (GCP) stack configuration entry.

Usage

\$ nodus stack:gcp:update STACK [OPTIONS]

Arguments

STACK Stack Name or ID **Options** -D --dataFile=dataFile Input files for user provisioning process (multiple files supported) -N --nodeProvisioner=nodeProvisioner User provisioning script to run during stack build on Compute node only User provisioning script to run during stack -S --server-Provisioner=serverProvisioner build on Head node only -c --custom Managed Image -d --description=description Description -h --help Show Help

Op	Options		
-i	instance=instance	Instance Type ID	
-n	name=name	Name Identifier	
-p	prefix=prefix	Output Image Prefix	
-s	source=source	Source AMI ID	
-t	type=centos-7	OS Type	
-u	username=username	SSH Username	
-w	walltime=walltime	Job walltime	
-Z	zone=zone	Availability Zone ID	
	[no-]account	Auth via Service Account	
	disk=disk	Extended Root Disk Size (GB)	
	no-disk	Remove Disk	
	no-proxy	Remove HTTP(S) Proxy	
	no-subnet	Remove Subnet	
	proxy=proxy	HTTP(S) Proxy URL	
	subnet=subnet	Subnet Self Link ID	
r	1		

Examples

\$ nodus stack:gcp:update myStack --name newStack

\$ nodus stack:gcp:update myStack --zone=us-east1-b --instance=n1-standard-1

\$ nodus stack:gcp:update myStack --prefix=myNodus --zone=us-east1-b --instance=n1standard-1

Show Help

[default: text] Output Format

stack:list

Description

List stack entries from database.

Usage

\$ nodus stack:list [OPTIONS]

Options

-f --format=text|json

-h --help

Examples

\$ nodus stack:list

\$ nodus stack:list --format json

stack	stack:log CLUSTER TYPE				
Descr	iption				
Displa	y stack	t build logs.			
Usage)				
\$ nod	us stacl	k:log CLUSTER TYPE	[OPTIONS]		
Argur	nents				
STACE	X	Stack Name or ID			
TYPE		(master build) [defa	ult: master] Log Type		
Options					
-d	debı	ıg	Debug Logs		
-f	follo	W	Follow File Output Stream		
-h	help		Show Help		
-n	lines	=lines	Last N Lines		
follow F		W	Follow File Output Stream		
Example					
\$ nodus stack:log myCluster					

stack:oracle:create NAME TYPE

Description

Create new Oracle Cloud stack configuration entry.

Usage

\$ nodus stack:oracle:create NAME TYPE [CREDENTIAL] [OPTIONS]

Arg	guments		
NA	ME	Associa	ated Name
TY	PE	(centos	s-7) Image Type
CR	EDENTIAL	Set Cre	edential
Op	tions		
-D	DdataFile=dataFile		Path (absolute or relative) of user input files for user provisioning process (multiple files supported)
-N	-NnodeProvisioner=nodeProvisioner		Path (absolute or relative) of user provisioning script to run during stack build on Compute node only
-S	 serverProvisioner=serverProv	isioner	Path (absolute or relative) of user provisioning script to run during stack build on Head node only

-C	custom	Use Managed Image
-d	description=description	Description
-h	help	Show Help
-i	instance=instance	(required) [default: VM.Standard2.1] Instance Type ID
-n	subnet=subnet	(required) Subnet OCID
-p	prefix=prefix	(required) [default: nodus] Output Image Prefix
-r	region=region	(required) Region ID
-s	source=source	Source Image ID
-u	username=username	SSH Username

\$ nodus stack:oracle:create myStack centos-7 myCred --prefix=myNodus --region=usashburn-1 --

subnet=ocid1.subnet.oc1.iad.aaaaaaaa7v2znysxlclowk7rhgkgldvjaxmkkjpiktnahnusgknhw 5pcvi6q

\$ nodus stack:oracle:create myStack centos-7 myCred --prefix=myNodus --region=usashburn-1 --subnet=mySubnet -S ~/myServerScript -N ~/myNodeScript -D ~/myDataFile1 -D ~/myDataFile2

sta	ck:oracle:update STA	ACK	
De	scription		
Up	date Oracle Cloud stacl	k configuration	entry.
Us	age		
\$ n	odus stack:oracle:upda	ate STACK [OPT	'IONS]
Arg	guments		
ST	АСК	Stack Name or	ID
Options			
-D	dataFile=dataFile		Input files for user provisioning process (mul- tiple files supported)
-N	nodeProvisioner=no	deProvisioner	User provisioning script to run during stack build on Compute node only
-S	server- Provisioner=serverPr	ovisioner	User provisioning script to run during stack build on Head node only
-C	custom		Use Managed Image
-d	description=descript	tion	Description
-h	help		Show Help
-i	instance=instance		Instance Type ID

Op	Options		
-n	name=name	Name Identifier	
-n	subnet=subnet	(required) Subnet OCID	
-p	prefix=prefix	Output Image Prefix	
-r	region=region	Region ID	
-S	source=source	Source Image ID	
-t	type=centos-7	OS Type	
-u	username=username	SSH Username	
	-		

Examples

\$ nodus stack:oracle:update myStack --name newStack

\$ nodus stack:oracle:update myStack --prefix=myNodus --region=us-ashburn-1 -subnet=ocid1.subnet.oc1.iad.aaaaaaaa7v2znysxlclowk7rhgkgldvjaxmkkjpiktnahnusgknhw 5pcvi6q

stack:otc:create NAME TYPE

Description

Create new OpenTelekom Cloud stack configuration entry.

Usage

	\$	nodus stack:otc:create	NAME TYPE	[CREDENTIAL]	[OPTIONS]
--	----	------------------------	-----------	--------------	-----------

Ar	guments		
NAME Associ		Associa	ated Name
ΤY	PE	(centos	s-7) Image Type
CR	EDENTIAL	Set Cre	edential
Op	otions		
-D	dataFile=dataFile		Path (absolute or relative) of user input files for user provisioning process (multiple files supported)
-N	nodeProvisioner=nodeProvis	ioner	Path (absolute or relative) of user provisioning script to run during stack build on Compute node only
-S	 serverProvisioner=serverProv	isioner	Path (absolute or relative) of user provisioning script to run during stack build on Head node only
-C	custom		Use Managed Image
-d	description=description		Description
-h	help		Show Help
-i	instance=instance		(required) [default: s2.medium.2] Instance Type ID

-p	prefix=prefix	(required) [default: nodus] Output Image Prefix
-s	source=source	Source Image ID
-u	username=username	SSH Username
	private	Provision via Private IP
	proxy=proxy	HTTP(S) Proxy URL
	security=security	Security Group ID
	subnet=subnet	(required) Subnet Network ID
	volume=volume	Extended Root Storage Volume (GB)

\$ nodus stack:otc:create myStack centos-7 myCred --subnet 3bc69be8-3ebc-434c-b828-9aeb5a8ec78a --instance s2.medium.2

\$ nodus stack:otc:create myStack centos-7 --prefix myNodus --subnet 3bc69be8-3ebc-434c-b828-9aeb5a8ec78a --instance s2.medium.2

\$ nodus stack:otc:create myStack centos-7 --subnet 3bc69be8-3ebc-434c-b828-9aeb5a8ec78a --proxy \$http_proxy

\$ nodus stack:otc:create myStack centos-7 --subnet mySubnet --serverProvisioner ~/myServerScript --nodeProvisioner ~/myNodeScript --dataFile ~/myDataFile2

stack:otc:create STACK

De	scription	
Cre	eate new OpenTelekom Cloud stack co	onfiguration entry.
Usa	age	
\$ n	odus stack:otc:create STACK [CREDE	NTIAL] [OPTIONS]
Arg	guments	
STA	АСК	Stack Name or ID
CR	EDENTIAL	Set Credential
Op	tions	
-D	dataFile=dataFile	Path (absolute or relative) of user input files for user provisioning process (multiple files supported)
-N	nodeProvisioner=nodeProvisioner	Path (absolute or relative) of user provisioning script to run during stack build on Compute node only
-S	 serverProvisioner=serverProvisione	Path (absolute or relative) of user provisioning r script to run during stack build on Head node only
-C	custom	Use Managed Image

-d	description=description	Description
-h	help	Show Help
-i	instance=instance	Instance Type ID
-n	name=name	Name Identifier
-p	prefix=prefix	Output Image Prefix
-s	source=source	Source Image ID
-t	type=centos-7	OS Type
-u	username=username	SSH Username
	no-proxy	Remove HTTP(S) Proxy
	no-security	Remove Security Group
	no-volume	Remove Extended Root Storage Volume
	[no-]private	Provision via Private IP
	proxy=proxy	HTTP(S) Proxy URL
	security=security	Security Group ID
	subnet=subnet	Subnet Network ID
	volume=volume	Extended Root Storage Volume (GB)

\$ nodus stack:otc:create myStack myCred --name newStack

\$ nodus stack:otc:create myStack --subnet 3bc69be8-3ebc-434c-b828-9aeb5a8ec78a -instance s2.medium.2

\$ nodus stack:otc:create myStack --prefix myNodus --subnet 3bc69be8-3ebc-434c-b828-9aeb5a8ec78a --instance s2.medium.2

\$ nodus stack:otc:create myStack --subnet 3bc69be8-3ebc-434c-b828-9aeb5a8ec78a -proxy \$http_proxy

stack:remove STACK

Description		
Remove stack entries f	rom c	latabase.
Usage		
\$ nodus stack:remove \$	STACI	K [OPTIONS]
Argument		
STACK	St	ack Name or ID
Options		
-hhelp		Show Help
[no-]clean		Remove Files Created for Cluster
Examples		

\$ nodus stack:remove myStack

\$ nodus stack:remove myStack --no-clean

\$ nodus stack:remove myStack --force

stack:set STACK CREDENTIAL

Description

Associate stack entry with credential entry.

Usage

\$ nodus stack:set STACK CREDENTIAL [OPTIONS]

Arguments

STACK Stack Name or ID CREDENTIAL Credential Name or ID Option -h alp Show Help Example \$ nodus stack myStack myCredential

stack:share STACK USERNAME Description Share your stack to another user. Usage \$ nodus stack:share STACK USERNAME Argument STACK Stack Name or ID **USERNAME** Linux Username **Options** -h --help Show Help **Examples** \$ nodus stack:share myStack otherUser

stack:show STACK

Description

Display details of a particular stack entry from the database.

Usage

\$ nodus stack:show STACK [OPTIONS]					
Argu	ment				
STAC	CK	Stack Name or I	D		
Opti	ons				
-f	format=text json xml		[default: text] Output Format		
-h	help		Show Help		
Exan	Examples				
\$ nodus stack:show myStack					
\$ noo	\$ nodus stack:show myStackformat json				

stack:u	nshare STACK		
Descrip	tion		
Unshare	e your stack to a	nother user.	
Usage	-		
\$ nodus	stack:unshare S	TACK [USER	NAME] [OPTIONS]
Argume	ent		
STACK			Stack Name or ID
USERNAME			Linux Username
Options	5		
-h	help	Show Help	
	all	Remove all	shared users
Exampl	es		
\$ nodus	stack:unshare n	nyStack othe	rUser
\$ nodus	stack:unshare n	nvStackall	

4.5 Clusters

This section contains the following commands:

- cluster:aws:create NAME TYPE MANAGER
- cluster:aws:update CLUSTER
- cluster:azure:create NAME TYPE MANAGER
- cluster:azure:update CLUSTER
- cluster:burst CLUSTER

- cluster:cores CLUSTER
- cluster:deploy CLUSTER
- cluster:destroy CLUSTER
- cluster:gcp:create NAME TYPE MANAGER
- cluster:gcp:update CLUSTER
- cluster:list
- cluster:local:create
- cluster:local:update CLUSTER
- cluster:log
- cluster:members CLUSTER
- cluster:nodes CLUSTER
- cluster:oracle:create NAME TYPE MANAGER
- cluster:oracle:update CLUSTER
- cluster:otc:create NAME TYPE MANAGER
- cluster:otc:update CLUSTER
- cluster:ovpn CLUSTER
- cluster:queue CLUSTER
- cluster:releasehold CLUSTER
- cluster:remove CLUSTER
- cluster:remove-output CLUSTER ID
- cluster:resize CLUSTER
- cluster:service CLUSTER
- cluster:set CLUSTER CREDENTIAL
- cluster:share CLUSTER USERNAME
- cluster:show CLUSTER
- cluster:ssh CLUSTER
- cluster:sshfs CLUSTER
- cluster:sync CLUSTER TYPE

• cluster:unshare CLUSTER

cluster:aws:create NAME TYPE MANAGER

Description

Create new Amazon Web Services (AWS) cluster configuration entry.

Usage

\$ nodus cluster:aws:create NAME TYPE MANAGER [CREDENTIAL] [OPTIONS]

Arg	guments			
NAME Name		Name	dentifier	
TYPE (centos		(cento	s-7) Image Type	
MA	NAGER	(torqu	e slurm) HPC Workload Manager	
CR	EDENTIAL	Set Cre	edential	
Op	tions			
-P	package=package		Packages	
-b	[no-]burstOnDepl	oy	Initiate Burst Service post Deploy	
-d	description=descr	iption	Description	
-h	help		Show Help	
-i	instance=instance		(required) Server Instance Type ID	
-m	mode=min max		[default: min] Bursting Mode	
-p	prefix=prefix		(required) [default: nodus] Source Image Root Prefix (example: nodus)	
-r	region=region		(required) Region ID	
-zzone=zone			Availability Zone ID	
	eip=eip		Elastic IP ID	
	idle-purge=idle-pu	urge	[default: 600] Node Idle Purge Time(s)	
	job-completed-dro	opoff	Completed Jobs Queue Time	
	node-volume=nod volume	le-	Expanded Node Root Volume (GB)	
	private		Provision via Private IP	
	role		Auth via EC2 Role	
	security=security		Security Group ID	
	server-volume=se volume	erver-	Expanded Server Root Volume (GB)	
	subnet=subnet		Subnet ID	
	vpc=vpc		VPC Network Self Link ID	
-0			OCPUs for flexible Shapes ¹	
Ex:	amples			

\$ nodus cluster:aws:create myCluster centos-7 torque myCred --prefix myNodus --region
us-east-2 --instance=t2.large --job-completed-dropoff=60

\$ nodus cluster:aws:create myCluster centos-7 slurm --region us-east-2 --package git -package python3 --package perl

\$ nodus cluster:aws:create myCluster centos-7 torque --region us-east-2 --instancee=t2.large --vpc=vpc-03ceecbf61bb37c99 --subnet=subnet-05aa121e98148d0ce --security=sg-09cda11597d6fd926

¹ When using flex based instances, the $-\circ$ flag is required. And when using flex instances, you can only use flex instances, although you can mix and match between generations.

clu	ster:aws:update CLUSTE	ĸ	
Des	cription		
Upc	late Amazon Web Services	(AWS) clust	er configuration entry.
Usa	ıge		
\$ no	odus cluster:aws:update CL	USTER [OP1	TIONS]
Arg	guments		
CLU	JSTER	Cluster Nar	ne or ID
Opt	tions		
-P	package=package		Add Package
-R	no-package=no-package		Remove Package
-b	[no-]burstOnDeploy		Initiate Burst Service post Deploy
-d	description=description		Description
-h	help		Show Help
-i	instance=instance		Server Instance Type ID
-m	mode=min max		Bursting Mode
-n	name=name		Name Identifier
-p	prefix=prefix		Source Image Root Prefix (Ex: nodus)
-r	region=region		Region ID
-t	type=centos-7		OS Type
-Z	zone=zone		Availability Zone ID
	eip=eip		Elastic IP ID
	force		Skip Checks
	idle-purge=idle-purge		Node Idle Purge Time(s)
	job-completed-dropoff		Completed Jobs Queue Time
	manager=torque slurm		HPC Workload Manager
	no-eip		Remove Elastic IP
	no-node-volume		Remove Expanded Node Root Volume

Opt	tions	
	no-security	Remove Security Group
	no-server-volume	Remove Expanded Server Root Volume
	no-subnet	Remove Subnet
	no-vpc	Remove VPC
	no-zone	Remove Zone
	node-volume=node-volume	Expanded Node Root Volume (GB)
	[no-]private	Provision via Private IP
	[no-]role	Auth via EC2 Role
	security=security	Security Group ID
	server-volume=server-volume	Expanded Server Root Volume (GB)
	subnet=subnet	Subnet ID
	vpc=vpc	VPC ID
-0		OCPUs for flexible Shapes ¹
Exa	mples	

\$ nodus cluster:aws:update myCluster --name newCluster

\$ nodus cluster:aws:update myCluster --job-completed-dropoff=60

\$ nodus cluster:aws:update myCluster --instance=t2.large

\$ nodus cluster:aws:update myCluster --vpc=vpc-03ceecbf61bb37c99 --subnet=subnet
05aa121e98148d0ce --security=sg-09cda11597d6fd926

¹ When using flex based instances, the $-\circ$ flag is required. And when using flex instances, you can only use flex instances, although you can mix and match between generations.

cluster:azure:create NAME TYPE MANAGER

Description

Create new Microsoft Azure cluster configuration entry.

Usage	
-------	--

\$ nodus cluster:azure:create NAME TYPE MANAGER [CREDENTIAL] [OPTIONS]

Arg	Arguments				
NA	ME	Name I	dentifier		
TY	PE	(centos	-7) Image Type		
MA	NAGER	(torque	slurm) HPC Workload Manager		
CREDENTIAL Set Cree		Set Cre	dential		
Op	Options				
-Ppackage=package			Packages		
-R	-Rresource=resource		(required) Image Resource Group Name		

-b	[no-]burstOnDeploy	Initiate Burst Service post Deploy
-d	description=description	Description
-h	help	Show Help
-i	instance=instance	(required) [default: Standard_DS2_v2] Server Instance Type ID
-m	mode=min max	[default: min] Bursting Mode
-p	prefix=prefix	(required) [default: nodus] Source Image Root Prefix (example: nodus)
-r	region=region	(required) Region ID
	idle-purge=idle-purge	[default: 600] Node Idle Purge Time(s)
	job-completed-dropoff	Completed Jobs Queue Time
	node-volume=node- volume	Expanded Node Root Volume (GB)
	server-volume=server- volume	Expanded Server Root Volume (GB)
-0		OCPUs for flexible Shapes ¹
Em	amala	

\$ nodus cluster:azure:create myCluster centos-7 torque myCred --region=eastus -instance=Standard_DS2_v2 --resource=myResourceGroup --job-completed-dropoff=60

\$ nodus cluster:azure:create myCluster centos-7 slurm --prefix=myNodus --region=westus
--instance=Standard_DS2_v2 --resource=myResourceGroup

¹ When using flex based instances, the $-\circ$ flag is required. And when using flex instances, you can only use flex instances, although you can mix and match between generations.

clu	cluster:azure:update CLUSTER				
Des	scription				
Up	date Microsoft Azure cluste	er configura	ation entry.		
Usa	age				
noc	lus cluster:azure:update C	LUSTER [O	PTIONS]		
Arg	guments				
CLU	JSTER	Cluster Nai	me or ID		
Op	tions				
-P	package=package		Add Package		
-R	no-package=no-package		Remove Package		
-R	resource=resource		Image Resource Group Name		
-b	[no-]burstOnDeploy		Initiate Burst Service post Deploy		
-d	description=description		Description		

Op	tions	
-h	help	Show Help
-i	instance=instance	Server Instance Type ID
-m	mode=min max	Bursting Mode
-n	name=name	Name Identifier
-p	prefix=prefix	Prefix Source Image Root Prefix (Ex: nodus)
-r	region=region	Region ID
-t	type=centos-7	OS Type
	force	Skip Checks
	idle-purge=idle-purge	Node Idle Purge Time(s)
	job-completed-dropoff	Completed Jobs Queue Time
	manager=torque slurm	HPC Workload Manager
	no-node-volume	Remove Expanded Node Root Volume
	no-server-volume	Remove Expanded Server Root Volume
	node-volume=node-volume	Expanded Node Root Volume (GB)
	server-volume=server-volume	Expanded Server Root Volume (GB)
-0		OCPUs for flexible Shapes ¹

Examples

\$ nodus cluster:azure:update myCluster --name newCluster

\$ nodus cluster:azure:update myCluster --job-completed-dropoff=60

\$ nodus cluster:azure:update myCluster --prefix=myNodus --region=eastus --resourcee=myResourceGroup

¹ When using flex based instances, the $-\circ$ flag is required. And when using flex instances, you can only use flex instances, although you can mix and match between generations.

cluster:burst CLUSTER

Desc	ription		
Mana	ge cluster bursting state	or manual burst.	
Usag	e		
\$ nod	us cluster:burst CLUSTE	R [OPTIONS]	
Argu	ment		
CLUSTER Cluste		Cluster Name or ID	
Optio	ons		
-f	force	Skip State Checks	
-h	help	Show Help	
-m	mode=min max	Bursting Mode	

	raw	Raw Details		
	start	Start bursting service Daemon		
	status	Check Service Status		
	stop Stop bursting service Daemon			
Examples				
\$ nodus cluster:burst myCluster				
\$ nodus cluster:burst myClusterstart				
\$ nodus cluster:burst myClusterstop				
\$ nodus cluster:burst myClusterstatus				

\$ nodus cluster:burst myCluster --mode max --start

Cluster Coles GLOSILIN

Description

Get cluster core information.

Usage

\$ nodus cluster:cores CLUSTER [OPTIONS]

Options

-f --format=text|json

-h --help

[default: text] Output Format Show Help

Show Help

Show Plan

Node Hostname

Examples

\$ nodus cluster:cores myCluster

cluster:deploy CLUSTER

Description

Modify cloud resources based on cluster configuration entry.

Cluster Name or ID

Usage

\$ nodus cluster:deploy CLUSTER [OPTIONS]

Argument

CLUSTER	
0200121	

Options

-h --help

- -t --target=target
- --[no-]plan

Examples

\$ nodus cluster:deploy myCluster

\$ nodus cluster:deploy myCluster --no-plan

cluster:destroy (CLUSTER
-------------------	---------

Description

Destroy cloud resources based on cluster configuration entry.

Usage

\$ nodus cluster:destroy CLUSTER [OPTIONS]

Argument

CLUSTER

Cluster Name or ID

Skip Checks

Show Help

Show Plan

Node Hostname

Options

-f

--force --help

-h -t --target=target --plan

Examples

\$ nodus cluster:destroy myCluster

\$ nodus cluster:destroy myCluster --no-plan

cluster:gcp:create NAME TYPE MANAGER

Description

Create new Google Cloud Platform (GCP) cluster configuration entry.

Usage

\$ nodus cluster:gcp:create NAME TYPE MANAGER [CREDENTIAL] [OPTIONS]

Arg	Arguments				
NAME Name Ide		Name Id	entifier		
TYPE (centos-7		(centos-7) Image Type		
MANAGER (torque s		(torque)	slurm) HPC Workload Manager		
CREDENTIAL Set Crede		Set Cred	ential		
Options					
-P	Ppackage=package		Packages		
-b	[no-]burstOnDeploy		Initiate Burst Service post Deploy		
-d	ddescription=description		Description		
-h	hhelp		Show Help		
-					

-m	mode=min max	[default: min] Bursting Mode
-p	prefix=prefix	(required) [default: nodus] Source Image Root Prefix (example: nodus)
-r	region=region	(required) Region ID
-z	zone=zone	(required) Availability Zone ID
	account	Auth via Service Account
	disk- type=ssd balanced standard	[default: standard] Storage class for boot disk Options correspond to the GCP persistent disk types [ssd persistent disks (pd-ssd), balanced persistent disks (pd- balanced), and standard persistent disks (pd-standard)]
	firewall=firewall	Firewall Self Link ID
	idle-purge=idle-purge	[default: 600] Node Idle Purge Time(s)
	job-completed-dropoff	Completed Jobs Queue Time
	node-volume=node- volume	Expanded Node Root Volume (GB)
	server-volume=server- volume	Expanded Server Root Volume (GB)
	subnet=subnet	Subnet Self Link ID
	vpc=vpc	VPC Network Self Link ID
-0		OCPUs for flexible Shapes ¹

\$ nodus cluster:gcp:create myCluster centos-7 torque myCred --region=us-east1 -zone=us-east1-b --instance=n1-standard-1 --job-completed-dropoff=60

\$ nodus cluster:gcp:create myCluster centos-7 slurm --prefix=myNodus --region=us-east1 --zone=us-east1-b --instance=n1-standard-1

¹ When using flex based instances, the $-\circ$ flag is required. And when using flex instances, you can only use flex instances, although you can mix and match between generations.

cluster:gcp:update CLUSTER

Description

Update Google Cloud Platform (GCP) cluster configuration entry.

Usage

nodus cluster:gcp:update CLUSTER [OPTIONS]

Arguments

CLUSTER Cluster Name or ID

Op	tions			
-P	package=package	Add Package		
-R	no-package=no-package	Remove Package		
-b	[no-]burstOnDeploy	Initiate Burst Service post Deploy		
-d	description=description	Description		
-h	help	Show Help		
-i	instance=instance	Server Instance Type ID		
-m	mode=min max	Bursting Mode		
-n	name=name	Name Identifier		
-p	prefix=prefix	Prefix Source Image Root Prefix (Ex: nodus)		
-r	region=region	Region ID		
-t	type=centos-7	OS Type		
-Z	zone=zone	Availability Zone ID		
	[no-]account	Auth via Service Account		
	disk-	Storage class for boot disk		
	type=ssd balanced standard	Options correspond to the GCP persistent disk types [ssd persistent disks (pd-ssd), balanced persistent disks (pd-balanced), and standard persistent disks (pd-standard)]		
	firewall=firewall	Firewall Self Link ID		
	force	Skip Checks		
	idle-purge=idle-purge	Node Idle Purge Time(s)		
	job-completed-dropoff	Completed Jobs Queue Time		
	manager=torque slurm	HPC Workload Manager		
	no-firewall	Remove Firewall		
	no-node-volume	Remove Expanded Node Root Volume		
	no-server-volume	Remove Expanded Server Root Volume		
	no-subnet=no-subnet	Remove Subnet		
	no-vpc=no-vpc	Remove VPC		
	node-volume=node- volume	Expanded Node Root Volume (GB)		
	server-volume=server- volume	Expanded Server Root Volume (GB)		
	subnet=subnet	Subnet Self Link ID		
	vpc=vpc	VPC Network Self Link ID		
-0		OCPUs for flexible Shapes ¹		
Exa	amples			
\$ n	\$ nodus cluster:gcp:update myClustername newCluster			

\$ nodus cluster:gcp:update myCluster --job-completed-dropoff=60

\$ nodus cluster:gcp:update myCluster --prefix=myNodus --region=us-east1 --zone=useast1-b

¹ When using flex based instances, the $-\circ$ flag is required. And when using flex instances, you can only use flex instances, although you can mix and match between generations.

cluster:list					
Des	rintion				
List	cluster entries from database				
Hac					
Usa	ge				
\$ no	dus cluster:list [OPTIONS]				
Opt	Options				
-f	format=text json	[default: text] Output Format			
-h	help	Show Help			
Exa	nples				
\$ nodus cluster:list					
\$ nodus cluster:listformat json					
cluster:local:create					
_					
Description					
Create new On Premises cluster configuration entry.					
Usage					
\$ nodus cluster:local:create NAME [OPTIONS]					
Arg	iments				
NAM	1E Name Ident	tifier			

Options

-d--description=descriptionDescription-h--helpShow Help

Examples

\$ nodus cluster:local:create myCluster

cluster:local:update CLUSTER

Description

Update On Premises cluster configuration entry.

Usage				
\$ nodus cluster:local:undate CLUSTER [OPTIONS]				
Arguments				
CLUSTER Cluster Name or ID				
Options				
-ddescription=description	Description			
-hhelp	Show Help			
-nname=name	Name Identifier			
Examples				
\$ nodus cluster:local:update myClustername newCluster				

cluster:log

Description

Display cluster logs.

Usage

\$ nodus cluster:log CLUSTER TYPE [OPTIONS]

Arguments

di de di	CLUSTER	Cluster	Name	or ID
--	---------	---------	------	-------

TYPE (init|plan|deploy|destroy|master|burst) [default: master] Log Type

Options

-d	debug	Debug Logs
-f	follow	Follow File Output Stream
-h	help	Show Help
-n	lines=lines	Last N Lines
Examples		

\$ nodus cluster:log myCluster

\$ nodus cluster:log myCluster burst

cluster:members CLUSTER

Description

Get cluster information as reported by 'serf members'.

Usage

\$ nodus cluster:members CLUSTER [OPTIONS]

Argument

CLUSTER Cluster Name or ID

Optio	Options				
-f	format=text json	[default: text] Output Format			
-h	help	Show Help			
Example					
\$ nod	\$ nodus cluster:members myCluster				
cluster:nodes CLUSTER					
Description					
Get cluster node information.					
Usage					
\$ nodus cluster:nodes CLUSTER [OPTIONS]					
Arguments					
CLUSTER Cluster		Name or ID			
Options					
-f	format=text json	[default: text] Output Format			
-h	help	Show Help			
Examples					
\$ nodus cluster:nodes myCluster					

cluster:oracle:create NAME TYPE MANAGER

Description

Create new Oracle Cloud cluster configuration entry.

\$ nodus cluster:oracle:create NAME TYPE MANAGER [CREDENTIAL] [OPTIONS]

Arg	Arguments				
NAME Name I		Name	ldentifier		
TY	PE	(centos	s-7) Image Type		
MA	NAGER	(torqu	e slurm) HPC Workload Manager		
CR	EDENTIAL	Set Cre	edential		
Op	tions				
-P	package=package		Packages		
-b	[no-]burstOnDeploy		Initiate Burst Service post Deploy		
-d	-ddescription=description		Description		
-h	-hhelp		Show Help		
-iinstance=instance			(required) [default: VM.Standard2.1] Server Instance Type		

		ID
-m	mode=min max	[default: min] Bursting Mode
-p	prefix=prefix	(required) [default: nodus] Source Image Root Prefix (example: nodus)
-r	region=region	(required) Region ID
	idle-purge=idle-purge	[default: 600] Node Idle Purge Time(s)
	job-completed-dropoff	Completed Jobs Queue Time
	node-volume=node- volume	Expanded Node Root Volume (GB)
	security=security	Security Group ID
	server-volume=server- volume	Expanded Server Root Volume (GB)
-0		OCPUs for flexible Shapes ¹

\$ nodus cluster:oracle:create myCluster centos-7 torque myCred --prefix=myNodus -region=us-ashburn-1 --instance=VM.Standard2.1 --job-completed-dropoff=60

\$ nodus cluster:oracle:create myCluster centos-7 slurm --region=us-ashburn-1 --instancee=VM.Standard2.1

¹ When using flex based instances, the $-\circ$ flag is required. And when using flex instances, you can only use flex instances, although you can mix and match between generations.

clu	cluster:oracle:update CLUSTER					
Des	scription					
Upo	late Oracle Cloud cluster o	configuratio	on entry.			
Usa	Ige	U	-			
noc	lus cluster:oracle:update (CLUSTER [(OPTIONS]			
Arg	guments					
CLU	JSTER	Cluster Na	ame or ID			
Op	tions					
-P	package=package		Add Package			
-R	no-package=no-package		Remove Package			
-b	[no-]burstOnDeploy		Initiate Burst Service post Deploy			
-d	-ddescription=description		Description			
-hhelp Sho			Show Help			
-i	instance=instance		Server Instance Type ID			
-m	mode=min max		Bursting Mode			
-n	name=name		Name Identifier			

0p	Options					
-p	prefix=prefix	Prefix Source Image Root Prefix (Ex: nodus)				
-r	region=region	Region ID				
-t	type=centos-7	ОЅ Туре				
	force	Skip Checks				
	idle-purge=idle-purge	Node Idle Purge Time(s)				
	job-completed-dropoff	Completed Jobs Queue Time				
	manager=torque slurm	HPC Workload Manager				
	no-node-volume	Remove Expanded Node Root Volume				
	no-server-volume	Remove Expanded Server Root Volume				
	node-volume=node-volume	Expanded Node Root Volume (GB)				
	server-volume=server-volume	Expanded Server Root Volume (GB)				
-0		OCPUs for flexible Shapes ¹				
Exa	Examples					
\$ n	\$ nodus cluster:oracle:update myClustername newCluster					
*						

\$ nodus cluster:oracle:update myCluster --job-completed-dropoff=60

\$ nodus cluster:oracle:update myCluster --prefix=myNodus

¹ When using flex based instances, the $-\circ$ flag is required. And when using flex instances, you can only use flex instances, although you can mix and match between generations.

cluster:otc:create NAME TYPE MANAGER

De	Description				
Cre	ate new OpenTelek	om Clou	d cluster configuration entry.		
Usa	age				
\$ n	odus cluster:otc:crea	ate NAN	IE TYPE MANAGER [CREDENTIAL] [OPTIONS]		
Arg	guments				
NA	ME	Name l	dentifier		
TY	PE	(centos	-7) Image Type		
MA	NAGER	(torque	slurm) HPC Workload Manager		
CR	EDENTIAL	Set Cre	dential		
Op	tions				
-P	package=package		Packages		
-b	b[no-]burstOnDeploy		Initiate Burst Service post Deploy		
-d	ddescription=description		Description		
-h	hhelp		Show Help		
-i	iinstance=instance		(required) [default: s2.medium.2] Server Instance Type ID		

-m	mode=min max	[default: min] Bursting Mode		
-pprefix=prefix		(required) [default: nodus] Source Image Root Prefix (example: nodus)		
	fip=fip	Floating IP Address		
	idle-purge=idle-purge	[default: 600] Node Idle Purge Time(s)		
	job-completed-dropoff	Completed Jobs Queue Time		
	network=network	Subnet Network ID		
	node-volume=node- volume	Expanded Node Root Volume (GB)		
	private	Provision via Private IP		
security=security		Security Group ID		
	server-volume=server- volume	Expanded Server Root Volume (GB)		
	subnet=subnet	Subnet ID		
	zone=zone	Availability Zone ID		
-0		OCPUs for flexible Shapes ¹		
-	•			

\$ nodus cluster:otc:create myCluster centos-7 torque myCred --prefix=myNodus -instance=s2.medium.2 --job-completed-dropoff=60

\$ nodus cluster:otc:create myCluster centos-7 slurm --instance=s2.medium.2

¹ When using flex based instances, the $-\circ$ flag is required. And when using flex instances, you can only use flex instances, although you can mix and match between generations.

cluster:otc:update CLUSTER

Description

Update OpenTelekom Cloud cluster configuration entry.

Usa	Usage					
\$ n	odus cluster:otc:update CL	USTER [OF	PTIONS]			
Arg	guments					
CLU	JSTER	Cluster Na	ame or ID			
Opt	tions					
-P	package=package		Add Package			
-R	no-package=no-package		Remove Package			
-b[no-]burstOnDeploy			Initiate Burst Service post Deploy			
-ddescription=description			Description			
-h	help		Show Help			

Opt	Options				
-i	instance=instance	Server Instance Type ID			
-m	mode=min max	Bursting Mode			
-n	name=name	Name Identifier			
-p	prefix=prefix	Prefix Source Image Root Prefix (Ex: nodus)			
-t	type=centos-7	ОЅ Туре			
	fip=fip	Floating IP Address			
	force	Skip Checks			
	idle-purge=idle-purge	Node Idle Purge Time(s)			
	job-completed-dropoff	Completed Jobs Queue Time			
	manager=torque slurm	HPC Workload Manager			
	network=network	Subnet Network ID			
	no-fip	Remove Floating IP Address			
	no-network	Remove Subnet Network			
	no-node-volume	Remove Expanded Node Root Volume			
	no-security	Remove Security Group			
	no-server-volume	Remove Expanded Server Root Volume			
	no-subnet=no-subnet	Remove Subnet			
	no-zone	Remove Availability Zone			
	node-volume=node-volume	Expanded Node Root Volume (GB)			
	[no-]private	Provision via Private IP			
	security=security	Security Group ID			
	server-volume=server-volume	Expanded Server Root Volume (GB)			
	subnet=subnet	Subnet Self Link ID			
	zone=zone	Availability Zone ID			
-0		OCPUs for flexible Shapes ¹			

\$ nodus cluster:otc:update myCluster --name newCluster

\$ nodus cluster:otc:update myCluster --job-completed-dropoff=60

\$ nodus cluster:otc:update myCluster --prefix=myNodus --instance=s2.medium.2

¹ When using flex based instances, the $-\circ$ flag is required. And when using flex instances, you can only use flex instances, although you can mix and match between generations.

cluster:ovpn CLUSTER

Description

Installs OpenVPN on head node and can download the ovpn file that is generated.

Usage					
\$ nodus cluster:ovpn CLUSTER [OPTIONS]					
Arguments					
CLUSTER	Cluster Name or ID				
Options					
-hhelp	Show Help				
Examples					
\$ nodus cluster:ovpn myCluster					

cluster:queue CLUSTER

Description					
Get workload queue information.					
Usage					
\$ nodus cluster:queue CLUSTER [O	PTIONS]				
Arguments					
CLUSTER Clust	er Name or ID				
Options					
-fformat=text json	[default: text] Output Format				
-hhelp	Show Help				
Examples					
\$ nodus cluster:queue myCluster					

cluster:releasehold CLUSTER

Description					
Release all jo	ob holds.				
Usage					
\$ nodus clus	ter:releasehold CL	USTER [O	PTIONS]		
Argument					
CLUSTER Cluster Na		ime or ID			
Option	Option				
-h	help		Show Help		
Example					
\$ nodus cluster:releasehold myCluster					

cluster:remove CLUSTER						
Desc	ription					
Rem	ove cluster entries fror	n database.				
Usag	ge					
\$ no	dus cluster:remove CLU	JSTER [OPTIONS]				
Argu	Argument					
CLUSTER Cluster Name or ID						
Opti	ons					
-h	-hhelp Show Help					
[no-]clean Remove Files Created for Cluster		Remove Files Created for Cluster				
force Force Removal from Database		Force Removal from Database				
Examples						
cluster:remove myCluster						
cluster:remove myClusterno-clean						
clust	cluster:remove myClusterforce					

cluster:remove-output (CLUSTER ID
-------------------------	------------

Description					
Delete job dir	ectory from clus	ster.			
Usage					
\$ nodus clust	er:remove-outpu	at CLUSTER ID [ID] [OPTIONS]			
Arguments					
CLUSTER		Cluster Name or ID			
JOB		NODUS Job ID			
Options					
-hhelp Show Help		Show Help			
Examples					
\$ nodus cluster:remove-output myCluster 0					
\$ nodus cluster:remove-output myCluster 0 1 2					

cluster:resize CLUSTER

Description

Alter cluster configuration by modifying instance types and their counts.

Usage

\$ nodus cluster:resize CLUSTER [[INSTANCE COUNT] ...] [OPTIONS]

Arg	Arguments					
CLUSTER		Cluster Name or ID				
INS	TANCE	Instance ID Code				
COUNT		Number of Instances [0,inf)				
Opt	Options					
-f	force	Ignore Checks				
-h	help	Show Help				
-p	purge	Purge All Existing Node Groups Except Given Args				
-sserver=server New Instance ID Code for Server		New Instance ID Code for Server				
Examples						
\$ nodus cluster:resize myCluster t2.micro 4 t2.xlarge 1						
\$ nodus cluster:resize myCluster t2.nano 5purge						

cluster:service CLUSTER

Description

Restarts service on the cluster head node.

Usage

\$ nodus cluster:service CLUSTER SERVICE

Arguments

CLUSTER Cluster Name or ID

SERVICE (serf|pbs_server|pbs_mom|trqauthd|maui|mariadb|munge|slurmdbd|slurmctld|slurmd|slurmrestd) Service

Name

Options

-h --help

Show Help

Examples

\$ nodus cluster:service myCluster pbs_server

cluster:set CLUSTER CREDENTIAL

Description

Associate cluster entry with credential entry.

Usage

\$ nodus cluster:set CLUSTER CREDENTIAL [OPTIONS]

Arguments

CLUSTER

Cluster Name or ID

CREDENTIAL		Credential Name or ID		
Option				
-h	help	Show Help		
Example				
\$ nodus cluster:set myCluster myCredential				

cluster:share CLUSTER USERNAME

Description

Share your cluster to another user.

Usage

\$ nodus cluster:share CLUSTER USERNAME

Arguments

CLUSTER USERNAME

Cluster Name or ID Linux Username

Options

-h

Show Help

Examples

\$ nodus cluster:share myCluster otherUser

--help

cluster:show CLUSTER Description Display details of a particular cluster entry from the database. Usage \$ nodus cluster:show CLUSTER [OPTIONS] Argument **CLUSTER Cluster Name or ID Options** -b --backup Show TF State Backup -f --format=text|json [default: text] Output Format -h --help Show Help --keys -k Show Keys

Show TF State

Example

--state

-S

\$ nodus cluster:show myCluster

cluster:ssh CLUSTER					
Descri	iption				
SSH in	to the head node of o	cluster.			
Usage					
\$ nodı	s cluster:ssh CLUST	ER [OPTIONS]			
Argun	nent				
CLUST	ER	Cluster Name or ID			
Optio	ns				
-d	details	Show SSH Details Instead			
-f	force Ignore Checks				
-h	help	Show Help			
-p	private	Force Private IP Use			
	admin	Use Default Sudoer Instead			
Example					
\$ nodus cluster:ssh myCluster					
\$ nodus cluster:ssh myClusterdetails					
\$ nodus cluster:ssh myClusteradmin					
\$ nodu	\$ nodus cluster:ssh myClusteradmindetails				

cluster:sshfs CLUSTER

Description

Mount/Unmount a remote file system over SSH.

Usage

\$ nodus cluster:sshfs CLUSTER [OPTIONS]

Argument					
CLUSTER C		Cluster Name or ID			
Optio	Options				
-d	destination	Where to Mount the Directory			
-h	help	Show Help			
-m	mount	Mount the Directory			
-u	unmount	Unmount the Directory			
Example					
<pre>\$ nodus cluster:sshfs myClustermount /mnt/beegfsdestination ~/mnt</pre>					
\$ nodus cluster:sshfs myClusterunmount ~/mnt					

cluster:sync CLUSTER TYPE

Description

Synchronizes data with cluster. Used for version upgrades, maintenance, and development purposes.

Usage			
\$ nodus cl	uster:sync CLU	STER TY	PE [OPTIONS]
Argument	S		
CLUSTER		Cluster	Name or ID
TYPE (api scr		(api scr	ipts users) Type
Options			
-h	help		Show Help
force			Skip State Check
Examples			
\$ nodus cluster:sync myCluster api			
\$ nodus cluster:sync myCluster scripts			
\$ nodus cluster:sync myCluster users			

cluster:unshare CLUSTER

Descrip	Description				
Unshare	your cluster to	another us	ser.		
Usage					
\$ nodus cluster:unshare CLUSTER [USERNAME] [OPTIONS]					
Arguments					
CLUSTER			Cluster Name or ID		
USERNAME			Linux Username		
Options					
-h	help	Show Help			
	all	Remove all shared users			
Examples					
\$ nodus cluster:unshare myCluster otherUser					
\$ nodus cluster:unshare myClusterall					

4.6 Jobs

This section contains the following commands:

- job:aws:create SCRIPT NAME TYPE
- job:aws:update NAME
- job:azure:create SCRIPT NAME TYPE
- job:azure:update NAME
- job:cancel ID CLUSTER
- job:create SCRIPT NAME
- job:gcp:create SCRIPT NAME TYPE
- job:gcp:update NAME
- job:list
- job:oracle:create SCRIPT NAME TYPE
- job:oracle:update NAME
- job:otc:create SCRIPT NAME TYPE
- job:otc:update NAME
- job:output ID CLUSTER
- job:remove JOB
- job:show JOB
- job:submit JOB CLUSTER
- job:submit-od JOB
- job:update NAME

job:aws:create SCRIPT NAME TYPE

Description

Create new AWS on-demand job entry.

Usage

\$ nodus job:aws:create SCRIPT NAME TYPE [CREDENTIAL] [OPTIONS]

SCRIPT	(Absolute / Relative) File path to job script
NAME	Job Name
ТҮРЕ	(centos-7) Image Type
MANAGER	(torque slurm) HPC Workload Manager
CREDENTIAL	Credential Name or ID

Op	Options					
-P	package=package	Add Package				
-С	cores=cores	(required) [default: 1] Number of required cores per node				
-d	description=description	Description of the job				
-f	dataFile=dataFile	(Absolute / Relative) File path to data file				
-h	help	Show Help				
-n	nodes=nodes	(required) [default: 1] Number of required nodes				
-р	prefix=prefix	(required) [default: nodus] Source Image Root Prefix (Ex: nodus)				
-r	region=region	(required) Region ID				
-w	walltime=walltime	[default: 24:00:00] Job maximum wall-time				
-z	zone=zone	Availability Zone ID				
	node-instance=node-instance	(required) Node Instance Type ID				
	node-volume=node-volume	Expanded Node Root Volume (GB)				
	on-demand-	(required) On-Demand Behavior				
	a=persistionine down destroy					
	server-instance=server-instance	(required) Server Instance Type ID				
	server-volume=server-volume	Expanded Server Root Volume (GB)				
	on-demand- d=persist offline down destroy server-instance=server-instance server-volume=server-volume	(required) On-Demand Behavior (required) Server Instance Type ID Expanded Server Root Volume (GB)				

\$ nodus job:aws:create ~/Documents/myScript.sh myJob centos-7 --nodes=2 --cores=16 -on-demand destroy

\$ nodus job:aws:create ~/Documents/myScript.sh myJob centos-7 --dataFilee=~/Documents/data0.dat --dataFile=~/Documents/data1.dat --on-demand down

job:aws:update NAME

Description						
Update AWS on-demand job entry.						
Usage						
\$ nodus job:aws:update NAME [OPTIONS]						
Arguments						
JOB		Job Name				
Options						
-P	package=package		Add Package			
-R	no-package=no-package		Remove Package			
-a	add-df=add-df		Absolute Path to any data files to be added			

Op	Options				
-C	cores=cores	Number of required cores per node			
-d	description=description	Description of the job			
-h	help	Show Help			
-n	nodes=nodes	Number of required nodes			
-p	prefix=prefix	Source Image Root Prefix (Ex: nodus)			
-r	remove-df=remove-df	Absolute Path to any data files to be removed			
-s	script=script	Absolute File path to job script			
-t	type=centos-7	OS Type			
-w	walltime=walltime	Job walltime			
	credential=credential	Add Credential			
	manager=torque slurm	HPC Workload Manager			
	name=name	Name Identifier			
	no-credential=no-credential	Remove Credential			
	no-node-volume	Remove Expanded Node Root Volume			
	no-server-volume	Remove Expanded Server Root Volume			
	no-zone	Remove Zone			
	node-instance=node-instance	Node Instance Type ID			
	node-volume=node-volume	Expanded Node Root Volume (GB)			
	on-	On-Demand Behavior			
	demand=persist offline down destroy				
	region=region	Region ID			
	server-instance=server-instance	Server Instance Type ID			
	server-volume=server-volume	Expanded Server Root Volume (GB)			
	zone=zone	Availability Zone ID			
-	•				

\$ nodus job:aws:update myJob --description="My Job" -script=/home/jdoe/Documents/myScript.sh

\$ nodus job:aws:update myJob --description="My Job" --scriptt=/home/jdoe/Documents/myScript.sh --nodes=2 --cores=16 --walltime="00:30:00" -remove-df=/home/jdoe/Documents/file0.dat --add-df=/home/jdoe/Documents/file1.dat

job:azure:create SCRIPT NAME TYPE

Description

Create new AWS on-demand job entry.

Usage							
<pre>\$ nodus job:azure:create SCRIPT NAME TYPE [CREDENTIAL] [OPTIONS]</pre>							
Arguments							
SCRIPT	(Absolute / Relative	Absolute / Relative) File path to job script					
NAME	Job Name						
ТҮРЕ	(centos-7) Image Type						
MANAGER	(torque slurm) HPC Workload Manager						
CREDENTIAL	Credential Name or ID						
Options							
-Ppackage=package	e	Package					
-ccores=cores		(required) [default: 1] Number of required cores per node					
-ddescription=desc	cription	Description of the job					
-fdataFile=dataFile	e	(Absolute / Relative) File path to data file					
-gresource=resour	се	(required) Image Resource Group Name					
-hhelp		Show Help					
-nnodes=nodes		(required) [default: 1] Number of required nodes					
-pprefix=prefix		(required) [default: nodus] Source Image Root Prefix (Ex: nodus)					
rregion=region		(required) Region ID					
-wwalltime=walltime		[default: 24:00:00] Job maximum wall-time					
node-instance=n	ode-instance	(required) Node Instance Type ID					
node-volume=no	de-volume	Expanded Node Root Volume (GB)					
on-		(required) On-Demand Behavior					
demand=persist o	demand=persist offline down destroy						
server-instance=	server-instance	(required) Server Instance Type ID					
server-volume=s	erver-volume	Expanded Server Root Volume (GB)					

\$ nodus job:azure:create ~/Documents/myScript.sh myJob centos-7 --nodes=2 --cores=16
--on-demand destroy

\$ nodus job:azure:create ~/Documents/myScript.sh myJob centos-7 -dataFile=~/Documents/data0.dat --dataFile=~/Documents/data1.dat --on-demand down

job:azure:update NAME

Description

Update Azure on-demand job entry.
Usage					
\$ nodus job:azure:update NAME [OPTIONS]					
Arg	Arguments				
JOE	Job I	Name			
Op	tions				
-P	package=package	Add Package			
-R	no-package=no-package	Remove Package			
-a	add-df=add-df	Absolute Path to any data files to be added			
-C	cores=cores	Number of required cores per node			
-d	description=description	Description of the job			
-g	resource=resource	(required) Image Resource Group Name			
-h	help	Show Help			
-n	nodes=nodes	Number of required nodes			
-p	prefix=prefix	Source Image Root Prefix (Ex: nodus)			
-r	remove-df=remove-df	Absolute Path to any data files to be removed			
-s	script=script	Absolute File path to job script			
-t	type=centos-7	OS Type			
-w	walltime=walltime	Job walltime			
-Z	zone=zone	Availability Zone ID			
	[no-]account	Auth via Service Account			
	firewall=firewall	Firewall Self Link ID			
	force	Skip Checks			
	idle-purge=idle-purge	Node Idle Purge Time(s)			
	manager=torque slurm	HPC Workload Manager			
	no-firewall	Remove Firewall			
	no-node-volume	Remove Expanded Node Root Volume			
	no-server-volume	Remove Expanded Server Root Volume			
	no-subnet=no-subnet	Remove Subnet			
	no-vpc=no-vpc	Remove VPC			
	node-volume=node-volume	Expanded Node Root Volume (GB)			
	server-volume=server-volume	Expanded Server Root Volume (GB)			
	subnet=subnet	Subnet Self Link ID			
	vpc=vpc	VPC Network Self Link ID			
Exa	Examples				

\$ nodus cluster:gcp:update myCluster --name newCluster

\$ nodus cluster:gcp:update myCluster --prefix=myNodus --region=us-east1 --zone=useast1-b

job:cancel ID CLUSTER		
Description		
Cancel Submitted Job.		
Usage		

\$ nodus job:cancel ID CLUSTER [OPTIONS]

Arguments			
ID		Torque Job ID	
CLUSTER		Cluster Name or ID	
Option			
-h	help	Show Help	
Example			

\$ nodus job:cancel 0.nodus-server myCluster

job:create SCRIPT NAME

Description

Create new job entry. When a job is created, the location of the script will be absolute. If the script and data files are modified/deleted, the changes will be automatically included in the next running of the job.

Usage

\$ nodus job:create SCRIPT NAME [OPTIONS]

•	
Arguments	
SCRIPT	(Absolute/Relative) File Path to Job Script
NAME	Job Name
Options	

-C	cores=cores	(required) [default: 1] Number of required cores per node
-d	description=description	Description of the job
-f	dataFile=dataFile	(Absolute/Relative) File path to data file
-h	help	Show Help
-n	nodes=nodes	(required) [default: 1] Number of required nodes
-w	walltime=walltime	[default: 24:00:00] Job maximum wall-time
	override=override	Override 'nodes', 'cores', and 'walltime' with raw flag string
Fy:	amnles	

\$ nodus job:create ~/Documents/myScript.sh myJob

\$ nodus job:create ~/Documents/myScript.sh myJob --nodes=2 --cores=16

\$ nodus job:create ~/Documents/myScript.sh myJob --dataFile=~/Documents/data0.dat -dataFile=~/Documents/data1.dat

\$ nodus job:create ~/Documents/myScript.sh myJob --override "-N myJobName -procs=16" --dataFile=~/Documents/data0.dat

job:gcp:create SCRIPT NAME TYPE

Description

Update Google Cloud Platform (GCP) cluster configuration entry.

Usage

\$ nodus job:gcp:create SCRIPT NAME TYPE [CREDENTIAL] [OPTIONS]

Arguments

SCRIPT	(Absolute / Relative) File path to job script
NAME	Job Name
TYPE	(centos-7) Image Type
MANAGER	(torque slurm) HPC Workload Manager
CREDENTIAL	Credential Name or ID

Options

-		
-P	package=package	Add Package
-C	cores=cores	(required) [default: 1] Number of required cores per node
-d	description=description	Description of the job
-f	dataFile=dataFile	(Absolute / Relative) File path to data file
-h	help	Show Help
-n	nodes=nodes	(required) [default: 1] Number of required nodes
-p	prefix=prefix	(required) [default: nodus] Source Image Root Prefix (Ex: nodus)
-r	region=region	(required) Region ID
-w	walltime=walltime	[default: 24:00:00] Job maximum wall-time
-z	zone=zone	Availability Zone ID
	node-instance=node-instance	(required) Node Instance Type ID
	node-volume=node-volume	Expanded Node Root Volume (GB)
	on-	(required) On-Demand Behavior
	demand=persist offline down destroy	
	server-instance=server-instance	(required) Server Instance Type ID
	server-volume=server-volume	Expanded Server Root Volume (GB)

Examples

\$ nodus job:gcp:create ~/Documents/myScript.sh myJob centos-7 --nodes=2 --cores=16 -on-demand destroy

\$ nodus job:gcp:create ~/Documents/myScript.sh myJob centos-7 -dataFile=~/Documents/data0.dat --dataFile=~/Documents/data1.dat --on-demand down

job:gcp:update NAME

Description

Update Google Cloud Platform (GCP) on-demand job entry.

Usage

\$ nodus job:gcp:update NAME [OPTIONS]

Arguments

JOB		Name
Op	tions	
-P	package=package	Add Package
-R	no-package=no-package	Remove Package
-a	add-df=add-df	Absolute Path to any data files to be added
-C	cores=cores	Number of required cores per node
-d	description=description	Description
-h	help	Show Help
-n	nodes=nodes	Number of required nodes
-p	prefix=prefix	Source Image Root Prefix (Ex: nodus)
-r	remove-df=remove-df	Absolute Path to any data files to be removed
-s	script=script	Absolute File path to job script
-t	type=centos-7	OS Type
-w	walltime=walltime	Job walltime
	credential=credential	Add Credential
	manager=torque slurm	HPC Workload Manager
	name=name	Name Identifier
	no-credential=no-credential	Remove Credential
	no-node-volume	Remove Expanded Node Root Volume
	no-server-volume	Remove Expanded Server Root Volume
	no-zone	Remove Zone
	node-instance=node-instance	Node Instance Type ID
	node-volume=node-volume	Expanded Node Root Volume (GB)
	on-	On-Demand Behavior

Op	otions	
	demand=persist offline down destroy	
	region=region	Region ID
	server-instance=server-instance	Server Instance Type ID
	server-volume=server-volume	Expanded Server Root Volume (GB)
	zone=zone	Availability Zone ID
Ex	amnles	

\$ nodus job:gcp:update myJob --description="My Job" -script=/home/jdoe/Documents/myScript.sh

\$ nodus job:gcp:update myJob --description="My Job" --

script=/home/jdoe/Documents/myScript.sh --nodes=2 --cores=16 --walltime="00:30:00" -remove-df=/home/jdoe/Documents/file0.dat --add-df=/home/jdoe/Documents/file1.dat

job:list

Description

List job entries from database.

U	sa	ge	

\$ nodus job:l	ist [CLUSTER]	[OPTIONS]
----------------	---------------	-----------

Argu	Argument				
CLUSTER		Cluster Name or ID			
Optio	ons				
-f	format=text json		[default: text] Output Format		
-h	help		Show Help		
Exan	Examples				
\$ nod	\$ nodus job:list				
\$ nod	\$ nodus job:listformat json				
\$ nod	\$ nodus job:list myCluster				

job:oracle:create SCRIPT NAME TYPE

Description

Create new Oracle on-demand job entry.

Usage

\$ nodus job:oracle:create SCRIPT NAME TYPE [CREDENTIAL] [OPTIONS]

Arguments

SCRIPT (Absolute / Relative) File path to job script

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Ar	guments			
NAME Job		Job Name		
TYPE (centos-7) Image Ty		(centos-7) Image T	уре	
MA	ANAGER	(torque slurm) HP	C Workload Manager	
CR	EDENTIAL	Credential Name of	r ID	
Op	otions			
-P	package=packag	e	Packages	
-C	ccores=cores		(required) [default: 1] Number of required cores per node	
-d	description=desc	cription	Description of the job	
-f	dataFile=dataFile	е	(Absolute / Relative) File path to data file	
-h	help		Show Help	
-n	nnodes=nodes		(required) [default: 1] Number of required nodes	
-p	ρprefix=prefix		(required) [default: nodus] Source Image Root Prefix (Ex: nodus)	
-r	region=region		(required) Region ID	
-w	-wwalltime=walltime		[default: 24:00:00] Job maximum wall-time	
	node-instance=n	ode-instance	(required) Node Instance Type ID	
	node-volume=no	de-volume	Expanded Node Root Volume (GB)	
	on-		(required) On-Demand Behavior	
	demand=persist offline down destroy			
	server-instance=server-instance		(required) Server Instance Type ID	
server-volume=server-volume		server-volume	Expanded Server Root Volume (GB)	
Examples				
\$ r	odus job:oracle:cre	eate ~/Documents/	myScript.sh myJob centos-7nodes=2cores=16	
on-demand destroy				

\$ nodus job:oracle:create ~/Documents/myScript.sh myJob centos-7 --

dataFile=~/Documents/data0.dat --dataFile=~/Documents/data1.dat --on-demand down

job:oracle:update NAME			
Description			
Update Oracle on-demand job entry.			
Usage			
\$ nodus job:oracle:update NAME [OPTIONS]			
Arguments			
JOB	Job Name		

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-Ppackage=packageAdd Package-Rno-package=no-packageRemove Package-aadd-df=add-dfAbsolute Path to any data files to be adde-ccores=coresNumber of required cores per node-ddescription=descriptionDescription of the job-hhelpShow Help-nnodes=nodesNumber of required nodes	
-Rno-package=no-packageRemove Package-aadd-df=add-dfAbsolute Path to any data files to be adde-ccores=coresNumber of required cores per node-ddescription=descriptionDescription of the job-helpShow Help-nnodes=nodesNumber of required nodes	
 -aadd-df=add-df -cores=cores -description=description -help -nodes=nodes Number of required nodes 	
-ccores=coresNumber of required cores per node-ddescription=descriptionDescription of the job-hhelpShow Help-nnodes=nodesNumber of required nodes) be added
-ddescription=descriptionDescription of the job-hhelpShow Help-nnodes=nodesNumber of required nodes	ode
-hhelp Show Help	
-nnodes=nodes Number of required nodes	
n noues-noues	
-pprefix=prefix Source Image Root Prefix (Ex: nodus)	odus)
-r -remove-df=remove-df Absolute Path to any data files to be removed) be
-sscript=script Absolute File path to job script	
-ttype=centos-7 OS Type	
-wwalltime=walltime Job walltime	
credential=credential Add Credential	
manager=torque slurm HPC Workload Manager	
name=name Name Identifier	
no-credential=no-credential Remove Credential	
no-node-volume Remove Expanded Node Root Volume	olume
no-server-volume Remove Expanded Server Root Volume	Volume
no-zone Remove Zone	
node-instance=node-instance Node Instance Type ID	
node-volume=node-volume Expanded Node Root Volume (GB)	B)
 on- demand=persist offline down destroy On-Demand Behavior 	
region=region Region ID	
server-instance=server-instance Server Instance Type ID	
server-volume=server-volume Expanded Server Root Volume (GB)	GB)
zone=zone Availability Zone ID	

Examples

\$ nodus job:oracle:update myJob --description="My Job" -script=/home/jdoe/Documents/myScript.sh

\$ nodus job:oracle:update myJob --description="My Job" -script=/home/jdoe/Documents/myScript.sh --nodes=2 --cores=16 --walltime="00:30:00" -remove-df=/home/jdoe/Documents/file0.dat --add-df=/home/jdoe/Documents/file1.dat

jol	job:otc:create SCRIPT NAME TYPE				
De	scription				
Cre	eate new Open Tel	ekom Cloud (OTC) o	n-demand job entry.		
Us	age		· ·		
\$ n	odus job:otc:creat	e SCRIPT NAME TYP	E [CREDENTIAL] [OPTIONS]		
Arguments					
SC	RIPT	(Absolute / Relativ	e) File path to job script		
NA	ME	Job Name			
ΤY	PE	(centos-7) Image T	уре		
MA	ANAGER	(torque slurm) HP	C Workload Manager		
CR	EDENTIAL	Credential Name of	r ID		
Op	otions				
-P	package=packag	ge	Packages		
-С	cores=cores		(required) [default: 1] Number of required cores per node		
-d	description=description		Description of the job		
-f	dataFile=dataFile		(Absolute / Relative) File path to data file		
-h	hhelp		Show Help		
-n	nnodes=nodes		(required) [default: 1] Number of required nodes		
-p	pprefix=prefix		(required) [default: nodus] Source Image Root Prefix (Ex: nodus)		
-w	walltime=walltin	ne	[default: 24:00:00] Job maximum wall-time		
-z	zone=zone		Availability Zone ID		
	node-instance=r	ode-instance	(required) Node Instance Type ID		
	node-volume=node-volume		Expanded Node Root Volume (GB)		
	on-		(required) On-Demand Behavior		
	demand=persist o	offline down destroy			
	server-instance	server-instance	(required) Server Instance Type ID		
	server-volume=	server-volume	Expanded Server Root Volume (GB)		
Exa	amples				

\$ nodus job:otc:create ~/Documents/myScript.sh myJob centos-7 --nodes=2 --cores=16 -on-demand destroy

\$ nodus job:otc:create ~/Documents/myScript.sh myJob centos-7 -dataFile=~/Documents/data0.dat --dataFile=~/Documents/data1.dat --on-demand down

job:otc:update NAME				
Description				
Update Open Telekom Cloud (OTC) on-demand job entry.				
Usage				
\$ nodus job:otc:update NAME [OPTIONS]				
Arguments				
JOB Job Name				
Options				
-Ppackage=package	Add Package			
-Rno-package=no-package	Remove Package			
-aadd-df=add-df	Absolute Path to any data files to be added			
-ccores=cores	Number of required cores per node			
-ddescription=description	Description of the job			
-hhelp	Show Help			
-nnodes=nodes	Number of required nodes			
-pprefix=prefix	Source Image Root Prefix (Ex: nodus)			
-rremove-df=remove-df	Absolute Path to any data files to be removed			
-sscript=script	Absolute File path to job script			
-ttype=centos-7	OS Type			
-wwalltime=walltime	Job walltime			
credential=credential	Add Credential			
manager=torque slurm	HPC Workload Manager			
name=name	Name Identifier			
no-credential=no-credential	Remove Credential			
no-node-volume	Remove Expanded Node Root Volume			
no-server-volume	Remove Expanded Server Root Volume			
no-zone	Remove Zone			
node-instance=node-instance	Node Instance Type ID			
node-volume=node-volume	Expanded Node Root Volume (GB)			
on- demand=persist offline down destroy	On-Demand Behavior			
server-instance=server-instance	Server Instance Type ID			
server-volume=server-volume	Expanded Server Root Volume (GB)			
zone=zone	Availability Zone ID			
Examples				

\$ nodus job:otc:update myJob --description="My Job" --

Examples

script=/home/jdoe/Documents/myScript.sh

\$ nodus job:otc:update myJob --description="My Job" --

script=/home/jdoe/Documents/myScript.sh --nodes=2 --cores=16 --walltime="00:30:00" -remove-df=/home/jdoe/Documents/file0.dat --add-df=/home/jdoe/Documents/file1.dat

job:output ID CLUSTER

Desc	ription				
Disp	lay stdout or stderr of fro	om.			
Usag	Usage				
\$ nodus job:output ID CLUSTER [OPTIONS]					
Arguments					
JOB NO		NODUS Jo	NODUS Job ID		
CLUSTER Cluster		Cluster ID	or Name		
Options					
-f	format=text json		[default: text] Output Format		
-h	nhelp		Show Help		
-t	ttype=stdout stderr		[default: stdout] Output Type		
Examples					
\$ nodus job:output 0 myCluster					
\$ noo	\$ nodus job output 0 myClusterformat ison				

job:remove JOB

Description	Description				
Remove job	Remove job entries from database.				
Usage					
\$ nodus job:remove JOB [OPTIONS]					
Argument					
JOB		Job Name or ID			
Option					
-h	-hhelp Show Help				
Example					
job:remove myJob					

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job:s	job:show JOB				
Desc	Description				
Disp	Display job entry.				
Usag	je				
\$ noo	\$ nodus job:show JOB [OPTIONS]				
Argument					
JOB	Job ID or Nam	ne			
Opti	Options				
-f	format=text json	[default: text] Output Format			
-h	help	Show Help			
Examples					
\$ nodus job:show myJob					
\$ noc	\$ nodus job:show myJobformat json				

job:submit JOB CLUSTER

Description					
Submit a job	Submit a job to the cluster.				
Usage	Usage				
\$ nodus job:	submit JOB CLUST	ER [OPTIONS]			
Arguments					
JOB Job Name of		Job Name or ID			
CLUSTER Cluster Na		Cluster Name or ID			
Option					
-h	help	Show Help			
Example					
¢	and wait ward als ward	lastar			

\$ nodus job:submit myJob myCluster

job:submit-od JOB			
Description			
Submit on-demand job.			
Usage			
\$ nodus job:submit-od JOB [CREDENTIAL] [OPTIONS]			
Arguments			
JOB	Job Name or ID		

CREDENTIAL		Credential Name or ID	
Option			
-h	help	Show Help	
Example			
\$ nodus job:submit-od myJob myCredential			

job:update NAME

Description					
Update job configuration entry.	Update job configuration entry.				
Usage					
\$ nodus job:update NAME [OPTIONS]					
Argument					
JOB J	ob Name				
Options					
-aadd-df=add-df	Absolute Path to any data files to be added				
-ccores=cores	Number of required cores per node				
-ddescription=description	Description of the job				
-hhelp	Show Help				
-nnodes=nodes	Number of required nodes				
-rremove-df=remove-df	Absolute Path to any data files to be removed				
-sscript=script	Absolute File path to job script				
-wwalltime=walltime	Job walltime				
Examples					
\$ nodus job:update myJobdescription="My Job" script=/home/jdoe/Documents/myScript.sh					

\$ nodus job:update myJob --description="My Job" --

script=/home/jdoe/Documents/myScript.sh --nodes=2 --cores=16 --walltime="00:30:00" --remove-df=/home/jdoe/Documents/file0.dat --add-df=/home/jdoe/Documents/file1.dat

4.7 Providers

This section contains the following commands:

- provider:instance
- provider:region

provider:instance		
Description		
List provider instances.		
WARNING Non-exhausti	ve list.	
WARNING Availability is	dependent on region and demand.	
WARNING Eligibility is s	rictly dependent on your account.	
Usage		
<pre>\$ nodus provider:instance</pre>	[OPTIONS]	
Argument		
PROVIDER (aws go	p azure oracle otc) Cloud Provider	
Options		
-fformat=text json	[default: text] Output Format	
-hhelp	Show Help	
Examples		
\$ nodus provider:instance		
\$ nodus provider:instanceformat json		

provider:region

Description

List provider regions and zones.

WARNING Non-exhaustive list.

WARNING Availability and eligibility is strictly dependent on your account.

Usage

\$ nodus provider:region [OPTIONS]

Argument

PROVIDER (aws|gcp|azure|oracle|otc) Cloud Provider

Options

-f --format=text|json

[default: text] Output Format Show Help

-h --help Examples

\$ nodus provider:region

\$ nodus provider:region --format json

4.8 Misc

This section contains the following commands:

- daemon
- db:backup
- db:drop
- db:restore
- help
- license
- upgrade

daemon

Description

Manage Master Bursting Daemon. Run 'daemon --init' to initialize the bursting daemon.

Usage

\$ nodus daemon [OPTIONS]

Options

-		
-h	help	Show Help
	init	Initializes and Starts Bursting Service
	restart	Restart Bursting Service
	start	Start Bursting Service
	status	Check Bursting Service Status
	stop	Stop Bursting Service
Examples		

\$ nodus daemon --init

\$ nodus daemon --status

db:backup

Description

Backup NODUS database To File.

Usage

\$ nodus db:backup [OPTIONS]

Options		
-h	help	Show Help
-u	user=user	Username
Examples		
\$ nodus db:backup		
\$ nodus db:backupuser myUser		

db:drop

Descriptio	on	
Drop a NO	DUS database.	
Usage		
\$ nodus dł	o:drop [OPTIONS]	
Options		
-h	help	Show Help
-u	user=user	Username
Examples		
\$ nodus dl	p:drop	
\$ nodus db:dropuser myUser		

db:rest	ore	
Descrip	otion	
Restore	NODUS database From Back	ıp.
Usage		
\$ nodus	db:restore [OPTIONS]	
Option	S	
-h	help	Show Help
-uuser=user Username		
Examp	les	
\$ nodus	s db:restore	

help		
Description		
Display help for nodus.		
Usage		

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\$ nodus help [COMMAND]		
Argument		
COMMAND		Command to show help for
Option		
all	See all co	mmands in CLI

license

Descripti	on	
Show cur	rent license informati	on.
Usage		
\$ nodus li	cense [OPTIONS]	
Options		
-h	help	Show Help
	main	Check main license
Example		
\$ nodus li	cense	

upgrade	upgrade		
Description			
Description			
Prepare or F	inish Upgrade Process.		
Usage			
\$ nodus upgr	ade [OPTIONS]		
Options			
-h	help	Show Help	
Example			
\$ nodus upgr	ade		

Appendix A: Creating Accounts for Cloud Service Providers

If you don't have credentials through your company, you can get them by following the procedures below.

In this appendix:

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A.1 Creating an AWS Account

- 1. Go to https://aws.amazon.com/ and click Create an AWS account.
- 2. Follow the steps and enter your account information and then click Continue.
- 3. Choose Personal or Professional.
- 4. Enter your company information and accept the customer agreement.
- 5. Choose Create Account and Continue.
- **6.** Provide a payment method and verify your phone number.

A.2 Creating a Google Cloud Account

- 1. Go to https://cloud.google.com/ and click Get started for free.
- 2. Follow the steps on the screen to complete account registration.

A.3 Creating a Microsoft Azure Account

- 1. Go to https://azure.microsoft.com/en-us/free/ and click Start Free.
- 2. On the Sign in page, click Create one!.
- **3.** Click **Next** and then provide the rest of your user information (i.e., username, passwords, credit/debit, etc.).
- **4.** Run the script **Azure.sh** to configure the Azure account.

A.4 Creating an OTC Account

- 1. Go to https://open-telekom-cloud.com/en and click Login / Console.
- 2. Click **Register** and follow the steps on the screen to complete account registration.

A.5 Creating an Oracle Cloud Account

- 1. Go to https://www.oracle.com/cloud/ and sign up for a cloud account.
- **2.** Follow the steps to complete account registration.

See the appendix Obtaining Cloud Service Provider Account Information and Credentials below for additional information.

Appendix B: Obtaining Cloud Service Provider Account Information and Credentials

Follow the checklists below to prepare accounts and get credentials for the chosen cloud service provider.

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B.1 AWS

- Create Key: IAM / Security Status / Manage Security Credentials / Access Keys / Create New Access Key
- Copy and fill Credentials File Template

B.2 Google Cloud

• Select Project / IAM / Service Accounts / Create Key (JSON)

B.3 Microsoft Azure

Azure Template Credential File

This is a template credential file for Azure:

```
{
  "client_id": " ",
  "client_secret": " ",
  "subscription_id": " ",
  "tenant_id": " "
```

```
"region": " "
}
```

Obtaining Azure Credential Information

Follow these steps to obtain credential information.

client_id/tenant_id

- **1.** On the Azure homepage (https://portal.azure.com/), under the Azure services section, click **App registrations**.
- 2. Under **Display name**, click the requested application (e.g., oddc) and copy/paste the **Application (client) ID** into the template between the quotes for the **client_id** variable, and copy/paste the **Directory (tenant) ID** into the template between the quotes for the **tenant_id** variable.

Note: If you have not previously registered an application, for this step, first click **Register an application** and enter the required information.

client_secret

Since Azure hides the client key, we can make another one that coexists with the one that is hidden by Azure.

- 3. Under the Azure services section, click App registrations.
- 4. Under **Display name**, click the requested application (e.g., oddc).
- 5. Under the Manage section on the left side of the page, click Certificates & secrets.
- 6. In the Client secrets section, click New client secret.
- 7. Add a **Description** and specify an **Expiration** time frame.
- **8.** Copy/paste the **Value** into the template between the quotes for the **client_secret** variable.

subscription_id

- 9. Under the Navigate section, click Subscriptions.
- **10.** Copy/paste the **Subscription ID** into the template between the quotes for the **subscription_id** variable.

region

11. Enter the desired region into the template between the quotes for the **region** variable. For example, the region can be **eastus** or **westus**.

Appendix B: Obtaining Cloud Service Provider Account Information and Credentials

B.4 OTC

Create Images (see https://open-telekom-cloud.com/en/products-services/virtual-privatecloud):

- Create VPC network
- Create subnet on VPC
- Create stack file (where: network = {network_id} of the subnet)

B.5 Oracle Cloud

Create Images (see https://docs.cloud.oracle.com/iaas/Content/home.htm):

- Create VPC network
- Create subnet on VPC

Appendix C: Job Preparation

The Job script can be run using standard shell scripts such as batch, Perl, Geant4, or Python. The Job script files are stored in the Input folder and the results are stored in the Output (head node) folder.

Example Job Script

```
#!/bin/bash
set -x
cd input
PROCESSORS=1
TASKNAME=geant4
cp Dockerfile.template Dockerfile
sed -i -e "s/__FILE__/$FILE/g" Dockerfile
sed -i -e "s/__PROCESSORS__/$PROCESSORS/g" Dockerfile
sudo docker build -t $TASKNAME .
sudo docker run -v $PWD/../output:/app/output $TASKNAME
```

Example Input Dockerfile.template Contents

```
FROM ifurther/geant4
RUN mkdir BUILD
RUN mkdir output
RUN sed -i -e "s/g4root.hh/g4csv.hh/g" /sr-
c/geant4.10.05.p01/examples/ex-
tended/radioactivedecay/rdecay01/include/HistoManager.hh
RUN cd BUILD; cmake -DGeant4_DIR=/app/geant4.10.5.1-
install/lib/Geant4-10.5.1/ /sr-
c/geant4.10.05.p01/examples/extended/radioactivedecay/rdecay01/
```

RUN cd BUILD; make -j __PROCESSORS__ rdecay01 RUN cd BUILD; make install RUN . /app/geant4.10.5.1-install/bin/geant4.sh ; /usr/local/bin/rdecay01 ./BUILD/__FILE__.mac CMD mv *.csv output

Note: This program creates CSV files and moves them to the Output folder according to the script.

Appendix D: Configuring the ODDC to be a Secure Server

Follow the steps below to configure the ODDC to be a secure server.

- 1. Edit the file /NODUS/nodus-web-ui/build/assets/config.json:
 - A. Replace http://with https://.
 - **B.** Save the file.
- 2. Edit the file nodus-web-api.json:
 - **A.** Add the following lines to identify the server's private key location and the certificate file (this is an example):

```
{
"https_key_file" : "/example/directory/privkey.pem",
"https_cert_file": "/example/directory/fullchain.pem"
}
```

- **B.** Save the file.
- 3. Enter systemctl restart nodus-web-api to restart the ODDC web API.

Appendix E: Credential JSON Examples

Credential JSON files should look like the below:

- AWS
- Google Cloud
- Microsoft Azure
- **OTC**
- Oracle Cloud

AWS

```
{
"access_key": "",
"secret_key": ""
}
```

nodus_cluster_permissions.json

```
{
   "Version": "2012-10-17",
   "Statement": [
    {
        "Sid": "VisualEditor0",
        "Effect": "Allow",
        "Action": [
           "ec2:AuthorizeSecurityGroupIngress",
           "ec2:DescribeInstances",
           "ec2:ReplaceRouteTableAssociation",
           "aws-marketplace:*",
           "ec2:DeleteVpcEndpoints",
           "ec2:DeleteVpcEndpoints",
           "ec2:DeleteVpcEndpoints",
           "Statement";
           "ec2:DeleteVpcEndpoints",
           "Statement";
           "Effect": "2012-10-17",
           "Statement";
           "Statement";
           "Statement";
           "Statement";
           "Statement";
           "Statement";
           "Statement";
           "ec2:DeleteVpcEndpoints";
           "Statement";
           "S
```

```
"ec2:CreateKeyPair",
"ec2:AcceptTransitGatewayVpcAttachment",
"ec2:AttachInternetGateway",
"ec2:ReportInstanceStatus",
"route53:ListHostedZonesByName",
"ec2:UpdateSecurityGroupRuleDescriptionsIngress",
"ec2:DeleteRouteTable",
"ec2:DescribeVolumeStatus",
"ec2:StartInstances",
"ec2:CreateNetworkInterfacePermission",
"ec2:RevokeSecurityGroupEgress",
"ec2:CreateRoute",
"ec2:CreateInternetGateway",
"ec2:DescribeScheduledInstanceAvailability",
"ec2:DescribeVolumes",
"ec2:DeleteInternetGateway",
"ec2:UnassignPrivateIpAddresses",
"ec2:RejectTransitGatewayVpcAttachment",
"ec2:DescribeKeyPairs",
"ec2:DescribeReservedInstancesListings",
"ec2:DisassociateTransitGatewayRouteTable",
"ec2:ImportKeyPair",
"ec2:CreateTags",
"ec2:DescribeVpcClassicLinkDnsSupport",
"ec2:ModifyNetworkInterfaceAttribute",
"route53:ListVPCAssociationAuthorizations",
"ec2:RunInstances",
"ec2:StopInstances",
"ec2:AssignPrivateIpAddresses",
"ec2:DisassociateRouteTable",
"route53:CreateVPCAssociationAuthorization",
"ec2:DescribeVolumeAttribute",
```

```
"ec2:CreateVolume",
"ec2:ReplaceNetworkAclAssociation",
"ec2:CreateVpcEndpointServiceConfiguration",
"ec2:RevokeSecurityGroupIngress",
"ec2:CreateNetworkInterface",
"ec2:DescribeVpcEndpointServicePermissions",
"ec2:CreateTransitGatewayVpcAttachment",
"ec2:DescribeScheduledInstances",
"ec2:DescribeImageAttribute",
"ec2:DeleteNatGateway",
"ec2:DescribeReservedInstancesModifications",
"ec2:EnableTransitGatewayRouteTablePropagation",
"ec2:DescribeSubnets",
"ec2:CreateSubnet",
"ec2:ModifyVpcEndpoint",
"ec2:AttachVolume",
"ec2:DisassociateAddress",
"ec2:ModifyVpcEndpointServicePermissions",
"ec2:MoveAddressToVpc",
"ec2:CreateNatGateway",
"ec2:CreateVpc",
"ec2:DescribeVpcEndpointServices",
"ec2:DescribeSpotInstanceRequests",
"ec2:DescribeVpcAttribute",
"ec2:ModifySubnetAttribute",
"ec2:DescribeTransitGatewayRouteTables",
"ec2:DescribeAvailabilityZones",
"ec2:DescribeNetworkInterfaceAttribute",
"ec2:DescribeVpcEndpointConnections",
"ec2:DescribeInstanceStatus",
"ec2:ReleaseAddress",
"ec2:RebootInstances",
```

```
"ec2:ModifyInstanceMetadataOptions",
"ec2:AssignIpv6Addresses",
"ec2:AcceptVpcEndpointConnections",
"route53:ListHostedZones",
"ec2:DescribeClassicLinkInstances",
"ec2:DisassociateSubnetCidrBlock",
"ec2:DescribeVpcEndpointConnectionNotifications",
"ec2:DescribeSecurityGroups",
"ec2:DeleteVpcEndpointConnectionNotifications",
"ec2:RestoreAddressToClassic",
"ec2:DescribeVpcs",
"ec2:DisableVpcClassicLink",
"ec2:DisableVpcClassicLinkDnsSupport",
"ec2:ModifyVpcTenancy",
"route53:AssociateVPCWithHostedZone",
"ec2:DescribeStaleSecurityGroups",
"ec2:DeleteSubnet",
"ec2:ModifyVpcEndpointServiceConfiguration",
"ec2:UnmonitorInstances",
"ec2:DetachClassicLinkVpc",
"ec2:MonitorInstances",
"ec2:CreateTransitGatewayRouteTable",
"route53:GetHostedZone",
"ec2:DescribeVolumesModifications",
"ec2:AssociateVpcCidrBlock",
"ec2:ReplaceRoute",
"ec2:AssociateRouteTable",
"ec2:DisassociateVpcCidrBlock",
"ec2:DescribeInternetGateways",
"ec2:DeleteVolume",
"ec2:DeleteTransitGatewayVpcAttachment",
"ec2:ReplaceNetworkAclEntry",
```

"ec2:AssociateTransitGatewayRouteTable", "ec2:UnassignIpv6Addresses", "ec2:DescribeNetworkInterfacePermissions", "ec2:DescribeReservedInstances", "route53:UpdateHostedZoneComment", "ec2:RejectVpcEndpointConnections", "ec2:DescribeNetworkAcls", "ec2:DescribeRouteTables", "ec2:EnableVpcClassicLink", "ec2:DescribeEgressOnlyInternetGateways", "ec2:DetachVolume", "ec2:ModifyVolume", "ec2:DisableTransitGatewayRouteTablePropagation", "ec2:UpdateSecurityGroupRuleDescriptionsEgress", "ec2:CreateVpcEndpointConnectionNotification", "route53:DisassociateVPCFromHostedZone", "ec2:ResetNetworkInterfaceAttribute", "ec2:DescribeReservedInstancesOfferings", "ec2:CreateRouteTable", "ec2:DeleteNetworkInterface", "ec2:DescribeFleetInstances", "ec2:DetachInternetGateway", "ec2:DescribeVpcEndpointServiceConfigurations", "ec2:ModifyVpcEndpointConnectionNotification", "ec2:DescribeInstanceCreditSpecifications", "ec2:DescribeVpcClassicLink", "ec2:DeleteTransitGatewayRouteTable", "route53:DeleteVPCAssociationAuthorization", "ec2:GetTransitGatewayRouteTablePropagations", "ec2:AssociateSubnetCidrBlock", "route53:ChangeTagsForResource", "ec2:DeleteVpc",

```
"ec2:CreateEgressOnlyInternetGateway",
"ec2:DescribeVpcEndpoints",
"ec2:AssociateAddress",
"ec2:DeleteKeyPair",
"ec2:DescribeAddresses",
"ec2:DeleteTags",
"ec2:DescribeInstanceAttribute",
"ec2:DeleteVpcEndpointServiceConfigurations",
"ec2:DeleteNetworkInterfacePermission",
"ec2:DescribeNetworkInterfaces",
"ec2:CreateSecurityGroup",
"ec2:CreateNetworkAcl",
"ec2:ModifyVpcAttribute",
"ec2:ModifyInstanceAttribute",
"ec2:GetTransitGatewayRouteTableAssociations",
"ec2:AuthorizeSecurityGroupEgress",
"ec2:AttachClassicLinkVpc",
"ec2:ModifyTransitGatewayVpcAttachment",
"ec2:DeleteEgressOnlyInternetGateway",
"ec2:TerminateInstances",
"ec2:DetachNetworkInterface",
"ec2:DescribeIamInstanceProfileAssociations",
"ec2:DescribeTags",
"ec2:DeleteRoute",
"ec2:DescribeNatGateways",
"ec2:AllocateAddress",
"ec2:DescribeImages",
"ec2:DescribeSpotFleetInstances",
"ec2:CreateVpcEndpoint",
"ec2:DeleteSecurityGroup",
"ec2:AttachNetworkInterface",
"ec2:EnableVpcClassicLinkDnsSupport",
```

```
"ec2:DescribeTransitGatewayVpcAttachments",
    "ec2:CreateNetworkAclEntry"
    ],
    "Resource": "*"
  }
]
```

nodus_stack_permissions.json

```
{
  "Version": "2012-10-17",
  "Statement": [
    {
      "Sid": "VisualEditor0",
      "Effect": "Allow",
      "Action": [
        "ec2:ModifyVolumeAttribute",
        "ec2:DescribeInstances",
        "ec2:UnmonitorInstances",
        "aws-marketplace:*",
        "ec2:MonitorInstances",
        "ec2:CreateKeyPair",
        "ec2:DescribeVolumesModifications",
        "ec2:CreateImage",
        "ec2:DescribeSnapshots",
        "ec2:DeleteVolume",
        "ec2:DescribeVolumeStatus",
        "ec2:ModifySnapshotAttribute",
        "ec2:StartInstances",
        "ec2:DescribeVolumes",
        "ec2:DescribeKeyPairs",
```

```
"ec2:DetachVolume",
  "ec2:ResetImageAttribute",
  "ec2:DisableFastSnapshotRestores",
  "ec2:ImportKeyPair",
  "ec2:CreateTags",
  "ec2:RegisterImage",
  "ec2:RunInstances",
  "ec2:DescribeFastSnapshotRestores",
  "ec2:StopInstances",
  "ec2:CreateVolume",
  "ec2:DescribeVolumeAttribute",
  "ec2:CreateSnapshots",
  "ec2:DescribeImageAttribute",
  "ec2:DeleteKeyPair",
  "ec2:AttachVolume",
  "ec2:DeregisterImage",
  "ec2:DeleteSnapshot",
  "ec2:DeleteTags",
  "ec2:DescribeInstanceAttribute",
  "ec2:DescribeRegions",
  "ec2:ModifyImageAttribute",
  "ec2:EnableFastSnapshotRestores",
  "ec2:CreateSnapshot",
  "ec2:DescribeInstanceStatus",
  "ec2:RebootInstances",
  "ec2:TerminateInstances",
  "ec2:DescribeTags",
  "ec2:ResetSnapshotAttribute",
  "ec2:DescribeSecurityGroups",
  "ec2:DescribeImages",
  "ec2:DescribeStaleSecurityGroups"
],
```

```
"Resource": "*"
}
]
}
```

Google Cloud

```
{
"type": "",
"project_id": "",
"private_key_id": "",
"private_key": ""
}
```

Microsoft Azure

```
{
  "client_id": "",
  "client_secret": "",
  "subscription_id": "",
  "tenant_id": ""
}
```

OTC

```
{
"username" : "",
```

```
"domain_name": "",
"tenant_name": ""
}
```

Oracle Cloud

```
{
"user_ocid" : "<user_content_of_View_Configuration_file>",
"tenancy_ocid" : "<tenancy_content_of_View_Configuration_file>",
"compartment_ocid" : "<content_of_subnet_OCID>",
"availability_domain": "<content_of_Availability_Domain>",
"key_file" : "----BEGIN RSA PRIVATE KEY-----\n<content_of_
private-key.pem>\n----END RSA PRIVATE KEY-----",
"fingerprint" : "<fingerprint_content_of_View_Configuration_file>"
}
```

Note: The key_file must not have any spaces and each line must start with n, and the key_file must end with n.

Appendix F: Writing ODDC Scripts

The environment variables below can be used to write ODDC scripts.

Variable	Description
ENVIRONMENT	ВАТСН
HISTCONTROL	ignoredups
HISTSIZE	1000
НОМЕ	/home/linux
HOSTNAME	nodus-c3-15xlarge-2-node-0
LANG	en_US.UTF-8
LESSOPEN	/usr/bin/lesspipe.sh %s
LOADEDMODULES	
LOGNAME	linux
MAIL	/var/spool/mail/linux
MODULEPATH	/usr/share/Modules/modulefiles:/etc/modulefiles
MODULESHOME	/usr/share/Modules
no_proxy	127.0.0.1,localhost,169.254.169.254
NO_PROXY	127.0.0.1,localhost,169.254.169.254
РАТН	/usr/local/bin:/usr/local/sbin:/bin:/usr/ bin:/usr/local/sbin:/usr/sbin:/home/linux/.local/ bin:/home/linux/bin
PBS_ENVIRONMENT	PBS_BATCH
PBS_GPUFILE	/var/spool/torque/aux//63.nodus-servergpu
PBS_JOBCOOKIE	E36EE984E318A76438F6A28EB31CC5DB
PBS_JOBID	63.nodus-server
PBS_JOBNAME	env
PBS_MICFILE	/var/spool/torque/aux//63.nodus-servermic
PBS_MOMPORT	15003
PBS_NODEFILE	/var/spool/torque/aux//63.nodus-server
PBS_NODENUM	0
PBS_NP	1
PBS_NUM_NODES	1
PBS_NUM_PPN	1
PBS_O_HOME	/home/linux
PBS_O_HOST	nodus-server

Variable	Description
PBS_O_INITDIR	/NODUS/jobs/63
PBS_O_LANG	en_US.UTF-8
PBS_O_LOGNAME	linux
PBS_O_MAIL	/var/spool/mail/linux
PBS_O_PATH	/usr/local/bin:/usr/local/sbin:/usr/local/maui/ bin:/usr/local/maui/sbin:/usr/local/bin:/bin:/usr/ bin:/usr/local/sbin:/usr/sbin
PBS_O_QUEUE	batch
PBS_O_SERVER	nodus-server
PBS_O_SHELL	/bin/sh
PBS_0_WORKDIR	/NODUS/jobs/63
PBS_QUEUE	batch
PBS_TASKNUM	1
PBS_VERSION	TORQUE-6.1.3
PBS_VNODENUM	0
PBS_WALLTIME	3600
PWD	/NODUS/jobs/63
SHELL	/bin/bash
SHLVL	2
USER	linux
Appendix G: Known Issues and Troubleshooting

This appendix contains information on known issues and troubleshooting:

- Error refreshing state
- WARNING: REMOTE HOST IDENTIFICATION HAS CHANGED!
- Error applying plan
- Cluster Fails to Deploy
- Error creating Floating IP
- Cluster 'oracle-test' needs X nodes with >= Y cores
- Build 'market-node' errored: Error executing Ansible: Non-zero exit status: 2
- The quota of CPUs established by the provider is exceeded

Error refreshing state

Issue

While deploying a cluster, the logs display the following error.

```
Error: Error refreshing state: 1 error occurred:
```

* provider.azurerm: Error building account: Error getting authenticated object ID: Error listing Service Principals: autorest.DetailedError{Original:adal.tokenRefreshError{message:"adal: Refresh request failed. Status Code = '400'. Response body: {\"error\":\"unauthorized_client\",\"error_ description\":\"AADSTS700016: Application with identifier 'f46f18e7-2047-4b18-b801-1579f731f057' was not found in the directory '82c76c0f-4c88-4dfaaf71-055fa67876fd'. This can happen if the application has not been installed by the administrator of the tenant or consented to by any user in the tenant. You may have sent your authentication request to the wrong tenant.

Solution

Cross-check the client_secret for the given client_id with the system administrator to determine the issue. The client_secret either no longer exists or has expired; therefore, another client_secret needs to be generated or given to the user, and their credentials file updated to reflect the new client_secret.

WARNING: REMOTE HOST IDENTIFICATION HAS CHANGED!

Issue

Providers reuse a pool of IP addresses for the head node. You may want to connect to this node via Secure Shell (SSH). Since the SSH key is tied to your account on the ODDC server, a message similar to the following may display when connecting to an IP address that has been reused.

```
WARNING: REMOTE HOST IDENTIFICATION HAS CHANGED!
IT IS POSSIBLE THAT SOMEONE IS DOING SOMETHING NASTY!
Someone could be eavesdropping on you right now (man-in-the-middle attack)!
It is also possible that a host key has just been changed.
The fingerprint for the ECDSA key sent by the remote host is
SHA256:TPfwqpRrL2HB34ln4bar5hP+FiN3tTsecR51IBOHRJk.
Please contact your system administrator.
Add correct host key in ~/.ssh/known hosts to get rid of this message.
Offending ECDSA key in ~/.ssh/known hosts:36
remove with:
ssh-keygen -f "~/.ssh/known hosts" -R "#.#.#"
ECDSA host key for #.#.#.# has changed and you have requested strict check-
ing.
Host key verification failed.
```

Solution

Follow the instructions in your message to correct this issue.

Error applying plan

Issue

While deploying or resizing a cluster, the logs display an error similar to the following.

Error: Error applying plan: 1 error occurred: * oci_core_instance.nodus-cluster-VM-Standard2-2-node-1: 1 error occurred: * oci_core_instance.nodus-cluster-VM-Standard2-2-node-1: Service error:LimitExceeded. The following service limits were exceeded: vm-standard2-2count. Request a service limit increase from the service limits page in the console. . http status code: 400. Opc request id: 3dd1bcd1a550b6f1148ea32ac0986512/0780130618F448D9EB693213AF75B0A9/6139656939DE1-86B0C9C22D172B925DE

Solution

The services limits were exceeded by the provider. Clean up existing resources that could be hanging, lost, or currently deployed, and try again.

Cluster Fails to Deploy

Issue

While deploying a cluster, the logs display an error similar to the following.

```
data.provider_ami.this: Refreshing state...
module.nodus-t2-micro-node-0.data.provider_ami.this: Refreshing state...
Error: Your query returned no results. Please change your search criteria
and try again.
on data.tf line 5, in data "provider_ami" "this":
5: data "provider ami" "this" {
```

Solution

When creating the cluster, the Prefix field must contain the correct value.

Error creating Floating IP

Issue

While deploying a cluster, the logs display an error similar to the following.

```
Error: Error creating Floating IP: Action Forbidden
on network/main.tf line 87, in resource "provider compute floatingip v2"
"server": 87: resource "provider compute floatingip v2" "server" {
{
"shortMessage": "Command failed with exit code 1: bash -euo pipefail -c
\"TF LOG=TRACE TF LOG PATH=logs/deploy.debug.log
/home/gauser/.nodus/bin/terraform apply -lock=true -lock-timeout=0s -
input=false -refresh=true -auto-approve -compact-warnings -parallelism=100
terraform.tfplan 2>&1 | tee --append
/home/qauser/.nodus/clusters/5f773d90b7fb245d17c69bed/logs/master.log | tee
--append
/home/qauser/.nodus/clusters/5f773d90b7fb245d17c69bed/logs/deploy.log\"",
"command": "bash -euo pipefail -c \"TF LOG=TRACE TF LOG
PATH=logs/deploy.debug.log /home/qauser/.nodus/bin/terraform apply -
lock=true -lock-timeout=0s -input=false -refresh=true -auto-approve -
compact-warnings -parallelism=100 terraform.tfplan 2>&1 | tee --append
/home/qauser/.nodus/clusters/5f773d90b7fb245d17c69bed/logs/master.log | tee
--append
/home/gauser/.nodus/clusters/5f773d90b7fb245d17c69bed/logs/deploy.log\"",
"exitCode": 1,
"failed": true,
"timedOut": false,
"isCanceled": false,
"killed": false
}
```

Solution

Decrease the number of IP addresses that are in use in your cloud provider account.

Cluster 'oracle-test' needs X nodes with >= Y cores

Issue

This error may occur at the end of the Deploy process with bursting enabled. This occurs when a new Compute Node has been deployed and added to the Torque list of nodes. Torque sets the CPU count to 1 and waits for the Compute Node to report to store the actual number of CPUs a Compute Node has.

Error: Cluster 'oracle-test' needs X nodes with >= Y cores

Solution

If you want to resize your cluster automatically, use the elastic flag: -e or --elastic

Build 'market-node' errored: Error executing Ansible: Non-zero exit status: 2

Issue

This error may occur during a stack build if the Head Node Size is too small to handle the Ansible run.

```
Build 'market-node' errored: Error executing Ansible: Non-zero exit status:
2
==> Some builds didn't complete successfully and had errors:
--> market-server: Error executing Ansible: Non-zero exit status: 2
--> market-node: Error executing Ansible: Non-zero exit status: 2
==> Builds finished but no artifacts were created.
```

Solution

Increase the Head Node Size when creating the new stack or when editing an existing stack.

The quota of CPUs established by the provider is exceeded

Issue

This error may occur when estimating the cost of running a job from the **Instance Prices** panel or when deploying a cluster.

The quota of CPUs established by the provider is exceeded

Solution

Manually specify the quotas established by the provider in the provider.json file, inside the zones (zones: {cpu:99, intance:99, network:10}).

Appendix H: Performing a Clean Installation of the ODDC

Follow the steps below to clean the ODDC off the server and perform a fresh install.

- **1.** On the server, run **sudo /NODUS/nodus cluster:list** to see all the clusters that are still available for all the users.
- **2.** Destroy all available clusters, because this process will clean out all clusters. Otherwise, you will have instances running on the Cloud service provider that you cannot destroy from the ODDC.
- 3. Save the /NODUS/.license, /NODUS/nodus-webui/build/assets/config.json, and the /NODUS/nodus-web-api.json files (if they exist), in your home directory for possible later use.
- 4. In the release directory, run the sudo ./clean.sh script. This script will perform the following:
 - Stops and disables the API and Bursting Daemons.
 - Removes the root crontab. Remove crontab -r from the file before execution if you have your own cron entries. Run **sudo crontab** -l to verify.
 - Uninstalls MongoDB.
 - Removes all MongoDB files.
 - Removes the /NODUS directory.
 - Installs MongoDB, via yum. Make sure the account can install packages from the repository.
 - Removes all the .nodus directories from all users in the /home directory.

The system is now set up to look similar to a completely new installation.

- 5. In the release directory, run sudo ./install-nodus.sh <install user> icense file>.
- 6. Edit the nodus-user-add.sh script to add the users that need access to the ODDC.
- 7. Run the nodus-user-add.sh script to add the users back into the system.

Appendix I: ODDC Workload Considerations

Listed below are some of the considerations and questions that need to be answered when running workloads in the Cloud. All of these may not be appropriate for each of your workloads, or you may have additional considerations.

- **1.** Not all workloads can be effectively run in the Cloud, so each workload should be tested for cloud appropriateness by running them in the Cloud and collecting statistics.
 - The ODDC has multi-cloud capabilities and will run workloads in the Cloud from the UI on one or more of the major cloud service providers.
 - Run your workload on each cloud service provider and record the statistics for each one in the Cloud Business Value Process Benchmark Report (see Figure 1 Benchmarks).
 - HTC (High-Throughput Computing) workloads and small scale HPC (High-Performance Computing) workloads that are not memory-, communication-, largedata-, or bandwidth-intensive are ideal for migrating to cloud environments.

- **2.** Cloud OpEx costs are difficult to model without actually running the workload in the Cloud.
 - Build a cost and performance model based on the statistics from (Figure 1) below. This will help you develop your cloud budget. See the attached *Cloud Business Value Process Spreadsheet*. It is also available on adaptivecomputing.com (Support Portal Home / Product Download / HPC Cloud On-Demand Data Center).

	NG								A. S.
Cloud Busin Your Compa	ess Value P iny	rocess-Be	enchmark	s					
WORKLOAD NAME	CLOUD PROVIDER	INSTANCE TYPE	NUMBER OF NODES	NUMBER OF CPUS PER NODE	PERFORMANCE	COST PER CPU HOUR	JOB RUN FREQUENCY PER MONTH	MONTHLY COST	TOTAL COST
1	AWS								
	AWS								
	AWS								
	Google Cloud								
	Google Cloud								
	Google Cloud								
	Azure								
	Azure								
	Azure								
	Oracle Cloud								
	Oracle Cloud								
	Oracle Cloud								
WORKLOAD NAME	CLOUD PROVIDER	INSTANCE TYPE	NUMBER OF NODES	NUMBER OF CPUs PER NODE	PERFORMANCE	COST PER CPU HOUR	JOB RUN FREQUENCY PER MONTH	MONTHLY COST	TOTAL COST
	AWS								
	AWS								
	AWS								
	Google Cloud								
	Google Cloud								
	Google Cloud								
	Azure								
	Azure								
	Azure								
	Oracle Cloud								
	Oracle Cloud								
	Oracle Cloud								

Figure 1: Benchmarks

- When using the ODDC, expenditures move from capital expenses (CapEx) to operational expenses (OpEx) because you are gaining capacity without buying more hardware. This allows for the immediate availability of resources and the ability to scale up clusters instantaneously.
- **3.** Choose the appropriate delivery model for each of your workloads.
 - The ODDC accommodates on-premises, even your laptop, SaaS, and cloud-hosted delivery models, which are very easy to implement because of the low barriers to entry using the ODDC. The delivery model for each workload could be different.

- **4.** Do you want to run your workload independent from or as part of your on-premises cluster?
 - The ODDC offers superior usability when devising cloud and on-premises integration strategies.
 - The ODDC works with any HPC or enterprise job scheduler or without a workload scheduler.
 - In the diagram below (Figure 2) the workload has burst to the Cloud automatically based on backlog. The job is seen by the scheduler as part of the on-premises cluster. The ODDC has the capability to seamlessly integrate on-premises and cloud resources. See the section Bursting for additional information.



Figure 2: Bursting Becoming On-Premises

• In the diagram below (Figure 3) the workload has burst to the Cloud on demand and is running in the Cloud independently of the on-premises cluster.



Figure 3: Bursting Off-Premises

- 5. Which workloads can be run in the Cloud on VMs and which need bare metal?
 - Can you get the performance you need from VMs?
 - Virtualization layers can often cause slower performance, although VMs can be easily moved to and from similar clouds and are less expensive.
 - You may have to run your workload on bare metal to get the performance results required.

- 6. Which workloads require additional licenses to run in the Cloud and which do not?
 - Determine if your workload requires additional licensing to run in the Cloud.
 - License sharing can be difficult in international organizations and will increase costs. License sharing is easier to manage with regional workloads, making these better suited to run in the Cloud and are less expensive.
 - Use vendors or open-source software with cloud-friendly terms.
- **7.** Which of your workloads require moving large amounts of data to the Cloud and which do not?
 - Look at each job, the amount of data it requires, and then make a determination.
 - Consider compute, memory, and storage when assessing data requirements.
 - Test your data transfer line.
 - Move your data first and then spin up the nodes to run your workload in the Cloud.
 - The ODDC has a data movement feature, which can automatically move the data and proliferate it.
- **8.** Which public cloud service providers match which of your workloads? One size does not fit all.
 - Using the ODDC, you can test your workloads on each one of the Cloud service providers. Within the ODDC interface, select the Cloud service provider that your job will run on. The nodes will shut down when the job completes, and you can then select another cloud service provider to test your workload on. For example, one workload should run on AWS and another should run on Google Cloud.
 - The ODDC supports all major public clouds, and can be configured to support any public cloud of any size.
 - After calculating the cost for a workload, multiply that cost by the number of times the workload runs each month. Repeat this for each cloud service provider (Figure 1).

• A blank worksheet is provided if you want to test other cloud service providers (Figure 4). See the attached *Cloud Business Value Process Spreadsheet*.

Cloud Business Value Process-Worksheet Your Company									
WORKLOAD NAME	CLOUD PROVIDER	INSTANCE TYPE	NUMBER OF NODES	NUMBER OF CPUS PER NODE	PERFORMANCE	COST PER CPU HOUR	JOB RUN FREQUENCY PER MONTH	MONTHLY COST	TOTAL COST

Figure 4: Worksheet

• A budget sheet is included for you to summarize your testing results and prepare your Cloud Business Value Process Budget Report for management (Figure 5). See the attached *Cloud Business Value Process Spreadsheet*.

Cloud Business Value Process - Budget Your Company										
WORKLOAD NAME	CLOUD PROVIDER	INSTANCE TYPE	NUMBER OF NODES	NUMBER OF CPUS PER NODE	PERFORMANCE	COST PER CPU HOUR	JOB RUN FREQUENCY PER MONTH	MONTHLY COST	TOTAL COST	
									-	

Figure 5: Budget

Test your workloads in the Cloud one at a time (the most cloud-friendly ones first) and begin collecting statistics.

Enter the gathered statistical data into the attached spreadsheet. In a very short period, you will know which of your workloads can be run in the Cloud, and on which cloud service provider using which instance type. We recommend that you run each workload using at least three different instance types for each cloud service provider to determine the best cost/performance for each workload (Figure 1).

When testing is concluded, your cloud budget will be determined.

Appendix J: Data Staging to the Cloud

Data Staging with Moab-ODDC-Connect can be accomplished in multiple ways. See three examples below.

- **1.** When a cluster is created or shared with a user within the ODDC, an SSH key pair is created and available to the user to transfer files via the SSL protocol to the head node of the cluster. ¹
- **2.** The ODDC allows for the creation of an OpenVPN server on the head node. An OPVN file can be retrieved and used to create a VPN connection between on-premises resources and the cluster head node. ¹
- **3.** The compute nodes are created on a private network behind the head node. Depending on the configuration within the Cloud provider, these nodes have the ability to pull data from external sources, such as provider-created storage services, or any other IP address.

¹ A directory /NODUS/share exists on the head node and is shared across all compute nodes via NFS or BeeGFS (default: NFS). Placing data files in this directory will make them visible to all compute nodes when the job is executed.

Please contact us at oddcsupport@adaptivecomputing.com if you need a different Data Staging method.

Appendix K: Using Client–Server Directory Service Protocol Setups

When adding ODDC to client–server directory service protocol networks (such as NIS/YP, LDAP, etc.), you need to make operating system modifications. ODDC uses the Linux command **useradd** to create any new accounts.

Make the following changes to /etc/default/useradd.

- **1.** Add **UID_MAX (number)** and **UID_MIN (number)** to the file so that any ODDC created user does not conflict with existing UIDs.
- 2. Change the **HOME (string)** information so that the HOME directory is local and does not conflict with the existing home directories. The **useradd** command defaults to /HOME.

Appendix L: Modifying Provider Information To Support Customer Requirements

A Provider file, which is included in the ODDC installation file, enables you to populate your specific needs to list providers, regions, and instance types.

Example

```
{
       "providers": [
               {
                        "id": "local",
                        "regions": [],
                        "instanceSizes": []
               },
               {
                        "id": "aws",
                        "regions": [
                               {
                                         "name": "US East 1",
                                         "region id": "us-east-1",
                                         "zones": [
                                                {
                                                         "name": "US East 1a",
                                                         "zone_id": "use1-az1"
                                                 },
                                                 {
                                                         "name": "US East 1b",
                                                         "zone id": "use1-az2"
                                                 },
                                                 {
                                                         "name": "US East 1c",
                                                         "zone id": "use1-az4"
                                                 },
                                                 {
                                                         "name": "US East 1d",
                                                         "zone id": "use1-az6"
                                                 },
                                                 {
                                                         "name": "US East 1e",
                                                          "zone id": "use1-az3"
                                                 },
                                                 {
                                                         "name": "US East 1f",
                                                          "zone id": "use1-az5"
                                                 }
                                        ]
                                },
                                {
                                         "name": "US West 1",
                                         "region id": "us-west-1",
                                         "zones": [
                                                {
                                                         "name": "US West 1a",
```

Appendix L: Modifying Provider Information To Support Customer Requirements

```
"zone id": "usw1-az3"
                },
                {
                         "name": "US West 1b",
                         "zone id": "usw1-az1"
                }
        ]
},
{
        "name": "US Gov East 1",
        "region id": "us-gov-east-1",
        "zones": [
                {
                         "name": "US Gov East 1a",
                         "zone id": "usgel-az1"
                },
                {
                         "name": "US Gov East 1b",
                         "zone id": "usge1-az2"
                },
                {
                         "name": "US Gov East 1c",
                         "zone_id": "usge1-az3"
                }
        ]
},
{
        "name": "CA Central 1",
        "region id": "ca-central-1",
        "zones": [
                {
                         "name": "CA Central 1a",
                         "zone_id": "cac1-az1"
                },
                {
                         "name": "CA Central 1b",
                         "zone_id": "cac1-az2"
                },
                {
                         "name": "CA Central 1d",
                         "zone id": "cac1-az4"
                }
        ]
},
{
        "name": "EU Central 1",
        "region_id": "eu-central-1",
        "zones": [
                {
                         "name": "EU Central 1a",
                         "zone id": "euc1-az2"
                },
                {
                         "name": "EU Central 1b",
                         "zone id": "euc1-az3"
                },
                {
                         "name": "EU Central 1c",
```

Appendix L: Modifying Provider Information To Support Customer Requirements

```
"zone id": "eucl-az1"
                        }
                ]
        },
        {
                "name": "EU West 1",
                "region id": "eu-west-1",
                "zones": [
                        {
                                 "name": "EU West 1a",
                                 "zone id": "euw1-az3"
                         },
                         {
                                 "name": "EU West 1b",
                                 "zone id": "euw1-az1"
                         },
                         {
                                 "name": "EU West 1c",
                                 "zone id": "euw1-az2"
                         }
                ]
        }
],
"instanceSizes": [
        {
                "name": "t2.nano - vCPU: 1, Mem (GB): 0.50",
                "instance id": "t2.nano",
                "cores": "1"
        },
        {
                "name": "t2.micro - vCPU: 1, Mem (GB): 1",
                "instance id": "t2.micro",
                "cores": "1"
        },
        {
                "name": "t2.small - vCPU: 1, Mem (GB): 2",
                "instance id": "t2.small",
                "cores": "1"
        },
        {
                "name": "t2.medium - vCPU: 2, Mem (GB): 4",
                "instance id": "t2.medium",
                "cores": "2"
        },
        {
                "name": "t2.large - vCPU: 2, Mem (GB): 8",
                "instance id": "t2.large",
                "cores": "2"
        },
        {
                "name": "t2.xlarge - vCPU: 4, Mem (GB): 16",
                "instance id": "t2.xlarge",
                "cores": "4"
        },
        {
                "name": "t2.2xlarge - vCPU: 8, Mem (GB): 32",
                "instance id": "t2.2xlarge",
                "cores": "8"
```

Appendix L: Modifying Provider Information To Support Customer Requirements

]		}	
]	
	}		

Appendix M: Enabling Clusters From Other Users to be Used in ODDC Connect

This appendix describes the steps for enabling clusters from other users (on the same ODDC server) to be used in ODDC Connect.

ODDC Connect enables bi-directional communication between Moab and ODDC. The .env file specifies the user that is managing a cluster on ODDC (i.e., a Linux user who is a registered ODDC user on HOST). This user can specify as many clusters in the .env file as desired, from different providers, but it has to belong to this user's ODDC login (a registered ODDC cluster name).

To add another user's clusters to the .env file to be available on Moab as Cloud resources, complete the following steps:

- **1.** Edit the collaborators by going to the **Applications** menu / **Cluster Manager** / **ellipsis** / **Edit Collaborators**.
- 2. Add the user's clusters to the .env file by editing this file using the command sudo vi /opt/moab/contrib/oddc/.env and adding the clusters to the # Registered NODUS Cluster Name section of the file, separated by a comma (,).

These clusters are now also visible to Moab as additional Cloud resources and will be managed the same way by ODDC web API as before.

When you have completed sharing the clusters on ODDC with the user specified in the .env file on Moab, and you have completed the .env file update on Moab by adding the additional user's clusters, complete the following steps:

- 1. Restart Moab using the command sudo systemctl restart moab.
- **2.** Restart ODDC job monitor on Moab using the command **sudo systemctl restart oddcjob-monitor**.
- **3.** Restart ODDC monitor on Moab using the command **sudo systemctl restart oddc-monitor**.
- **4.** Restart the ODDC web API using the command **sudo systemctl restart nodus-web***a***pi**, which will refresh the bi-directional communication between Moab and ODDC.

Using ODDC Connect and the shared clusters from other users will become available on Moab as new Cloud resources.

Glossary

BeeGFS: A parallel file system developed and optimized for HPC and includes a distributed metadata architecture for scalability and flexibility.

Bursting: The event of clusters and nodes being deployed to run jobs, then being destroyed.

Cluster: A collection of compute instances consisting of a head node and compute nodes.

Cluster Size: The number of compute nodes.

Compute Nodes: The servers, typically designed for fast computations and large amounts of I/O, that provide the storage, networking, memory, and processing resources.

Compute Node Size: An instance type or hardware configuration (for example, n1-standard-2 - vCPU: 2, Mem (GB): 7.50).

Core: An individual hardware-based execution unit within a processor that can independently execute a software execution thread and maintain its execution state separate from the execution state of all other cores within the processor.

Credentials: Authentication information required to access the respective cloud service provider from code.

Custom Job: A job that is customizable and configurable.

Head Node: The server that manages the delegation of jobs.

Idle Purge Time: Specifies how long to keep a compute node available after a job (workload) is processed, before destroying the compute node when using bursting.

Image: A snapshot of an OS.

Job: A workload submitted to a scheduler for the purpose of scheduling resources on which the workload executes when started up by the scheduler. Typically, a user creates a script that executes the workload (one or more applications) and submits the script to the scheduler where it becomes a job.

Job Script: A program to be run on a cluster (generally a shell script).

On Demand Cluster: A cluster that carries out a specific job then is removed.

Provisioning: The event of configuring a node or cluster with its stack and getting it into a ready-to-work state.

Scheduler: The specialized software between the user and the HPC cluster/datacenter system that manages submitted workloads or jobs. This includes queuing jobs, prioritizing queued jobs for execution, scheduling and allocating requested resources for each job, and starting jobs when their requested resources become available and the jobs have the highest priority.

Stack: An instance of software packages that defines the operating system components.

Thread: The quantity of software execution threads the core can simultaneously track.

Torque (Terascale Open-source Resource and Queue manager): An industry-standard resource manager solution with a built-in scheduler.

Walltime: The job's time limit (HH:MM:SS).

Workload: Jobs to be run and/or jobs in the queue.

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