

Deploying Oracle Database with IBM Cloud Automation Manager and IBM PowerVC

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1 Abstract

This paper builds on the Proof of Technology described in “Deploying Oracle® Database as a Service with IBM Cloud PowerVC Manager 1.3.1” (see References, page 99) where we demonstrate how IBM Cloud PowerVC Manager (PowerVC) technology enables the implementation of Database-as-A-Service (DBaaS) for an Oracle® database.

In the first section of this paper we demonstrate how to utilize IBM Cloud Automation Manager (CAM), instead of (PowerVC), to provide the control point and end-user interface for DBaaS for an Oracle database, while re-using the existing PowerVC image developed in the earlier project.

We then expand the scope and illustrate the workload orchestration capabilities of CAM by creating a deployable service which co-deploys two virtual machines (VM) - a database server and an application server. The result of that orchestrated deployment is a running and pre-loaded oracle database and a workload driver in the second VM ready for the end-user to connect to and drive simulated transactions against the database.

Readers of this paper are assumed to have at least some familiarity with IBM Cloud Private v3.2, IBM Cloud Automation Manager v3.2, IBM Power environment, IBM Power Virtualization Center (PowerVC), AIX and Linux system administration. The creation of the deployable image for the Oracle database server, as described in the sister white paper, requires working knowledge of Oracle 12c database software.

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3 Comments / Feedback

Version: 1.0

The authors are interested in any feedback or comments on this white paper and the approach taken to implement a service on IBM Cloud Automation Manager.

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4 Introduction

Application containerization has become a major trend in software development and deployment. A late 2017 survey conducted by IBM suggests that adoption is happening very quickly, revealing that 59% of adopters improved application quality and reduced defects as a result.

In support of this new development and deployment paradigm, IBM has created the IBM Cloud Private offering which is based on Kubernetes. Kubernetes is an open-source container-orchestration system for automating application deployment, scaling, and management. It was originally designed by Google and is now maintained by the Cloud Native Computing Foundation.

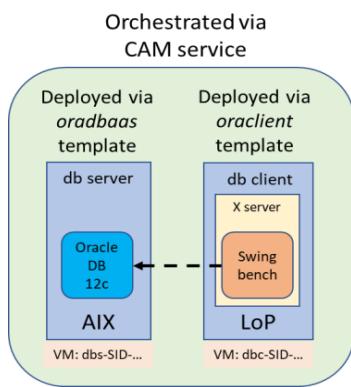
In 2019 IBM bought Red Hat®, Inc. and made the decision that Red Hat Openshift will be the platform of choice to develop and deploy containerized applications going forward and replaces IBM Cloud Private in the future. Redhat Openshift is based on Kubernetes as well.

This white paper utilizes CAM 3.2.1.2 deployed into an IBM Cloud Private 3.2.1 environment on IBM Power servers, but a deployment of CAM into a Red Hat Openshift 3.11 on Power environment would provide the same functionality and features. The latest IBM Cloud Pak for Multicloud Management version includes CAM and is available for Red Hat Openshift 3.11 on IBM Power architecture today.

While more and more containerized applications are being developed and deployed, many critical applications today are still virtual machine (VM) based. For mixed environments, with both VM and containerized applications, IBM Cloud Automation Manager (CAM) is a Docker container application that allows you to deploy existing VM-based applications in a multi-cloud environment. Since CAM is an application that runs on IBM Cloud Private, or RedHat Openshift, you can integrate management of new container-based services with existing mission critical workloads and provide a single software and services catalog for both containerized and VM-based applications.

The purpose of this paper is to illustrate how CAM can be utilized to orchestrate the deployment of two VMs from within IBM Cloud Private. All relevant configuration and setup steps are described in detail so the reader can reproduce the deployment and implementation steps in his own environment.

The graphic below illustrates the end state after a successful service deployment from CAM.



The deployed environment consists of:

- A database server (db server) running Oracle Database 12c on AIX, using the image described in the IBM Whitepaper entitled “Deploying Oracle Database as a Service with IBM Cloud PowerVC Manager 1.3.1” (DBaaS whitepaper, see References, Section 11) and,
- A database client (db client) consisting of a Linux on Power VM running the Swingbench load generator over Oracle Instant Client against the database server

After deployment, workload data is automatically loaded into the db server's database from the db client. Once the load is complete, the user/requester can access the db client to run Swingbench load generator.

The only required input from the end-user, and even that is optional, to deploy this full functionality via a “single-click” service deployment is to provide the database name to be configured.

Note: The Swingbench tool was developed by Dominic Giles, Oracle and is freely available at:
<http://www.dominicgiles.com/swingbench.html>

The following are pre-requisites for this proof of technology and the setup or configuration therefore are not covered in this white paper.

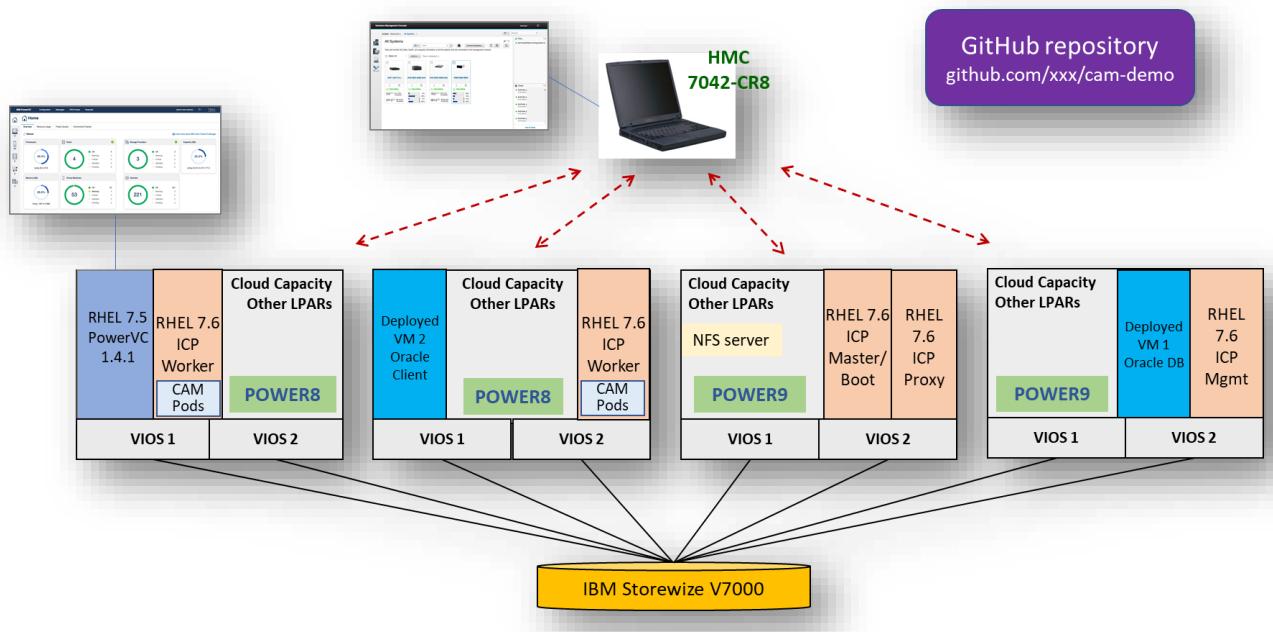
- [IBM® Cloud Power® VC Manager](#) (PowerVC) has been installed and configured and can successfully manage, capture, deploy, start, stop, etc. images and virtual machines onto managed IBM Power servers and storage.
- A virtual machine image with Linux on Power as OS has been created and is deployable in PowerVC.
- A virtual machine image with AIX and Oracle database software has been created and is deployable in PowerVC. See “Deploying Oracle Database as a Service with IBM Cloud PowerVC Manager 1.3.1” (see References, page 99) for details on how to create this image.
- An NFS server with Oracle client 12c software and the swingbench install zip-file accessible during deployment of the *oraclient* template.
- IBM Cloud Private (ICP) and IBM Cloud Automation Manager (CAM) have been installed. Please see “[Cloud Automation Manager CE Installation](#)” white paper as reference for the installation of CAM CE 3.2.1.2 into IBM Cloud Private 3.2.1 as utilized in this proof of technology.
- A GitHub repository to be used to store the CAM designer templates.

In the remainder of this white paper we provide:

- A description of the hardware / software environment in which this project was developed,
- A brief overview of IBM Cloud Private and IBM Cloud Automation Manager,
- A detailed description of how to create the *oradbaas* template with the IBM Template Designer, part of CAM software package, and deploy this template via IBM Cloud Automation Manager.
- A description on how to create the *oraclient* template the same way, but not in as much detail. Template file content is available in the appendix.
- A detailed description of how to create and deploy a service, *Oracle 12C on AIX with Swingbench Client on LoP*, in CAM using the two new templates *oradbaas* and *oraclient*.

5 Lab Environment

The graphic below illustrates the environment in which this proof of technology was developed:



- Two POWER9 processor-based servers and two IBM POWER8 processor-based servers, all managed by an IBM Hardware Management Console (HMC),
- An IBM Storewize V7000 providing virtualized storage,
- Fiber-based SAN switches connecting the storage to the servers (not shown in the graphic),
- The Power servers are fully virtualized and each was configured with two Virtual I/O Servers (VIOS),
- IBM Power Virtualization Center (PowerVC) as the Openshift endpoint for VM deployments via Terraform,
- The IBM Cloud Private environment, with IBM Cloud Automation Manager (CAM) deployed.

The software versions of ICP, CAM and PowerVC in our lab environment at the time this paper was written were:

- IBM Cloud Private Enterprise Edition Version 3.2.1
- IBM Cloud Automation Manager Version 3.2.1.2
- IBM PowerVC Version 1.4.2.1

6 About IBM Cloud Private and IBM Cloud Automation Manager

IBM® Cloud Private is an application platform for developing and managing containerized applications across hybrid cloud environments, on-premises and public clouds. It is an integrated environment for managing containers that includes the container orchestrator Kubernetes, a private image registry, a management console, and monitoring frameworks.

Many applications today are still VM-based. For these environments, IBM Cloud Automation Manager (IBM CAM) is an application that runs in a Docker container on IBM Cloud Private or Redhat Openshift. CAM allows you to deploy existing VM-based applications in a multi-cloud environment, add any AIX, IBM i, or Linux VM-based application to the IBM Cloud Private or Redhat Openshift catalog, integrate new services with existing mission critical workloads, and achieve a single catalog with coordinated orchestration.

Cloud Automation Manager uses Terraform, an open-source tool created by HashiCorp, to handle provisioning of cloud and infrastructure resources. These resources are described to Terraform using a high-level configuration language, stored in configuration files, or templates. From these templates, Terraform generates an execution plan describing what it will do, and executes it to build the described infrastructure.

IBM CAM includes two graphical user interface (GUI) tools, accessed through a web browser, for developing templates and services:

- Template Designer is used to develop Terraform templates featuring a "drag and drop" interface. Template Designer can also be installed on a local workstation using Docker Compose. Templates created using Template Designer are "pushed" to a Git repository and published or imported into the CAM Template Library.
- Service Composer allows to create orchestrated services, via drag-and-drop interface, from CAM (Terraform) templates and/or Kubernetes Helm charts based on a designed sequence or decision. Service Composer is part of the CAM Service library.

7 Working with CAM

7.1 Accessing CAM

The access URL to the CAM user interface can be found in IBM Cloud Private. Access the hamburger menu (three bars on the upper left-hand corner), select Workloads -> Helm Releases.

The screenshot shows the IBM Cloud Private interface with the title bar "IBM Cloud Private" and "CLUSTER picp32clu". On the left, a sidebar menu includes "Overview", "Container Images", "Search", and "Workloads" (which is expanded to show "Brokered Services", "DaemonSets", "Deployments", "Helm Releases", "Jobs", and "StatefulSets"). The main content area has a heading "me to IBM Cloud Private" and a large graphic illustrating a cloud architecture with various components like databases, servers, and storage. A callout bubble points to the "Helm Releases" section of the sidebar.

Search for **cam**, or the name you used when you installed the CAM Helm Release, and click the name of the CAM deployment.

The screenshot shows the "Helm Releases" page in IBM Cloud Private. The search bar at the top contains "cam". A callout bubble points to the search bar with the text "Click the name of the CAM deployment.". Below the search bar is a table with columns: Name, Cluster Name, Namespace, Status, Chart Name, and Current Version. One row is visible: "cam-clu038", "local-cluster", "services", "Deployed", "ibm-cam", "3.1.8". At the bottom of the table, there is a pagination control "items per page 20 | 1-1 of 1 items".

Scroll all the way down to find the section about Notes and CAM UI access. In our example,

The screenshot shows the "Notes" section of the CAM UI. It contains the following text:

```
#  
# Licensed Materials - Property of IBM  
# 5737-E67  
# (C) Copyright IBM Corporation 2016-2019 All Rights Reserved.  
# US Government Users Restricted Rights - Use, duplication or  
# disclosure restricted by GSA ADP Schedule Contract with IBM Corp.  
  
Note: It may take some time for Cloud Automation Manager to initialize, please be patient.  
You can monitor the status of the pods with the following command:  
kubectl get -n services pods  
  
Once all the pods are running, you can run the helm tests:  
helm test cam-clu038 --tls  
  
To access the UI:  
export SERVICE_PORT=$(kubectl get service -n services cam-proxy -o jsonpath='{.spec.ports[0].nodePort}')  
echo https://<ICP_PROXY_IP>:$SERVICE_PORT/cam
```

Typically,
<https://<Hostname or IP address of ICP proxy node>:30000/cam>

Use a browser to access CAM with the appropriate URL determined above and log in.

Once logged in, the **Welcome** screen or **Getting Started** screen is displayed as shown in the picture below.

The screenshot shows the 'Welcome to IBM Cloud Automation Manager' screen. At the top left is a blue button labeled 'IBM Cloud Automation Manager'. A callout bubble points to this button with the text 'Click here to access a menu for quicker access to other screens.' To the right of the button are links for 'Docs', 'Support', and a user profile icon. The main heading 'Welcome to IBM Cloud Automation Manager' is centered at the top. Below it is a sub-headline: 'Use Cloud Automation Manager to accelerate application delivery by automating provisioning with cloud resource templates and service blueprints.' A large blue button in the center says 'Let's get started.' Below this are four numbered steps with icons and descriptions:

- 1. Connect to a Cloud**: To start using cloud automation manager, connect to a cloud in the [cloud connection](#) page.
- 2. Create Your Template**: Quickly find the perfect infrastructure template, or import your own template in the [library](#) page.
- 3. Create your Service**: Next head to the [service library](#) to create a service that can be published into the ICP catalog.
- 4. Manage Deployed Instances**: View and manage all requested service instances in the [deployed instances](#) page.

Note that the hamburger menu can be used to bring up the left-hand panel menu below. This menu can be used to access the functions shown on this **Getting Started** screen or return to this screen quickly from other screens.

This screenshot shows the same 'Welcome to IBM Cloud Automation Manager' screen as above, but with a left-hand sidebar menu open. The menu includes:

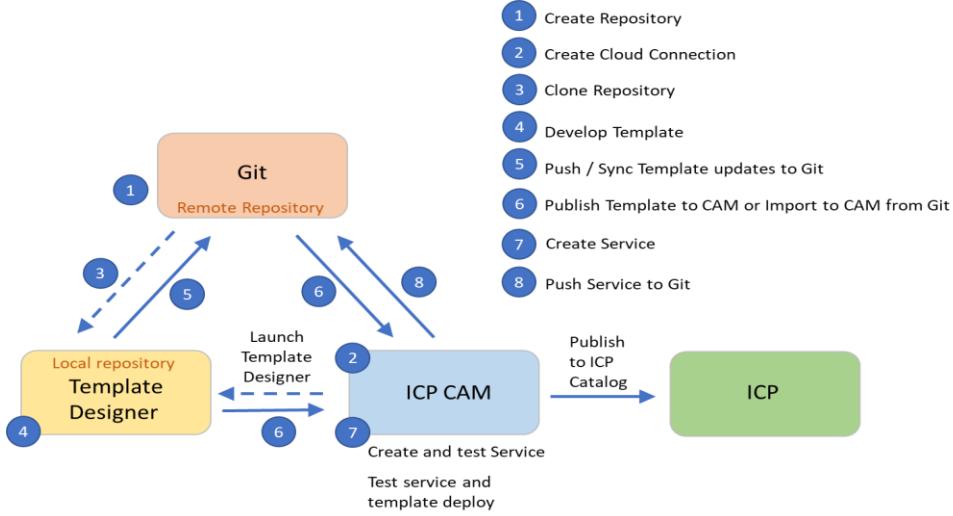
- Getting Started** (selected)
- Library**
 - Templates
 - Services
- Deployed Instances**
- Manage**

The rest of the screen is identical to the first screenshot, showing the 'Let's get started.' button and the four numbered steps with their respective icons and descriptions.

7.2 Development Workflow - Overview

Templates and content libraries that are created in the Template Designer are stored and versioned in a Git repository. GitHub, GitLab and Bitbucket server are supported in CAM. For this paper, we used GitHub and have included the steps we performed to set up the repository in Appendix, Section 10.1., "Working with GitHub".

The picture below illustrates the sequence of steps we followed to prepare for, develop, test and deploy the two CAM templates and the CAM service for this proof of technology.



We started with the creation of a new GitHub repository, *cam-demo*, for this project under an existing GitHub account, then cloned that new repository (empty at this point) to the Template Designer. We then used Template Designer to create and modify the Terraform files defining the *oradbaas* and *oraclient* templates, committed our changes and pushed the updated files to the GitHub repository. Once that was done, we published (using Template Designer) the new templates to CAM, where we then tested / successfully deployed the *oradbaas* template.

Once the templates had been tested, we used CAM Service Composer to create and test the CAM Service *Oracle 12C on AIX with Swingbench Client on LoP*. This new service is an orchestration of *oradbaas* and *oraclient* templates. We then pushed the new service to GitHub and published it to ICP.

Pushing templates and services to Git serves as backup and facilitates distribution and collaboration with other interested parties. Templates and services can be easily imported into other CAM deployments, saving the effort of recreating templates and services in CAM.

7.3 Terraform Console

Git provides change control and management that may not be needed when first starting Terraform template development. One way to quickly learn, create and test early prototypes of Terraform files is to install Terraform on your Windows, Mac or Linux workstation.

This blog by Joe Cropper, IBM, describes how to install and run Terraform on your workstation.

<https://developer.ibm.com/powervc/2017/06/29/infrastructure-code-terraform-meets-powervc/>

One useful function of locally installed Terraform software is the Terraform console, which we used to test and verify Terraform functions, including syntax checking. For example, on our laptop terminal, the following was used to test the timestamp function used in our *oradbaas* template.

Note that the console functionality, at least on windows, seems to be broken with current version 0.12, but works with version 0.11.14 of Terraform.

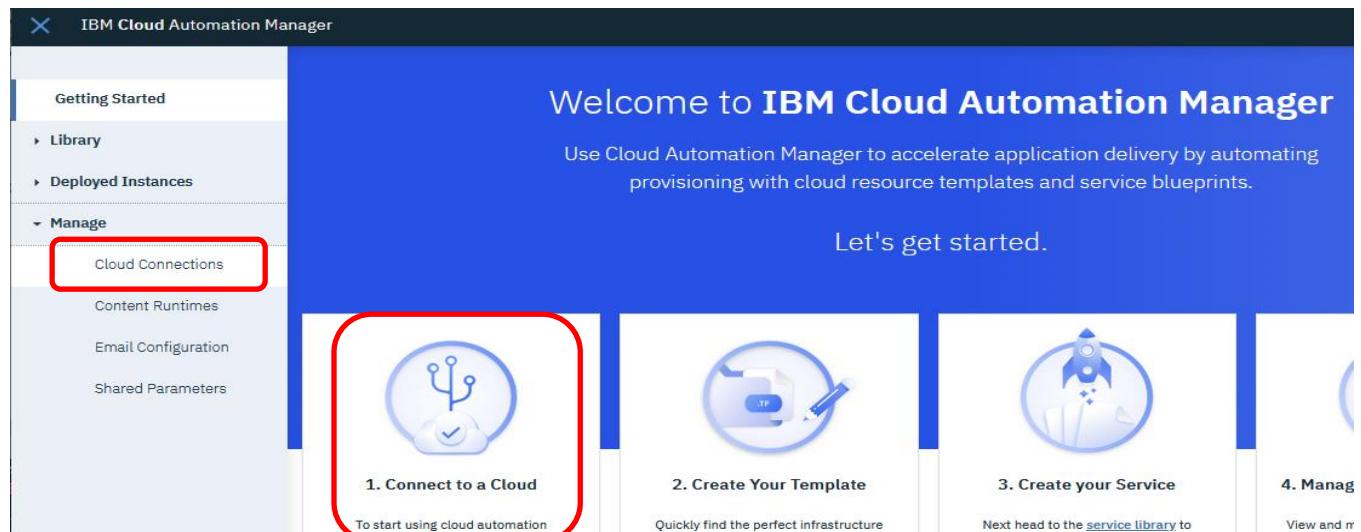
```
$ terraform console
> timestamp()
2019-05-23T18:41:34Z
> replace(replace(replace(substr(timestamp(),0,19),"-",""),"T","",""),"T","",""),":","");
20190523184013
> replace(replace(replace(substr(timestamp(),2,17),"-",""),"T","_"),":","");
190911_172625
> exit
$
```

7.4 Create Cloud Connection

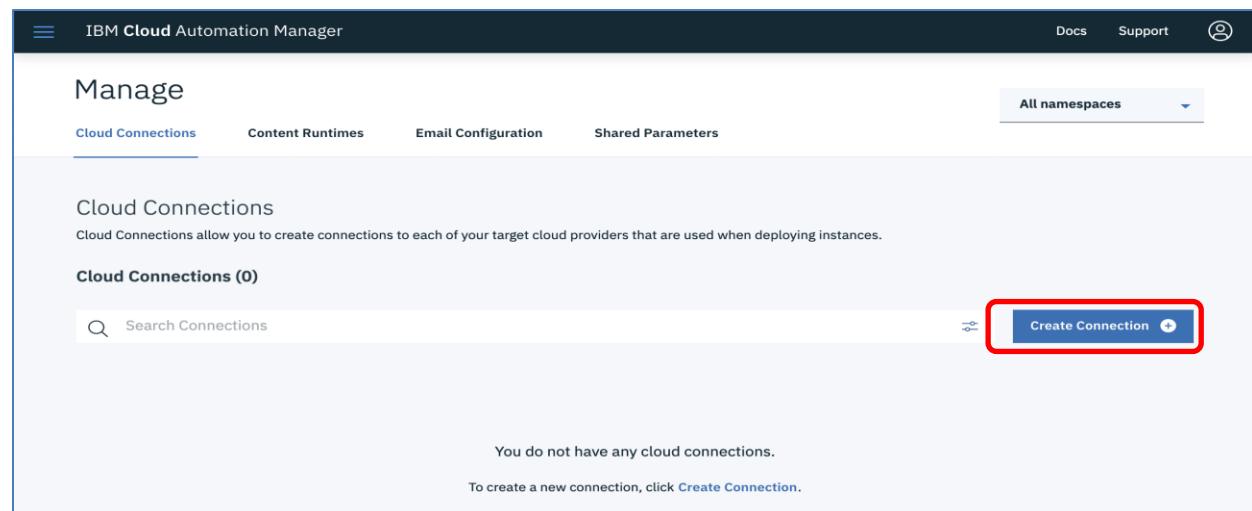
CAM is designed to work efficiently in a multi-cloud environment with multiple cloud providers. To simplify the use of a specific cloud provider CAM provides the concept of a Cloud Connection which stores the detailed connection related parameters (e.g. OpenStack user, password, auth_url, region, etc.). At deploy time – template or service - you can then simply specify which Cloud Connection to use without having to specify all the cloud provider connection details in the deployment.

To create a new Cloud Connection, click the left-side navigation panel, click **Manage** as shown on the screen below to expand the submenu and select **Cloud Connections**.

Alternatively, you can click **1. Connect to a Cloud** link on the Welcome screen



This switches the focus to the Manage (connections) screen where you click the **Create Connection** button,



Fill in the Create Connection screen as described below. Important for a PowerVC environment is to select OpenStack as **Cloud Provider**. We also defined the new cloud connection to be available in all namespaces – Globally Accessible. Note that in this case the Select a namespace field is not editable.

← Cloud Connections

Create Connection

Create cloud connections to deploy templates and services to target cloud providers.

* indicates a required field

We do not want to be limited to a specific namespace / project so we left default of “Globally Accessible”.

PowerVC “Cloud provider functionality” is implemented via Openstack api so OpenStack was selected as Cloud Provider.

This connection name provides the reference to be used in CAM templates to access this cloud provider.

You can specify the hostname or IP address for your PowerVC server, but note that “https” and port 5000/v3 are required.

PowerVC user.

Project name in our PowerVC

We are not using custom Certificates, so left this and the next two fields unchanged.

1. Select a Namespace

Assign Access

Make Connection Globally Accessible [?](#)

Make Connection part of a namespace

* Select a namespace

2. Select a Cloud Provider

* **Cloud Provider**

OpenStack

3. Enter Connection Name

* **Connection Name** [?](#)

PowerVCDev

4. Connection Description

Connection Description

WSC Development PowerVC

4. Connection Description

Connection Description

WSC Development PowerVC

5. Configure Connection

How to configure an OpenStack cloud

* **Authentication URL** [?](#)

https://129.0.1.1:5000/v3

* **User Name** [?](#)

admin

* **Password** [?](#)

Domain Name [?](#)

Default

Region [?](#)

RegionOne

Project Name [?](#)

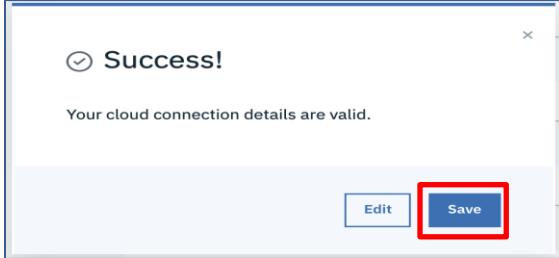
wsc-demo

CA Certificate [?](#)

Create

When complete, click the **Create** button.

A pop-up window indicates successful creation of the connection. Click the **Save** button.



The Manage screen now shows the just-created Cloud Connection.

The screenshot shows the IBM Cloud Automation Manager interface. The top navigation bar includes the title "IBM Cloud Automation Manager" and links for "Catalog", "Help", and "User". Below the title, a "Manage" section is displayed with tabs for "Cloud Connections", "Content Runtimes", "Email Configuration", and "Shared Parameters". A dropdown menu "All namespaces" is open. The main content area is titled "Cloud Connections" and contains a sub-section "Cloud Connections (1)". It features a search bar "Search Connections" and a table with columns: Name, Cloud Provider, Namespace, and Status. One entry is listed: "PowerVCDev" (Cloud Provider: OpenStack, Namespace: Globally Accessible, Status: Valid). A blue callout box points to the right margin of the table, containing the text: "Click here to reveal the submenu on the right for connection functions. Use Test to check validity of the connection." On the far right, there is a "Create Connection" button with a plus sign. A context menu is open over the "PowerVCDev" row, with options "Edit", "Test" (highlighted with a mouse cursor), and "Delete".

Name	Cloud Provider	Namespace	Status
PowerVCDev	OpenStack	Globally Accessible	Valid

7.5 Prepare Template Designer

In this section we describe the steps to configure Template Designer before starting to create the first template.

From the **Getting Started** screen, scroll down and launch **Template Designer**, as shown in the graphic below. Alternatively, click the hamburger menu, select Library -> Templates. Then click the **Create Template** button.

Welcome to IBM Cloud Automation Manager Hey, want to learn a little more? [Expand this row](#)

Useful links

Time to get productive with IBM Cloud Automation Manager!

Quickly find what you need here.

Edit your Templates!

Template Designer will visually edit templates.

Template Designer

New to Terraform?

Learn the basics about infrastructure as code.

 Terraform

Monitor and manage your instances

View the overall health of your instances.

[Template Instances](#) | [Service Instances](#)

Working with advance content?

Discover Templates and Services

Template Designer will launch, after going through the ICP login screen again, in a separate browser tab.

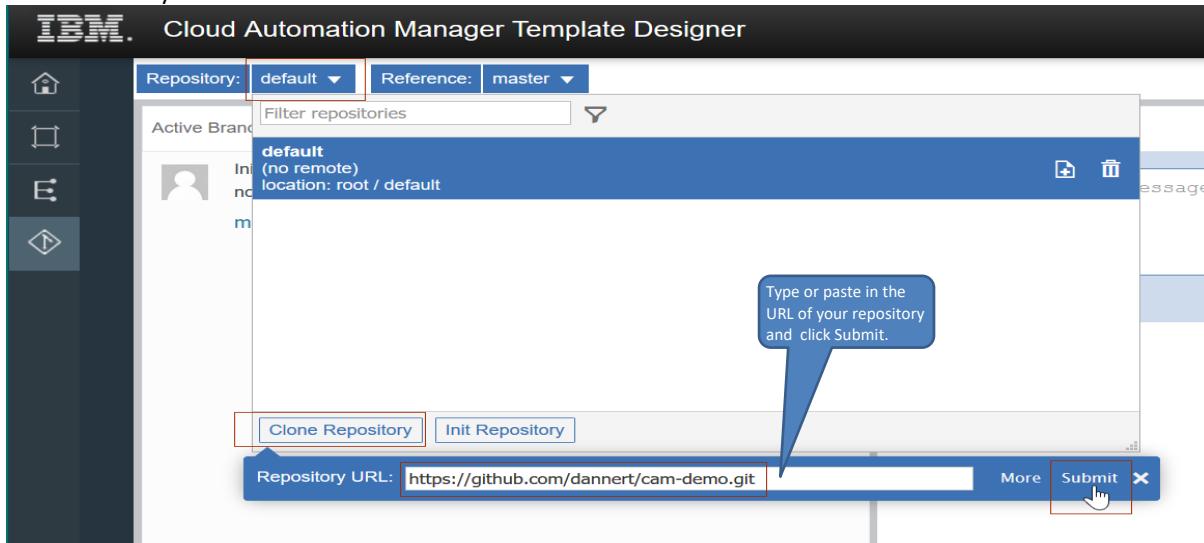
On the Template Designer browser tab, click Repositories (circled below).



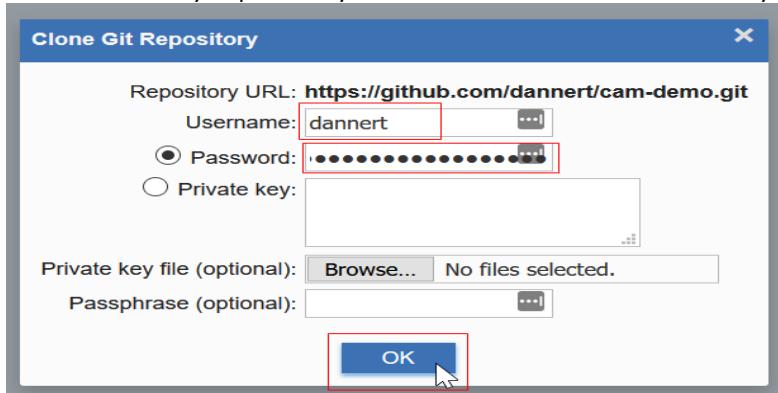
7.5.1 Create Repository

This section assumes that you have already created a Git repository for this project on github.com and have the URL and access token available. For reference see: [Working with GitHub](#) (Section: 10.1)

Click the down arrow next to Repository **default**, then click **Clone Repository**, fill in the GitHub repository URL into the input field and finally click on **Submit**.



After clicking **Submit** the following window pops up. Enter your GitHub user ID into **Username** and, into the **Password** field, the access token you previously created on the GitHub website. Finally click **Ok**.



To set this new repository as the default repository click again onto the “default” drop-down and select the new project as the new default as shown below.

The screenshot shows the Cloud Automation Manager Template Designer interface. On the left is a vertical toolbar with icons for Home, Clone, Edit, and Refresh. The main area has a header "IBM. Cloud Automation Manager Template Designer". Below the header is a "Repository" dropdown menu. A tooltip says: "Click the down arrow next to default and select the newly cloned repository". The dropdown menu lists two repositories: "cam-demo" and "default". "cam-demo" is highlighted with a red box and contains the following details: "git url: https://github.com/dannert/cam-demo.git" and "location: root / cam-demo". "default" contains the details "(no remote)" and "location: root / default". At the bottom of the repository list are "Clone Repository" and "Init Repository" buttons.

Now the Repository shows **cam-demo** as selected. Note that we are referring to the master branch, but you could modify that to a different branch/fork for a project via the Reference field.

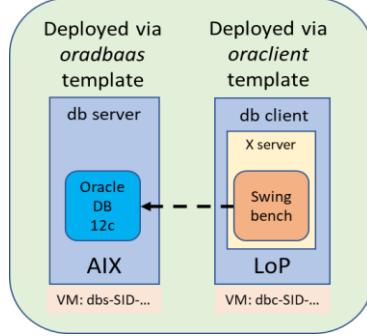
The screenshot shows the Cloud Automation Manager Template Designer interface with the "cam-demo" repository selected. The "Repository" dropdown is highlighted with a red box. The "Reference" dropdown shows "master => origin/master". The main workspace displays the "Active Branch (master)" section, which shows "Working Directory Changes" (Nothing to commit), "Outgoing (0)" (No Changes), "Incoming (0)" (No Changes), and a "History" section with "Initial commit". To the right, there is a "Working Directory Changes" panel with a text input field "Enter the command" and a checkbox "Amend previous commit".

8 Developing our Templates

In this section we describe how to create the two CAM templates used in this project to achieve the following:

- a) Deploy an AIX VM running Oracle Database 12c (dbserver). The Oracle database name (dbname) is entered as an input parameter and used to create the database instance in the deployed VM. This template can be deployed by itself. We will call this template *oradbaas*.
- b) Deploy a Linux on Power VM, set up Oracle Instant Client and the Swingbench load generator in the deployed VM (dbclient). dbclient will wait for dbserver to complete post-deployment customization, which includes the database creation and startup, before loading the Swingbench Order Entry schema into the Oracle database. This template cannot be deployed by itself as it requires input parameters from the deployment of the oradbaas template. We will call this template *oraclient*.

The following graphic illustrates the end state after an orchestrated deployment of both templates via a service.



Note that it is possible to create only one template to deploy both VMs, but that would preclude the re-use of either template in other contexts / services. Separating the deployment into two different templates also allows us to demonstrate how required or dependent data is passed between several template deployments when deployed as an orchestrated service. An example of such required data exchange is the passing of the IP address of the dbserver and the dbname of the Oracle database to the dbclient. Those values are needed by dbclient to be able to successfully connect to the Oracle database on dbserver.

We will only describe the two-template design in this paper.

8.1 *oradbaas* Template Design

In this section we provide the step-by-step instructions on how to create the *oradbaas* template.

8.1.1 *oradbaas* template

The *oradbaas* template relies on the Oracle DBaaS image to be available in PowerVC for deployment. Details on how we created that image can be found in IBM Technical Whitepaper, *Deploying Oracle Database as a Service with IBM Cloud PowerVC Manager 1.3.1*. This image utilizes Openstack Cloud Init and accepts the Oracle database name (dbname) as an input parameter passed to the post-deployment customization scripts that are imbedded in the captured image.

The following provides a quick overview of the key configuration blocks in main.tf. Please find the actual settings used later in this section!

The *oradbaas* template has two key configuration blocks:

- openstack provider, and
- openstack compute resource (openstack_compute_instance_v2).

The **default** openstack provider configuration block in file main.tf contains the following configuration arguments:

```
provider "openstack" {  
    user_name      = "<User id to log on to OpenStack server, e.g. PowerVC>"  
    password      = "<User password>"  
    tenant_name   = "<PowerVC project, usually ibm-default>"  
    domain_name   = "<PowerVC domain, usually Default>"  
    auth_url      = "<Identity authentication URL of OpenStack server>,"  
                    e.g. https://<IP address or hostname of OpenStack server>:5000/v3/>"  
    insecure      = "<Trust self-signed SSL certificates>"  
    version       = "~> 1.2"  
}
```

All but the last two of the arguments are already specified in CAM using the Cloud Connection and therefore only the last two arguments are needed in a CAM template.

The compute resource (`openstack_compute_instance_v2`) requires the following arguments and they were all left as input parameters in our templates.

```
resource "openstack_compute_instance_v2" "<name of compute instance resource>" {
    name      = "<Name of VM>"
    image_name = "<Name of the captured image on PowerVC>"
    flavor_name = "<Name of the OpenStack flavor, or compute template in PowerVC>"
    user_data = "<Special scripts processed by cloud-init. Used here for dbname>"
    network {
        uuid = "<ID of the network in PowerVC to attach to the instance>"
    }
}
```

Notes:

- Use PowerVC GUI or CLI to obtain values for `image_name` / `image ID`: **openstack image list**
- Use PowerVC GUI or CLI to obtain values for `flavor_name` / `flavor ID` (compute templates): **openstack flavor list**
- Use PowerVC CLI to obtain network name / network ID: **openstack network list**

8.1.2 Input and Output Parameters

Template developers should always have re-usability and flexibility in mind when creating a new template. To achieve maximum flexibility for our new template we decided to define all our parameters as template input parameters which could be specified / overridden at deployment time. The table below list the parameters and their meaning for the `oradbaas` template.

Input Parameter	Description
Namespace	This is the ICP / Kubernetes namespace or Red Hat project in which the instance will be deployed.
Instance name	This is the name of the instance being deployed; displayed on the CAM deployed instance screen. Choose any appropriate name.
dbserver_name	This is used to name the PowerVC VM. In our template, we concatenate this parameter to the <code>dbname</code> (from <code>dbserver_user_data</code>), and a timestamp in order to have a name that's unique and one that can be matched with the dbclient VM name. For example, <code>dbs-testdb-<YYMM_hhmmss></code> .
openstack_flavor_name	This is the PowerVC compute template which specifies the compute characteristics of the VM to be deployed. The flavor (OpenStack) or compute template (PowerVC) specifies VM specifications, including number of CPUs, RAM, etc. Alternative option would be to use the flavor id instead.
openstack_image_name	This is the name of the deployable image in PowerVC. Alternative option would be to use image id.
openstack_network_id	This is the network id in OpenStack. Alternatively, we can choose to use network name.
dbserver_user_data	This is used to code cloud-init cloud-config. In this template, we use this to pass the desired Oracle dbname. If not provided, the PowerVC image will take the VM name, truncated to 8 characters.

Note that image name, network name and flavor name can be changed via the GUI in PowerVC and it is therefore typically safer to use the respective ID value instead. For this project we wanted to demonstrate both options.

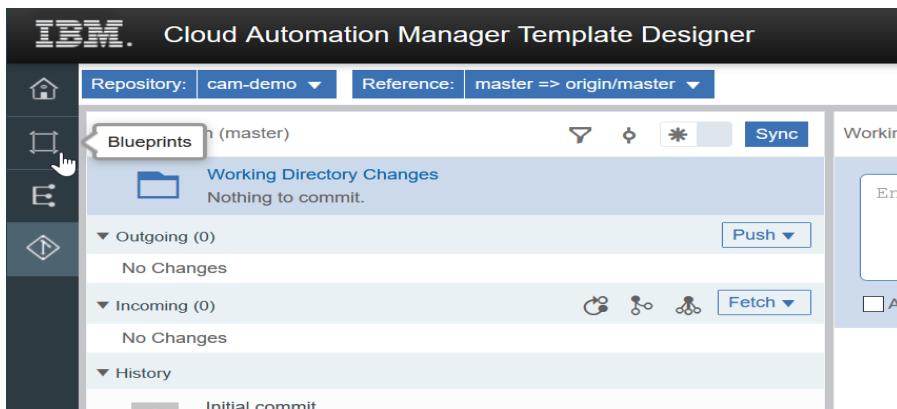
To be able to display deployment related information in the CAM deployment screen, or to make information available to other templates during a service deployment, we defined the following output parameters in this `oradbaas` template.

Output Parameter	Description
dbserver_ipaddr	The IP address of the db server. By not specifying a fixed ip address, the IP address is dynamically assigned by PowerVC from the pool of available IP addresses in the network specified by <code>openstack_network_id</code> input parameter.
dbserver_vm_name	This is the VM name in PowerVC, which is dynamically generated at deploy time based on input parameters and a local timestamp.
dbserver_ts	This output parameter is hidden and used to pass a local timestamp to another template. In our example, we pass the timestamp to <code>oraclient</code> for use in generating the VM name for the <code>oraclient</code> . This approach allows to easily match DB server and client VMs in PowerVC to each other.

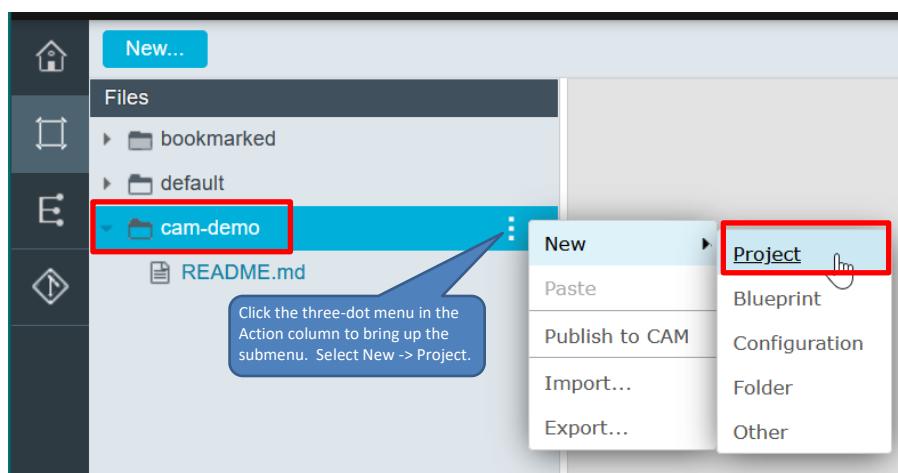
8.1.3 Create oradbaas template

After we prepared Template Designer and defined the input and output parameters we want to use / expose in this template, it is now time to actually create the *oradbaas* template in Template Designer.

In Template Designer click the **Blueprints** icon on the left-hand panel,



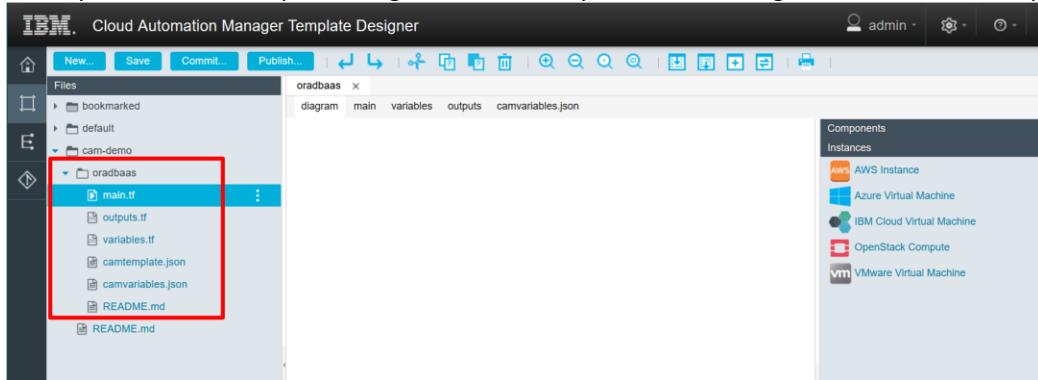
Select the cam-demo repository and click on New -> Project as shown below.



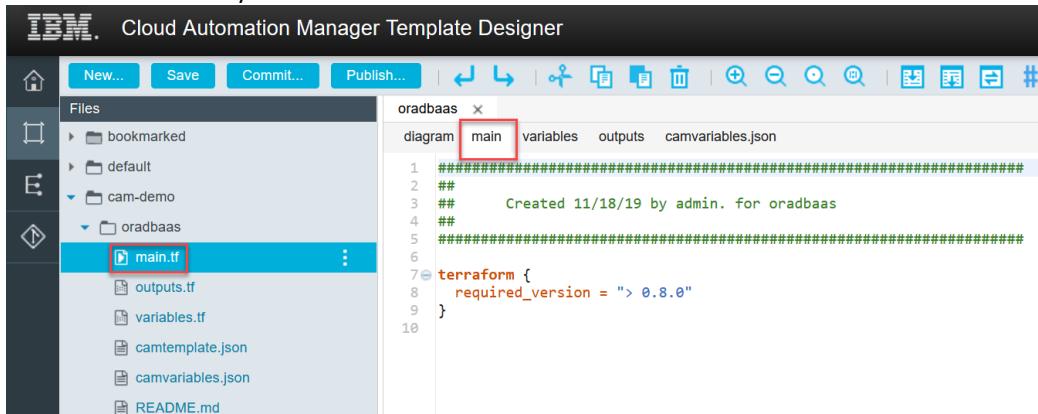
In the pop-up window below, set **Subtype**, **Cloud Provider** and **Name** exactly as shown and then click **Save**.

A screenshot of the "Add Project to cam-demo/" dialog. It has fields for "Subtype" (set to "CAM"), "Cloud Provider" (set to "OpenStack"), and "Name" (set to "oradbaas"). There is also a "Description" text area containing "Created 11/18/19 by admin.". At the bottom are "Save" and "Cancel" buttons, with "Save" highlighted.

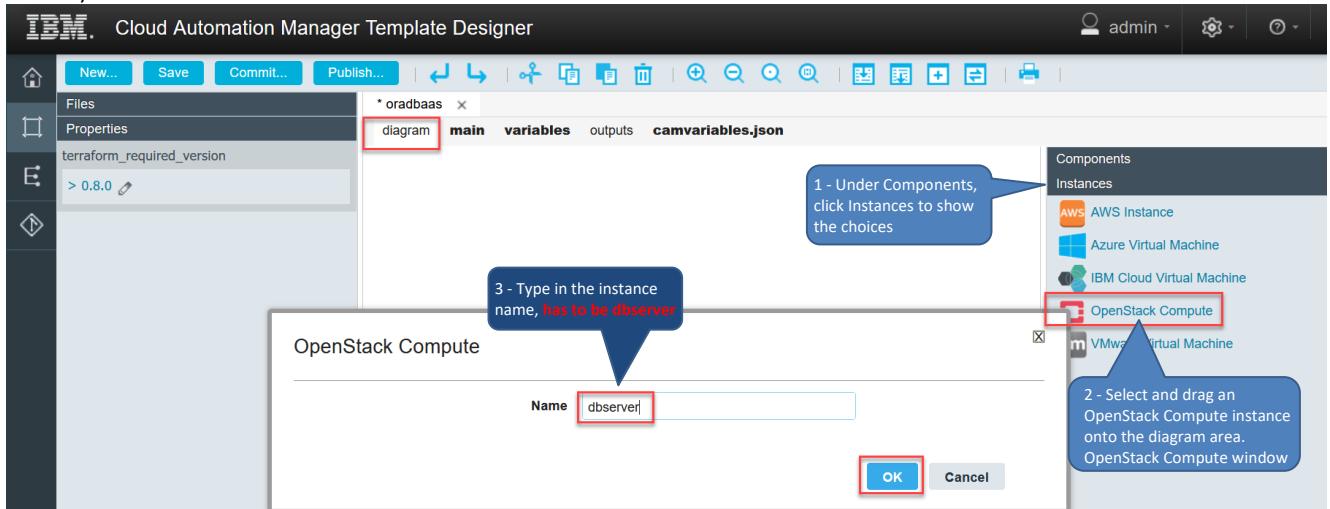
When you click **Save** Template Designer automatically creates a starting set of files for the template.



Select the main.tf entry to select the *oradbaas* template and then the main tab to examine the contents. Note that it's just a framework currently.

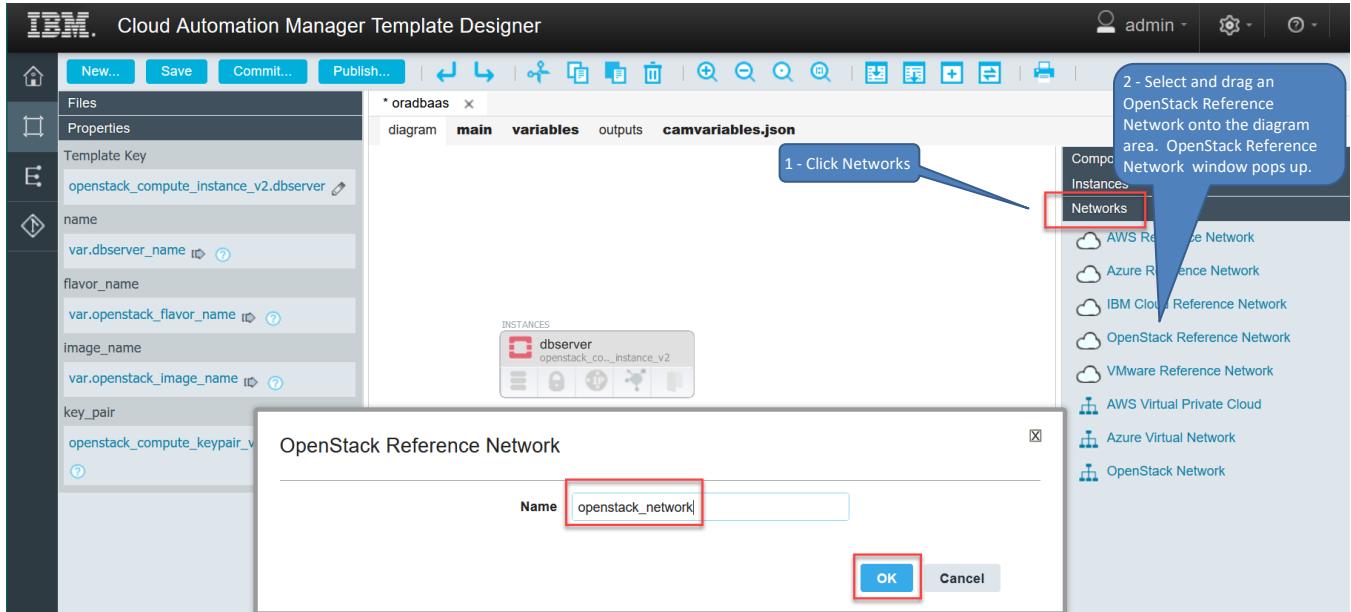


To populate the template with required resources we utilize the drag-and-drop feature provided. Select the diagram tab, select and then drag **OpenStack Compute** instance from the right-hand panel to the empty space in the middle (the canvas).

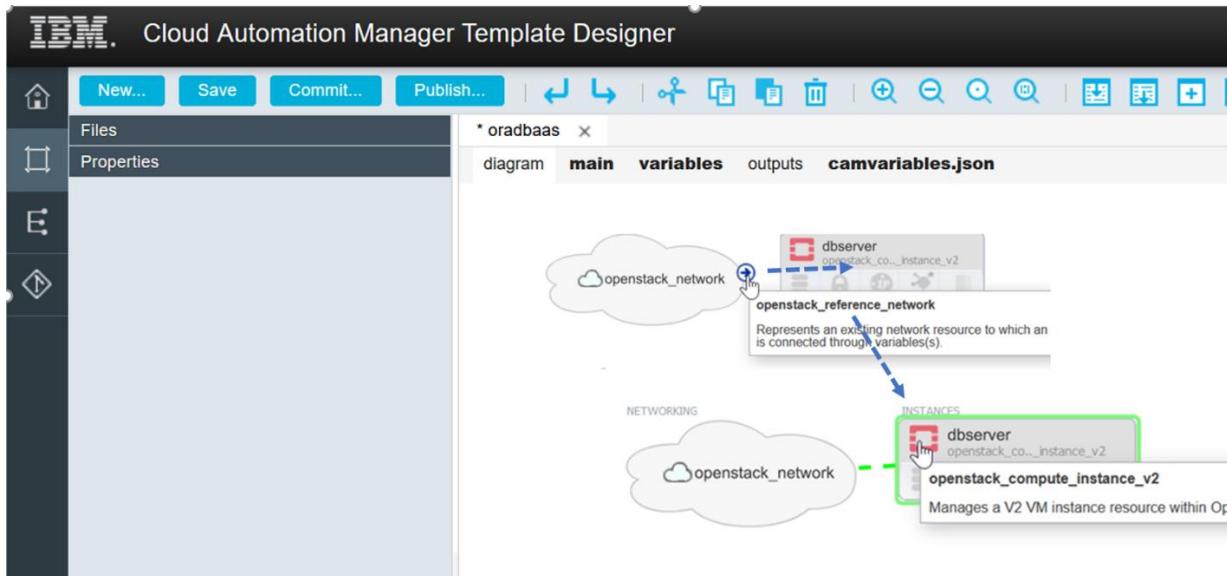


After typing in the OpenStack Compute instance name, **dbserver**, shown in the picture above, click **OK**. Please ensure that you enter the name exactly as shown as otherwise you will not be easily able to utilize the prepared template and service files as shown in the appendix. Note that this instance name becomes part of the generated template variable names, should not include spaces and should be meaningful.

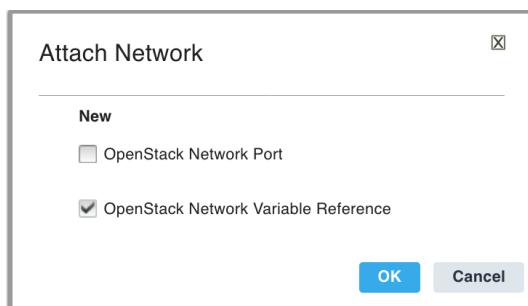
Next, select **Networks** and drag **OpenStack Reference Network**, as shown below, to the canvas. We left the Name unchanged as “openstack_network” and click **OK**.



Next hover your cursor over the **openstack_network** figure and point to the right arrow when it appears (a gloved hand appears, not shown on the screen capture), hold down the left mouse button and drag to the dbserver instance. Move the cursor around until the dbserver instance box's border turns green, as shown below, and then release the mouse button.



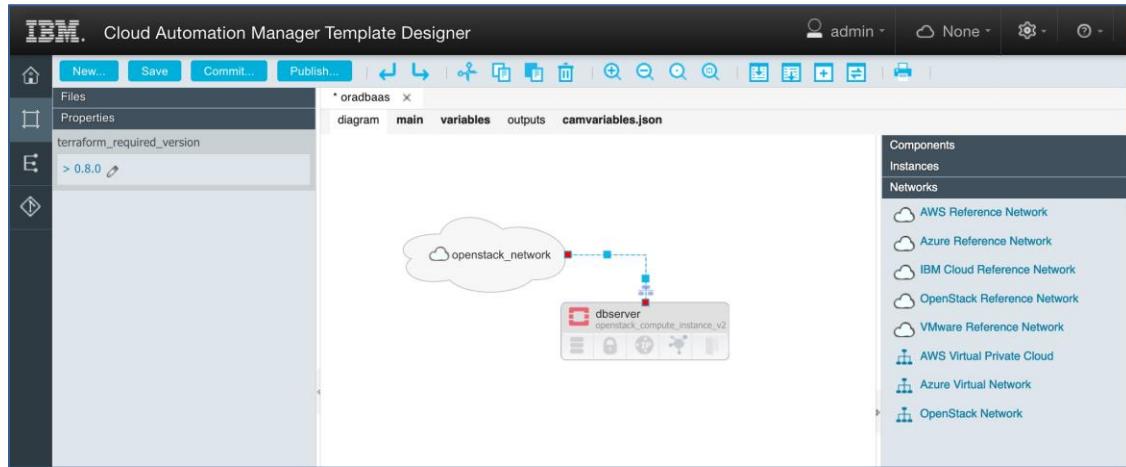
The Attach Network window pops up. **Check OpenStack Network Variable Reference** and click **OK**.



In the next pop-up window, OpenStack Network Variable Reference, set Name to **network** for this exercise. This value becomes part of the automatically generated variable names! Then click OK.



After completing the above steps, the diagram on the canvas looks like this:



At this point Template Designer has updated the files defining this template, three terraform files (*.tf) and two metadata files (*.json).

For more information about the template structure, refer to:

https://www.ibm.com/support/knowledgecenter/en/SS2L37_3.2.1.0/cam_struct_template.html

The next step is to modify these files to suit our specific requirements.

Click the **main** tab and review the terraform code generated by the drag-and-drop of the graphical components.

```
1 #####
2 ##
3 ##      Created 11/18/19 by admin. for oradbaas
4 ##
5 #####
6
7 ## REFERENCE {"openstack_network":{"type": "openstack_reference_network"}}
8
9 terraform {
10   required_version = "> 0.8.0"
11 }
12
13 provider "openstack" {
14   version = "~> 1.2"
15 }
16
17 resource "openstack_compute_instance_v2" "dbserver" {
18   name        = "${var.dbserver_name}"
19   image_name  = "${var.openstack_image_name}"
20   flavor_name = "${var.openstack_flavor_name}"
```

We will first modify the main.tf file. Click the main tab as indicated in the picture above. Note that you can find a copy of the file in the appendix.

File: main.tf

Before

```
## REFERENCE {"openstack_network":{"type": "openstack_reference_network"}}

terraform {
  required_version = "> 0.8.0"
}

provider "openstack" {
  version = "~> 1.2"
}

resource "openstack_compute_instance_v2" "dbserver" {
  name      = "${var.dbserver_name}"
  image_name = "${var.openstack_image_name}"
  flavor_name = "${var.openstack_flavor_name}"
  key_pair = "${openstack_compute_keypair_v2.auth.id}"
  network {
    uuid = "${var.openstack_network_id}"
  }
}

resource "tls_private_key" "ssh" {
  algorithm = "RSA"
}

resource "openstack_compute_keypair_v2" "auth" {
  name = "${var.openstack_key_pair_name}"
  public_key = "${tls_private_key.ssh.public_key_openssh}"
}
```

1

2

2

After

```
## REFERENCE {"openstack_network":{"type": "openstack_reference_network"}}

terraform {
  required_version = "> 0.8.0"
}

provider "openstack" {
  insecure  = true
  version = "~> 1.2"
}

resource "openstack_compute_instance_v2" "dbserver" {
  name      = "${format("${var.dbserver_name}-${var.dbserver_user_data}-${local.local_dbserver_ts}")}"
  image_name = "${var.openstack_image_name}"
  flavor_name = "${var.openstack_flavor_name}"
  user_data = "${format("DBNAME=%s",var.dbserver_user_data)}"
  network {
    uuid = "${var.openstack_network_id}"
  }
}
```

1

4

Notes:

1. This is the VM name in PowerVC. We will append dbserver_user_data and a time stamp to the instance name to make the VM name unique in PowerVC.
 - dbserver_user_data is an input variable used to hold the Oracle dbname
 - the time stamp is calculated in a local variable; see variables.tf.
 - Note that this is all 1 line!
2. Delete tls_private_key and key_pair related statements. These will not be used.
3. Add line to provider stanza.
4. Add user_data to pass cloud-config directives to Openstack cloud-init. Here we pass a text string containing the Oracle Database name (dbname) to the deployed instance in the form “DBNAME=<name>”. The deployed oradbaas image will parse this string to determine the name of the database to create.

Refer to

https://www.terraform.io/docs/providers/openstack/r/compute_instance_v2.html
for further information on the openstack_compute-instance_v2 resource.

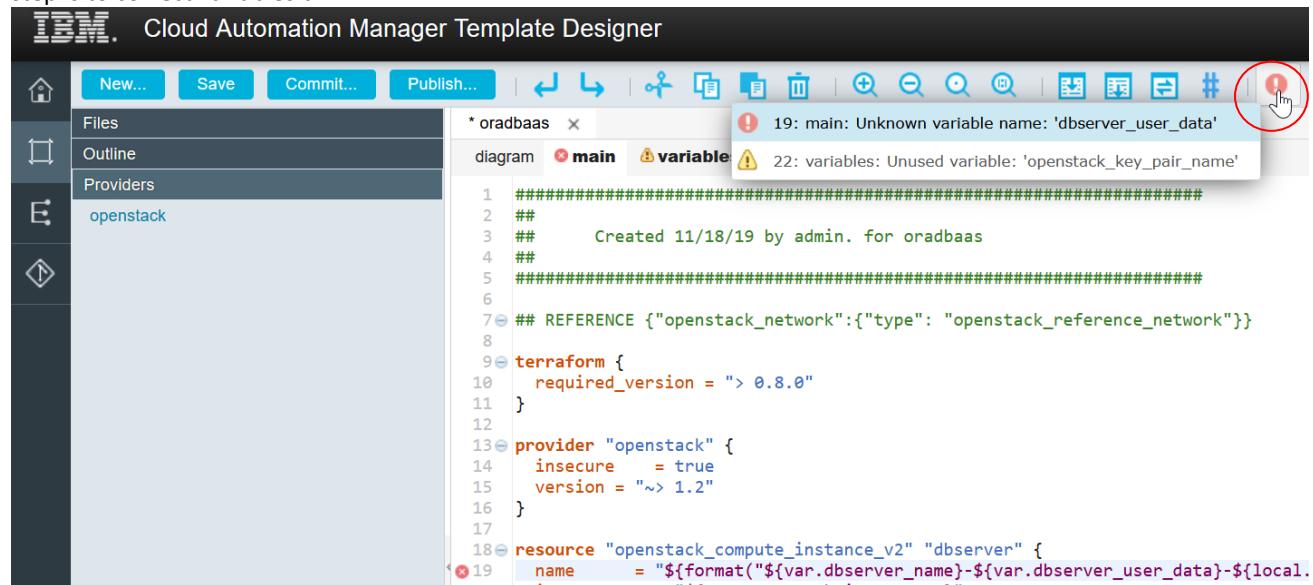
Note that once the above changes are made to main.tf, the Template Designer GUI will indicate errors and warnings as shown below. That is expected!

The screenshot shows a code editor window titled 'oradbaas'. The tabs at the top are 'diagram', 'main' (which is selected), 'variables', 'outputs', and 'camvariables.json'. The code itself is a Terraform script:

```
1 #####  
2 ##  
3 ##      Created 11/18/19 by admin. for oradbaas  
4 ##  
5 #####  
6  
7 ## REFERENCE {"openstack_network":{"type": "openstack_reference_network"} }  
8  
9 terraform {  
10   required_version = "> 0.8.0"  
11 }  
12  
13 provider "openstack" {  
14   insecure     = true  
15   version      = "~> 1.2"  
16 }  
17  
18 resource "openstack_compute_instance_v2" "dbserver" {  
19   main: Unknown variable name: 'dbserver_user_data'  
20   image_name    = "${var.openstack_image_name}"  
21   flavor_name   = "${var.openstack_flavor_name}"  
22   user_data     = "${format("DBNAME=%s", var.dbserver_user_data)}"  
23   network {  
24     uuid = "${var.openstack_network_id}"  
25   }  
26 }  
27
```

A red exclamation mark icon is positioned over the line 'main: Unknown variable name: 'dbserver_user_data''. A tooltip-like box appears, containing the error message '19: main: Unknown variable name: 'dbserver_user_data''.

Hover your pointer over the red exclamation mark symbol as shown below to see all current errors and warnings. The next step is to correct variables.tf.



Click on the **variables** tab and modify the contents as shown below.

File: variables.tf

Before:

```
variable "dbserver_name" {
  type = "string"
  description = "Generated"
}

variable "openstack_image_name" {
  type = "string"
  description = "Generated"
}

variable "openstack_flavor_name" {
  type = "string"
  description = "Generated"
}

variable "openstack_key_pair_name" {
  type = "string"
  description = "Generated"
}

variable "openstack_network_id" {
  type = "string"
  description = "Generated"
}
```

}

1

After:

```
variable "dbserver_name" {
  type = "string"
  description = "db server VM name prefix. Oracle dbname and a timestamp will be appended in the PowerVC VM name."
}
```

2

```
variable "openstack_image_name" {
  type = "string"
  description = "PowerVC image name"
}
```

2

```
variable "openstack_flavor_name" {
  type = "string"
  description = "flavor name, or PowerVC compute template)"
}
```

2

```
variable "openstack_network_id" {
  type = "string"
  description = "Network id in PowerVC"
}
```

2

```
variable "dbserver_user_data" {
  type = "string"
  description = "Oracle DB name"
}
```

3

```
locals {
  local_dbserver_ts =
"${replace(replace(replace(substr(timestamp(),2,17),"-",
",""),"T","_"),":","")}"
}
```

4

Notes:

These are variable definitions used in main.tf and must be declared, removed , and made consistent with what's in main.tf.

1. Deleted. No longer needed since they were deleted in main.tf.
2. Change the descriptions as appropriate.
3. Added. Cloud-init cloud-config. We use this variable to pass the desired Oracle dbname to the deployed PowerVC VM.
4. Added. Local variable used to calculate and hold a timestamp. Our timestamp is formatted to the YYMMDD_hhmmss` format. Note that the content between '{' and '}' is all one line with no line breaks! For information on:
 - local variables:
<https://www.terraform.io/docs/configuration/locals.html>
 - built-in functions (timestamp):
<https://www.terraform.io/docs/configuration/functions.html>

Now switch to the tab **outputs** to modify the file: outputs.tf

The original Template Designer-generated outputs.tf is empty except for a comment block. The following will be added.

File: outputs.tf

```
output "dbserver_ipaddr" {
    value = "${format("%s",join(",",
openstack_compute_instance_v2.dbserver.*.network.0.fixed_ip_v4))}"
}

output "dbserver_vm_name" {
    value = "${format("%s",join(",",
openstack_compute_instance_v2.dbserver.*.name))}"
    description = "VM name in PowerVC"
}

output "dbserver_ts" {
    value = "${format("${local.local_dbserver_ts}")}"
```

1

2

3

Notes:

1. The IP address is assigned by PowerVC and therefore not known until the instance is deployed. This output variable will be populated after the VM is deployed and is used to display the address on the user interface. This output variable is also referenced in the orchestrated service .
2. The VM name is dynamically created at deploy time, including a time stamp, and this variable will store that VM name for display in the user interface.
3. As a stand-alone template, the local timestamp may not be useful. However, we declare it as an output variable in order to have it available as input to the dbclient template deployment. This will be utilized when we create our service which orchestrates the co-deployment of the dbserver and the dbclient.

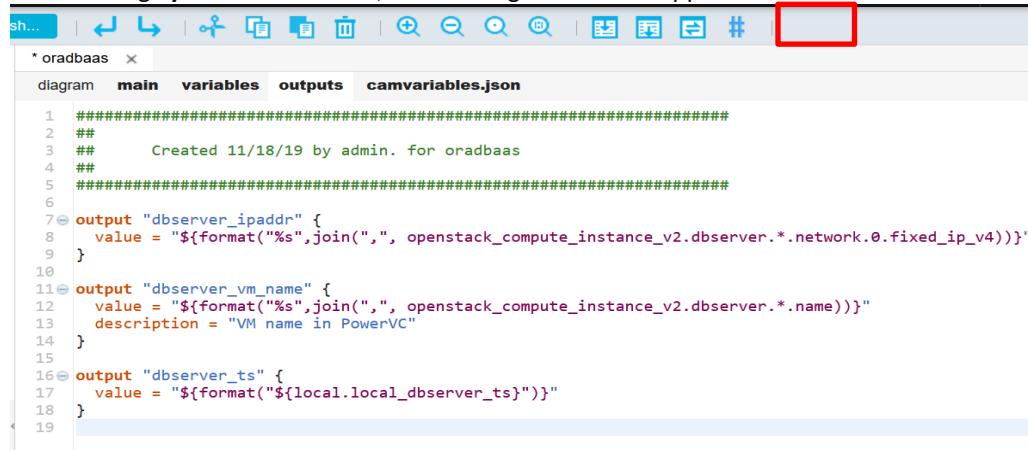
Now the only warning indicator left is against camvariables.json. Click the **Synchronize** or **Save** button to synchronize the configuration.



```
######
## camvariables.json: Synchronize configuration. Missing: dbserver_ipaddr, dbserver_vm_name, dbserver_ts. Unused: openstack_key_pair_name.
## Created 11/18/19 by admin. for oradbaas
#####
7@ output "dbserver_ipaddr" {
8    value = "${format("%s",join(",",
9        openstack_compute_instance_v2.dbserver.*.network.0.fixed_ip_v4)))"
10}
11@ output "dbserver_vm_name" {
12    value = "${format("%s",join(",",
13        openstack_compute_instance_v2.dbserver.*.name)))"
14    description = "VM name in PowerVC"
15}
16@ output "dbserver_ts" {
17    value = "${format("${local.local_dbserver_ts})"}"
18}
```

Synchronize
button

After clicking **Synchronize** or **Save**, the warning indicator disappears.



```
######
## Created 11/18/19 by admin. for oradbaas
##
7@ output "dbserver_ipaddr" {
8    value = "${format("%s",join(",",
9        openstack_compute_instance_v2.dbserver.*.network.0.fixed_ip_v4)))"
10}
11@ output "dbserver_vm_name" {
12    value = "${format("%s",join(",",
13        openstack_compute_instance_v2.dbserver.*.name)))"
14    description = "VM name in PowerVC"
15}
16@ output "dbserver_ts" {
17    value = "${format("${local.local_dbserver_ts})"}"
18}
```

The file Camvariables.json contains metadata that describe what and how variables appear in the CAM user interface. To suit our preferences, we modify **camvariables.json**.

1. Modify the input groups.

Template Designer defined four input_groups and no output_groups. As we don't have many input or output variable we simplified the configuration to a single input and output group each. Note that below shows only the top code section in the file.

Before

```
{
  "input_datatypes": [ ],
  "input_namespaces": [ ],
  "output_namespace": "",
  "input_groups": [
    {
      "name": "Instances-
openstack_compute_instance_v2.dbserver",
      "label": "Instances -
openstack_compute_instance_v2.dbserver"
    },
    {
      "name": "Other",
      "label": "Other"
    },
    {
      "name": "instances",
      "label": "Instances"
    },
    {
      "name":
"openstack_compute_instance_v2_networks",
      "label":
"openstack_compute_instance_v2 Networks"
    }
  ],
  "output_groups": [ ],
}
```

After

```
{
  "input_datatypes": [ ],
  "input_namespaces": [ ],
  "output_namespace": "",
  "input_groups": [
    {
      "name": "Input-parameters",
      "label": "Input parameters"
    }
  ],
  "output_groups": [
    {
      "name": "Output-parameters",
      "label": "Output parameters"
    }
  ],
}
```

2. Next, make the changes shown below to the following variables in each stanza as highlighted:

- group_name,
- label,
- immutable_after_create, and
- for **dbserver_ts** block in the **template_output_params** group, set hidden to true.
- To illustrate default values, I specified RSDtest as default database name in the dbserver_user_data stanza.

When camvariables.json was sync'd earlier, description labels were brought over from those specified in variables.tf. We adjusted them as well to be more descriptive.

```
"template_input_params": [
  {
    "name": "dbserver_name",
    "label": "db server VM name prefix",
    "description": "db server VM name prefix. Oracle dbname and a timestamp will be appended in the PowerVC VM name.",
    "type": "string",
    "default": "",
    "validation": "",
    "group_name": "Input-parameters",
    "required": true,
    "secured": false,
    "hidden": false,
    "immutable": false,
    "immutable_after_create": true
  }
]
```

```

},
{
  "name": "openstack_image_name",
  "label": "OpenStack Image Name",
  "description": "PowerVC image name",
  "type": "string",
  "default": "",
  "validation": "",
  "group_name": "Input-parameters",
  "required": true,
  "secured": false,
  "hidden": false,
  "immutable": false,
  "immutable_after_create": true
},
{
  "name": "openstack_flavor_name",
  "label": "OpenStack Flavor Name",
  "description": "flavor name, or PowerVC compute template",
  "type": "string",
  "default": "",
  "validation": "",
  "group_name": "Input-parameters",
  "required": true,
  "secured": false,
  "hidden": false,
  "immutable": false,
  "immutable_after_create": true
},
{
  "name": "openstack_network_id",
  "label": "OpenStack Network ID",
  "description": "Network id in PowerVC",
  "type": "string",
  "default": "",
  "validation": "",
  "group_name": "Input-parameters",
  "required": true,
  "secured": false,
  "hidden": false,
  "immutable": false,
  "immutable_after_create": true
},
{
  "name": "dbserver_user_data",
  "label": "Oracle dbname",
  "description": "Oracle DB name",
  "type": "string",
  "default": "RSDtest",
  "validation": "",
  "group_name": "Input-parameters",
  "required": true,
  "secured": false,
  "hidden": false,
  "immutable": false,
  "immutable_after_create": true
}
],
"template_output_params": [
{
  "name": "dbserver_ipaddr",
  "label": "dbserver IP address",
  "description": "dbserver IP address",
  "group_name": "Output-parameters",
  "secured": false,
  "hidden": false,
  "shortname": "",
  "type": "string"
},
{

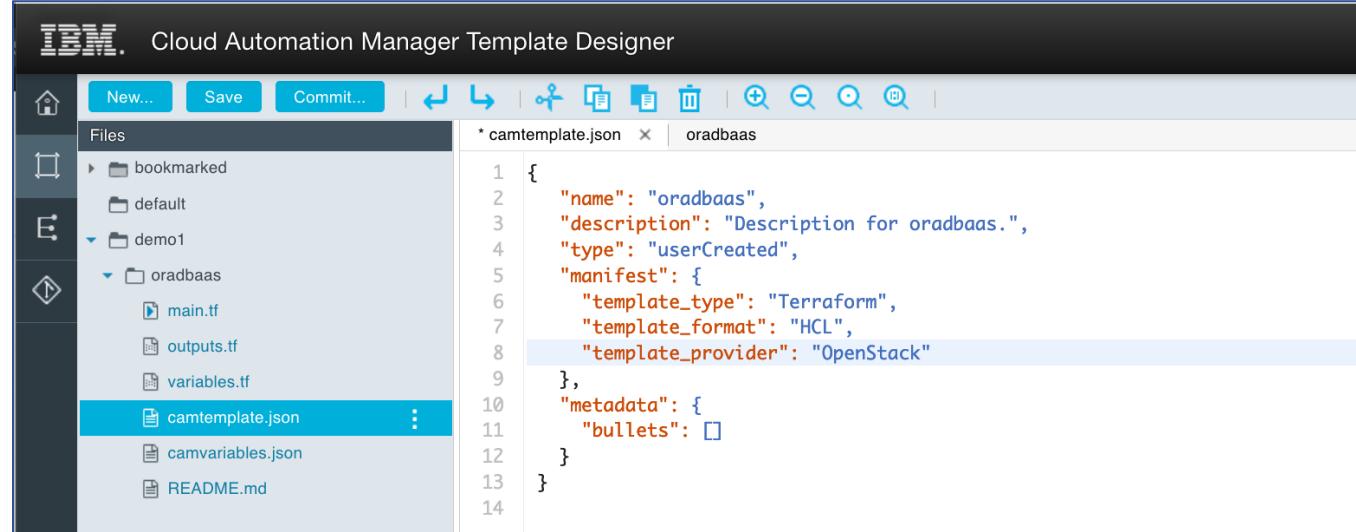
```

```

        "name": "dbserver_vm_name",
        "label": "dbserver VM name",
        "description": "VM name in PowerVC",
        "group_name": "Output-parameters",
        "secured": false,
        "hidden": false,
        "shortname": "",
        "type": "string"
    },
    {
        "name": "dbserver_ts",
        "label": "dbserver ts",
        "description": "internal only - timestamp for output to dbclient",
        "group_name": "Output-parameters",
        "secured": false,
        "hidden": true,
        "shortname": "",
        "type": "string"
    }
]

```

Next, click camtemplate.json under Files and verify that **template_provider** is set to “OpenStack” as shown below.



The screenshot shows the Cloud Automation Manager Template Designer interface. The left sidebar has icons for Home, New, Save, Commit, Undo, Redo, Find, Replace, and Delete. The main area has tabs for Files, Outline, Providers, Variables, Data Sources, and Resources. Under Resources, there are sections for Networking, Instances, and Other. The Instances section contains entries for openstack...k.openstack_network and openstack...nstance_v2.dbserver. The Other section contains local.local_dbserver_ts. The right pane shows the file content for camtemplate.json:

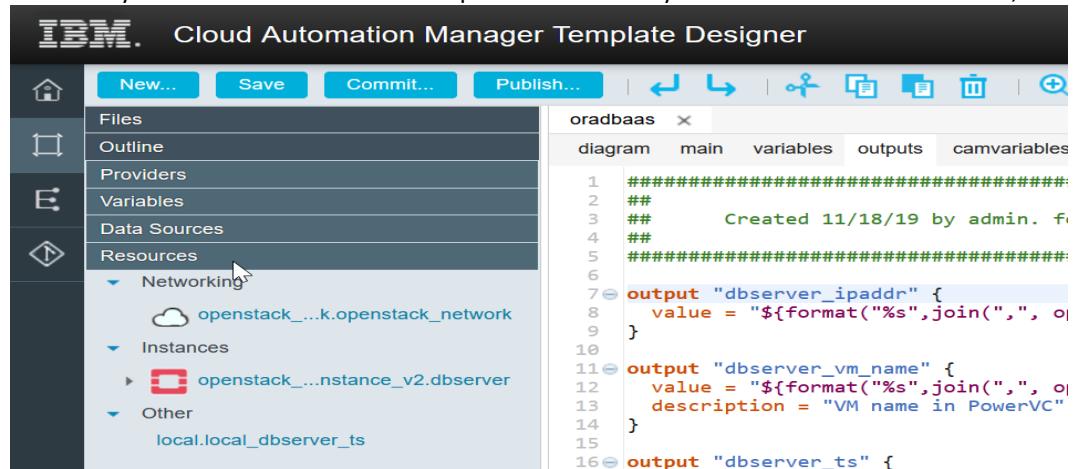
```

* camtemplate.json x | oradbaas
1 {
2     "name": "oradbaas",
3     "description": "Description for oradbaas.",
4     "type": "userCreated",
5     "manifest": {
6         "template_type": "Terraform",
7         "template_format": "HCL",
8         "template_provider": "OpenStack"
9     },
10    "metadata": {
11        "bullets": []
12    }
13}
14

```

Click the **Save** button to save your changes, making sure there are no warning or error indicators.

Note that you can drill down into the template details also by selection criteria like *Providers*, *Variables*, ...



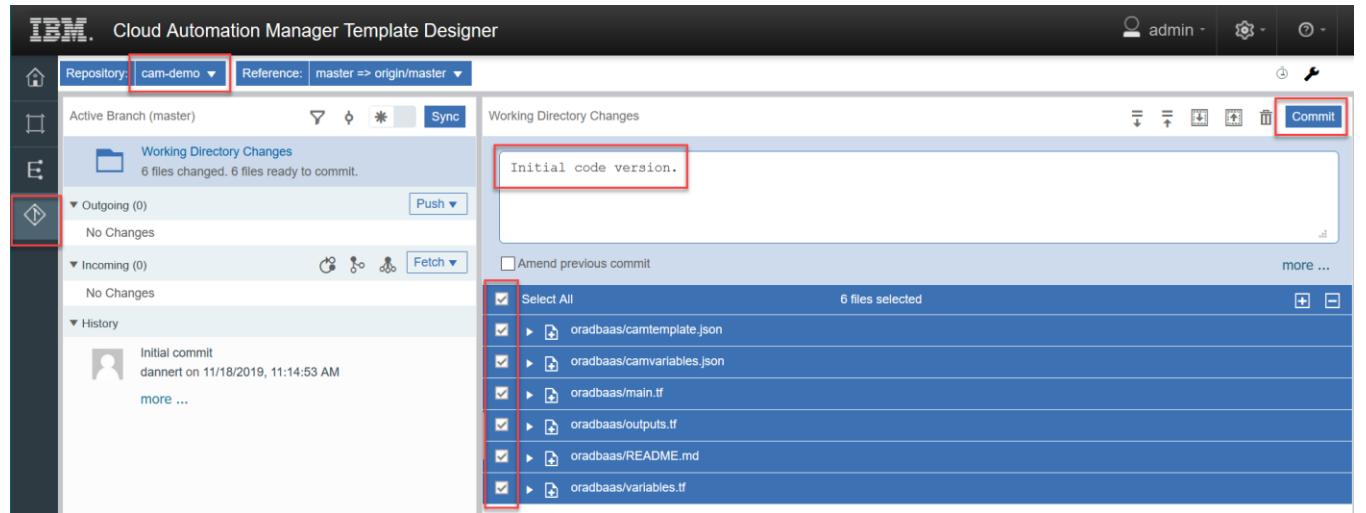
The screenshot shows the Cloud Automation Manager Template Designer interface with the Resources section expanded. The Instances section now includes the entry openstack...nstance_v2.dbserver. The right pane shows the detailed view for the oradbaas provider, specifically the main tab of the camvariables editor:

Diagram	Main	Variables	Outputs	camvariables
##### ##		## Created 11/18/19 by admin. f		##### ##
7@ output "dbserver_ipaddr" {		value = "\${format("%s",join(", ", o)}		
8@ }				
11@ output "dbserver_vm_name" {				
12@ value = "\${format("%s",join(", ", o)}				
13@ description = "VM name in PowerVC"				
14@ }				
16@ output "dbserver_ts" {				

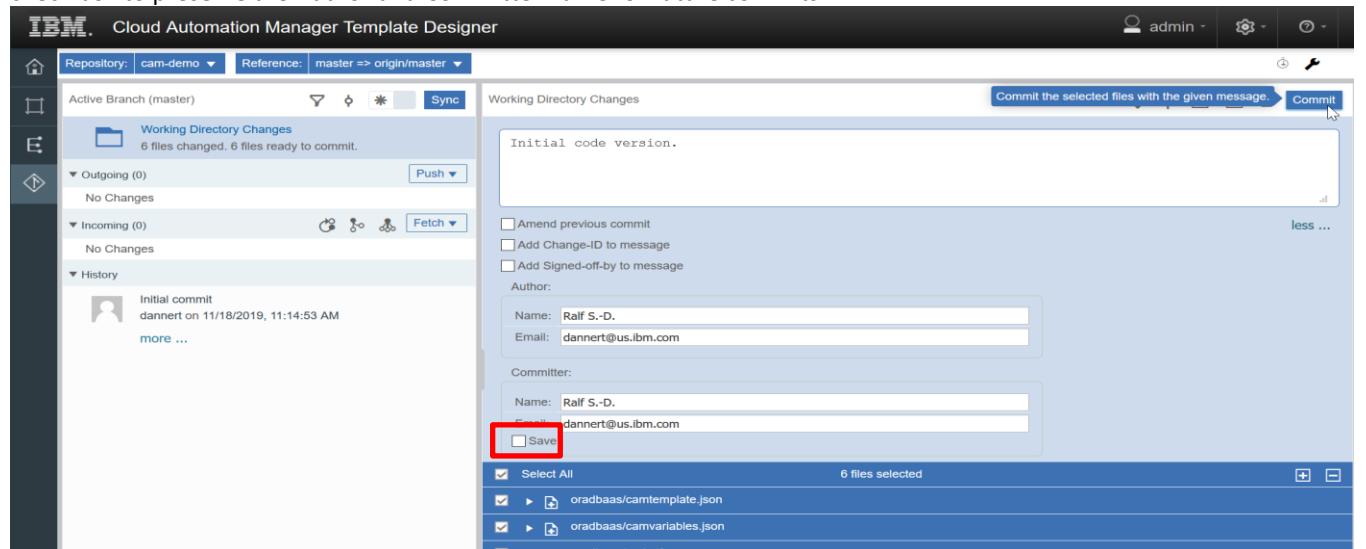
8.1.4 Commit *oradbaas* template to GitHub

After creating and modifying all the files defining the *oradbaas* template we now need to commit all those files back to the GitHub repository.

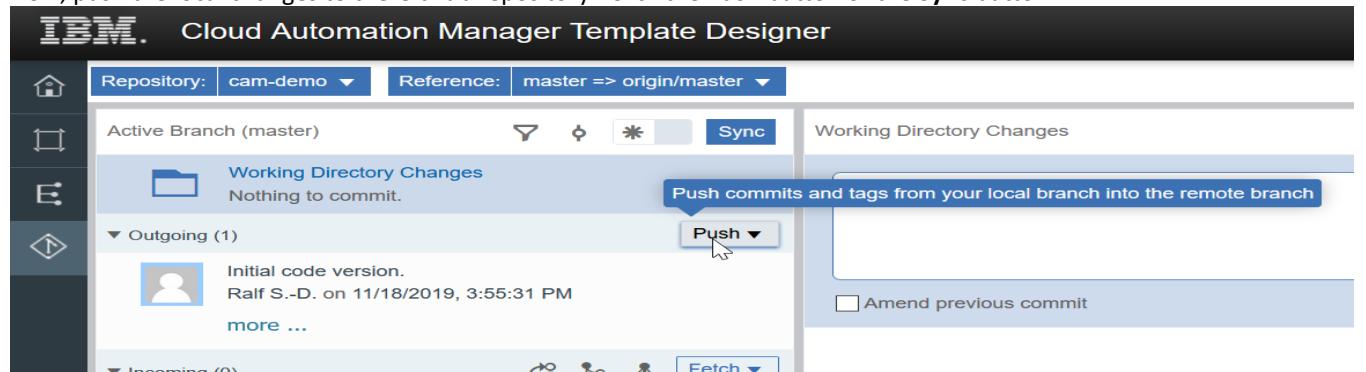
Return to the Repository menu via the lowest icon on the left-hand pane. Ensure the correct repository is selected! Enter a commit description, select all the files via Select All and finally click the Commit button.



Fill in the name and email address of the author and committer, then click the Commit button. You can check the Save check box to preserve the Author and Committer name for future commits.



Now, push the local changes to the GitHub repository. Click the **Push** button or the **Sync** button.



Type in repository user and password. The GitHub token may be entered in the Password field. Click the **Submit** button.

The screenshot shows the Cloud Automation Manager Template Designer interface. At the top, it displays the repository information: Repository: cam-demo and Reference: master => origin/master. In the center, there's a panel titled "Working Directory Changes" which says "Nothing to commit". Below this, under "Outgoing (1)", it shows an initial code version from Ralf S.-D. on 11/18/2019 at 3:55:31 PM. A "Push" button is available. To the right, a modal dialog is open for committing changes, with fields for "User Name" (dannert) and "Password" (redacted). A "Submit" button is highlighted with a cursor. Below the modal, there are "More" and "X" buttons.

Note that the Outgoing section is now empty and the "Initial code" entry is now under History (left hand panel).

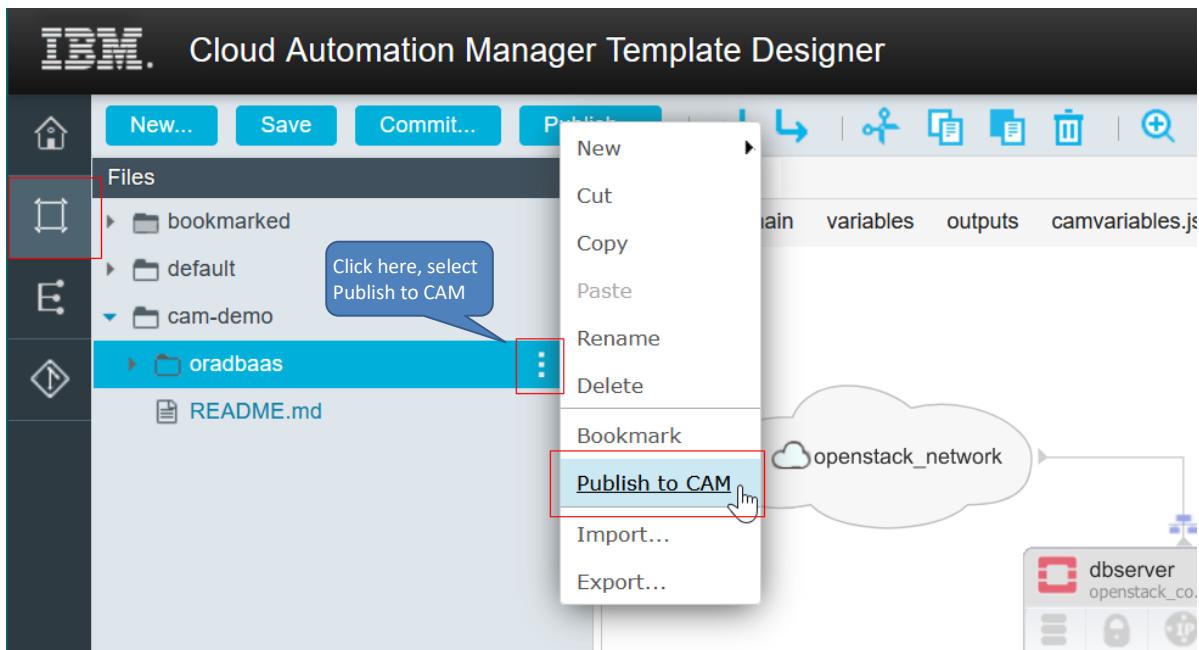
This screenshot shows the same interface after a commit. The "Outgoing (0)" section is highlighted with a red box. Under "History", the initial code version is listed again, with the entire entry (including the user name and date) highlighted with a red box. The "Incoming (0)" and "History" sections also show "No Changes". The "Working Directory Changes" panel remains empty.

8.1.5 Publish the *oradbaas* template to CAM

Return to Blueprints.

The screenshot shows the Cloud Automation Manager Template Designer interface with the "Published" tab selected in the top bar. The left sidebar shows the file structure: "Blueprints" is selected, and the "cam-demo/oradbaas" folder is expanded, showing files like main.tf, outputs.tf, variables.tf, camtemplate.json, camvariables.json, README.md, and README.md. The main workspace shows a diagram where a cloud icon labeled "openstack_network" is connected to a rectangular box labeled "dbserver" with the sub-label "openstack_co..._instance_v2".

Select **oradbaas**, then click the three-dot menu in the Action column. Select **Publish to CAM**.



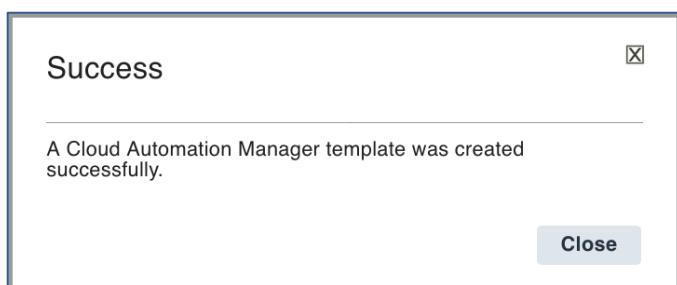
A pop-up window appears. Enter a template name *oradbaas* and the GitHub access token. Click **Save** button.

The form has the following fields:

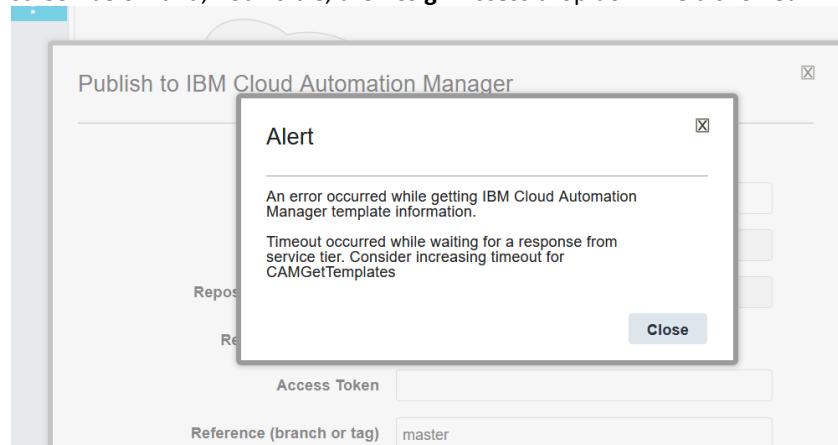
- Assign Access: Globally Accessible
- Template Name *: oradbaas
- Repository URL *: <https://github.com/dannert/cam-demo>
- Repository Sub-directory: oradbaas
- Repository Manager *: GitHub
- Access Token: (redacted)
- Reference (branch or tag): master

Buttons at the bottom: Save (blue) and Cancel.

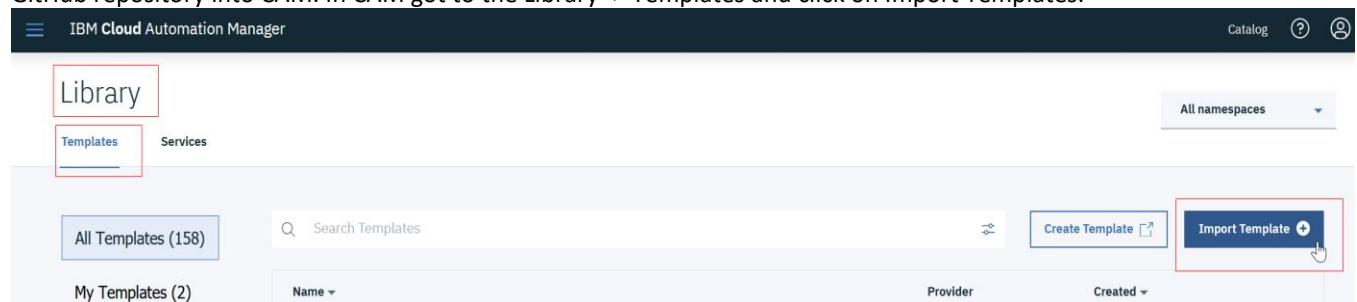
A new pop-up window indicates successful creation of the CAM template.



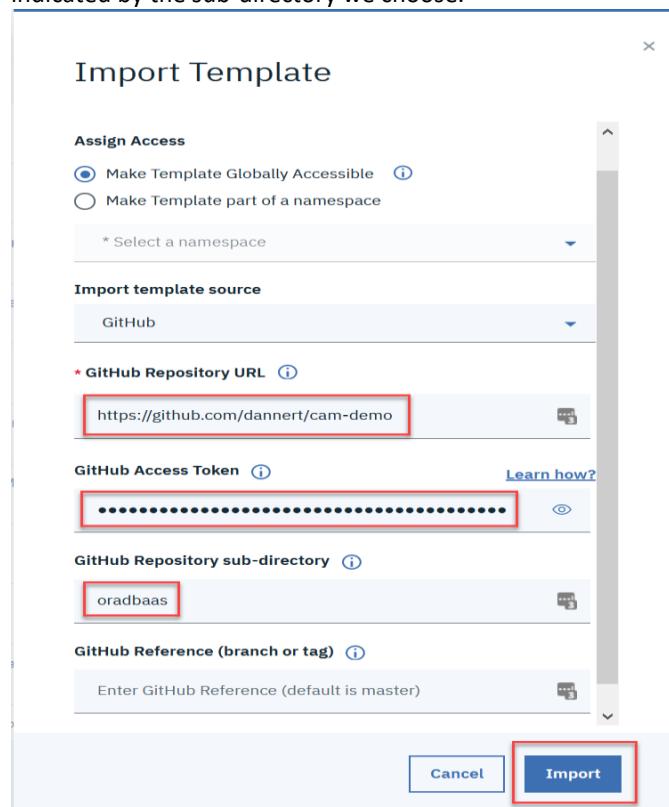
Note: In our testing we ran sporadically into challenges with the “Publish to CAM” functionality and it failed with the error screen below and, not visible, the **Assign Access** drop down field showed ERROR text.



As workaround we utilized instead the **Import Template** functionality in CAM to import the template definition from the GitHub repository into CAM. In CAM got to the Library -> Templates and click on Import Templates.



In the new pop-up window provide the relevant information to access GitHub and select the correct template, *oradbaas*, as indicated by the sub-directory we choose.



After the Publish to CAM or Import Template in CAM go the Template Library.

Note the newly published template, *oradbaas*. (You may need to refresh the browser page to see the new template.)

The screenshot shows the IBM Cloud Automation Manager Library interface. At the top, there's a navigation bar with 'IBM Cloud Automation Manager', 'Catalog', and help icons. Below it is a search bar and a 'Create Template' button. The main area is titled 'Library' with tabs for 'Templates' and 'Services'. A sidebar on the left lists categories: 'All Templates (157)', 'My Templates (1)' (which is highlighted with a red box), 'Middleware (77)', and 'Integration (7)'. The main content area displays a table of templates. The first row in the table has a red box around it, highlighting the 'Name' column which contains 'oradbaas' and the 'Globally Accessible' status. The table also includes columns for 'Provider' (OpenStack) and 'Created' (11/19/2019 10:46 AM). At the bottom of the table, there are pagination controls.

The new template can now be deployed in CAM or be used in a service which can also be published to ICP.

Note: The template Provider shown in the CAM screen above shows **OpenStack**. This value is taken from **template_provider** in **camtemplate.json**. If this does not show Openstack then this can be corrected in CAM by clicking the three-button menu on the right, selecting Edit and changing **Cloud Provider** to OpenStack.

8.2 Deploying the *oradbaas* template

Select the *oradbaas* template, click the menu and select **Deploy** to test the template.

This screenshot is similar to the one above, showing the IBM Cloud Automation Manager Library. The 'My Templates (1)' section is selected. The 'oradbaas' template is listed in the table. A callout bubble points to the three-dot menu icon in the 'Actions' column for the 'oradbaas' entry. A tooltip says: 'Click the three-dot menu in the Actions column and select Deploy'. A red box highlights the 'Deploy' option in the dropdown menu, which is also highlighted with a red box.

Selecting Deploy brings up the screen below. To start the actual deploy click on the **Deploy** button.

This screenshot shows the detailed view of the 'oradbaas' template. At the top, there's a back arrow labeled '← Template Library' and the template name 'oradbaas'. There are 'Edit' and '...' buttons. Below this is a navigation bar with 'Overview', 'Template Source', and 'Parameters'. The 'Overview' tab is selected. It displays information like Author (IBM), Type (Terraform), Assigned Access (Globally Accessible), Created (11/19/2019 10:46 AM), Cloud (OpenStack), and Version (master). The URL is listed as <https://github.com/dannert/cam-demo/tree/master/oradbaas>. A note says: 'To clone the template click the Git repository link, clone the repository and then create a template with the new repository information.' Below this is a 'Features' section which states: 'This Template has no features. To add a feature you can [edit the template](#)'. At the bottom right, there's a large blue 'Deploy' button with a red border.

On the Deploy a Template screen, select the Namespace, e.g. default.

Once Namespace is selected, other input parameters appear as shown on the screen below. Type in an **Instance Name**, e.g. demotest. This name is what will be listed under Deployed Instances in CAM.

Note that our Cloud Connection, PowerVCDev has been filled in already (it's the only OpenStack connection we've defined).

The screenshot shows the 'Deploy a Template' interface. On the left, the template 'oradbaas' is listed with its details: AUTHOR: IBM, TYPE: Terraform, ASSIGNED ACCESS: Globally Accessible, CREATED: 08/30/2019 12:01 PM, CLOUD: OpenStack, VERSION: master. The main area shows three steps: 1. Select a Namespace (with 'default' selected), 2. Enter Instance Name (with 'demotest' entered), and 3. Select a Cloud Connection (with 'PowerVCDev' selected). At the bottom are 'Cancel' and 'Deploy' buttons.

Type in the Input Parameters as shown below.

Note:

- All our template inputs are grouped under **Input Parameters**, which is our one input group defined in camvariables.json.
- In this example, only the Oracle dbname field had a default value set – RSDtest – and therefore all other input parameters show as “”. Note that you can overwrite the specified default value as you can see below. For a real production environment, it probably would make sense to set default values for the other input fields as well. If desired, this can be done in the camvariables.json file.
- Image name, flavor name and network ID can be determined via PowerVC gui or CLI command - openstack {image| flavor|network} list.

This screenshot shows the '4. Input parameters' step. It lists five input fields:

- * db server VM name prefix: dbs (highlighted with a red box)
- * Openstack Image Name: DBaaSv3_Ora_SSD (highlighted with a red box)
- * Openstack Flavor Name: ora_dbaaS
- * Openstack Network Id: 464aceff-141d-453d-a40b-7008d9c06614 (highlighted with a red box)
- * Observer User Data: testdb

Callouts with blue boxes point to specific fields:

- 'PowerVC Compute template' points to the db prefix field.
- 'PowerVC Image name' points to the image name field.
- 'PowerVC Network ID' points to the network ID field.
- 'Oracle dbname' points to the observer user data field.

At the bottom are 'Cancel' and 'Deploy' buttons.

Click the **Deploy** button to deploy the template.

After clicking Deploy the following screen is displayed where you can observe the status of the deploy. Note the “In Progress” in the top left.

The screenshot shows the 'Deployed Instances' page for a deployment named 'demotest'. The status is 'In Progress' (highlighted with a red box). The 'Template File' section shows 'oradbaas' and a 'View Git URL' button. The 'Instance Details' section lists the following information:

NAMESPACE	default
TEMPLATE	Terraform
TEMPLATE VERSION	master
CLOUD	OpenStack
CLOUD CONNECTION	PowerVCDev
CREATION TIME	11/19/2019 12:07 PM
OUTPUT DATA TYPE	

The 'Activity' section shows 'All(0)' under the 'In Progress' tab. A 'Resource Details' section is partially visible at the bottom.

After the deploy is complete the status changes to Ready and VM related details are all populated.

The screenshot shows the 'Deployed Instances' page for the same deployment 'demotest', now in 'Ready' status (highlighted with a red box). The 'Template File' section shows 'oradbaas' and a 'View Git URL' button. The 'Instance Details' section lists the same information as before, with the addition of 'OUTPUT DATA TYPE'. The 'Activity' section shows 'All(1)' under the 'Deployment Successful' tab, with a log entry: 'Deployment Successful 11/19/2019 12:07 PM' and a 'View Log' link. A 'Resource Details' section is present, showing one resource: 'openstack_compute_instance_v2.db...' with 'Console' (https://...), 'IP Address' (redacted), 'Created' (11/19/2019 12:07PM), and 'State' (Running). The 'Input Variables' section is shown at the bottom, listing variables like 'db server VM name prefix', 'Openstack Image Name', 'Openstack Flavor Name', 'Openstack Network Id', and 'Dbserver User Data'.

To see the populated output variables, we specified in the “output parameters” section of the camvariables.json file of the *oradbaas* template, click **Output Variables**.

Note that the “hidden” output parameter, as expected, is not displayed. The VM image name was correctly constructed as specified.

The screenshot shows the CloudBees CI interface. At the top, there's a table titled "Resource Details" with columns: Name, Console, IP Address, and Created. One row is listed: "openstack_compute_instance_v2.db..." with "https://129.***.***.***" in the Console column, and "11/19/2019 12:07PM" in the Created column. Below this is a message "Resources per page 10 ▾ | 1-1 of 1 Resources".

Below the resources table is another table titled "Output Variables" with columns: Name and Value. Two rows are listed: "dbserver IP address" and "dbserver VM name". The "dbserver VM name" row has its value "dbs-testdb-191119_180801" highlighted with a red box. Below this table is a message "Output Variables per page 10 ▾ | 1-2 of 2 Output Variables".

On PowerVC, use the dbname or timestamp to filter the list of Virtual Machines.

The screenshot shows the IBM PowerVC interface. At the top, there's a navigation bar with tabs: IBM PowerVC, Configuration, Messages, DRO Events, Requests, and a user dropdown. Below the navigation bar is a search bar with the text "testdb" highlighted with a red box. The main area is titled "Virtual Machines" and shows a list of 19 items. A filter bar above the list shows "1 of 55 items shown. Clear filter". The list table has columns: Name, Host, IP, State, Health, Owner, Expiration Date, and Task. The first item in the list, "dbs-testdb-191119_180801", is also highlighted with a red box.

8.3 *oraclient* Template Design

The *oraclient* template deploys a VM running Linux on Power. The PowerVC deployment image contains RedHat Linux, configured with graphical user interface, VNC client and NFS client software, but there are no post-deployment scripts, or oracle / swingbench related software included in that image.

Important: This template is written to be co-deployed with the *oradbaas* template as it expects values like DB server IP and database name as parameter which are the result of a successful deploy of the *oradbaas* template.

This template illustrates how you can inject scripts, via cloud-init cloud-config, into a VM at deploy time and the use of a known NFS export to access required additional software to be installed via the injected post-processing scripts. This approach is very flexible as it does not need the creation of a new image in PowerVC every time a post-deployment script needs to be changed. The availability of the NFS server to stage the software is, of course, critical at deploy time.

In contrast, the PowerVC image used in the *oradbaas* template deployment included the oracle database software and several post-processing scripts to configure, create and start the oracle database at VM deployment. Cloud-init user data was only used to provide simple parameters like the Oracle database name to the post-deployment scripts.

Note: All template files for the *oraclient* template are available in the appendix of this document.

8.3.1 *oraclient* template

As mentioned above, the PowerVC deployment image does not include any client-specific post-deployment customization processing. Post-deployment performed by *oraclient* is done using cloud-init cloud-config which injects the following files into the deployed VM and executes several additional shell commands at deployment.

- Inject four script files using the `write_files` configuration statement. These four files are:
 - `dbserver.cfg` - contains export statements to set environment variables
 - `sbsetup.sh` - shell script to check availability of the database, then load the Swingbench Order Entry schema using Swingbench's oewizard in silent mode (non-GUI).
 - `dropsoe.sh` - shell script to drop the Swingbench Order Entry. Invokes the oewizard Java program in silent mode.
 - `startsb.sh` - shell script to start the Swingbench GUI load generator. This is intended to be invoked in the VNC viewer.
- run shell commands to do the following:
 - restart (reset) vncserver
 - mount an NFS drive and copy Oracle Instant Client and Swingbench software to local filesystem
 - add Oracle Instant Client binary path to root user's PATH in `.bash_profile`
 - wait for *oradbaas* deploy to complete post-deployment and load the Swingbench Order Entry schema by running `sbsetup.sh`

8.3.2 Input and Output parameters

oraclient template input parameters:

Input Parameter	Description
Namespace	This is the ICP namespace or Red Hat Openshift project name in which the instance will be deployed.
Instance name	This is the name of the instance being deployed; displayed on the CAM deployed instance screen. Choose any appropriate name.
dbclient_name	This is used to name the PowerVC VM. In our template, we concatenate this parameter to the dbname (<code>dbserver_user_data</code>), and a timestamp in order to have a unique name that can be matched up to the dbclient VM. For example, <code>dbc-testdb-<YYMM_hhmmss></code> .
openstack_image_name	This is the PowerVC Compute template which specifies the compute characteristics of the VM to be deployed. The flavor (OpenStack) or compute template (PowerVC) specifies VM specifications, including number of CPUs, RAM, etc. Alternative option would be to use the flavor id instead.
openstack_flavor_name	This is the name of the deployable image in PowerVC. Alternative option would be to use image id.
openstack_network_name	This is the network name in OpenStack. Note that we'd typically use the network ID but also wanted to show the use of network name in this example.
dbserver_user_data	This parameter will be linked to <i>oradbaas</i> ' input parameter of the same name, which is used for the Oracle dbname. The dbname is needed for the connect string to the Oracle database, and it is also needed to build the VM name. See <code>dbclient_name</code> above.
dbserver_ipaddr	<code>dbserver_ipaddr</code> is assigned by PowerVC, therefore is not known at deployment request time. <code>dbserver_ipaddr</code> is obtained as input from the <i>oradbaas</i> output variable.
dbserver_ts	This is used to accept <i>oradbaas</i> ' output parameter of the same name. See <i>oradbaas</i> output parameter above.

oraclient template output parameters are for display on the CAM deployed instance screen:

Output Parameter	Description
<code>dbclient_ipaddr</code>	IP address of the dbclient VM, needed for user/requester access.
<code>dbclient_vm_name</code>	dbclient VM name in PowerVC, useful for verification and troubleshooting.
<code>dbserver_connect</code>	Oracle jdbc connect string. Used by the Swingbench load generator to connect to the database.
<code>dbclient_vnc</code>	Host and display information for access using VNC viewer.

8.3.3 Create *oraclient* template

In this section we provide only the critical steps to create the *oraclient* template. The contents of the template files can be found in section 10.3, *oraclient* Template files, and can be copied / pasted into the correct locations in Template Designer.

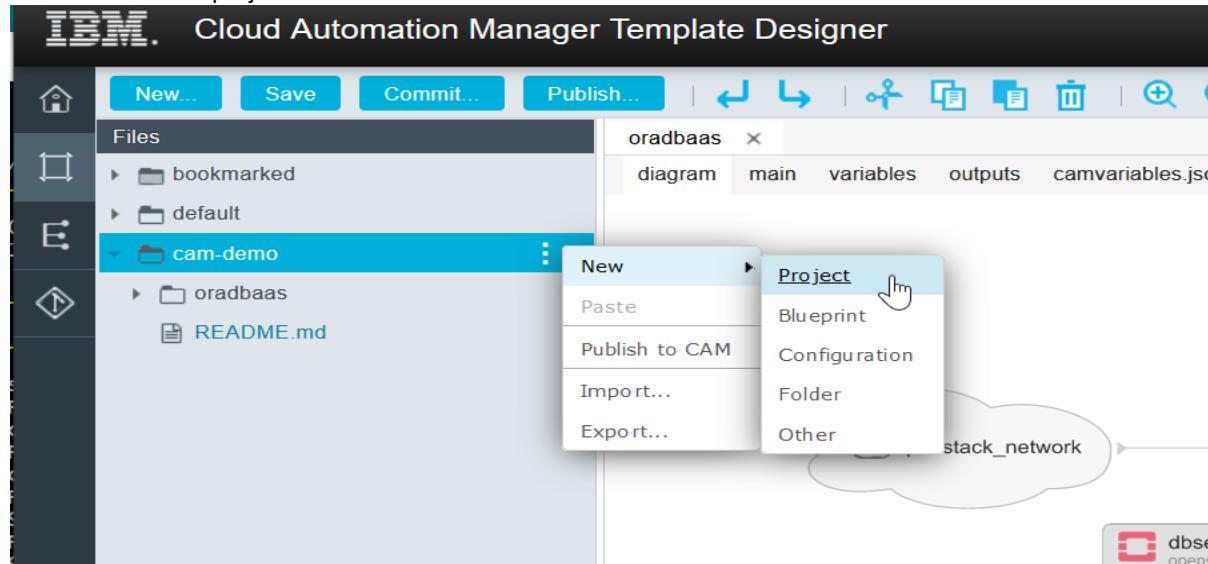
It is important to closely look at the main.tf file and understand how the file injection is specified in the openstack compute instance resource definition.

Here a sample snippet which, at deploy time, creates the file "dbserver.cfg" in the directory /root within the VM.

```
#cloud-config
write_files:
- content: |
  # dbserver parameters
  ${format("export DBNAME=%s",var.dbserver_user_data)}
  ${format("export DBSERVERIPADDR=%s",var.dbserver_ipaddr)}
  export ORASYSPW=oracle
  export SWINGBENCHBINDIR=/opt/swingbench/bin
  path: /root/dbserver.cfg
```

Note how the content of the file is dynamically generated at deploy time based on the values of input parameters derived from the output of the *oradbaas* template deploy step. The parameter transfer between the *oradbaas* and *oraclient* templates is discussed in more detail in section 9, Developing our Service.

To create the *oraclient* template, we go back to the Template Designer, select Blueprints, our cam-demo repository and then create a new project as shown below.

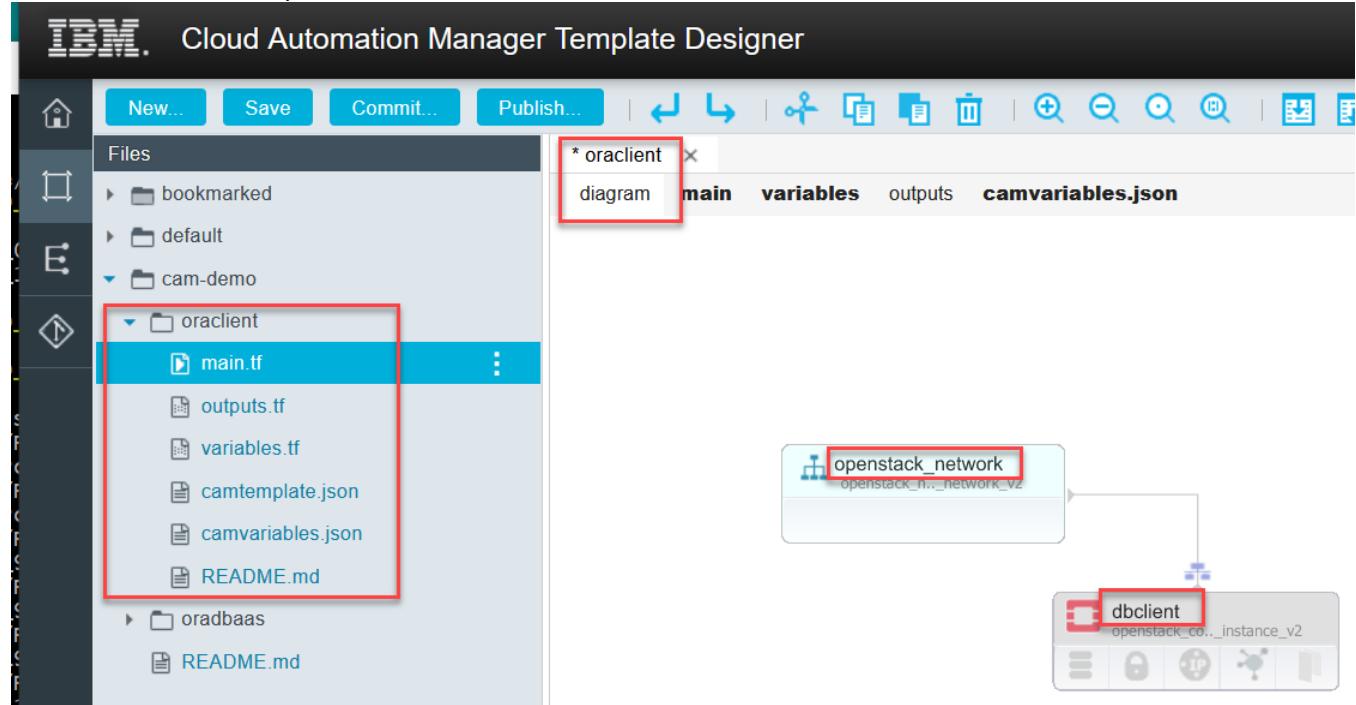


We complete the Add Project screen as shown below and then click Save.

A screenshot of the 'Add Project to cam-demo/' dialog box. It has fields for 'Subtype *' (set to 'CAM'), 'Cloud Provider *' (set to 'OpenStack'), 'Name *' (set to 'oraclient'), and a 'Description' text area containing 'Created 11/19/19 by admin.'. At the bottom are 'Save' and 'Cancel' buttons, with 'Save' being highlighted with a mouse cursor.

Similar to the steps performed when creating the *oradbaas template*, we then switch to the diagram view and create an openstack instance, openstack network and connect the two. Note the names we used for the openstack network

"network" and the openstack instance "dbclient". Those names are referenced in the variable names in the template files and need to be set exactly as mentioned.



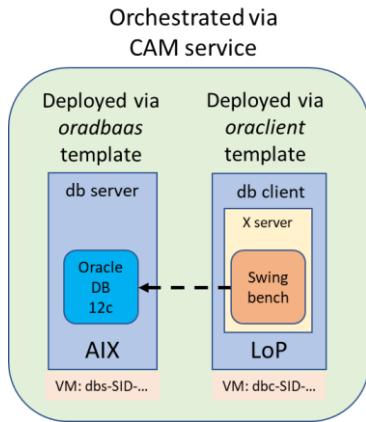
We then copied the respective code from section 10.3 in the appendix into the respective files and finally committed the new project to the GitHub repository. GitHub now shows a new sub-directory for *oraclient* with the respective template files:

The screenshot shows a GitHub repository page for 'dannert / cam-demo'. A red box highlights the 'cam-demo / oraclient /' path in the sidebar. The main area shows the contents of the 'oraclient' directory: 'README.md', 'camtemplate.json', 'camvariables.json', 'main.tf', 'outputs.tf', and 'variables.tf'. Each file has a brief description next to it. The 'camvariables.json' file is highlighted with a red box.

As the last step we published the *oraclient* template to CAM. For the required steps refer to the section *oradbaas* template.

9 Developing our Service

In this section we describe how to create a service to deploy the *oradbaas* and *oraclient* templates in an orchestrated fashion. In the end state, after the service has been deployed by the end user, the requester will be able to access the dbclient VM using VNC viewer and run Swingbench's Order Entry load generator against the database server.



9.1 Service Design

Use CAM Service Composer to create the service to deploy the *oradbaas* and *oraclient* templates together. To minimize the number of parameters an end-user must fill in, we specify most of the input parameters required for the *oradbaas* and *oraclient* templates in the service definition. This includes for example image and flavor names as well as network id and leaves only the Oracle database name as input parameter for the deployer of the service.

Input Parameter	Description
dbserver_user_data	Oracle dbname. This is linked to the oradbaas input parameter.

Create service output parameters for display on the deployed service screen.

Output Parameter	Description
dbserver_ipaddr	dbserver IP address
dbserver_vm_name	dbserver VM (in PowerVC) name. Expected value <prefix>-<dbname>-<timestamp>
dbclient_ipaddr	dbclient IP address
dbclient_vm_name	dbclient VM (in PowerVC) name. See dbserver_vm_name.
ora_dbname	Oracle database dbname.
oradb_connect	Oracle database connect string (jdbc). Expected value - //<ipaddress>/<dbname>
dbclient_vnc_addr	VNC host and display information. Expected value - <ipaddress>:<display#>.

9.2 Creating the Service

The Service Composer, part of the CAM Service library, enables the authoring of Cloud Automation Manager services. After Cloud Automation Manager templates are created, administrators can use the Service Composer to create a service, consisting of CAM templates or Kubernetes Helm charts from IBM Cloud Private, based on a designed sequence or decision.

9.2.1 Create Service

Invoke the Service Composer from the Service Library. Access the Service Library by clicking the hamburger menu and select Library->Services.

On the Service Library screen, click the **Create Service** button.

Library

All namespaces

Services

Name	Status	Created
Multi Cloud - MEAN Stack deployment	Draft	11/14/2019 11:34 AM

Create Service +

On the Create New Service window, enter the Service name and add a category or pick one from the drop-down list. We created a new category in our example.

Create New Service

* indicates required field

Assign Access

Make this service Globally Accessible i

Make this service part of namespace

* Select Namespace

* Service Name i

Oracle 12C on AIX with Swingbench Client on LoP

Add a category

WSC cam demo

Select from List

Create

Optionally, enter a short and long description. You may also change the icon here if desired.

Service Library

Oracle 12c on AIX with Swingbench Client on LoP

Overview Composition Parameters Plans & Form Source Code

Save Publish

Quick Overview

Tip: Changes made in Composition view may also be performed in Source Code view

* indicates required field

* Name i

Oracle 12c on AIX with Swingbench Client on LoP

Short Description

Deploys an AIX VM running Oracle 12c and a Linux on Power VM with Oracle Instant Client and Swingbench

Long Description

Enter long description here

Tags System Tags

Select Icon

Select an icon to represent your service Change icon

Assigned Access

Globally Accessible i

You can duplicate a service and re-assign its access.

Assign Categories

Categories are used to group your services in the Service Library, they also appear in this category when published to ICP.

Click Composition.

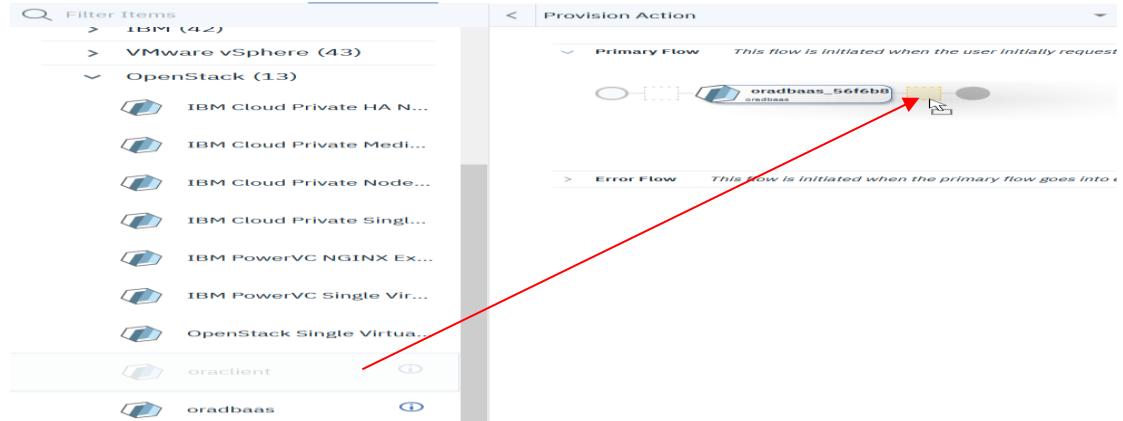
On the left-hand panel, expand the **OpenStack** group under Templates and scroll down to find the *oradbaas* and *oraclient* templates.

The screenshot shows the IBM Cloud Automation Manager interface. The top navigation bar includes 'Service Library', 'Docs', 'Support', and a user icon. The main title is 'Oracle 12c on AIX with Swingbench client on LoP'. The 'Composition' tab is selected. On the left, there's a sidebar with sections like 'Flow Components' (Decision, Notification, Email Notification), 'Integration' (Rest Hook), and 'Templates' (Amazon EC2, IBM, Microsoft Azure, VMware vSphere, VMware NSX-T, OpenStack). The 'OpenStack' section is expanded, showing 'OpenStack (9)' which is also highlighted with a red box. The main area shows 'Primary Flow' and 'Error Flow' sections with placeholder text and a drag-and-drop area.

Point to the *oradbaas* template, left click and hold on the *oradbaas* template, and drag it to the space between the two dots, shown by the arrow above. A rectangular box will appear between the two dots when the dragged object approaches the line. Release the mouse button to drop the template in this rectangular box.

This screenshot shows the same interface as the previous one, but with a red arrow pointing from the 'oradbaas' template in the 'Templates' sidebar to the drag-and-drop area between two dots in the 'Primary Flow' section of the main canvas. This indicates the step where the user is dragging the template to be placed into the service flow.

Repeat the same for oraclent, placing it to the right of the previously dragged oradbaas template.



When done, the two templates will be lined up between the two dots as shown below.

Since it's the most recently dragged/placed object, *oracclient* template's **Basic Information** tab will be shown on the right-hand panel. (If not, select Basic Information.) Save the value for **Activity Id**, which in this example, is `oraclientd1356a5d`, for later.

The screenshot shows the 'Service Library' interface with the 'Composition' tab selected. The 'oracclient' template is now correctly positioned to the right of the 'oradbaas' template in the Primary Flow diagram. The right-hand panel displays the 'Basic Information' tab for the 'oracclient_384925' template, showing the 'Title' as 'oraclient_384925' and the 'Activity Id' as 'oraclientd1356a5d'. Both the 'oracclient' template icon and its 'Activity Id' field are highlighted with red boxes.

Click the *oradbaas* template icon to show *oradbaas*' **Basic Information** tab on the right-hand panel. As before, save the value of Activity Id, in this case: `oradbaas13c2cfb6`.

The screenshot shows the 'Service Library' interface with the 'Composition' tab selected. The 'oradbaas' template is now correctly positioned to the left of the 'oracclient' template in the Primary Flow diagram. The right-hand panel displays the 'Basic Information' tab for the 'oradbaas_56f6b8' template, showing the 'Title' as 'oradbaas_56f6b8' and the 'Activity Id' as 'oradbaas13c2cfb6'. Both the 'oradbaas' template icon and its 'Activity Id' field are highlighted with red boxes.

With oradbaas still selected, scroll down the right-hand panel to find **Instance Name**. This will specify the deployment instance name in CAM. Type in a suitable name, e.g. **dbs**. Also verify that the value under **Connection** reflects the correct cloud provider (PowerVC) for your environment.

The screenshot shows the 'Provision Action' interface for the 'oradbaas_56f6b8' template. The 'Parameters' tab is active. On the right, there's a panel for 'oradbaas_56f6b8' with fields for 'Template Name' (oradbaas), 'Template Provider' (OpenStack), 'Version' (master (default)), 'Instance Name' (dbs), and 'Connection' (PowerVCDev). A callout box highlights the 'Instance Name' field with the text 'Type value of Instance name'.

Select the Parameters tab and click dbserver_name under Input Parameters. This dbserver_name will be the prefix of the VM name in PowerVC. (Recall from earlier that we are building the dbserver VM name in the format <prefix>-<dbname>-<YYMMDD>_<hhmmss>.)

The screenshot shows the 'Parameters' tab for the 'oradbaas_56f6b8' template. A callout box highlights the 'dbserver_name' input parameter in the 'Input Parameters' table with the text 'Click dbserver_name'. Another callout box highlights the 'Parameters' tab in the top navigation bar with the text 'Parameters'.

Type dbs in the area shown below dbserver_name. Click Save.

IBM Cloud Automation Manager

Service Library

Oracle 12C on AIX with Swingbench Client on LoP

Overview Composition Parameters Plans & Form Source Code

Filter Items > IBM (42)

> VMware vSphere (43)

OpenStack (13)

- IBM Cloud Private HA N...
- IBM Cloud Private Medi...
- IBM Cloud Private Node...
- IBM Cloud Private Singl...
- IBM PowerVC NGINX Ex...
- IBM PowerVC Single Vir...

Provision Action

Primary Flow This flow is initiated when the user initially requests the service.

Error Flow This flow is initiated when the primary flow goes into error condition.

Search Items

Basic Information Parameters

* indicates required field

Search parameters...

Type value of dbserver_name in this area

Input Parameters Value

dbserver_name	dbs
db	

Link Parameter Cancel Save

openstack_image_name

Repeat the previous step to specify the other input parameters we want to pre-set for this service. You need to determine the respective values from your specific PowerVC environment!

Input Parameter	Values from PowerVC
openstack_image_name,	DBaaSv3_Ora_SSD
openstack_flavor_name	ora_dbaas
openstack_network_id	464aceff-141d-453d-a40b-7008d9c06614

When completed, the right-hand panel of the screen will look like on the screen below.

Now click dbserver_user_data. Note that initially the specified default from the oradbaas template is pre-filled here.

IBM Cloud Automation Manager

Service Library

Oracle 12C on AIX with Swingbench Client on LoP

Overview Composition Parameters Plans & Form Source Code

Filter Items > IBM (42)

> VMware vSphere (43)

OpenStack (13)

- IBM Cloud Private HA N...
- IBM Cloud Private Medi...
- IBM Cloud Private Node...
- IBM Cloud Private Singl...
- IBM PowerVC NGINX Ex...
- IBM PowerVC Single Vir...
- OpenStack Single Virtua...
- oradbaas
- oraclient

Provision Action

Primary Flow This flow is initiated when the user initially requests the service.

Error Flow This flow is initiated when the primary flow goes into error condition.

Search Items

oradbaas_56f6b8 Template

Basic Information Parameters

* indicates required field

Search parameters...

Input Parameters Value

dbserver_name	dbs
openstack_image_name	DBaaSv3_Ora_SS
openstack_flavor_name	ora_dbaas
openstack_network_id	464aceff-141d-453d-a40b-7008d9c06614
dbserver_user_data	RSDtest

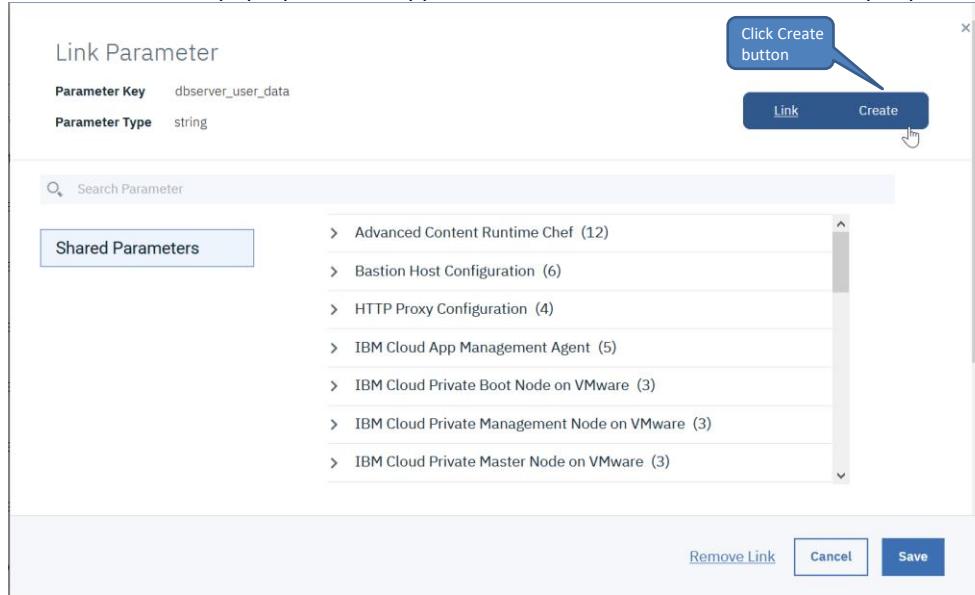
Link Parameter Cancel Save

Click dbserver_user_data

Click Link Parameter

Under dbserver_user_data (may need to scroll down to find), click Link Parameter.

The Link Parameter pop-up window appears. Click Create button to create an input parameter for the service.



Scroll down to **Display Name** in the pop-up window and adjust to read “Oracle dbname”.

Review and click the **Save** button.

A screenshot of a parameter configuration dialog. It includes fields for 'Parameter Key' (dbserver_user_data), 'End-User Permission' (Read-Write selected), 'Parameter Type' (string), 'Required' (Value Required checked), 'Display Name' (Oracle dbname), 'Description' (Oracle DB name), 'Validation Rule' (Define validation rule), 'Validation Rule Description' (Provide validation rule description), and 'Default Value' (RSDtest). The 'Display Name' field is highlighted with a red border. A callout points to the 'Save' button at the bottom right of the dialog.

Note the Output Parameters (right-hand panel on next picture). These were defined in the *oradbaas* template (*outputs.tf*). Later on in section 9.2.2, we will create Service Output Parameters for dbserver_ipaddr and dbserver_vm_name, so that they will be displayed on the Services detailed information page.

IBM Cloud Automation Manager

Service Library

Oracle 12C on AIX with Swingbench Client on LoP

Overview Composition Parameters Plans & Form Source Code

No Issues Save Publish

oradbaas_56f6b8

Template

openstack_image_name: DBaaSv3_Ora_SSD

openstack_flavor_name: ora_dbaaS

openstack_network_id: 464aceff-141d-453d-a40b-7008d9c06614

dbserver_user_data: \${input_parameters.dbserver_user_data}

OUTPUT PARAMETERS

dbserver_ipaddr
dbserver_vm_name
dbserver_ts

Next, we will set up the input parameters of the *oraclient* template.

Select the *oraclient* template by clicking the *oraclient_384925* icon in the middle panel of the screen. Scroll down on the right-hand panel to find **Instance Name** and type in **dbc** as shown below. Also verify that the correct cloud provider is selected in the **Connection** field. If you decide to use a different cloud provider (still PowerVC), that is possible as long as there is network connectivity between the two VMs to be created.

IBM Cloud Automation Manager

Service Library

Oracle 12C on AIX with Swingbench Client on LoP

Overview Composition Parameters Plans & Form Source Code

No Issues Save Publish

oraclient_384925

Template

Template Name: oraclient

Template Provider: OpenStack

Version: master (default)

Instance Name: dbc

Connection: PowerVCDev

Type value of Instance Name

Scroll back up and click Parameters,

The screenshot shows the 'Parameters' tab of the service library. The 'oracclient_384925' template is selected. The 'Parameters' panel displays the following input parameters:

Input Parameter	Value
dbclient_name	dbc
openstack_image_name	img_rhel76le_pvcdev
dbclient_flavor_name	small
openstack_network_name	AON_93

As we did before with the *oradbaas* template, click and fill in the values for your environment for the *oracclient* template. Note that at most the *openstack_network_id* will be identical to the *oradbaas* template values. Again, adjust the PowerVC specific values to your environment – rows 3-5 in the table below.

Input Parameter	Values
dbclient_name	dbc
openstack_image_name	img_rhel76le_pvcdev
dbclient_flavor_name	small
openstack_network_name	AON_93

Note that the *oracclient* template uses the network name instead of network ID (UUID). AON_93 in this case is the name for the same network we specified for the *oradbaas* template as UUID.

Be sure to click the Save button for each parameter.

Next, click **dbserver_ts**, then Link Parameter.

The screenshot shows the 'Parameters' tab of the service library. The 'oracclient_384925' template is selected. The 'Parameters' panel displays the following input parameters:

Input Parameter	Value
dbclient_name	dbc
openstack_image_name_dbclient	img_rhel76le_pvcdev
dbclient_flavor_name_dbclient	small
openstack_network_name	AON_93

Callouts indicate the following actions:

- A blue callout points to the 'dbserver_ts' parameter in the list with the text "Click dbserver_ts".
- A blue callout points to the "Link Parameter" button with the text "Click Link Parameter".

On the pop-up window for Link Parameters, click Templates and expand oradbaas_56f6b8.

The screenshot shows the 'Link Parameter' pop-up window. In the 'Templates' section, the 'oradbaas_56f6b8 (8) (Primary Flow)' item is expanded, revealing a table of parameters:

Key	Value
dbserver_name	dbs
openstack_image_name	DBBaSv3_Ora SSD
openstack_flavor_name	ora_dbaas
openstack_network_id	464aceff-141d-453d-a40b-7008d9c06614

A callout bubble points to the 'Expand oradbaas template' link above the table. Another callout bubble points to the 'Click Templates' button below the 'Templates' section header.

Scroll down to find the **dbserver_ts (output)** key and point the cursor to the dbserver_ts (output) row. The line becomes highlighted and a plus sign appears on the left at the beginning of the line.

The screenshot shows the 'Link Parameter' pop-up window. In the 'Templates' section, the 'dbserver_ts (output)' row is selected, indicated by a blue highlight and a plus sign (+) appearing on the left side of the row.

Key	Value
openstack_flavor_name	ora_dbaas
openstack_network_id	464aceff-141d-453d-a40b-7008d9c06614
dbserver_user_data	\$(input_parameters.dbserver_user_data)
dbserver_ipaddr (output)	
dbserver_vm_name (output)	
dbserver_ts (output)	

Click the plus sign and the check mark appears (signifying selection). Click the Save button.

The screenshot shows the 'Link Parameter' pop-up window. The 'dbserver_ts (output)' row is selected, indicated by a green checkmark in the first column. The 'Save' button is highlighted with a red box.

Key	Value
openstack_flavor_name	ora_dbaas
openstack_network_id	464aceff-141d-453d-a40b-7008d9c06614
dbserver_user_data	\$(input_parameters.dbserver_user_data)
dbserver_ipaddr (output)	
dbserver_vm_name (output)	
dbserver_ts (output)	

Notice that the value for `dbserver_ts` now points to the Activity ID of the `oradbaas` template. This step connects the output from `oradbaas` template to the input of `oraclient` template, allowing the VM name of the dbclient to have the same timestamp as that of dbserver.

The screenshot shows the IBM Cloud Automation Manager interface. The left sidebar lists various service categories like IBM, VMware vSphere, and OpenStack. The main area displays the composition of a service named "Oracle 12C on AIX with Swingbench Client on LoP". On the right, a detailed view of the "oraclient_384925" template is shown. This view includes a diagram of the flow, a search bar for parameters, and a table of input parameters. One parameter, "dbserver_ts", is highlighted with a red box and contains the value \${templates.oradbaas13c2fb6.output.dbs...}.

Input Parameters	Value
<code>dbclient_name</code>	<code>dbc</code>
<code>openstack_image_name_dbclient</code>	<code>img_rhel76le_pvcdev</code>
<code>openstack_flavor_name_dbclient</code>	<code>small</code>
<code>openstack_network_name</code>	<code>AON_93</code>
<code>dbserver_user_data</code>	
<code>dbserver_ipaddr</code>	
<code>dbserver_ts</code>	<code>#{templates.oradbaas13c2fb6.output.dbs...</code>

Repeat the above steps for `dbserver_user_data` and `dbserver_ipaddr` (only the pop-up windows for the Link Parameter step are shown).

`dbserver_user_data`:

The screenshot shows the "Link Parameter" dialog for the "dbserver_user_data" parameter. The "Templates" section is selected. A link is being created between "dbserver_user_data" and "\$(input_parameters.dbserver_user_data)". The "Save" button is highlighted with a red box.

dbserver_ipaddr:

Link Parameter

Parameter Key: dbserver_ipaddr
Parameter Type: string

Input Parameters

openstack_flavor_name	vif_ubuntu
openstack_network_id	464aceff-141d-453d-a40b-7008d9c06614
dbserver_user_data	\$(input_parameters.dbserver_user_data)
dbserver_ipaddr (output)	
dbserver_vm_name (output)	
dbserver_ts (output)	

Shared Parameters

Templates

Remove Link Cancel Save

When done, the input parameters for *oraclient* template will look like the screen below.

In the screen shot below you also see the defined Output Parameters. In section 9.2.2, we create the Service's Output Parameters, which will display these parameters on the Service detailed information page.

oraclient_384925
Template

Input Parameters Value

dbclient_name	dbc
openstack_image_name_dbclient	img_rhel76le_pvcdev
openstack_flavor_name_dbclient	small
openstack_network_name	AON_93
dbserver_user_data	\${templates.oradbaas1 3c2cfb6.dbserver_us...}
dbserver_ipaddr	\${templates.oradbaas1 3c2cfb6.output.dbse...}
dbserver_ts	\${templates.oradbaas1 3c2cfb6.output.dbse...}

Output Parameters

dbclient_ipaddr
dbclient_vm_name
dbserver_connect

9.2.2 Create Service Output Parameters

An end user needs to be able to easily find the access information for the deployed service. To provide that data we create service output parameters which will be displayed on the deployed service screen.

On the service creation screen select the **Parameters** tab and then click the **Create Parameter** button for the **Output Parameter** section as indicated on the previous screen.

The screenshot shows the 'Service Library' section of the IBM Cloud Automation Manager. The 'Parameters' tab is selected. The 'Input Parameters' section contains one entry: dbserver_user_data with value RSDtest, permission Read-Write, and display name Oracle dbname, type string. The 'Activity Parameters' section lists two entries: oradbaas_56f6b8 and oraclient_384925. The 'Output Parameters' section is shown below, with a 'Create Parameter' button highlighted by a red box. The 'Output Parameters' table has columns: PARAMETER KEY, VALUE, END-USER PERMISSION, DISPLAY NAME, and PARAMETER TYPE.

Fill in the parameter shown below. Here we will need the Activity IDs saved earlier. If you need to find them again, go back to the **Composition** tab and select **Basic Information**, after selecting the correct template on the canvas.

Template	Activity Id
oradbaas	oradbaas13c2cfb6
oraclient	oracliend1356a5d

For new output parameter dbserver_ipaddr, complete the definition screen as shown below. Note that you will need to substitute your Activity ID for **oradbaas** in the **Value** field. After filling the fields in click **Add**.

The 'Create Parameter' dialog box is open. It shows the following fields:

- Parameter Key:** dbserver_ipaddr (highlighted with a red box)
- Description:** DB server IP address
- Display Name:** DB server IP address
- Value:** \${templates.oradbaas13c2cfb6.output.dbserver_ipaddr}

At the bottom right of the dialog box is a blue 'Add' button, which is also highlighted with a red box.

For new output parameter dbserver_vm_name, again ensure to replace the Activity ID with the correct value from your **oradbaas** template in **Value**.

Create Parameter

* indicates required field

* Parameter Key ⓘ

dbserver_vm_name

Create a new Output Parameter
Output Parameters can be referenced in your Service Composition to reduce the entry of repetitive values.

End-User Permission

Read-Only

* Parameter Type	Description
string	DB server VM name in PowerVC

* Display Name

DB server VM name

* Value

`\${templates.oradbaas13c2cfb6.output.dbserver_vm_name}`

For dbclient_ipaddr, again ensure to replace the Activity ID with the correct value from your **oraclient** template in **Value**.

Create Parameter

* indicates required field

* Parameter Key ⓘ

dbclient_ipaddr

Create a new Output Parameter
Output Parameters can be referenced in your Service Composition to reduce the entry of repetitive values.

End-User Permission

Read-Only

* Parameter Type	Description
string	DB client IP address

* Display Name

dbclient IP address

* Value

`\${templates.oracle1end1356a5d.output.dbclient_ipaddr}`

For dbclient_vm_name, again ensure to replace the Activity ID with the correct value from your **oraclient** template in **Value**.

Create Parameter

* indicates required field

* Parameter Key ⓘ

Create a new Output Parameter
Output Parameters can be referenced in your Service Composition to reduce the entry of repetitive values.

End-User Permission

Read-Only

* Parameter Type

string

Description

DB client VM name in PowerVC

* Display Name

DB client VM name

* Value

`#{templates.oraclien1356a5d.output.dbclient_vm_name}`

For Oracle dbname, again ensure to replace the Activity ID with the correct value from your **oradbaas** template in **Value**.

Create Parameter

* indicates required field

* Parameter Key ⓘ

Create a new Output Parameter
Output Parameters can be referenced in your Service Composition to reduce the entry of repetitive values.

End-User Permission

Read-Only

* Parameter Type

string

Description

Oracle dbname

* Display Name

Oracle dbname

* Value

`#{templates.oradbaas5198900d.dbserver_user_data}`

Cancel Add

and finally for Oracle database connect string, , again ensure to replace the Activity ID with the correct value from your **oraclient** template in **Value**.

Create Parameter

* indicates required field

*** Parameter Key** ⓘ
oradb_connect

Create a new Output Parameter
Output Parameters can be referenced in your Service Composition to reduce the entry of repetitive values.

End-User Permission
 Read-Only

* Parameter Type	Description
string	Oracle db connect string
* Display Name	Oracle db connect string
* Value	`\${templates.oraclien7960c7ca.output.dbserver_connect}`

Add

When done, the Output Parameters section will look like the picture below.

IBM Cloud Automation Manager

← Service Library

Oracle 12C on AIX with Swingbench Client on LoP

Overview Composition Parameters Plans & Form Source Code

No Issues Save Publish

Activity Parameters ⓘ

TEMPLATE NAME	PARAMETER KEY	VALUE
> oradbaas_56f6b8		
☒ oraclient_384925		

Output Parameters ⓘ

PARAMETER KEY	VALUE	END-USER PERMISSION	DISPLAY NAME	PARAMETER TYPE
dbserver_ipaddr	`\${templates.oradbaas13c2cfb6.output.dbserver...`	Read-Only	DB server IP address	string
dbserver_vm_name	`\${templates.oradbaas13c2cfb6.output.dbserver...`	Read-Only	DB server VM name	string
dbclient_ipaddr	`\${templates.oraclien1356a5d.output.dbclient_i...`	Read-Only	dbclient IP address	string
dbclient_vm_name	`\${templates.oraclien1356a5d.output.dbclient...`	Read-Only	DB client VM name	string
ora_dbname	`\${templates.oradbaas13c2cfb6.output.dbserver...`	Read-Only	Oracle dbname	string
oradb_connect	`\${templates.oraclien1356a5d.output.dbserver...`	Read-Only	Oracle DB connect string	string

Click the **Save** button as indicated above.

At this point you may want to Save (Push) the Service to Git as shown in the next section Push Service to GitHub 9.3.

9.3 Push Service to GitHub

To facilitate distribution and collaboration without having to rebuild the service from scratch each time, push the service to GitHub. To do this, access the Service Library and edit the service.

Click the three-dot menu next to the Publish button and select Push to Git as shown below.

The screenshot shows the IBM Cloud Automation Manager interface. In the top right corner, there is a three-dot menu icon next to the 'Publish' button. A context menu is open, with the 'Push to GIT' option highlighted and a mouse cursor pointing at it. Other options in the menu include 'Save', 'Duplicate', 'Move to', and 'Delete'. The main service details are visible, including the service name 'Oracle 12C on AIX with Swingbench Client on LoP' and its description.

Since we created the service using Service Composer, rather than importing from Git, we need to provide the Git repository details.

In our scenario, we created a new folder named **oradbsc** in the cam-demo project via GitHub WEB interface first and then performed the **Push to GIT**. On the pop-up screen for Push Service enter the appropriate repository details as shown in the example below. Be sure to also enter an appropriate Commit Message.

The screenshot shows the 'Push Service' configuration dialog. It includes fields for GitHub Repository URL, GitHub Access Token, GitHub Repository path to service, GitHub Ref (branch), and Commit Message. The GitHub Repository URL field contains 'https://github.com/dannert/cam-demo'. A note indicates that the URL does not include '.git', which differs from the Clone or Download URL. The GitHub Access Token field is redacted. The GitHub Repository path to service field contains 'oradbsc/oradbaas_oraclient.json'. The GitHub Ref (branch) field is set to 'master'. The Commit Message field contains 'Initial commit for service'.

9.4 Deploying the Service

Return to the Service Library by clicking the link on the left-hand upper corner. Alternatively, click the hamburger menu, then Library->Services.

Click the three-dot menu in the Action column and select **Deploy**.

The screenshot shows the Service Library interface. In the center, there is a table listing services. One service, "Oracle 12C on AIX with Swingbench Client on LoP", is selected. To the right of the table, a context menu is open over the service row. The menu items are: Edit, Duplicate, Move to ..., Deploy, Publish, and Delete. The "Deploy" button is highlighted with a red box and a mouse cursor icon. A callout bubble points to the "Deploy" button with the text: "Click the three-dot menu in the Action column and select Deploy."

On the next screen, click the **Next** button.

The screenshot shows the detailed view of the "Oracle 12C on AIX with Swingbench Client on LoP" service. It includes sections for Overview, Associated Instances, Features, and Plans. At the bottom right, there are buttons for Cancel, Publish, Edit, and Next. The "Next" button is highlighted with a red box and a mouse cursor icon.

Enter the input parameters on the **Deploy a Service** screen and then click the **Deploy** button.

The screenshot shows the "Deploy a Service" screen. It has three main sections: 1. Select a Namespace (Namespace dropdown set to "default"), 2. Enter Service Instance Name (Service Instance Name input field set to "Orawrk service"), and 3. Service Input Parameters (Oracle dbname input field set to "ORAtest"). A callout bubble points to the "Service Instance Name" input field with the text: "Type in service instance name". Another callout bubble points to the "Oracle dbname" input field with the text: "Type in Oracle dbname". At the bottom right, there are buttons for Back and Deploy. The "Deploy" button is highlighted with a red box and a mouse cursor icon.

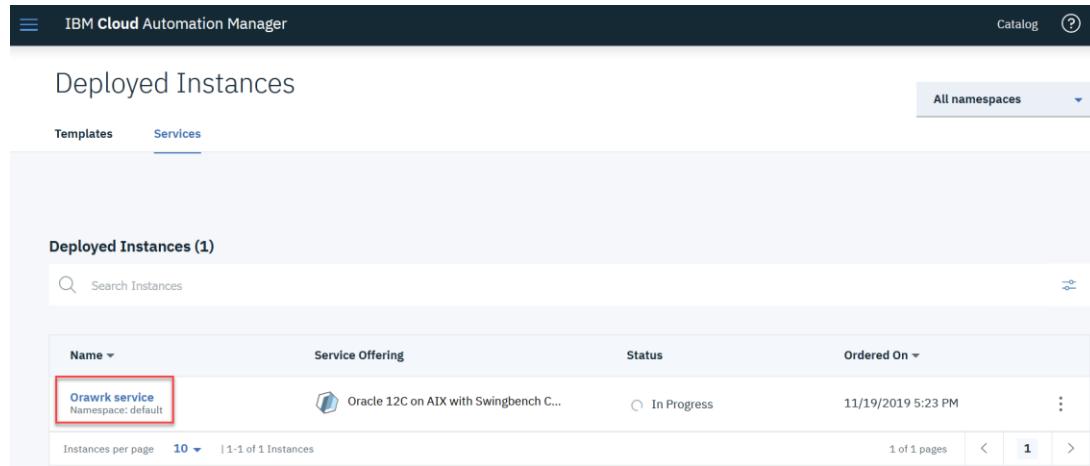
A pop-up window appears to indicate order submission. Click the **Go to Instances** button.



Your order has been submitted successfully.
Please check [Deployed Instances](#) for deployment status
or order more services from [Service library](#).

Go to Instances **Go to Library**

The **Deployed Instances** screen is displayed. Note the name under Name, **Orawrk service**, which we entered earlier. Click on **Orawrk service** for more details.



IBM Cloud Automation Manager Catalog ?

Deployed Instances

All namespaces ▾

Templates Services

Deployed Instances (1)

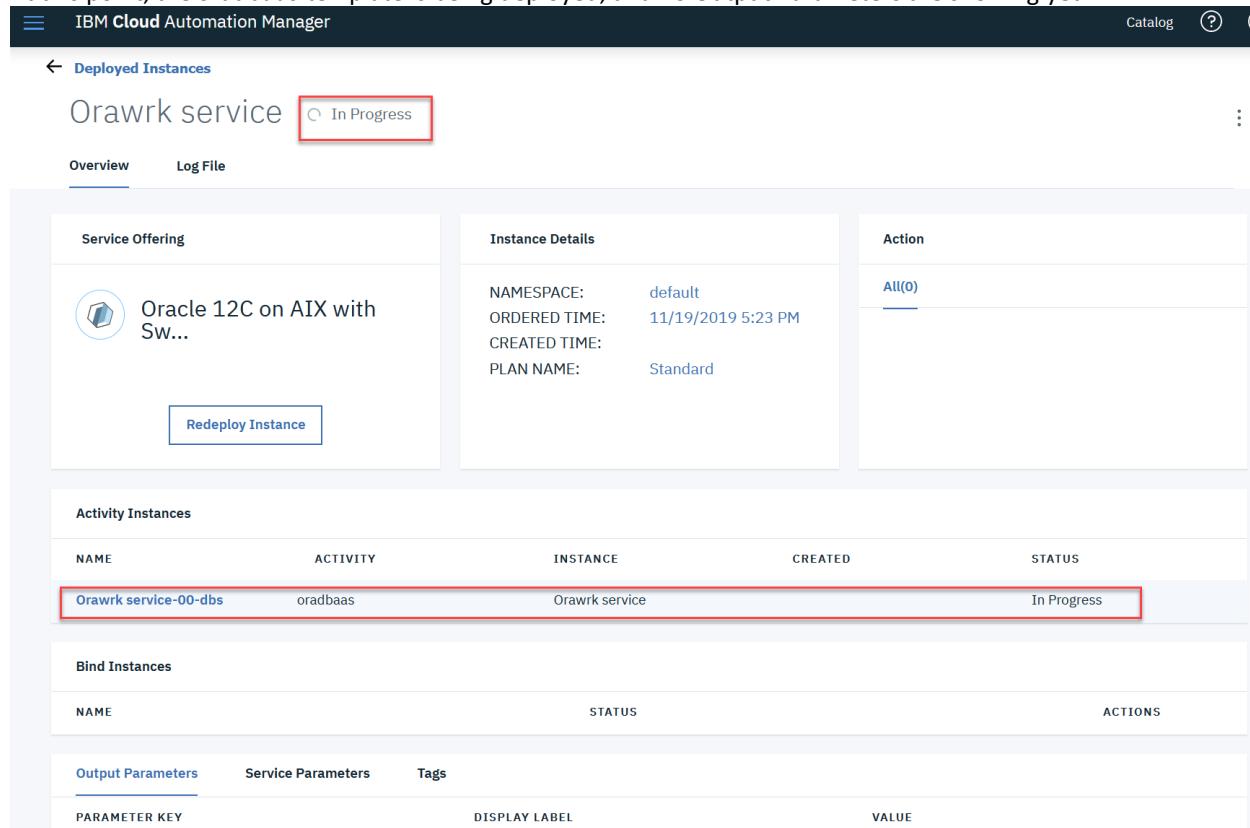
Search Instances

Name	Service Offering	Status	Ordered On
Orawrk service Namespace: default	Oracle 12C on AIX with Swingbench C...	In Progress	11/19/2019 5:23 PM

Instances per page: 10 | 1-1 of 1 Instances

1 of 1 pages < 1 >

At this point, the *oradbaas* template is being deployed, and no Output Parameters are showing yet.



IBM Cloud Automation Manager Catalog ?

← Deployed Instances

Orawrk service

In Progress

Overview Log File

Service Offering

Oracle 12C on AIX with SW...

Redeploy Instance

Instance Details

NAMESPACE: default
ORDERED TIME: 11/19/2019 5:23 PM
CREATED TIME: 11/19/2019 5:23 PM
PLAN NAME: Standard

Action

All(0)

Activity Instances

NAME	ACTIVITY	INSTANCE	CREATED	STATUS
Orawrk service-00-dbs	oradbaas	Orawrk service	11/19/2019 5:23 PM	In Progress

Bind Instances

NAME	STATUS	ACTIONS

Output Parameters

PARAMETER KEY	DISPLAY LABEL	VALUE

After the service is fully deployed and in status Active, the Service details page shows two VMs (from *oradbaas* and *oraclient* templates) deployed and all output parameters are filled in.

The screenshot shows the 'Deployed Instances' section of the IBM Cloud Automation Manager. At the top, there is a green 'Active' status indicator for the 'Orawrk service'. Below it, there are two tabs: 'Overview' (selected) and 'Log File'. The 'Service Offering' section shows an icon of a server and the text 'Oracle 12C on AIX with Sw...'. The 'Instance Details' section lists the following information:

NAMESPACE:	default
ORDERED TIME:	11/19/2019 5:54 PM
CREATED TIME:	11/19/2019 5:59 PM
PLAN NAME:	Standard

The 'Action' section shows a button labeled 'All(1)' and a redboxed entry 'Deployment Completed 11/19/2019 5:59 PM' with a green checkmark. Below this, the 'Activity Instances' section lists two entries:

NAME	ACTIVITY	INSTANCE	CREATED	STATUS
Orawrk service-00-dbs	oradbaas	Orawrk service	11/19/2019, 05:54 PM	Created
Orawrk service-01-dbc	oraclient	Orawrk service	11/19/2019, 05:57 PM	Created

The 'Bind Instances' section shows a table with columns: NAME, STATUS, and ACTIONS. The 'Output Parameters' table at the bottom contains the following data:

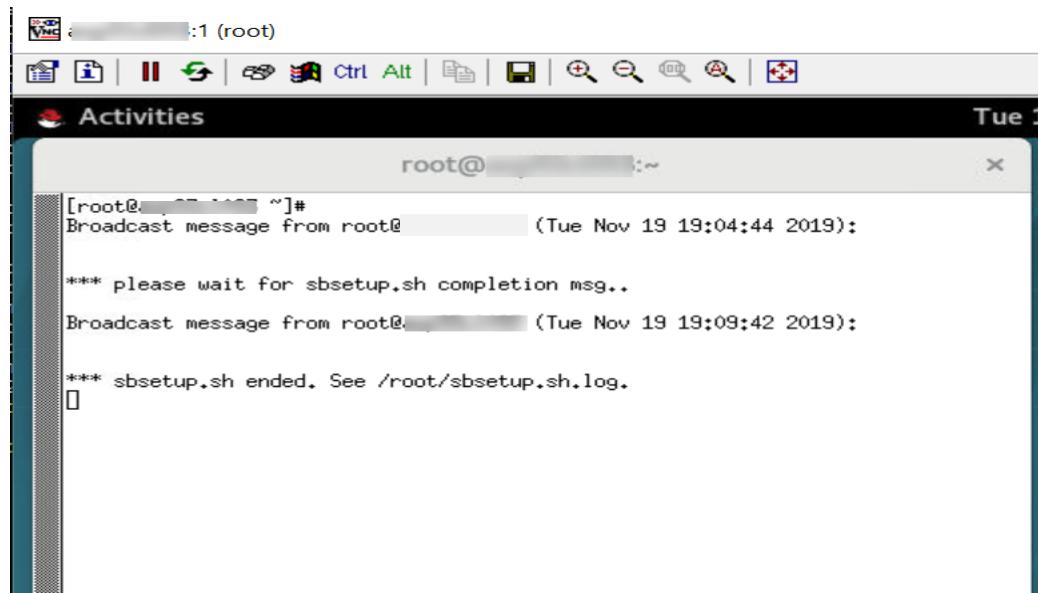
Output Parameters	Service Parameters	Tags	DISPLAY LABEL	VALUE
dbserver_ipaddr			dbserver_ipaddr	[REDACTED]
dbserver_vm_name			dbserver_vm_name	dbs-ORATest-191119_235415
ora_dbname			ora_dbname	[REDACTED]
dbclient_ipaddr			dbclient_ipaddr	[REDACTED]
dbclient_vm_name			dbclient_vm_name	dbc-ORATest-191119_235415
oradb_connect			oradb_connect	Swingbench connect string: //192.168.1.10:1521/orcl

9.5 Test the deployed service

From the parameter output in the services screen we can utilize the value reported in dbclient_ipaddr to open a VNC viewer session to the dbclient server – <ip address>:1. This gets us to the X-session with an xterm running as root user in this case.

Note that the service deployment in CAM will show as complete significantly before all post-processing in the dbclient server is actually complete. There service deployment, from the viewpoint of CAM and PowerVC, is complete with the successful creation and start of the dbclient VM, regardless of the success of any post-deployment steps.

To account for this behavior, the client publishes the start and stop messages of when the data load started and when it completed. Only after completion, as shown below, can the swingbench driver workload be successfully executed.



Below how the post-processing log looks like after successful deployment.

```
*** sbsetup.sh ended. See /root/sbsetup.log.
[roo... ]# cat /root/sbsetup.log
Connected to:
Oracle DB server active
Oracle DB server open in READ WRITE mode
,tempfile name is = +DATA/ORATEST/TEMPFILE/temp.263.1024768003
Database altered.

SwingBench Wizard
Author : Dominic Giles
Version : 2.6.0.1076

Running in Lights Out Mode using config file : ../wizardconfigs/oewizard.xml
=====
Datagenerator Run Stats
=====
Connection Time          0:00:00.004
Data Generation Time     0:01:13.785
DDL Creation Time        0:00:25.154
Total Run Time           0:01:38.946
Rows Inserted per sec    164,073
Data Generated (MB) per sec 13.4
Actual Rows Generated    13,014,431
Commits Completed         787
Batch Updates Completed   65,191

Post Creation Validation Report
=====
The schema appears to have been created successfully.

Valid Objects
=====
Valid Tables : 'ORDERS', 'ORDER_ITEMS', 'CUSTOMERS', 'WAREHOUSES', 'ORDERENTRY_META...
VALIDATOR : 'INVENTORIES', 'PRODUCT_INFORMATION', 'PRODUCT_DESCRIPTIONS', 'CAR...
Valid Indexes : 'PROD_DESC_PK', 'PROD_NAME_I...', 'PRODUCT_INFORMATION_PK', 'PROD_SUPP...
VALIDATOR : 'ORDERS', 'ORDERS_SEQ', 'ORDERS...
Valid Views : 'PRODUCTS', 'PRODUCT_PRICES'
VALIDATOR : 'CUSTOMER_SEQ', 'ORDERS_SEQ', 'ADDRESS_SEQ', 'LOGON_SEQ', 'CARD_DE...
VALIDATOR : 'ORDERS', 'ORDERS_SEQ', 'ADDRESS_SEQ', 'LOGON_SEQ', 'CARD_DE...
Valid Code : 'ORDERENTRY'
VALIDATOR : 'CUSTOMER_SEQ', 'ORDERS_SEQ', 'ADDRESS_SEQ', 'LOGON_SEQ', 'CARD_DE...
Schema Created
[roo... ]#
```

To illustrate that the service deployment achieved the expected end result, we ran the swingbench driver by executing the /root/runsb.sh script:

```

=====
Datagenerator Run Stats
=====
Connection Time          0:00:00.004
Data Generation Time     0:01:13.785
DDL Creation Time        0:00:25.154
Total Run Time           0:01:38.946
Rows Inserted per sec    164,073
Data Generated (MB) per sec
Actual Rows Generated
Commits Completed
Batch Updates Completed

Post Creation Validation Report
=====
The schema appears to have been created
Valid Objects
=====
Valid Tables : 'ORDERS', 'ORDER_ITEMS', 'ITEMS', 'INVENTORIES', 'PRODUCT_INFORMATION', 'D_DETAILS'
Valid Indexes : 'PROD_DESC_PK', 'PROD_NAME_LIER_IX', 'PROD_CATEGORY_IX', 'INVENTORY_PK', 'ORDERS_REF_IX', 'ORD_CUSTOMER_IX', 'ORDER_ITEMS_PK', 'ITEM_ORDER_IX', 'CATION_IX', 'CUSTOMERS_PK', 'CUST_EMAIL_IX', 'ORDER_NAME_IX', 'ADDRESS_PK', 'ADDRESS_CUS_IX'
Valid Views : 'PRODUCTS', 'PRODUCT_PRICE'
Valid Sequences : 'CUSTOMER_SEQ', 'ORDER_TAILS_SEQ'
Valid Code : 'ORIENTENTRY'
Schema Created
[root@REDACTED ~]# echo $PATH
/usr/local/sbin:/usr/local/bin:/sbin:/b
[root@REDACTED ~]# runsb.sh
bash: runsb.sh: command not found...
[root@REDACTED ~]# ls /root/bin
1st: cannot access /root/bin: No such file or directory
[root@REDACTED ~]# ls /root
anaconda-ks.cfg  Documents  initial-setup-ks.cfg  Public  sbsetup.sh
observer.cfg  Downloads  Music  runsb.sh  Templates
Desktop  dropsoe.sh  Pictures  sbsetup.log  Videos
[root@REDACTED ~]# ./root/runsb.sh
Application : Swingbench
Author   : Dominic Giles
Version  : 2.6.0.1076

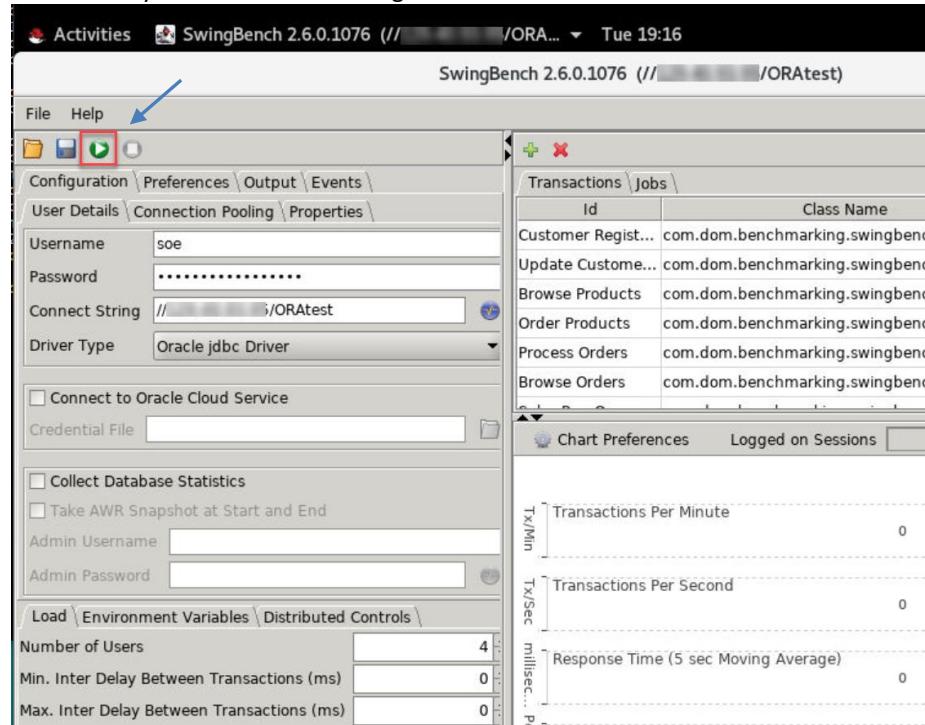
Started Swingbench, Version 2.6.0.1076. No config file specified

```

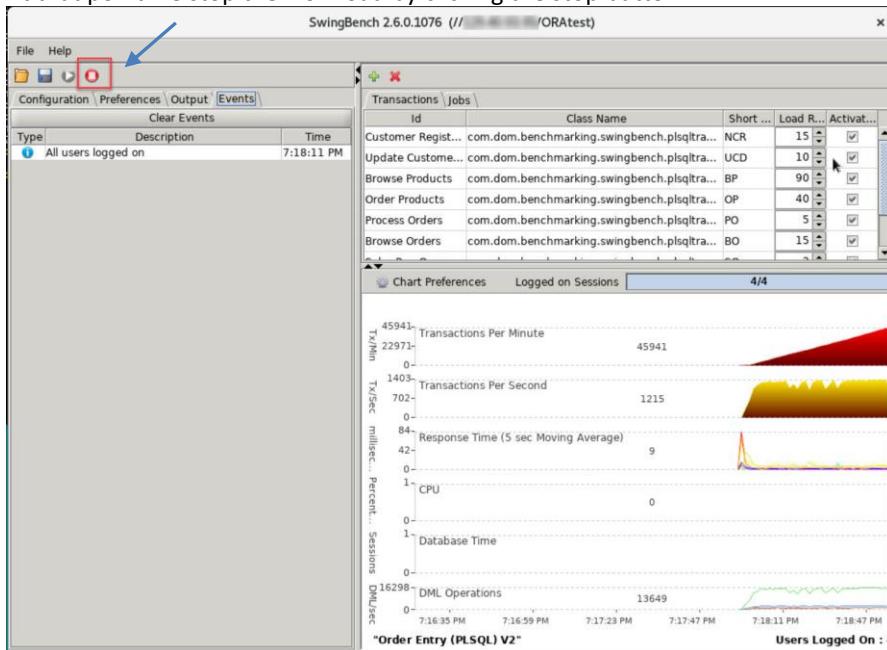
Click the OK button.

Note the connect string and other fields have been pre-filled by the script.

Click the Play icon to start the load generator.



And as a proof that it works you see that all users successfully logged in and are driving transactions against the database. At that point we stop the workload by clicking the stop button.



This completes the validation that our service, consisting of the dbserver and the dbclient, was successfully deployed and that parameter hand-over and orchestration worked as expected.

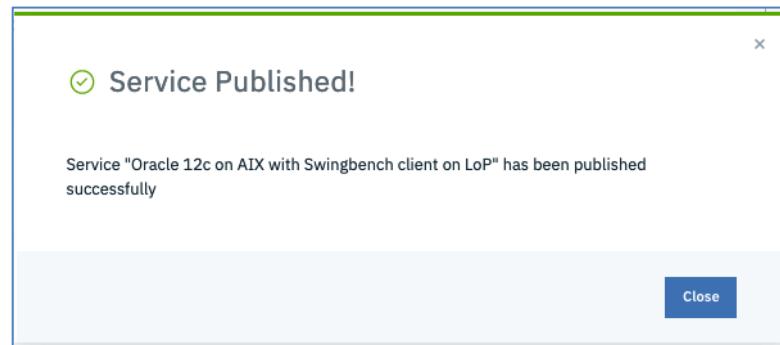
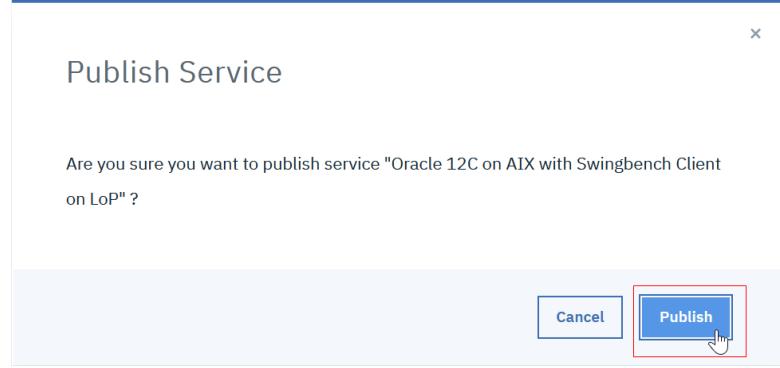
9.6 Publish the service to ICP

The service has so far been successfully deployed from the CAM service library. Now we want to make this service also easily consumable for end-users of ICP via the ICP software catalog.

To publish the service into the ICP catalog go in CAM to Library -> Services, enter Oracle as filter and then click on the three-dot menu to the right of the service and select Publish as shown in the screen shot below.

The screenshot shows the IBM Cloud Automation Manager interface with a navigation bar for Catalog and Help. The main area is titled "Library" and contains a "Services" tab. A search bar shows "Oracle". The results table lists one service: "Oracle 12C on AIX with Swingbench Client on LoP" (Status: Draft, Created: 11/19/2019 5:44 PM). To the right of the service card is a three-dot menu. A red box highlights the "Publish" option in this menu. Other options visible in the menu are Edit, Duplicate, Move to ..., Deploy, and Delete.

Confirm the Publish Service pop-up with **Publish**.



Wait a few minutes and then access the ICP catalog. Enter a search key, e.g. **orac** to more easily find the newly added service – note that the name of the helm chart for our service is all lower-case characters.

A screenshot of the IBM Cloud Private Catalog interface. At the top, there is a navigation bar with the IBM Cloud Private logo and the cluster name "CLUSTER picp32clu". Below the navigation bar is a search bar containing the text "orac", which is highlighted with a red box. The main area is titled "Catalog" and shows a sidebar with categories: All Categories, AI & Watson, Blockchain, Business Automation, Data, Data Science & Analytics, DevOps, and Integration. To the right of the sidebar is a section titled "Helm Charts". A specific chart entry for "oracle-12c-on-aix-with-swingbench-client-on-lop" is highlighted with a red box. The chart details include a logo of a bee, the name "oracle-12c-on-aix-with-swingbench-client-on-lop", the description "service", and the note "Deploys an AIX VM running Oracle database 12c and a Linux on Power VM with Oracle Instant Client and Swingbench.".

To deploy the service from ICP catalog, click **oracle-12c-on-aix-with-swingbench-client-on-lop**. Select the standard plan, you have to click on it, and then click **Configure**.

The screenshot shows the IBM Cloud Private Catalog interface. At the top, there are navigation links: 'IBM Cloud Private' (with a cluster icon), 'CLUSTER picp32clu', 'Create resource', 'Catalog', and help icons. Below the header, a link 'View All' is visible. The main content area displays the service details for 'oracle-12c-on-aix-with-swingbench-client-on-lop'.
Description: Deployes an AIX VM running Oracle database 12c and a Linux on Power VM with Oracle Instant Client and Swingbench.
Details: Version 1573452, Published November 19, 2019, Type Service.
Useful Links: Documentation and Support link.
Plans: A table showing a single plan:

PLAN	FEATURES	PRICING
standard	To deploy a Standard plan	Free

Configure button.

Fill in requested parameters and then **Install**.

The screenshot shows the 'Create Service instance' form. At the top, there are navigation links: 'IBM Cloud Private' (with a cluster icon), 'CLUSTER picp32clu', 'Create resource', 'Catalog', and help icons. Below the header, a link 'View All' is visible. The main content area displays the 'Create Service instance' form for 'Deployes an AIX VM running Oracle database 12c and a Linux on Power VM with Oracle Instant Client and Swingbench.'
Create Service instance
Deployes an AIX VM running Oracle database 12c and a Linux on Power VM with Oracle Instant Client and Swingbench.
Instance name *: testicp
Namespace *: default
Parameters
dbserver_user_data *: RS0test|

Install button (highlighted with a red box).

Installation complete. (with a green checkmark icon).
View Brokered Service button.
Return to Catalog link.

Note that the deployment shows up in ICP under “Brokered Services” and not “Helm Releases” under the Workloads menu. To observe the service deployment, click on **Launch** and that switches to a new window with CAM where you then can monitor the service deployment.

The screenshot shows the IBM Cloud Private Brokered Services interface. At the top, there's a navigation bar with 'IBM Cloud Private' and 'CLUSTER picp32clu'. Below the header, the title 'Brokered Services' is displayed. A search bar labeled 'Search Service Instances' is present. A table lists one service instance:

Name	Namespace	Created
testicp	default	4 minutes ago

Below the table, there's a pagination message 'items per page 20 | 1-1 of 1 items'. On the right side of the table, there's a red box around the 'Launch' button.

The screenshot shows the IBM Cloud Automation Manager (CAM) interface. The title bar says 'IBM Cloud Automation Manager' and 'Deployed Instances'. The main area shows a service instance named 'testicp' which is 'Active'. It has a 'Service Offering' section showing 'Oracle 12C on AIX with S...'. Below it is a 'Redeploy Instance' button. To the right is an 'Instance Details' panel showing 'NAMESPACE: default', 'ORDERED TIME: 11/19/2019 6:34 PM', 'CREATED TIME: 11/19/2019 6:40 PM', and 'PLAN NAME: Standard'. Further right is an 'Action' panel with a 'Deployment Completed' entry from 11/19/2019 6:40 PM. At the bottom, there's a table for 'Activity Instances' with two entries: 'testicp-00-dbs' and 'testicp-01-dbc'.

9.7 Cleaning up

This section describes the required steps to delete deployed templates and services. In our testing we found that a specific sequence of steps is required to be able to correctly clean up the environment and not be left with some objects which cannot be deleted.

9.7.1 Deleting a Deployed Service Instance

If you deployed the service from the ICP catalog you must start the deletion of the service from ICP as well, and not from CAM. For example the testicp deploy from ICP needs to be deleted like this – in ICP: Workloads -> Brokered Services. Select the service testicp, then the three-dot menu and select Delete from the drop-down. Accept the pop-up by clicking **Delete ServiceInstance**.

The screenshot shows the IBM Cloud Private Brokered Services interface again. The 'Brokered Services' title is highlighted with a red box. A table lists the service instance 'testicp'. On the right side of the table, there's a 'Delete' button with a red box around it. A mouse cursor is hovering over the 'Delete' button. A tooltip 'Open and close list of' is visible near the bottom right of the table area.

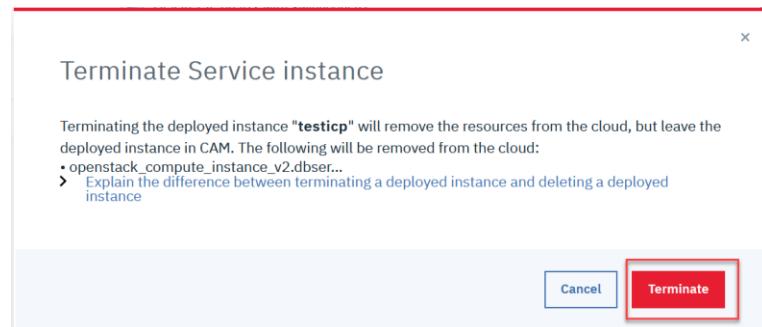
In our environment this correctly removed the service entry from the Brokered Services in ICP and Terminated the service instance in CAM, so all VMs were deleted, but the service was not deleted in CAM itself. That step had to be done manually – see below for details.

Deleting a deployed service instance in CAM requires two steps. The first step is to **Terminate** the service instance, which deletes the VMs in PowerVC. After the instance is terminated, the next step is to **Delete** the service instance which removes the service from CAM. If you do the **Delete** first, the service is removed from CAM, but the deployed VMs will persist and you'd need to delete those VMs from PowerVC instead as CAM has no longer any knowledge of those deployed VMs.

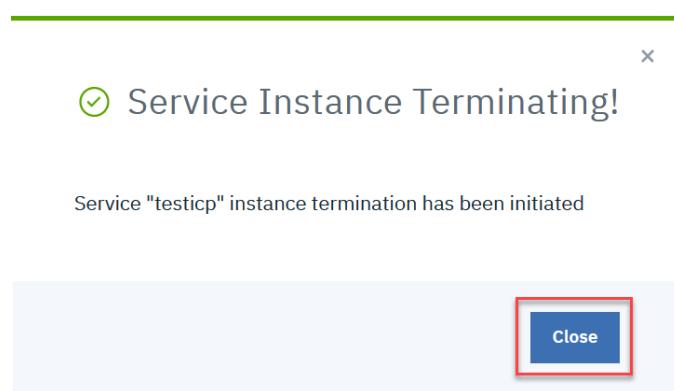
So to correctly delete a deployed service within CAM go to the Deployed Instances screen for the deployed service you want to delete, click the three-dot menu on the Actions column and then select **Terminate**.

Name	Service Offering	Status	Ordered On
testicp Namespace: default	Oracle 12C on AIX with Swingbench C...	Active	11/19/2019 6:34 PM
Orawrk service Namespace: default	Oracle 12C on AIX with Swingbench C...	Active	11/19/2019 5:54 PM

A pop-up window appears, requesting you to confirm. Click the **Terminate** button.



Another pop-up window appears to indicate start of termination.



The Deployed Instances window shows Terminating Status. Depending on the number and complexity of deployed VMs in that service this Terminate action can take several minutes.

Name	Service Offering	Status	Ordered On
testicp Namespace: default	Oracle 12C on AIX with Swingbench C...	Terminating	11/19/2019 6:34 PM
Orawrk service Namespace: default	Oracle 12C on AIX with Swingbench C...	Active	11/19/2019 5:54 PM

In PowerVC you can observe the VM status change to Deleting.

Name	Host	IP	State	Health	Owner	Expiration Date	Task
dbc-ORATest-191119_235415	ATS S824-8286-42A-	[REDACTED]	Active	OK		None	
dbc-ORATest-191119_235415	ATS S824-8286-42A-	[REDACTED]	Active	OK		None	
dbs-RSTest-191120_003500	ATS S824-8286-42A-	[REDACTED]	Active	OK		None	Deleting

When termination is complete, the service instance can be deleted by selecting the **Delete** option for the service. This **Delete** removes all knowledge about the existence of that service from CAM, including deployment history and logs.

A similar pop-up windows appear to confirm the Delete action. This is typically very quick.

Cancel
Delete

Service Instance Deleting

Service "testicp" instance deletion has been initiated

Close

Finally, the instance is no longer shown on the Deployed Instance screen.

The screenshot shows the 'Deployed Instances' page with a single entry:

Name	Service Offering	Status	Ordered On
Orawrk service Namespace: default	Oracle 12C on AIX with Swingbench C...	Active	11/19/2019 5:54 PM

Below the table, it says 'Instances per page: 10 | 1-2 of 1 Instances' and '1 of 1 pages'.

Note, after the **Terminate** of the service succeeded the status of the underlying template deployments for a service is changed to Destroyed. See below for the Orawrk service after Terminate.

The screenshot shows the 'Deployed Instances' page with two entries, both of which have been terminated:

Name	Provider	Template	Created	Status
Orawrk service-01-dbc Namespace: default	OpenStack	oraclient	11/19/2019 5:57 PM	Destroyed
Orawrk service-00-dbs Namespace: default	OpenStack	oradbaas	11/19/2019 5:54 PM	Destroyed

Below the table, it says 'Instances per page: 10 | 1-2 of 2 Instances' and '1 of 1 pages'.

9.7.1.1 Operational Note

While it is beyond the scope of this paper to discuss considerations, scenarios and steps to modify templates and their use as part of a service deployment, we encountered a situation that warrants mention.

When a service has been deployed and an underlying template is deleted and replaced, you will encounter an error when you try to terminate the deployed service.

In the scenario described here, we had test deployed our service, then deleted and replaced the *oradbaas* template for a minor change. When trying to terminate the deployed testservice service instance, we got the error shown below.

The screenshot shows the 'Deployed Instances' page with one entry:

Name	Service Offering	Status	Ordered On
testservice Namespace: default	Oracle 12c on AIX with Swingbench c...	Error	10/09/2019 10:32 AM

Below the table, it says 'Instances per page: 10 | 1-1 of 1 Instances' and '1 of 1 pages'.

At the bottom of the page, there is a search bar with the term 'oradbaas'.

Clicking on testservice to view service instance details,

The screenshot shows the 'Deployed Instances' section of the IBM Cloud Automation Manager. A service instance named 'testservice' is selected, indicated by a red error icon. The 'Overview' tab is active. In the 'Service Offering' panel, it shows 'Oracle 12c on AIX with Sw...' and a 'Redeploy Instance' button. The 'Instance Details' panel shows the namespace as 'default', ordered time as '10/09/2019 10:32 AM', created time as '10/09/2019 10:38 AM', and plan name as 'Standard'. The 'Activity' panel lists two actions: 'Destroy resources failed' (10/09/2019 10:56 AM) and 'Deployment Completed' (10/09/2019 10:38 AM), each with a 'View Log' link. Below these panels is an 'Activity Instances' table with two entries: 'testservice-00-dbs' (oradbaas, testservice, 10/09/2019, 10:32 AM, Failed) and 'testservice-01-dbc' (oraclient, testservice, 10/09/2019, 10:35 AM, Terminated). The search bar at the bottom contains 'oradbaas'.

Click on testservice-00-dbs, a new browser tab shows the deployed (underlying) template details. Here we see that the problem is due to the missing template (which has been deleted and replaced).

The screenshot shows the 'Deployed Instances' section for the 'testservice-00-dbs' instance, which is running. The 'Modify' button in the navigation bar is highlighted with a red box. A yellow warning box is displayed, stating: 'Warning : The template this stack was deployed from has been deleted.' The 'Template File' panel shows the 'oradbaas' template. The 'Instance Details' panel shows the namespace as 'default', template as 'Terraform', template version, cloud as 'OpenStack', cloud connection as 'PowerVCDev', creation time as '10/09/2019 10:32 AM', and output data type. The 'Activity' panel shows 'Destroy resources Failed' (10/09/2019 10:54 AM) and 'Deployment Successful' (10/09/2019 10:32 AM), each with a 'View Log' link. The 'Resource Details' panel shows one resource: 'openstack_compute_instance_v2.db...' with console 'https://aopppvc14.pbm.ihost.com', IP address '129.40.93.121', created '10/09/2019 10:32AM', state 'Running', and a 'More' button. The search bar at the bottom contains 'oradbaas'.

To resolve this situation, click Modify in the above screen.

Click Choose Template and select *oradbaas* (the template we replaced),

The screenshot shows the 'Modify Deployed Instance' interface for a stack named 'testservice-00-dbs'. A warning message at the top right states: 'Warning : The template this stack was deployed from has been deleted.' Below this, a horizontal navigation bar has 'Select Template' as the active step, indicated by a blue circle. The main content area contains a 'Select Template' section with a dropdown menu titled 'Choose Template'. The dropdown list includes several options, with 'oradbaas' highlighted in blue at the bottom.

Select the Template Version. We did not create any branches and only have the master branch. Click the Next button.

This screenshot shows the same 'Modify Deployed Instance' interface. The 'Select Version' step is now active, indicated by a blue circle on the navigation bar. The 'Choose Template' dropdown still shows 'oradbaas'. Below it, a 'Select Version' section has a dropdown menu for 'Template Version' with 'master(default)' selected. The 'Next' button is visible at the bottom right.

Click the Plan Changes button,

The screenshot shows the final step of the process: 'Plan Changes'. The 'Select Template' and 'Edit Parameters' steps are now completed, indicated by blue circles on the navigation bar. The 'Input Parameters' section displays a summary of changes: 'Existing Template' is 'oradbaas' and 'Selected Template' is also 'oradbaas'. The 'Cloud Connection' section shows 'Choose Cloud Connection' set to 'PowerVCDev'. At the bottom right, there are 'Back' and 'Plan Changes' buttons, with 'Plan Changes' being the active button.

Review the Planned Changes to see what's being changed. Click Apply Changes to continue.

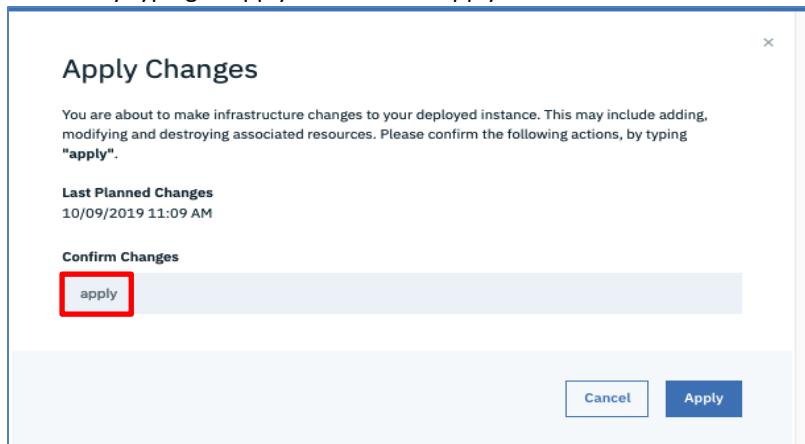
The screenshot shows the 'Deployed Instances' section for 'testservice-00-dbs'. The 'Modify' tab is selected. In the center, there's a 'Planned Changes' section with a log output window. The log shows:

```
Wed Oct 09 2019 18:09:47 GMT+0000 (UTC) Running terraform init ...
Initializing provider plugins...
Terraform has been successfully initialized!

You may now begin working with Terraform. Try running "terraform plan" to see
any changes that are required for your infrastructure. All Terraform commands
should now work.
If you ever set or change modules or backend configuration for Terraform,
rerun this command to reinitialize your working directory. If you forget, other
commands will detect it and remind you to do so if necessary.
Wed Oct 09 2019 18:09:47 GMT+0000 (UTC) Running terraform plan ...
Refreshing Terraform state in-memory prior to plan...
The refreshed state will be used to calculate this plan, but will not be
```

At the bottom right of the main area are 'Back' and 'Apply Changes' buttons.

Confirm by typing in apply and click the Apply button.



After the changes are applied, the deployed template status changes to Running.

The screenshot shows the 'Deployed Instances' section for 'testservice-00-dbs'. The 'Overview' tab is selected. On the left, there's a 'Template File' section with a 'oradbaas' icon and a 'View Git URL' button. In the center, there's an 'Instance Details' table and an 'Activity' section. The 'Activity' section shows a history of events:

Event	Date	Action	Log
Apply Complete	10/09/2019 11:11 AM		View Log
Plan Complete	10/09/2019 11:09 AM		View Log
Destroy resources Failed	10/09/2019 10:54 AM		View Log
Deployment Successful	10/09/2019 10:32 AM		View Log

At the bottom, there's a 'Resource Details' table with columns: Name, Console, IP Address, Created, State. One row in the table is highlighted with a red box in the 'State' column, which shows 'Running'.

With that change in place we now try to Terminate the service again. Return to the deployed service tab and select Terminate.

The screenshot shows the 'Deployed Instances' section of the IBM Cloud Automation Manager. There is one instance listed:

Name	Service Offering	Status	Ordered On
testservice Namespace: default	Oracle 12c on AIX with Swingbench c...	Error	10/09/2019 10:32 AM

Below the table, it says "Instances per page" with a dropdown set to "10". To the right, it shows "1 of 1 pages" and a page navigation bar with "1". A context menu is open over the first row, listing "View Details", "Terminate", and "Delete".

After going through the confirmation screens, the termination step now completed successfully.

The screenshot shows the 'Deployed Instances' section of the IBM Cloud Automation Manager. The instance status has changed to 'Terminated'.

Name	Service Offering	Status	Ordered On
testservice Namespace: default	Oracle 12c on AIX with Swingbench c...	Terminated	10/09/2019 10:32 AM

Below the table, it says "Instances per page" with a dropdown set to "10". To the right, it shows "1 of 1 pages" and a page navigation bar with "1". A context menu is open over the first row, listing "View Details", "Terminate", and "Delete".

The instance can now be deleted as described earlier.

9.7.2 Deleting a Deployed Template Instance

Deleting the deployed template instance requires two steps as well: Destroying the Resources and Deleting the Instance.

9.7.2.1 Destroy Resources

Go back to the CAM screen, click **Deployed Instances**, or use the upper left hamburger menu, select Deployed Instances -> Templates. The **Destroy Resources** is similar to the **Terminate** for a Service in that it deletes the underlying VM(s) for the template in PowerVC, but keeps the information about that template deployment intact in CAM.

Deployed Instances (1)

Name	Provider	Template	Created	Status
demotest Namespace: default	OpenStack	oradbaas	11/20/2019 4:49 PM	Ready

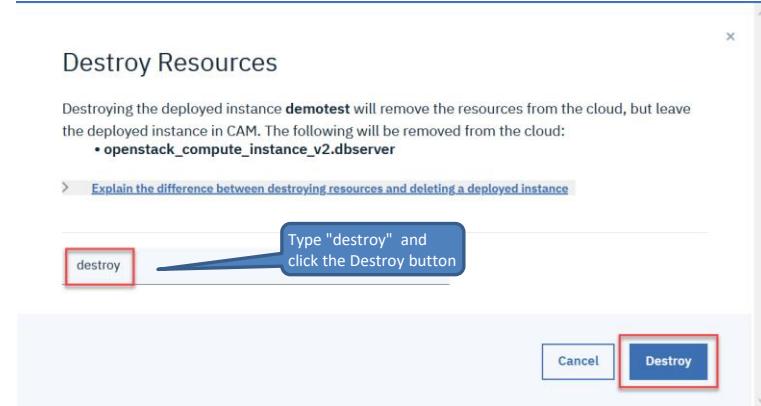
Instances per page 10 | 1-1 of 1 Instances

View Details

Destroy Resources

Delete Instance

A pop-up window appears,



The status for the deployed template instance changes to In Progress.

Deployed Instances (1)

Name	Provider	Template	Created	Status
demotest Namespace: default	OpenStack	oradbaas	11/20/2019 4:49 PM	In Progress

Instances per page 10 | 1-1 of 1 Instances

1 of 1 pages

Looking at PowerVC, we see the VM being deleted.

A screenshot of the PowerVC interface showing a list of virtual machines. One specific VM, 'dbs-RSDtest-191120_224954', is highlighted and has a status of 'Deleting'. The interface includes various management actions like Refresh, Start, Stop, and Delete.

When destroyed, the CAM status is updated accordingly.

A screenshot of the IBM Cloud Automation Manager 'Deployed Instances' page. It shows a single instance named 'demotest' with a status of 'Destroyed'. The status column is highlighted with a red box. The page also includes search, filter, and pagination controls.

The deployed instance may now be deleted.

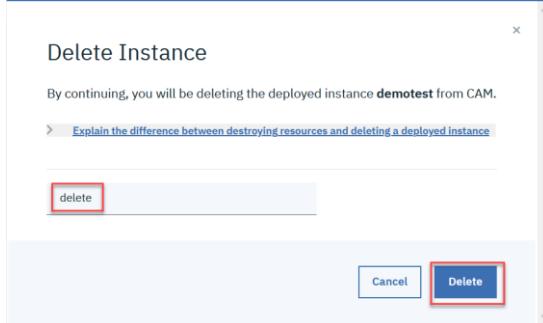
Tip: If you have a template with many parameters and you just want to re-deploy the template with a minor parameter change, you can Destroy the deployed template, then go to the “deployed template”, click on the details and edit the deployment, re-plan it – means changing any parameters needed – and then activate the plan. This will then trigger a new deployment with the same deployment name and the changed parameters, without having to go through the full template deployment process.

9.7.2.2 Delete Deployed Instance

Once the resources have been destroyed, the deployed instance can be deleted. Select the demotest deployed template instance, click on the three-dot menu and select **Delete Instance**.

A screenshot of the IBM Cloud Automation Manager 'Deployed Instances' page, similar to the previous one. The 'demotest' instance is shown with a status of 'Destroyed'. A context menu is open over the instance row, with the 'Delete Instance' option highlighted and a cursor pointing at it. Other options in the menu include 'View Details' and 'Destroy Resources'.

Again, a pop-up window appears. Type "delete" and click the **Delete** button.



The instance has been deleted.

A screenshot of the IBM Cloud Automation Manager interface. The title bar says "IBM Cloud Automation Manager". The main section is titled "Deployed Instances" and shows "Deployed Instances (0)". A search bar below the title says "Search Instances". At the bottom of the section, it says "You do not have any instances." and "To deploy an instance, click Template Library". The navigation bar at the top includes "Templates" (which is selected), "Services", "Docs", "Support", and a user icon.

10 Appendix

10.1 Working with GitHub

10.1.1 Create GitHub repository

Access <https://github.com>. Sign up for an account on github.com or use your existing account and log in to GitHub.

Click the **New** button next to Repositories or click on **Start a project** to create a new repository.



Type in the name of your repository. In this example, we use the name **cam-demo**. Select **Private** and **Initialize this repository with a README** and then click **Create Repository**.

A screenshot of the GitHub 'Create a new repository' form. The form includes fields for 'Owner' (set to 'dannert'), 'Repository name' (set to 'cam-demo'), and a 'Description (optional)' field containing the text 'Demonstrate IBM Cloud Automation Manager functionality to deploy VMs to IBM PowerVC'. It also includes a 'Visibility' section with 'Public' and 'Private' options ('Private' is selected), and a 'Skip this step if you're importing an existing repository' section with a checked checkbox for 'Initialize this repository with a README'. At the bottom is a large green 'Create repository' button.

Information on Private repository may be found on:

<https://help.github.com/en/articles/githubs-products>

Review

<https://github.com/pricing>

for features comparison of the various GitHub offerings.

Opening the new repository then looks like this:

Demonstrate IBM Cloud Automation Manager functionality to deploy orchestrated VMs to IBM PowerVC

Manage topics

1 commit 1 branch 0 packages 0 releases

Branch: master New pull request

Create new file Upload files Find file Clone or download

dannert Initial commit

README.md Initial commit

README.md

Open in Desktop Download ZIP

cam-demo

Demonstrate IBM Cloud Automation Manager functionality to deploy orchestrated VMs to IBM PowerVC

Copy the HTTPS URL shown as you will need that later in CAM to register this GitHub repository for use in the project.

10.1.2 Create personal access token

Click the icon (a profile picture that can be changed on the **Settings** screen) on the upper right-hand corner to reveal and access the drop-down submenu. See picture below. Select **Settings**.

Pull requests Issues Marketplace Explore

dannert / cam-demo Private

Unwatch 1 Star 0 Fork 0

Code Issues 0 Pull requests 0 Actions Projects 0 Security Insights Settings

Demonstrate IBM Cloud Automation Manager functionality to deploy orchestrated VMs to IBM PowerVC

Manage topics

1 commit 1 branch 0 packages 0 releases

Branch: master New pull request

Create new file Upload files Find file Clone or download

dannert Initial commit

README.md Initial commit

README.md

Signed in as dannert

Your profile Your repositories Your projects Your stars Your gists

Feature preview Help Settings Sign out

Select **Developer settings** on the left.

The screenshot shows the GitHub Public profile settings page. On the left, a sidebar lists various settings categories: Personal settings, Profile (which is selected), Account, Emails, Notifications, Billing, SSH and GPG keys, Security, Sessions, Blocked users, Repositories, Organizations, Saved replies, Applications, and Developer settings. A blue oval highlights the 'Developer settings' link. The main content area is titled 'Public profile' and contains fields for Name, Profile picture (with a green placeholder image), Public email (disabled), Bio (with placeholder text 'Tell us a little bit about yourself'), URL, Company, and Location. A note at the bottom states that all fields are optional and can be deleted. The URL in the address bar is https://github.com/settings/developers.

Select Personal access tokens.

The screenshot shows the GitHub Settings / Developer settings page. The left sidebar lists OAuth Apps, GitHub Apps (which is selected), and Personal access tokens. A blue oval highlights the 'Personal access tokens' link. The main content area displays a message: 'No OAuth applications'. It explains that OAuth applications are used to access the GitHub API and provides a 'Register a new application' button. The URL in the address bar is https://github.com/settings/developers/developer_settings.

Now click **Generate new token**.

The screenshot shows the GitHub developer settings page. On the left, there's a sidebar with 'GitHub Apps', 'OAuth Apps', and 'Personal access tokens' (which is highlighted with a red border). The main area is titled 'Personal access tokens' and contains a sub-section 'Tokens you have generated that can be used to access the GitHub API.' Below this, a note explains that personal access tokens function like OAuth access tokens. At the top right of this section, there are two buttons: 'Generate new token' (with a blue arrow pointing to it) and 'Revoke all'. At the bottom of the page, there's a footer with links to 'Contact GitHub', 'Pricing', 'API', 'Training', 'Blog', and 'About'.

Confirm the user password if requested to get to the next screen as shown below.
Type in an appropriate description for this token and scroll down.

The screenshot shows the 'New personal access token' creation screen. The sidebar on the left still shows 'Personal access tokens' as selected. The main area is titled 'New personal access token' and contains a note about personal access tokens. Below the note is a 'Note' field with a placeholder 'What's this token for?'. Under 'Select scopes', it says 'Scopes define the access for personal tokens. Read more about OAuth scopes.' There is a table where the first row has a checked checkbox for 'repo' with the description 'Full control of private repositories'.

Select the desired access scopes by checking the appropriate boxes, but at minimum the **repo** related permissions.

This screenshot shows the detailed 'Select scopes' list. A red box highlights the 'repo' section, which includes 'repo', 'repo:status', 'repo_deployment', 'public_repo', and 'repo:invite'. Another red box highlights the 'delete_repo' checkbox at the bottom of the list. To the right of each scope, there is a brief description of the permission level.

Scope	Description
<input checked="" type="checkbox"/> repo	Full control of private repositories
<input checked="" type="checkbox"/> repo:status	Access commit status
<input checked="" type="checkbox"/> repo_deployment	Access deployment status
<input checked="" type="checkbox"/> public_repo	Access public repositories
<input checked="" type="checkbox"/> repo:invite	Access repository invitations
<input type="checkbox"/> admin:org	Full control of orgs and teams, read and write org projects
<input type="checkbox"/> write:org	Read and write org and team membership, read and write org projects
<input type="checkbox"/> read:org	Read org and team membership, read org projects
<input type="checkbox"/> admin:public_key	Full control of user public keys
<input type="checkbox"/> write:public_key	Write user public keys
<input type="checkbox"/> read:public_key	Read user public keys
<input type="checkbox"/> admin:repo_hook	Full control of repository hooks
<input type="checkbox"/> write:repo_hook	Write repository hooks
<input type="checkbox"/> read:repo_hook	Read repository hooks
<input type="checkbox"/> admin:org_hook	Full control of organization hooks
<input type="checkbox"/> gist	Create gists
<input type="checkbox"/> notifications	Access notifications
<input type="checkbox"/> user	Update all user data
<input type="checkbox"/> read:user	Read all user profile data
<input type="checkbox"/> user:email	Access user email addresses (read-only)
<input type="checkbox"/> user:follow	Follow and unfollow users
<input checked="" type="checkbox"/> delete_repo	Delete repositories
<input type="checkbox"/> write:discussion	Read and write team discussions

Scroll down and click **Generate token**.

The screenshot shows the GitHub 'Personal access tokens' configuration page. On the left, there's a sidebar with 'GitHub Apps', 'OAuth Apps', and 'Personal access tokens' (which is selected and highlighted with a red border). The main area lists various scopes for generating tokens. The 'delete_repo' scope is checked. At the bottom right, there are two buttons: a green 'Generate token' button and a blue 'Cancel' button. The 'Generate token' button is highlighted with a red box.

Scope	Description
<input type="checkbox"/> <code>admin:repo_hook</code>	Full control of repository hooks
<input type="checkbox"/> <code>write:repo_hook</code>	Write repository hooks
<input type="checkbox"/> <code>read:repo_hook</code>	Read repository hooks
<input type="checkbox"/> <code>admin:org_hook</code>	Full control of organization hooks
<input type="checkbox"/> <code>gist</code>	Create gists
<input type="checkbox"/> <code>notifications</code>	Access notifications
<input type="checkbox"/> <code>user</code>	Update all user data
<input type="checkbox"/> <code>read:user</code>	Read all user profile data
<input type="checkbox"/> <code>user:email</code>	Access user email addresses (read-only)
<input type="checkbox"/> <code>user:follow</code>	Follow and unfollow users
<input checked="" type="checkbox"/> <code>delete_repo</code>	Delete repositories
<input type="checkbox"/> <code>write:discussion</code>	Read and write team discussions
<input type="checkbox"/> <code>read:discussion</code>	Read team discussions
<input type="checkbox"/> <code>write:packages</code>	Upload & delete packages in GitHub package registry
<input type="checkbox"/> <code>read:packages</code>	Download packages from GitHub package registry
<input type="checkbox"/> <code>admin:gpg_key</code>	Full control of user GPG keys (Developer Preview)
<input type="checkbox"/> <code>write:gpg_key</code>	Write user GPG keys
<input type="checkbox"/> <code>read:gpg_key</code>	Read user GPG keys

IMPORTANT: Save the personal access token for use later as CAM will request that token for any interaction with the GitHub repository.

[Settings](#) / [Developer settings](#)

The screenshot shows the 'Personal access tokens' list page. On the left, there's a sidebar with 'GitHub Apps', 'OAuth Apps', and 'Personal access tokens' (selected). The main area displays a table of tokens. A new token is listed at the top, highlighted with a green checkmark icon and a light green background. It includes a copy icon and a 'Delete' button. Below the table, a note says 'Make sure to copy your new personal access token now. You won't be able to see it again!' To the right of the table are 'Generate new token' and 'Revoke all' buttons.

Token	Scopes	Actions
		Delete

Tokens you have generated that can be used to access the GitHub API.

Make sure to copy your new personal access token now. You won't be able to see it again!

Generate new token [Revoke all](#)

Personal access tokens function like ordinary OAuth access tokens. They can be used instead of a password for Git over HTTPS, or can be used to [authenticate to the API over Basic Authentication](#).

10.2 oradbaas Template files

10.2.1 main.tf

```
#####
# Copyright: IBM Corp., 2019
#
# Written by: Stephen Poon, Ralf Schmidt-Dannert
#               IBM North America Systems Hardware
#               Power Technical Team, Oracle
#
# Disclaimers:
# This script is provided as-is to illustrate Oracle Database as a Service
# with IBM PowerVC. This script is not part of any IBM product and has not
# undergone extended testing of functionality or "fit for purpose" verification
#
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# is informed of their possibility. Some jurisdictions do not allow the
# exclusion or limitation of incidental or consequential damages, so the
# above exclusion or limitation may not apply to you.
-----
#####
##           Created 11/18/19 by admin. for oradbaas
##
#####
## REFERENCE {"openstack_network":{"type": "openstack_reference_network"}}

terraform {
    required_version = "> 0.8.0"
}

provider "openstack" {
    insecure      = true
    version       = "~> 1.2"
}

resource "openstack_compute_instance_v2" "dbserver" {
    name        = "${format("${var.dbserver_name}-${var.dbserver_user_data}-"
    ${local.local_dbserver_ts})}"
    image_name  = "${var.openstack_image_name}"
    flavor_name = "${var.openstack_flavor_name}"
    user_data   = "${format("DBNAME=%s", var.dbserver_user_data)}"
    network {
        uuid = "${var.openstack_network_id}"
    }
}
```

10.2.2 variables.tf

```
#####
# Copyright: IBM Corp., 2019
#
# Written by: Stephen Poon, Ralf Schmidt-Dannert
#               IBM North America Systems Hardware
#               Power Technical Team, Oracle
#
# Disclaimers:
```

```

# This script is provided as-is to illustrate Oracle Database as a Service
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# is informed of their possibility. Some jurisdictions do not allow the
# exclusion or limitation of incidental or consequential damages, so the
# above exclusion or limitation may not apply to you.
#-----
#####
##      Created 11/18/19 by admin. for oradbaas
##
#####
variable "dbserver_name" {
  type = "string"
  description = " db server VM name prefix. Oracle dbname and a timestamp will be appended in
the PowerVC VM name."
}

variable "openstack_image_name" {
  type = "string"
  description = "PowerVC image name"
}

variable "openstack_flavor_name" {
  type = "string"
  description = "flavor name, or PowerVC compute template)"
}

variable "openstack_network_id" {
  type = "string"
  description = "Network id in PowerVC"
}

variable "dbserver_user_data" {
  type = "string"
  description = "Oracle DB name"
}

locals {
  local_dbserver_ts = "${replace(replace(replace(substr(timestamp(),2,17),"-",
",","),"\T","_"),":","")}"
}

```

10.2.3 outputs.tf

```

#####
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#               IBM North America Systems Hardware
#               Power Technical Team, Oracle
#
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# undergone extended testing of functionality or "fit for purpose" verification

```

```

#
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# is informed of their possibility. Some jurisdictions do not allow the
# exclusion or limitation of incidental or consequential damages, so the
# above exclusion or limitation may not apply to you.
#-----
#####
##      Created 11/18/19 by admin. for oradbaas
##
#####
#####
```

output "dbserver_ipaddr" {
 value = "\${format("%s",join(", ",
 openstack_compute_instance_v2.dbserver.*.network.0.fixed_ip_v4))}"
}

output "dbserver_vm_name" {
 value = "\${format("%s",join(", ", openstack_compute_instance_v2.dbserver.*.name))}"
 description = "VM name in PowerVC"
}

output "dbserver_ts" {
 value = "\${format("\${local.local_dbserver_ts}")}"
}

10.2.4 camtemplate.json

```
{
  "name": "oradbaas",
  "description": "Description for oradbaas.",
  "type": "userCreated",
  "manifest": {
    "template_type": "Terraform",
    "template_format": "HCL",
    "template_provider": "OpenStack"
  },
  "metadata": {
    "bullets": []
  }
}
```

10.2.5 camvariables.json

```
{
  "input_datatypes": [ ],
  "input_namespaces": [ ],
  "output_namespace": "",
  "input_groups": [
    {
      "name": "Input-parameters",
      "label": "Input parameters"
    }
  ],
  "output_groups": [
    {
      "name": "Output-parameters",
      "label": "Output parameters"
    }
  ],
}
```

```

"template_input_params": [
    {
        "name": "dbserver_name",
        "label": "db server VM name prefix",
        "description": " db server VM name prefix. Oracle dbname and a timestamp will be appended in the PowerVC VM name.",
        "type": "string",
        "default": "",
        "validation": "",
        "group_name": "Input-parameters",
        "required": true,
        "secured": false,
        "hidden": false,
        "immutable": false,
        "immutable_after_create": true
    },
    {
        "name": "openstack_image_name",
        "label": "Openstack Image Name",
        "description": "PowerVC image name",
        "type": "string",
        "default": "",
        "validation": "",
        "group_name": "Input-parameters",
        "required": true,
        "secured": false,
        "hidden": false,
        "immutable": false,
        "immutable_after_create": true
    },
    {
        "name": "openstack_flavor_name",
        "label": "Openstack Flavor Name",
        "description": "flavor name, or PowerVC compute template)",
        "type": "string",
        "default": "",
        "validation": "",
        "group_name": "Input-parameters",
        "required": true,
        "secured": false,
        "hidden": false,
        "immutable": false,
        "immutable_after_create": true
    },
    {
        "name": "openstack_network_id",
        "label": "Openstack Network Id",
        "description": "Network id in PowerVC",
        "type": "string",
        "default": "",
        "validation": "",
        "group_name": "Input-parameters",
        "required": true,
        "secured": false,
        "hidden": false,
        "immutable": false,
        "immutable_after_create": true
    },
    {
        "name": "dbserver_user_data",
        "label": "Dbserver User Data",
        "description": "Oracle DB name",
        "type": "string",
        "default": "RSDtest",
        "validation": "",
        "group_name": "Input-parameters",
        "required": true,
        "secured": false,
        "hidden": false,
        "immutable": false,
        "immutable_after_create": true
    }
]

```

```
        "immutable_after_create": true
    }
],
"template_output_params": [
{
    "name": "dbserver_ipaddr",
    "label": "dbserver IP address",
    "description": null,
    "group_name": "Output-parameters",
    "secured": false,
    "hidden": false,
    "shortname": "",
    "type": "string"
},
{
    "name": "dbserver_vm_name",
    "label": "dbserver VM name",
    "description": "VM name in PowerVC",
    "group_name": "Output-parameters",
    "secured": false,
    "hidden": false,
    "shortname": "",
    "type": "string"
},
{
    "name": "dbserver_ts",
    "label": "dbserver ts",
    "description": "internal only - timestamp for output to dbclient",
    "group_name": "Output-parameters",
    "secured": false,
    "hidden": true,
    "shortname": "",
    "type": "string"
}
]
```

10.3 *oraclient* Template files

10.3.1 main.tf

Note that you need to replace the text <MY_NFS_SERVER_IP> to reflect the IP of your NFS server.

```
#####
# Copyright: IBM Corp., 2019
#
# Written by: Stephen Poon, Ralf Schmidt-Dannert
#               IBM North America Systems Hardware
#               Power Technical Team, Oracle
#
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# is informed of their possibility. Some jurisdictions do not allow the
# exclusion or limitation of incidental or consequential damages, so the
# above exclusion or limitation may not apply to you.
#-----
#####
## Deploy LOP with Oracle client and Swingbench for oraclient
##
#####
# Note that the text <MY_NFS_SERVER_IP> needs to be replaced with the
# hostname or IP of your NFS server in the line:
# - mount <MY_NFS_SERVER_IP>:/export/stage /mnt
#####

terraform {
    required_version = "> 0.8.0"
}

provider "openstack" {
    insecure      = true
    version       = "~> 1.2"
}

resource "openstack_compute_instance_v2" "dbclient" {
    name        = "${format("${var.dbclient_name}-${var.dbserver_user_data}-${var.dbserver_ts}")}"
    image_name  = "${var.openstack_image_name_dbclient}"
    flavor_name = "${var.openstack_flavor_name_dbclient}"
    user_data   = <<EOT
#cloud-config
write_files:
    - content: |
        # dbserver parameters
        ${format("export DBNAME=%s", var.dbserver_user_data)}
        ${format("export DBSERVERIPADDR=%s", var.dbserver_ipaddr)}
        export ORASYSPW=oracle
        export SWINGBENCHBINDIR=/opt/swingbench/bin
        path: /root/dbserver.cfg
    - content: |

```

```

cd ~
. ./bash_profile
. ./dbserver.cfg
DBACTIVE=false
MAXLOOP=30
LOOPDELAY=10
i=1
while [ "$DBACTIVE" = false ] && [ "$i" -le $MAXLOOP ] ; do
    sqlplus system/$ORASYSPW@$DBSERVERIPADDR/$DBNAME < /dev/null | grep "Connected to"
    if [ "$?" -eq 0 ]; then
        echo "Oracle DB server active"
        TEMP=`sqlplus -s system/$ORASYSPW@$DBSERVERIPADDR/$DBNAME << EOF1
        set pages 0
        set head off
        set feed off
        select open_mode, database_status, shutdown_pending from v\\$database,
v\\$instance;
        exit
EOF1` 
        TEMP2=`echo $TEMP | tr -d ' '
        if [ "$TEMP2" = "READWRITEACTIVEENO" ]; then
            DBACTIVE=true
            echo "Oracle DB server open in READ WRITE mode"
        fi
        else
            if [ "$i" -eq 1 ]; then
                /bin/echo -e "Waiting for Oracle DB server\c"
            fi
        fi
        sleep $LOOPDELAY
        /bin/echo -e ".\c"
        i=$(( $i + 1 ))
    done
    if [ "$DBACTIVE" = true ]; then
        TEMPFILE_NAME=`sqlplus -s system/$ORASYSPW@$DBSERVERIPADDR/$DBNAME << EOF
        set pages 0
        set head off
        set feed off
        select name from v\\$tempfile;
        exit
EOF` 
        echo tempfile name is = $TEMPFILE_NAME
        sqlplus -s system/$ORASYSPW@$DBSERVERIPADDR/$DBNAME << EOF2
        alter database tempfile '$TEMPFILE_NAME' resize 2G;
        exit
EOF2
        cd $SWINGBENCHBINDIR
        ./oewizard -c ../wizardconfigs/oewizard.xml -bigfile -cl -create -cs
//$/DBSERVERIPADDR/$DBNAME -dbap $ORASYSPW -scale 1 -u soe -p soe -ts soe -tc 16
    else
        echo "Unable to connect to database.. perhaps not active or incorrect connect
information"
        echo "Retries = $i"
    fi
    path: /root/sbsetup.sh
    permissions: '0755'
- content: |
    cd
    . ./dbserver.cfg
    cd $SWINGBENCHBINDIR
    ./oewizard -c ../wizardconfigs/oewizard.xml -cl -drop -cs //$/DBSERVERIPADDR/$DBNAME -
dbap $ORASYSPW -scale 1 -u soe -p soe -ts soe
    path: /root/dropsoe.sh
    permissions: '0755'
- content: |
    cd
    . ./dbserver.cfg
    cd $SWINGBENCHBINDIR
    ./swingbench -cs "//$/DBSERVERIPADDR/$DBNAME"
    cd

```

```

    path: /root/runsb.sh
    permissions: '0755'
runcmd:
- systemctl restart vncserver@:1
- mount <MY_NFS_SERVER_IP>:/export/stage /mnt
- if [ `uname -p` = "ppc64le" ]; then cp /mnt/client/12g/instantclient*.leppc64.*.zip
/root; elif [[ `uname -p` = "ppc64" ]]; then cp /mnt/client/12g/instantclient*.ppc64.*.zip
/root; fi
- unzip -o /mnt/Swingbench/swingbench261076.zip -d /opt
- cd /root; for i in `ls | grep instantclient`; do unzip -o $i -d /opt; rm -f $i; done
- chmod -R 755 /opt/swingbench /opt/instantclient_12_1
- /bin/echo -e "export PATH=\$PATH:/opt/`ls /opt | grep instantclient` \nexport
LD_LIBRARY_PATH=\$LD_LIBRARY_PATH:/opt/`ls /opt | grep instantclient`" >> /root/.bash_profile
- umount /mnt
- cd /root; rm -f instantclient*.zip
- /bin/echo -e "\n*** please wait for sbsetup.sh completion msg.." | wall
- sleep 180; /root/sbsetup.sh >> /root/sbsetup.log 2>&1
- /bin/echo -e "\n*** sbsetup.sh ended. See /root/sbsetup.sh.log." | wall
EOT

network {
    name = "${var.openstack_network_name}"
}
}

```

10.3.2 variables.tf

```

#####
# Copyright: IBM Corp., 2019
#
# Written by: Stephen Poon, Ralf Schmidt-Dannert
#               IBM North America Systems Hardware
#               Power Technical Team, Oracle
#
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# damages, including without limitation, lost profits, lost savings, or any
# incidental, special, or other economic consequential damages, even if IBM
# is informed of their possibility. Some jurisdictions do not allow the
# exclusion or limitation of incidental or consequential damages, so the
# above exclusion or limitation may not apply to you.
#-----
#####
## Deploy LOP with Oracle client and Swingbench for oraclient
##
#####
variable "dbclient_name" {
    type = "string"
    description = "DB client name (VM) on PowerVC"
    default = "dbc"
}

variable "openstack_image_name_dbclient" {
    type = "string"
}
```

```

    description = "PowerVC image name"
}

variable "openstack_flavor_name_dbclient" {
  type = "string"
  description = "PowerVC Compute Template name"
}

variable "openstack_network_name" {
  type = "string"
  description = "PowerVC network name"
}

variable "dbserver_user_data" {
  type = "string"
  description = "Oracle DB name"
}

variable "dbserver_ipaddr" {
  type = "string"
  description = "DB server IP address"
}

variable "dbserver_ts" {
  type = "string"
  description = "Unique id to be appended to db client name"
}

```

10.3.3 outputs.tf

```

#####
# Copyright: IBM Corp., 2019
#
# Written by: Stephen Poon, Ralf Schmidt-Dannert
#               IBM North America Systems Hardware
#               Power Technical Team, Oracle
#
# Disclaimers:
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# undergone extended testing of functionality or "fit for purpose" verification
#
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# above exclusion or limitation may not apply to you.
-----
#####
## Deploy LOP with Oracle client and Swingbench for oraclient
##
#####
output "dbclient_ipaddr" {
  value = "${format("%s",join(",",
openstack_compute_instance_v2.dbclient.*.network.0.fixed_ip_v4))}"
}
```

```

output "dbclient_vm_name" {
  value = "${format("%s",join(", ", openstack_compute_instance_v2.dbclient.*.name))}"
  description = "dbclient VM name"
}

output "dbserver_connect" {
  value = "${format("Swingbench connect string: //%s/%s",var.dbserver_ipaddr,
var.dbserver_user_data)}"
}

```

10.3.4 camtemplate.json

```
{
  "name": "oraclient",
  "description": "Description for oraclient.",
  "type": "userCreated",
  "manifest": {
    "template_type": "Terraform",
    "template_format": "HCL",
    "template_provider": "OpenStack"
  },
  "metadata": {
    "bullets": []
  }
}
```

10.3.5 camvariables.json

```
{
  "input_datatypes": [],
  "input_namespaces": [],
  "output_namespace": "",
  "input_groups": [
    {
      "name": "input-parms",
      "label": "Input parameters"
    }
  ],
  "output_groups": [
    {
      "name": "output_parms",
      "label": "Output parameters"
    }
  ],
  "template_input_params": [
    {
      "name": "dbclient_name",
      "label": "db client VM name prefix",
      "description": "DB client VM name prefix on PowerVC",
      "type": "string",
      "default": "",
      "validation": "",
      "group_name": "input-params",
      "required": true,
      "secured": false,
      "hidden": false,
      "immutable": false,
      "immutable_after_create": true
    },
    {
      "name": "openstack_image_name",
      "label": "Openstack Image Name",
      "description": "PowerVC image name",
      "type": "string",
      "default": "",
      "validation": "",
      "group_name": "input-params",
      "required": true,
      "secured": false,
      "hidden": false,
    }
  ]
}
```

```

    "immutable": false,
    "immutable_after_create": true
},
{
    "name": "openstack_flavor_name",
    "label": "Openstack Flavor Name",
    "description": "flavor name, or PowerVC Compute Template name",
    "type": "string",
    "default": "",
    "validation": "",
    "group_name": "input-params",
    "required": true,
    "secured": false,
    "hidden": false,
    "immutable": false,
    "immutable_after_create": true
},
{
    "name": "openstack_network_id",
    "label": "Openstack Network id",
    "description": "PowerVC network id",
    "type": "string",
    "default": "",
    "validation": "",
    "group_name": "input-params",
    "required": true,
    "secured": false,
    "hidden": false,
    "immutable": false,
    "immutable_after_create": true
},
{
    "name": "dbserver_user_data",
    "label": "DB Server's DB name",
    "description": "Oracle DB name",
    "type": "string",
    "default": "",
    "validation": "",
    "group_name": "input-params",
    "required": true,
    "secured": false,
    "hidden": false,
    "immutable": false,
    "immutable_after_create": true
},
{
    "name": "dbserver_ipaddr",
    "label": "DB Server ip address",
    "description": "DB server IP address",
    "type": "string",
    "default": "",
    "validation": "",
    "group_name": "input-params",
    "required": true,
    "secured": false,
    "hidden": false,
    "immutable": false,
    "immutable_after_create": true
},
{
    "name": "dbserver_ts",
    "label": "unique id in dbclient VM name",
    "description": "Unique id to be appended to db client VM name prefix",
    "type": "string",
    "default": "",
    "validation": "",
    "group_name": "input-params",
    "required": false,
    "secured": false,
    "hidden": false,

```

```

        "immutable": false,
        "immutable_after_create": false
    }
],
"template_output_params": [
{
    "name": "dbclient_ipaddr",
    "label": "DB client IP address",
    "description": "dbclient IP address",
    "group_name": "output_parms",
    "secured": false,
    "hidden": false,
    "shortname": "",
    "type": "string",
    "default": "",
    "validation": "",
    "required": true,
    "immutable": false,
    "immutable_after_create": false
},
{
    "name": "dbclient_vm_name",
    "label": "DB client VM name",
    "description": "dbclient VM name",
    "group_name": "output_parms",
    "secured": false,
    "hidden": false,
    "shortname": "",
    "type": "string",
    "default": "",
    "validation": "",
    "required": true,
    "immutable": false,
    "immutable_after_create": false
},
{
    "name": "dbserver_connect",
    "label": "Oracle db jdbc connect string",
    "description": "Oracle database jdbc connect string",
    "group_name": "output_parms",
    "secured": false,
    "hidden": false,
    "shortname": "",
    "type": "string",
    "default": "",
    "validation": "",
    "required": true,
    "immutable": false,
    "immutable_after_create": false
},
{
    "name": "dbclient_vnc",
    "label": "dbclient VNC host display",
    "description": "dbclient VNC server and display number",
    "group_name": "output_parms",
    "secured": false,
    "hidden": false,
    "shortname": "",
    "type": "string",
    "default": "",
    "validation": "",
    "required": true,
    "immutable": false,
    "immutable_after_create": false
}
]
}

```

10.4 Service definition

10.4.1 oradbaas_oraclient.json

```
{  
  "service": {  
    "specVersion": "v3",  
    "catalog_metadata": {  
      "name": "Oracle 12C on AIX with Swingbench Client on LoP",  
      "description": "Deploys an AIX VM running Oracle database 12c and a Linux on Power VM  
with Oracle Instant Client and Swingbench.",  
      "image": "serviceicon_1.svg",  
      "category": "WSC cam demo",  
      "bullets": [],  
      "providerDisplayName": "IBM",  
      "longDescription": "",  
      "documentationUrl": "",  
      "supportUrl": "",  
      "bindable": false,  
      "updatable": "",  
      "systemTags": true,  
      "author": "admin"  
    },  
    "tags": [  
      {  
        "name": "request_group",  
        "label": "request_group",  
        "type": "string",  
        "immutable": true,  
        "hidden": false,  
        "required": false,  
        "secured": false,  
        "description": "The current context group id of the current user that requested the  
provisioning of the template. This is important because a user may be part of more than one  
group and this identifies the context of which group the user made the request.",  
        "isSystemTag": true,  
        "default": "${svc_instance.group}",  
        "customtype": "string",  
        "permission": "Read-Only"  
      },  
      {  
        "name": "request_user",  
        "label": "request_user",  
        "type": "string",  
        "immutable": true,  
        "hidden": false,  
        "required": false,  
        "secured": false,  
        "description": "The user id of the current user that requested the provisioning of  
the template.",  
        "isSystemTag": true,  
        "default": "${svc_instance.owner}",  
        "customtype": "string",  
        "permission": "Read-Only"  
      },  
      {  
        "name": "service_name",  
        "label": "service_name",  
        "type": "string",  
        "immutable": true,  
        "hidden": false,  
        "required": false,  
        "secured": false,  
        "description": "Name provided for the service instance by the end user at time of  
request",  
        "isSystemTag": true,  
        "default": "${svc_instance.name}",  
        "customtype": "string",  
        "permission": "Read-Only"  
      },  
      {
```

```

        "name": "service_identifier",
        "label": "service_identifier",
        "type": "string",
        "immutable": true,
        "hidden": false,
        "required": false,
        "secured": false,
        "description": "Unique identifier generated by ICAM which is mapped to the service instance of the template provisioned.",
        "isSystemTag": true,
        "default": "${svc_instance.service_instance_id}",
        "customtype": "string",
        "permission": "Read-Only"
    }
],
"actions": [
{
    "type": "provision",
    "name": "Provision",
    "description": "Default action for deployment of service",
    "input_parameters": [
    {
        "name": "dbserver_user_data",
        "label": "Oracle dbname",
        "customtype": "string",
        "type": "string",
        "immutable": false,
        "hidden": false,
        "required": true,
        "secured": false,
        "description": "Oracle DB name",
        "view": "create new",
        "default": "RSDtest"
    }
],
"flow": {
    "conditions": [],
    "templates": [
    {
        "oradbaas": {
            "title": "oradbaas_56f6b8",
            "template_name": "oradbaas",
            "version": "master",
            "id": "oradbaas13c2cfb6",
            "template_type": "Terraform",
            "template_content_type": "OpenStack",
            "template_provider": "OpenStack",
            "instance_name": "dbs",
            "cloud_connection_name": "PowerVCDev",
            "template_data_objects": {},
            "template_params": {
                "dbserver_name": "dbs",
                "openstack_image_name": "DBaaSv3_Ora_SSD",
                "openstack_flavor_name": "ora_dbaas",
                "openstack_network_id": "464aceff-141d-453d-a40b-7008d9c06614",
                "dbserver_user_data": "${input_parameters.dbserver_user_data}"
            },
            "outputs": [
                "dbserver_ipaddr",
                "dbserver_vm_name",
                "dbserver_ts"
            ],
            "error": false,
            "isErrorFlow": false,
            "warning": false
        }
    },
    {
        "oraclient": {
            "title": "oraclient_384925",

```

```

        "template_name": "oraclient",
        "version": "master",
        "id": "oracliend1356a5d",
        "template_type": "Terraform",
        "template_content_type": "OpenStack",
        "template_provider": "OpenStack",
        "instance_name": "dbc",
        "cloud_connection_name": "PowerVCDev",
        "template_data_objects": {},
        "template_params": {
            "dbclient_name": "dbc",
            "openstack_image_name_dbclient": "img_rhel76le_pvcdev",
            "openstack_flavor_name_dbclient": "small",
            "openstack_network_name": "AON_93",
            "dbserver_user_data": "${templates.oradbaas13c2cfb6.dbserver_user_data}",
            "dbserver_ipaddr": "${templates.oradbaas13c2cfb6.output.dbserver_ipaddr}",
            "dbserver_ts": "${templates.oradbaas13c2cfb6.output.dbserver_ts}"
        },
        "outputs": [
            "dbclient_ipaddr",
            "dbclient_vm_name",
            "dbserver_connect"
        ],
        "error": false,
        "isErrorFlow": false,
        "warning": false
    }
},
],
"resthooks": [],
"notifications": [],
"sequence": {
    "0": "oradbaas13c2cfb6",
    "1": "oracliend1356a5d"
},
"error_sequence": {}
},
"output_parameters": [
{
    "name": "dbserver_ipaddr",
    "label": "DB server IP address",
    "customtype": "string",
    "type": "string",
    "immutable": true,
    "hidden": false,
    "required": false,
    "secured": false,
    "description": "DB server IP address",
    "default": "${templates.oradbaas13c2cfb6.output.dbserver_ipaddr}"
},
{
    "name": "dbserver_vm_name",
    "label": "DB server VM name",
    "customtype": "string",
    "type": "string",
    "immutable": true,
    "hidden": false,
    "required": false,
    "secured": false,
    "description": "DB server VM name in PowerVC",
    "default": "${templates.oradbaas13c2cfb6.output.dbserver_vm_name}"
},
{
    "name": "dbclient_ipaddr",
    "label": "dbclient IP address",
    "customtype": "string",
    "type": "string",
    "immutable": true,
    "hidden": false,
    "required": false,
    "secured": false
}
]

```

```

        "secured": false,
        "description": "DB client IP address",
        "default": "${templates.oracliend1356a5d.output.dbclient_ipaddr}"
    },
    {
        "name": "dbclient_vm_name",
        "label": "DB client VM name",
        "customtype": "string",
        "type": "string",
        "immutable": true,
        "hidden": false,
        "required": false,
        "secured": false,
        "description": "DB client VM name in PowerVC",
        "default": "${templates.oracliend1356a5d.output.dbclient_vm_name}"
    },
    {
        "name": "ora_dbname",
        "label": "Oracle dbname",
        "customtype": "string",
        "type": "string",
        "immutable": true,
        "hidden": false,
        "required": false,
        "secured": false,
        "description": "Oracle dbname",
        "default": "${templates.oradbaas13c2cfb6.output.dbserver_user_data}"
    },
    {
        "name": "oradb_connect",
        "label": "Oracle DB connect string",
        "customtype": "string",
        "type": "string",
        "immutable": true,
        "hidden": false,
        "required": false,
        "secured": false,
        "description": "Oracle DB connect string",
        "default": "${templates.oracliend1356a5d.output.dbserver_connect}"
    }
]
}
],
"plans": [
{
    "name": "Standard",
    "description": "To deploy a Standard plan",
    "actions": [],
    "plan_parameters": []
}
]
}
}

```

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