White paper Cisco public IIIII CISCO The bridge to possible

Cisco Intersight Kubernetes Service (IKS) with Azure Arc-enabled Data Services

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Purpose of this document

This document describes the steps to deploy Azure Arc-enabled data services on Cisco Intersight^s Kubernetes Services (IKS) running on premises or at the edge.

Customers can confidently deploy this solution because it has been successfully validated by Microsoft's Azure Arc-enabled Kubernetes and Data Services Validation Program. The solution has been validated with Cisco IKS deployed on top of VMware ESXi hypervisors and Cisco Intersight Workload Engine (IWE).

The benefits of this validated solution to customers include a database-as-a-service offering, elastic scale, built-in capabilities such as high availability, and unified management for data workloads running on Cisco IKS enabled for Azure Arc data services. Cisco IKS integrates the Kubernetes lifecycle management capabilities into the Intersight hybrid-cloud platform to offer Kubernetes as a service. It enables customers to deploy quickly and easily and manage the lifecycle of Kubernetes clusters across the globe using a single cloud portal – Cisco Intersight.

Audience

The intended audience of this document includes but is not limited to cloud and database administrators, IT architects and managers, sales engineers, partner engineering, and customers who want to deploy Azure Arc hybrid offerings and services on Cisco IKS.

Introduction

Cisco <u>Intersight</u> is an API-driven, cloud-based, Software-as-a-Service (SaaS) hybrid-cloud operations platform. It delivers intelligent automation, observability, and optimization for traditional and cloud-native applications and infrastructure.

Cisco Intersight Kubernetes Service (IKS) introduces lifecycle management capabilities allowing customers to quickly provision, deploy, and easily manage multicluster Kubernetes across multiple clouds globally using Cisco Intersight. IKS also has a full stack of observability, monitoring, and logging for Kubernetes management.

Azure Arc is an offering of Azure service that simplifies the governance and management of complex and distributed environments across on-premises, edge, and multicloud sites. It provides a single pane of glass by projecting your non-Azure, on-premises, and other cloud resources (such as AWS, Google Cloud Platform, etc.) into Azure Resource Manager.

With Azure Arc you can:

- Easily organize, govern, and secure servers (Windows and Linux), SQL Servers, and Kubernetes clusters across data centers, the edge, and multicloud environments and use Azure tools such as Azure Policy and Azure Resource Graph with both traditional and cloud workloads.
- Ensure consistent deployments and configuration deploy and manage Kubernetes applications with GitHub and Azure Policy. Ensure that applications and clusters are consistently deployed and configured at scale from source control.
- Automate and enforce policies to meet data governance and security requirements, and manage costs efficiently. Get the latest cloud innovation and automation, elastic scale, and unified management for data workloads that are running across hybrid infrastructure.

Azure Arc-enabled Kubernetes

Using Azure Arc, organizations can connect Kubernetes clusters located anywhere to Azure. You can manage clusters in a consistent way. Azure Arc-enabled Kubernetes lets you control the cluster configuration and workloads at scale, using git repositories for the clusters. It also lets organizations use management capabilities in Azure for cluster management needs such as inventory, monitoring, policy compliance, security, user access, and more.

Azure Arc-enabled data services

Azure Arc-enabled data services make it possible to run Azure data services such as Azure Arc-enabled-SQL Managed Instance and Azure Arc-enabled PostgreSQL Hyperscale. You can run these systems on premises, at the edge, in Azure, and in other public clouds. Using Kubernetes allows you to use the infrastructure of your choice. You get an always-current, elastically scaled, self-provisioning deployment. You also get a unified command-line and graphical management and monitoring system. Azure Arc-enabled data services have both <u>direct and indirect connected modes</u>. Azure Arc-enabled data services also provide deep security and compliance monitoring.

Azure Arc-enabled Kubernetes and data services validation program

Azure Arc-enabled Kubernetes works with any Cloud Native Computing Foundation (CNCF)-certified Kubernetes clusters. The Azure Arc team has worked with Cisco and other industry partners to validate conformance of their Kubernetes distributions with Azure Arc-enabled Kubernetes

Cisco successfully validated and passed the conformance tests of Azure Arc-enabled Kubernetes for the two standard IKS deployments: (1) IKS with VMware ESXi, and (2) IKS with Cisco Intersight Workload Engine (IWE). For more information on Azure Arc service and technology partners and the validated distributions, refer to the following <u>links</u>:

Azure Arc service and technology partners

Azure Arc-enabled Kubernetes validation program

Azure Arc-enabled data services validation program

Azure Arc-enabled data services validation program

The Azure Arc-enabled data services team has also worked with industry partners to validate specific distributions and solutions to host Azure Arc-enabled data services. This validation extends the Azure Arc-enabled Kubernetes validation for the data services. The below link provides information on partner solutions, versions, Kubernetes versions, SQL engine versions, and PostgreSQL Hyperscale versions that have been verified to support the data services.

The conformance tests run as part of the Azure Arc-enabled data services validation. A prerequisite to running these tests is to pass on the Azure Arc-enabled Kubernetes tests for the Kubernetes distribution in use. These tests verify that the product is compliant with the requirements of running and operating data services. This process helps assess if the product is enterprise ready for deployments.

The validation tests for data services on Cisco IKS covered the following in indirectly connected mode

- Deploy data controller in indirect mode
- Deploy Azure Arc-enabled SQL Managed Instance

Plan an Azure Arc-enabled data services deployment

Careful planning and preparing the infrastructure to support the database workloads based on your business requirements is required to deploy Azure Arc-enabled data services. For more information on planning to deploy Azure Arc-enabled data services, refer to this link.

This document covers the steps to deploy Azure Arc-enabled data services on Cisco IKS in the following way:

- Connect an existing Cisco Intersight Kubernetes Service (IKS) cluster to Azure Arc
- Deploy the Azure Arc-enabled data controller (in direct connectivity mode)
- Deploy an Azure Arc-enabled SQL managed instance

Connect an existing Cisco Intersight Kubernetes Service (IKS) cluster to Azure Arc

To deploy Cisco IKS and connect the cluster to Azure using Azure Arc-enabled Kubernetes, refer to the white paper "Azure Arc-enabled Kubernetes with Cisco IKS".

Deploy the Azure Arc-enabled data controller (direct connectivity mode)

This section describes how to prepare and deploy a data controller for Azure Arc-enabled data services in direct-connect mode from the Azure portal. Deploying an Azure Arc data controller requires additional understanding and concepts as described in <u>Plan to deploy Azure Arc-enabled data services</u>.

Install tools

- On your administration workstation:
- Install client tools for creating and managing Azure Arc-enabled data services
- Install arcdata extension (Azure CLI)
- Download and install Azure Data studio.

Prerequisites

The prerequisites for creating Azure Arc data controller in direct connectivity mode include:

Access to your Kubernetes cluster

Run the following command to make sure you have access and are connected to your Kubernetes cluster on which you want to deploy Azure Arc-enabled data services:

```
> kubectl cluster-info
```

> kubectl config view

Login and set Azure subscription

Run the commands below on your administration workstation to log in to Azure and set the subscription.

```
> az login
```

> az account set --subscription xxxxxxxx-xxxx-xxxx-xxxx-xxxxx

Connect the Kubernetes cluster to Azure using Azure Arc-enabled Kubernetes

To deploy Cisco IKS and connect to Azure Arc, refer to the section above: "<u>Connect an existing Cisco Intersight</u> <u>Kubernetes Service (IKS) cluster to Azure Arc</u>".

For this documentation purpose, we are using the Cisco IKS cluster named "sn-arc-iwe-glxy" as shown in the figure below for deploying the Azure Arc data controller.



This Cisco IKS cluster is already connected to Azure using Azure Arc-enabled Kubernetes, as shown in the figure below. The Azure Arc-enabled Kubernetes cluster "sn-arc-iwe-glxy" is placed in the "az-arc-iks-proxy" resource group, and the status of the projected cluster is "Connected."

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Home > sn-arc-iwe-glxy ☆ Kubernetes - Azure Arc							
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Activity log	Resource group az-arc-iks-proxy				Last 17:27	connec 7:16. 25	tivity time /03/2022
Access control (IAM)	Status				Distr	ibution	,,
Tags	Connected				gene	eric	
Diagnose and solve problems	Location East US				Infra: gene	structu ric	re
Security (preview)	Subscription <u>CloudNativeSolutions</u>				Ager 1.6.6	nt versio	on
Kubernetes resources (preview)	Subscription ID				Kube	ernetes	version
Namespaces					1.20.	14	
South Workloads	Tags (<u>edit</u>)						
Workloads	Datacenter : galaxy proxy : no						
Services and ingresses							

Create Azure Arc data controller in direct connectivity mode from Azure portal

1. Log in to the Azure portal. Locate and open "Azure Arc" from Azure services.

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	Azure services										
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	Create a resource	Azure Arc	Resource groups	Monitor	Subs	cription	IS	Azure Direc	Active tory	1	Managed dentities
	8	[Å]	\rightarrow								
	Custom locations	Management groups	All services								

2. Select Management > Data Controllers and click on "Create Azure Arc data controller" button.

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80 880 800	Kubernetes clusters		Create	an Azure Arc o	data contro	oller to enable	Azure o	data ser	vices ir	າ the Kເ	ubernet	es enviro
	Servers					Creat	e Azure	Arc da	ta cont	roller		
	SQL Servers						Lea	arn mor	e 🖉			

3. Select "Azure Arc-enabled Kubernetes cluster (Direct connectivity mode)" and click Next.



- 4. In the Data controller details section, specify the details below by replacing the values as per your environment and click Next to provide additional details:
 - Select the subscription and resource group where the Azure Arc-enabled Cisco IKS is deployed from the drop-down button
 - Specify a name for the data controller
 - Specify a custom location (namespace). If not available, create a new one.

Custom location * (i)	blrlab-3 (arcds)	\sim
Ċ	Create new custom location	nted with the selected custon
	Name *	
Kubernetes configuration	glxy-lab 🗸	
Select a template appropriate for your clust	Cluster * (i) sn-arc-iwe-glxy	
Kubernetes configuration template * 🕦	Namespace * (i)	\sim
	alxv-lab 🗸	

• In the Kubernetes configuration, select "azure-arc kubeadm" as the template, "onpremises" for infrastructure, and "default" storage class for both data and log. To find out the storage classes available in your cluster, run the command below:

> kubectl get s	SC								
snaldurg@SNALDURG-M-WH74 ~ % kubectl get sc									
NAME	PROVISIONER	RECLAIMPOLICY	VOLUMEBINDINGMODE	ALLOWVOLUMEEXPANSION	AGE				
default	csi-hxcsi	Delete	Immediate	false	25d				
standard (default)	csi-hxcsi	Delete	Immediate	false	28d				

• Select a Service type and enter Metrics and Logs dashboard credentials and click Next.

≡ Microsoft Azure 🖉 Searc	:h resources, services, and docs (G+/)
Home > Azure Arc >	
Create Azure Arc data	controller
Prerequisites 2 Data controlle	er details (3) Additional Settings (4) Tags (5) Review + Create
Create an Azure Arc data controller to en	able Azure data services in the Kubernetes environment of your choice.
Project details	
Select the subscription to manage deploy manage all your resources.	ved resources and costs. Use resource groups like folders to organize and
Subscription *	CloudNativeSolutions
Resource group * ①	az-arc-iks-proxy V
Data controller details	
Provide a name to identify your data con	troller for remote management and monitoring.
This data controller will be installed i This connectivity mode will allow you Managed Instance and Arc-enabled	n direct connectivity mode to an existing Azure Arc-enabled Kubernetes cluster. u to create and manage Arc-enabled data services, such as Arc-enabled SQL PostgreSQL Hyperscale, directly from the Azure portal.
Data controller name *	arc-glxy-dc 🗸
Custom location A custom location is an Azure resource th controller will be hosted. Learn more abo	nat represents the namespace on your Kubernetes cluster where the data ut custom locations
	Create new
Kubernetes configuration	
Select a template appropriate for your cit	Ister configuration.
Kubernetes configuration template * ()	azure-arc-kubeadm
Infrastructure *	onpremises V
Data storage class * ①	default 🗸
Log storage class * 🛈	default 🗸
Service type *	Node port: Exposes the service on each node's IP at a static port.
	 Load balancer: Exposes the service externally through a load balancer.
Metrics and Logs Dashboard Credent	ials
Username * ①	logadmin 🗸
Password * ①	······· ✓
< Previous Next : Additional S	iettings >

5. In Additional settings, provide the Log Analytics workspace, ID, and primary key and click Next.

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Hor	ne > Azure Arc >				
Cr	eate Azure A	rc data controller			
ø	Prerequisites 🛛 📀 🛛	Data controller details Additional Settings Additional Settings Review + Create			
Co	nfigure optional settings	s for metrics and logs upload below.			
M	etrics upload				
Yo ale to	u may choose to automa erts, send notifications, o the Managed Identity of	atically upload your metrics to Azure Monitor so you can aggregate and analyze metrics, raise or trigger automated actions. The required Monitoring Metrics Publisher role will be granted f the extension.	1		
En	able metrics upload				
Lo	gs upload				
Yo	u may choose to automa orkspace information bel	atically upload logs to an existing Log Analytics workspace. To enable, provide Log Analytics low.			
En	able logs upload				
Lo	g Analytics workspace	DefaultWorkspace-0f03ee59-b846-475f-acb1-68202f100c8e-EUS	-		
Lo	g Analytics workspace ID) * d12fe361-19e4-4410-9aa9-f888ede740c3 ~	·		
Lo	g Analytics primary key *	*	·]		
	< Previous Next	t : Tags >			

- 6. Add tags, if any, to categorize resources and click Next.
- 7. In the Review + Create section, review the details and click Create.



8. The deployment of the data controller begins; it takes a few minutes to complete. Click on "Go to resource group" when it is done.

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Home > arc-glxy-dc Overview Deployment	V \$							
✓ Search (Cmd+/) «	📋 Delete 🚫 Cancel ሰ Redeploy 💍 Refresh							
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📄 Template	Deployment name: arc-glxy-dc Start time: 3/21/2022, 7:20:56 PM Subscription: CloudNativeSolutions Resource group: az-arc-iks-proxy							
	 Deployment details (Download) 							
	Resource Type Status			Ope	eration det	ails		
	Second Second Action Action Contract Action Co			Оре	eration deta	ails		
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	Solution glxy-lab-ext Microsoft.KubernetesConfigu OK			Оре	eration deta	ails		
	∧ Next steps							
	Go to resource group							

9. In the resource group, click on the newly deployed data controller resource to view the details. The data controller status should be in "Ready" state.



10. Check the status using the kubectl CLI by running the following commands to see if the namespace mentioned above is created and that the data controller and all pods in that namespace are in ready and running states, respectively, as shown below

```
> kubectl get ns
[[snaldurg@galaxy.cisco.com@GFFA-LNX-2 testsuite]$ kubectl get ns
NAME
                   STATUS
                             AGE
azure-arc
                   Active
                             28m
default
                   Active
                             21d
glxy-lab
                   Active
                             113s
iks
                   Active
                             21d
kube-node-lease Active
                             21d
kube-public
                   Active
                             21d
kube-system
                   Active
                             21d
> kubectl -n glxy-lab get datacontrollers
[[snaldurg@galaxy.cisco.com@GFFA-LNX-2 testsuite]$ kubect1 -n glxy-lab get datacontroller
NAME
           STATE
arc-glxy-dc Ready
> kubectl get pods -n glxy-lab
[[snaldurg@galaxy.cisco.com@GFFA-LNX-2 testsuite]$ kubectl get pods -n glxy-lab
NAME
                          READY STATUS RESTARTS AGE
                                               6m58s
bootstrapper-fd75f888-s25cw 1/1
                                Running 0
Running 0
control-86wpj
                          2/2
controldb-0
                          2/2
                                Running 0
                                                   6m58s
                          3/3
                                 Running 0
logsdb-0
                                                   5m8s
logsui-qdqnp
                          3/3
                                 Running
                                          0
                                                    3m5s
                                 Running 0
metricsdb-0
                          2/2
                                                    5m8s
metricsdc-755bd
                          2/2
                                  Running 0
                                                    5m8s
metricsdc-sb2tt
                                  Running 0
                          2/2
                                                    5m8s
metricsdc-sf6vg
                           2/2
                                  Running
                                          0
                                                    5m8s
metricsui-cvzjc
                          2/2
                                  Running 0
                                                    5m8s
```

Create an Azure SQL-managed instance on Azure Arc

Prerequisites

- 1. Install tools Azure CLI, Azure Data Studio, and the required extensions. Follow this link to install client tools.
- 2. An Azure Arc data controller is already installed.

Create an Azure SQL-managed instance from Azure portal

This section provides steps to create an Azure SQL-managed instance on Azure Arc using an Azure portal.

1. In Azure portal, open Azure Arc services as shown in the figure below, and click on Create SQL managed instance – Azure Arc.



- 2. In the Basics section of the Create Azure SQL Managed Instance Azure Arc page, do the following:
 - Select the subscription and resource group from the dropdown list where the data controller is deployed. Use the same values that were set in the previous section.
 - Set a name for the SQL-managed instance, and select a custom location from the dropdown list associated with Azure Arc-enabled Kubernetes and also where the data controller is deployed.
 - Set the Node Port as Kubernetes service type.
 - Edit the Compute + Storage information as per your requirements, or leave it to the defaults.
 - Provide credentials for the managed instance administrator account.

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Home > Azure Arc > Create Azure SQL Ma Microsoft	naged Instance - Azure Arc		
Basics Tags Review + create			
Deploy an Azure Arc-enabled SQL Mai	naged Instance in the Kubernetes environment of your choic	e. Learn more	
Project details			
Select the subscription to manage dep manage all your resources.	loyed resources and costs. Use resource groups like folders	to organize and	
Subscription * 🛈	CloudNativeSolutions	\checkmark	
Resource group * ①	az-arc-iks-proxy	\checkmark	
Managed Instance details			
Instance name * 🥡	sqldemo1-glxy	\checkmark	
Custom location * 🛈	glxy-lab (glxy-lab)	\checkmark	
You can only deploy to custom lo	cations that you have access to and for which a data controller ha	as been configured.	
Service type * (i)	NodePort .	\sim	
Compute + Storage ①	4 vCores, 8 Gi memory Configure compute + storage		
Administrator account			
Managed Instance admin login *	sqladmin	\checkmark	
Password *	••••••	~	

- 3. Click Next.
- 4. Enter any tag-related information in the "Tags" section, and click on Next. This step is optional.

- 5. In the "Review + create" section, verify the details, and click on the "Create" button.
- 6. Wait for the completion of the creation of a SQL-managed instance, as shown in the figure below.

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Home >											
Sqldemo1-glxy	Overvie	ew ☆ …									
Search (Cmd+/)) « 📋	📋 Delete 🚫 Cancel 🏦 Redeploy 🏷 Refresh									
👶 Overview	0	We'd love your feedback! \rightarrow									
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Template	R	Deployment name: sqldemo1-glxy Subscription: CloudNativeSolutions Resource group: az-arc-iks-proxy	Sta Co	rrt time: 3/2 rrelation ID:	/2022, 8: 25bd40f0	:00:52 PM 0-a348-41	8d-8cbf-cb103b2c9f30				
	^	Deployment details (Download)									
		Resource Type		Sta	tus		Operation details				
		Sqldemo1-glxy Micros	soft.AzureAr	cData OK			Operation details				
	^	Next steps									
		Go to resource									

7. Once the deployment is complete, click on the "Go to resource" button to see the details of the installed instance. Note down the "External endpoint" details required to connect using a SQL client such as Azure Data Studio.



8. To verify the instance has been created, and also to check the pod deployment of SQL, enter the following commands:

> kubectl get sqlmi -n glxy-lab

snaldurg@SNALDU	RG-M-WH74	~ %	kubectl	get	sqlmi	-n	glxy-la	b
NAME	STATUS	REPI	LICAS	PRIMA	ARY-ENI	DPO1	INT	AGE
sqldemo1-glxy	Ready	1		10.10	0.52.1	16,3	32202	6d22h

> kubectl get all -n glxy-lab

[snaldurg@galaxy.cisco.com@GF	FA-LNX-2 te	stsuite]\$	kubectl get	all -n glxy-lab			
NAME	READY	STATUS	RESTARTS	AGE			
pod/bootstrapper-fd75f888-s25	cw 1/1	Running	0	44m			
pod/control-86wpj	2/2	Running	0	42m			
pod/controldb-0	2/2	Running	0	42m			
pod/logsdb-0	3/3	Running	0	40m			
pod/logsui-qdqnp	3/3	Running	0	38m			
pod/metricsdb-0	2/2	Running	0	4 0 m			
pod/metricsdc-755bd	2/2	Running	0	4 0 m			
pod/metricsdc-sb2tt	2/2	Running	0	4 0 m			
pod/metricsdc-sf6vg	2/2	Running	0	4 0 m			
pod/metricsui-cvzic	2/2	Running	0	40m			
pod/sgldemol-glxy-0	4/4	Running	0	4m3s			
pod/sgldemol-glxv-ha-0	2/2	Running	0	4m3s			
		,					
NAME	TYI	E (CLUSTER-IP	EXTERNAL-IP	PORT(S)		AGE
service/arc-webhook-svc	Clu	sterIP	100.65.75.11	7 <none></none>	443/TCP		42m
service/controldb-svc	Clu	sterIP	100.65.32.17	4 <none></none>	1433/TCP,8311/TCP,8411/T	CP	42m
service/controller-external-s	vc Nod	lePort	100.65.11.12	6 <none></none>	8443:30080/TCP		42m
service/controller-svc	Clu	sterIP	100.65.122.9	<none></none>	443/TCP,8311/TCP,8301/TC	P,8411/TCP,8401/TCP	42m
service/logsdb-svc	Clu	sterIP	100.65.6.223	<none></none>	9200/TCP		40m
service/logsui-external-svc	Noc	lePort	100.65.178.6	8 <none></none>	5601:31053/TCP		40m
service/logsui-svc	Clu	sterIP	100.65.170.2	36 <none></none>	5601/TCP		40m
service/metricsdb-svc	Clu	sterIP	100.65.243.2	30 <none></none>	8086/TCP		40m
service/metricsui-external-sv	c Noo	lePort	100.65.89.55	<none></none>	3000:31054/TCP		40m
service/metricsui-svc	Clu	sterIP	100.65.247.8	4 <none></none>	3000/TCP		40m
service/saldemol-alxy-externa	l-svc Nor	lePort	100.65.221.1	93 <none></none>	1433:32202/TCP.5022:3253	1/TCP	4m10s
service/sqldemol_glxy-ba_syc	Clr	sterTP	100.65.237.2	2 <none></none>	8080/TCP		4m9s
service/sqldemol_glxy_na_svc	Cli	sterTP	100.65.179.2	26 <none></none>	1433/TCP. 1533/TCP		4m9e
service/sqldemol_glxy_porc	Cli	sterTP 1	None	<none></none>	1533/702		4m10g
bervice, bqidemoi-gixy-bve	010	beerr .	aone	41101102	1555,101		4111100
NAME DE	SIRED CUP	RENT REA	ADY UP-TO-	DATE AVAILABLE	NODE SELECTOR	AGE	
daemonset.apps/metricsdc 3	3	3	3	3	kubernetes.io/os=linux	40m	
	-	-	-	-			
NAME	READY U	P-TO-DATE	AVAILABLE	AGE			
deployment.apps/bootstrapper	1/1 1		1	44m			
NAME		DESIRED	CURRENT R	EADY AGE			
replicaset.apps/bootstrapper-	fd75f888	1	1 1	4.4 m			
replicaset.apps/control		1	1 1	42m			
replicaset apps/loggui		1	1 1	3.8m			
replicaset apps/metricsui		1	1 1	40m			
repricasectapps/meetrosar		-		4 0 11			
NAME	READ	Y AGE					
statefulset.anns/controldh	1/1	42m					
statefulset apps/logsdb	1/1	40m					
statefulset anns/metricedb	1/1	40m					
statefulset apps/metricsub	v 1/1	4m4c					
statefulset apps/squuemol-gix	y_ha_1/1	4m4s					
scacerarsec.abbs/sdragmo1-dix	y-110 1/1	ama B	-				

> az sql mi-arc list --k8s-namespace glxy-lab --use-k8s

[[snalurg@galaxy.cisco.com@GFFA-LNX-2 testsuite]\$ az sql mi-arc list --k8s-namespace glxy-lab --use-k8s {
 "name": "sqldemo1-glxy",
 "primaryEndpoint": "10.100.52.16,32202",
 "replicas": "1/1",
 "state": "Ready"
}

```
}
```

]



Monitor and manage Azure Arc resources using Azure Data Studio

Azure Data Studio is a client tool used to connect to and view information about your Azure Arc resources from your local environment. This section provides steps to connect to an existing Azure data controller and SQL-managed instances using Azure Data Studio.



1. Launch Azure Data Studio on your administration workstation.

 Select the Connections tab on the left navigation pane and expand the Azure panel. Click on the "+" button next to the Azure panel to sign in to your Azure subscription where the Azure data controller and SQL-managed instance are deployed. 3. Next, select the Connections tab on the left navigation pane, and expand the Azure Arc Controllers panel. Click on the "+" next to Azure Arc Controllers panel to connect to an existing Azure Arc controller.



- 4. In the Connect to Existing Controller wizard on the right-side pane, enter the following details and click on the Connect button:
- Namespace where the data controller and SQL-managed instance are deployed
- Kube Config File Path path to the kubeconfig file of the cluster
- Cluster Context Select the correct cluster context from multiple cluster contexts configured in the above kubeconfig file
- Name enter the name of the existing Azure data controller

••	•	Welcome
	CONNECTIONS ····	Connect to Existing Controller
	 ✓ SERVERS Add Connection ✓ AZURE → @ Sanjeev Naldurgkar (snaldurg) - snal 	Namespace • glxy-lab Kube Config File Path • /Users/snaldurg/.kube/config Browse Cluster Context • (admin@sn-arc-iwe-glxy) Name (2) arc-glxy-dc
8	✓ AZURE ARC CONTROLLERS + p ⁵ No Azure Arc controllers registered. Learn More Connect Controller	
کریخ ⊗ 0	▲ 0	Connect Cancel

5. On successful connection, the Azure Arc data controller is now seen under the Azure Arc Controllers panel in the Connections tab in the left navigation pane. Expand the data controller under the Azure Arc Controllers panel to view all the SQL managed instances deployed under it.

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6. Right-click on the data controller as shown in the figure below, and click on Manage to open the Azure Arc Data Controller Dashboard on the right side of the navigation page.



 Similarly, you can right-click on the SQL-managed instance, and click on Manage, to open the SQLmanaged instance - Azure Arc Dashboard. On the overview tab, you can view details about the SQL-managed instance, as shown in the figure below.

• •	•	SQL managed instance - Azu	ure Arc Dashboard (Previe	ew) - sqldemo1-glxy	
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2	Add Connection	Uverview	Resource Group	Status	
		Settings	az-arc-iks-proxy Data controller arc-glxy-dc	Ready Region East US	
þ		Connection Strings	Subscription ID 0f03ee59-b846-475f	Managed instance	admin
မို	× AZURE + ひ > ⊗ Sanjeev Naldurgkar (snald	Oompute + Storage Backups	External Endpoint 10.100.52.16,32202	Compute 4 vCores	
E B			Service endpoints	5	
			Name En	ndpoint	Description
			Kibana Dashboard	tps://10.100.52.17:31053/app/kibana	Dashboard for viewing logs
	\checkmark AZURE ARC CONTROLLERS + β°		Grafana <u>htt</u> Dashboard	tps://10.100.52.16:31054/d/40g72Hn	Dashboard for viewing metrics
	saldemo1-alxy				
			Databases		
			A connec	tion is required to list the databases or	this instance.
				Connect to Server	
8		PROBLEMS OUTPUT TER	RMINAL TASKS	Tasks	∨ ≡ A ° ^ ×

8. Next, click on "Connect to Server" under Databases on the right navigation pane, and enter the details for the server endpoint, username, and password, and click on Connect. The details for the server endpoint can be noted down from the figure for step 7, above.

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	CONNECTIONS ···· dc ≣ SQL m		Connect to SQL managed instance - Azure Arc (sqldemo1-glxy)					
Q	Add Connection	11 Overview	Server Endpoint •					
:		Settings	10.100.52.16,32202 Username *					
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 On the SQL-managed instance – Azure Arc Dashboard on the right navigation pane, click on the link next to Grafana Dashboard under Service endpoints to view the SQL-managed instance metrics for that context. At the login prompt, key in the credentials provided during the creation of the SQLmanaged instance.



10. On the SQL-managed instance – Azure Arc Dashboard on the right navigation pane, click on the link next to Kibana Dashboard under Service endpoints to view the SQL- managed instance logs for that context. At the login prompt, key in the credentials provided during the creation of the SQLmanaged instance.



11. To connect to and query Azure Arc SQL server-managed instances using Azure Data Studio, expand the Servers panel in the Connections tab on the left navigation pane, and click on the Add Connections button. Enter the details for your SQL-managed instance as shown in the figure below, and click Connect.

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	CONNECTIONS ···· d	lc ≣ SQL m	Connection			
			Recent Browse			
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		Connection				
	∼ azure + ひ		Connection Details			
	> 🛞 Sanjeev Naldurgkar (snald	Compute +	Connection type	Microsoft SQL Server		~
		🔗 Backups				
			Server •	10.100.52.16,32202		
			Authentication type	SQL Login		~
	\sim azure arc controllers $+$ β°		User name *	sqladmin		
	✓ <u>i</u> arc-glxy-dc		Password			
	aqldemo1-glxy			Remember password		
			Database	<default></default>		\sim
		PROBLEMS C	Server group	<default></default>		~
		_	Name (optional)			
					· · ·	
					Connect	Cancel

12. Right-clicking on the server as shown below allows you to perform a variety of operations.

•	•		10.127.61.159,30024								
	CONNECTIONS SERVERS Q Q C 10.127.61.159,30024, cdef M Databases Security Server Objects	Welcome ■ 10.127.6 Home > 10.127.61.159,3002 Manage New Query New Notebook Disconnect Edit Connection Delete Connection Refresh Data-tier Application wizard Import wizard	10.127.61.159,30024 11.159,30024 × 4 New Query New Notebook Restore sion .2195.191 nputer Name demo1-0 10.0000000000000000000000000000000000	Restore Refresh ① Learn More Edition General Purpose (64-bit) OS Version Ubuntu 20.04 The set of							
ß	 ✓ AZURE + ℃ ✓ Sanjeev Naldur ♡ Ţ ∑ > ② CloudNativeSolutions ✓ AZURE ARC CONTROLLERS + 6° ✓ arc-dc1 	Data-tier Application wizard	CRUp Status *** ** Updated: 18:26:54 24/11/2021 Within 24hrs O Older than 24hrs O No backup found	msdb							
	sqidem01										1

Create an Azure SQL-managed instance using Azure CLI

Refer this link to create an Azure SQL-managed instance on Azure Arc using Azure CLI.

The example below can be used to create a SQL-managed instance for direct connectivity modes:

> az sql mi-arc create --name sqldemo-azcli --resource-group az-arc-iks-proxy --location eastus --subscription xxxxxxxx-xxxx-xxxx-xxxx-xxxxx-xxxxx --custom-location glxy-lab



To view the created instance, use the following command:

```
> az sql mi-arc list --k8s-namespace glxy-lab --use-k8s
snaldurg@SNALDURG-M-WH74 ~ % az sql mi-arc list --k8s-namespace glxy-lab --use-k8s
{
    {
        "name": "sqldemo-azcli",
        "primaryEndpoint": "10.100.52.17,31666",
        "replicas": "1/1",
        "state": "Ready"
    },
    {
        "name": "sqldemo1-glxy",
        "primaryEndpoint": "10.100.52.16,32202",
        "replicas": "1/1",
        "state": "Ready"
    }
}
```

For more information

For additional information, see the following resources:

- <u>https://intersight.com/help/saas/resources/intersight_kubernetes_service_user_guide#overview</u>
- <u>https://docs.microsoft.com/en-us/azure/azure-arc/kubernetes/overview</u>
- https://docs.microsoft.com/en-us/azure/azure-arc/data/
- https://docs.microsoft.com/en-us/azure/azure-arc/data/managed-instance-overview
- https://docs.microsoft.com/en-us/sgl/azure-data-studio/?view=sgl-server-ver15

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