

Create an AKS cluster

Terraform Scripts to build Kubernetes cluster on Azure

```
userclient@myclientvm:~$ cd acs-kube-terraform/
userclient@myclientvm:~/acs-kube-terraform$ ls
createacskube.tf  provider.tf  terraform.tfstate  terraform.tfstate.backup  terraform.tfvars  variables.tf
userclient@myclientvm:~/acs-kube-terraform$ cat createacskube.tf
resource "azurerm_resource_group" "sparkkube_resource_group" {
  name     = "sparkkubepocrg"
  location = "East US"
}

resource "azurerm_container_service" "acskube" {
  name                = "acskube"
  location            = "${azurerm_resource_group.sparkkube_resource_group.location}"
  resource_group_name = "${azurerm_resource_group.sparkkube_resource_group.name}"
  orchestration_platform = "Kubernetes"

  master_profile {
    count = 1
    dns_prefix = "${var.azure_cluster_prefix}"
  }

  linux_profile {
    admin_username = "${var.linux_admin_username}"

    ssh_key {
      key_data = "${var.ssh_key}"
    }
  }

  agent_pool_profile {
    name     = "default"
    count    = "${var.azure_node_count}"
    dns_prefix = "acskube.agent"
    vm_size  = "Standard_D3_v2"
  }

  service_principal {
    client_id     = "${var.client_id}"
    client_secret = "${var.client_secret}"
  }
}
```

Output:

Home > Resource groups > sparkkubepocrg > acskube

acskube
Container service

Search (Ctrl+/) << → Move Delete Refresh

Overview
Activity log
Access control (IAM)
Tags

SETTINGS
Properties
Locks
Automation script

SUPPORT + TROUBLESHOOTING
New support request

Resource group [\(change\)](#)
[sparkkubepocrg](#)
Location
East US
Subscription [\(change\)](#)
[Visual Studio Premium with MSDN](#)
Subscription ID
039c1eda-5f36-4dad-975e-1ec3384e0d7c

Service type
Unmanaged
Master FQDN
kcls.eastus.cloudapp.azure.com
Orchestrator
Kubernetes

Node pools
To scale a node pool, update the node count below then click 'Save'

NAME	NODE SIZE	NODE COUNT	TOTAL CORES	TOTAL MEMORY	FQDN
default	Standard D3 v2 (4 vcpus...	<input type="text" value="1"/>	4 vCPUs	14 GB	-

Save

```
userclient@myclientvm:~$ kubectl cluster-info
Kubernetes master is running at https://kcls.eastus.cloudapp.azure.com
Heapster is running at https://kcls.eastus.cloudapp.azure.com/api/v1/namespaces/kube-system/services/heapster/proxy
KubeDNS is running at https://kcls.eastus.cloudapp.azure.com/api/v1/namespaces/kube-system/services/kube-dns:dns/proxy
Kubernetes-dashboard is running at https://kcls.eastus.cloudapp.azure.com/api/v1/namespaces/kube-system/services/kubernetes-dashboard/proxy
tiller-deploy is running at https://kcls.eastus.cloudapp.azure.com/api/v1/namespaces/kube-system/services/tiller-deploy:tiller/proxy
```

Prerequisites on Client Machine

Docker

```
userclient@myclientvm:~$ sudo docker version
Client:
 Version:      17.12.1-ce
 API version:  1.35
 Go version:   go1.9.4
 Git commit:   7390fc6
 Built: Tue Feb 27 22:13:43 2018
 OS/Arch:     linux/amd64

Server:
 Engine:
  Version:     17.12.1-ce
  API version: 1.35 (minimum version 1.12)
  Go version:  go1.9.4
  Git commit:  7390fc6
  Built:       Tue Feb 27 22:20:43 2018
  OS/Arch:    linux/amd64
  Experimental: false
userclient@myclientvm:~$
```

Scala

```
userclient@myclientvm:~$ scala
Welcome to Scala version 2.11.6 (OpenJDK 64-Bit Server VM, Java 1.8.0_151).
Type in expressions to have them evaluated.
Type :help for more information.

scala>
```

Spark

[illegible]

Build and publish Docker Images

```
userclient@myclientvm:~$ sudo docker images -a
```

REPOSITORY	TAG	IMAGE ID	CREATED	SIZE
sag61086/spark	2.3.0	96f66ce41281	3 days ago	346MB
<none>	<none>	a49895263875	3 days ago	346MB
<none>	<none>	4962aca93379	3 days ago	346MB
<none>	<none>	813257325c1d	3 days ago	346MB
<none>	<none>	7a5a60efee82	3 days ago	346MB
<none>	<none>	d588be12c27e	3 days ago	342MB
<none>	<none>	6abd39f06335	3 days ago	342MB
<none>	<none>	7cdd68bcfcdb	3 days ago	342MB
<none>	<none>	d827b948f7f0	3 days ago	342MB
<none>	<none>	ded178c94e9e	3 days ago	342MB
<none>	<none>	67ebbf75733	3 days ago	108MB
<none>	<none>	816f30829d04	3 days ago	102MB
<none>	<none>	f74544e769d2	3 days ago	102MB
openjdk	8-alpine	224765a6bdb6	2 months ago	102MB
hello-world	latest	f2a91732366c	4 months ago	1.85kB

```
userclient@myclientvm:~$
```

Submit a Spark job

Launch Spark Pi in cluster mode

```
userclient@myclientvm:~$ cd spark-2.3.0-bin-hadoop2.7/
userclient@myclientvm:~/spark-2.3.0-bin-hadoop2.7$ ./bin/spark-submit --master k8s://https://kcls.eastus.cloudapp.azure.com --deploy-mode cluster --name spark-pi --class org.apache.spark
examples.SparkPi --conf spark.executor.instances=2 --conf spark.kubernetes.container.image=sag61086/spark:2.3.0 local:///opt/spark/examples/jars/spark-examples_2.11-2.3.0.jar
2018-03-28 17:46:17 INFO LoggingPodStatusWatcherImpl:54 - State changed, new state:
pod name: spark-pi-f98f5f63a14d365c84376ce4580424e8-driver
namespace: default
labels: spark-app-selector -> spark-24d46a514cfc4466bb2b85a3a32040db, spark-role -> driver
pod uid: eaa66543-32af-11e8-b231-000d3a194880
creation time: 2018-03-28T17:46:17Z
service account name: default
volumes: default-token-m3jcm
node name: N/A
start time: N/A
container images: N/A
phase: Pending
status: []
2018-03-28 17:46:17 INFO LoggingPodStatusWatcherImpl:54 - State changed, new state:
pod name: spark-pi-f98f5f63a14d365c84376ce4580424e8-driver
namespace: default
labels: spark-app-selector -> spark-24d46a514cfc4466bb2b85a3a32040db, spark-role -> driver
pod uid: eaa66543-32af-11e8-b231-000d3a194880
creation time: 2018-03-28T17:46:17Z
service account name: default
volumes: default-token-m3jcm
node name: k8s-agent-5272049d-0
start time: N/A
container images: N/A
phase: Pending
status: []
2018-03-28 17:46:17 INFO LoggingPodStatusWatcherImpl:54 - State changed, new state:
pod name: spark-pi-f98f5f63a14d365c84376ce4580424e8-driver
namespace: default
labels: spark-app-selector -> spark-24d46a514cfc4466bb2b85a3a32040db, spark-role -> driver
pod uid: eaa66543-32af-11e8-b231-000d3a194880
creation time: 2018-03-28T17:46:17Z
service account name: default
volumes: default-token-m3jcm
node name: k8s-agent-5272049d-0
start time: 2018-03-28T17:46:17Z
status: [ContainerStatus(containerID=docker://45c445e4e70dba537e5e3ad6a618ce2d4f459073798d860407e74a59a3cad226, image=sag61086/spark:2.3.0, imageID=docker-pullable://sag61086/spark:2.3.0, phase=Running, restartCount=0, state=ContainerState(running=ContainerStateRunning(startedAt=2018-03-28T17:46:19Z, additionalProperties={}), terminated=ContainerStateTerminated(containerID=docker://45c445e4e70dba537e5e3ad6a618ce2d4f459073798d860407e74a59a3cad226, exitCode=0, finishedAt=2018-03-28T17:46:46Z, additionalProperties={}), message=Completed, signal=null, startedAt=2018-03-28T17:46:19Z, additionalProperties={}), waiting=ContainerStateWaiting(message=null, reason=ContainerCreating, additionalProperties={}), additionalProperties={})], additionalProperties={})]
2018-03-28 17:46:18 INFO Client:54 - Waiting for application spark-pi to finish...
2018-03-28 17:46:19 INFO LoggingPodStatusWatcherImpl:54 - State changed, new state:
pod name: spark-pi-f98f5f63a14d365c84376ce4580424e8-driver
namespace: default
labels: spark-app-selector -> spark-24d46a514cfc4466bb2b85a3a32040db, spark-role -> driver
pod uid: eaa66543-32af-11e8-b231-000d3a194880
creation time: 2018-03-28T17:46:17Z
service account name: default
volumes: default-token-m3jcm
node name: k8s-agent-5272049d-0
start time: 2018-03-28T17:46:17Z
container images: sag61086/spark:2.3.0
phase: Running
status: [ContainerStatus(containerID=docker://45c445e4e70dba537e5e3ad6a618ce2d4f459073798d860407e74a59a3cad226, image=sag61086/spark:2.3.0, imageID=docker-pullable://sag61086/spark:2.3.0, phase=Running, restartCount=0, state=ContainerState(running=ContainerStateRunning(startedAt=2018-03-28T17:46:19Z, additionalProperties={}), terminated=ContainerStateTerminated(containerID=docker://45c445e4e70dba537e5e3ad6a618ce2d4f459073798d860407e74a59a3cad226, exitCode=0, finishedAt=2018-03-28T17:46:46Z, additionalProperties={}), message=Completed, signal=null, startedAt=2018-03-28T17:46:19Z, additionalProperties={}), waiting=ContainerStateWaiting(message=null, reason=ContainerCreating, additionalProperties={}), additionalProperties={})], additionalProperties={})]
2018-03-28 17:46:46 INFO LoggingPodStatusWatcherImpl:54 - State changed, new state:
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pod uid: eaa66543-32af-11e8-b231-000d3a194880
creation time: 2018-03-28T17:46:17Z
service account name: default
volumes: default-token-m3jcm
node name: k8s-agent-5272049d-0
start time: 2018-03-28T17:46:17Z
container images: sag61086/spark:2.3.0
phase: Succeeded
status: [ContainerStatus(containerID=docker://45c445e4e70dba537e5e3ad6a618ce2d4f459073798d860407e74a59a3cad226, image=sag61086/spark:2.3.0, imageID=docker-pullable://sag61086/spark:2.3.0, phase=Succeeded, restartCount=0, state=ContainerState(running=ContainerStateRunning(startedAt=2018-03-28T17:46:19Z, additionalProperties={}), terminated=ContainerStateTerminated(containerID=docker://45c445e4e70dba537e5e3ad6a618ce2d4f459073798d860407e74a59a3cad226, exitCode=0, finishedAt=2018-03-28T17:46:46Z, additionalProperties={}), message=Completed, signal=null, startedAt=2018-03-28T17:46:19Z, additionalProperties={}), waiting=ContainerStateWaiting(message=null, reason=ContainerCreating, additionalProperties={}), additionalProperties={})], additionalProperties={})]
2018-03-28 17:46:46 INFO LoggingPodStatusWatcherImpl:54 - Container final statuses:
```

```
phase: Pending
status: [ContainerStatus(containerID=null, image=sag61086/spark:2.3.0, imageID=, lastState=ContainerState(running=null, terminated=null, waiting=null, additionalProperties={}), name=spark-kubernetes-driver, ready=false, restartCount=0, state=ContainerState(running=null, terminated=null, waiting=ContainerStateWaiting(message=null, reason=ContainerCreating, additionalProperties={}), additionalProperties={}), additionalProperties={})]
2018-03-28 17:46:18 INFO Client:54 - Waiting for application spark-pi to finish...
2018-03-28 17:46:19 INFO LoggingPodStatusWatcherImpl:54 - State changed, new state:
pod name: spark-pi-f98f5f63a14d365c84376ce4580424e8-driver
namespace: default
labels: spark-app-selector -> spark-24d46a514cfc4466bb2b85a3a32040db, spark-role -> driver
pod uid: eaa66543-32af-11e8-b231-000d3a194880
creation time: 2018-03-28T17:46:17Z
service account name: default
volumes: default-token-m3jcm
node name: k8s-agent-5272049d-0
start time: 2018-03-28T17:46:17Z
container images: sag61086/spark:2.3.0
phase: Running
status: [ContainerStatus(containerID=docker://45c445e4e70dba537e5e3ad6a618ce2d4f459073798d860407e74a59a3cad226, image=sag61086/spark:2.3.0, imageID=docker-pullable://sag61086/spark:2.3.0, phase=Running, restartCount=0, state=ContainerState(running=ContainerStateRunning(startedAt=2018-03-28T17:46:19Z, additionalProperties={}), terminated=ContainerStateTerminated(containerID=docker://45c445e4e70dba537e5e3ad6a618ce2d4f459073798d860407e74a59a3cad226, exitCode=0, finishedAt=2018-03-28T17:46:46Z, additionalProperties={}), message=Completed, signal=null, startedAt=2018-03-28T17:46:19Z, additionalProperties={}), waiting=ContainerStateWaiting(message=null, reason=ContainerCreating, additionalProperties={}), additionalProperties={})], additionalProperties={})]
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pod uid: eaa66543-32af-11e8-b231-000d3a194880
creation time: 2018-03-28T17:46:17Z
service account name: default
volumes: default-token-m3jcm
node name: k8s-agent-5272049d-0
start time: 2018-03-28T17:46:17Z
container images: sag61086/spark:2.3.0
phase: Succeeded
status: [ContainerStatus(containerID=docker://45c445e4e70dba537e5e3ad6a618ce2d4f459073798d860407e74a59a3cad226, image=sag61086/spark:2.3.0, imageID=docker-pullable://sag61086/spark:2.3.0, phase=Succeeded, restartCount=0, state=ContainerState(running=ContainerStateRunning(startedAt=2018-03-28T17:46:19Z, additionalProperties={}), terminated=ContainerStateTerminated(containerID=docker://45c445e4e70dba537e5e3ad6a618ce2d4f459073798d860407e74a59a3cad226, exitCode=0, finishedAt=2018-03-28T17:46:46Z, additionalProperties={}), message=Completed, signal=null, startedAt=2018-03-28T17:46:19Z, additionalProperties={}), waiting=ContainerStateWaiting(message=null, reason=ContainerCreating, additionalProperties={}), additionalProperties={})], additionalProperties={})]
2018-03-28 17:46:46 INFO LoggingPodStatusWatcherImpl:54 - Container final statuses:
```

```
Container name: spark-kubernetes-driver
Container image: sag61086/spark:2.3.0
Container state: Terminated
Exit code: 0
2018-03-28 17:46:46 INFO Client:54 - Application spark-pi finished.
2018-03-28 17:46:46 INFO ShutdownHookManager:54 - Shutdown hook called
2018-03-28 17:46:46 INFO ShutdownHookManager:54 - Deleting directory /tmp/spark-c19861dd-54a8-431b-b3ba-9ac569706af6
userclient@myclientvm:~/spark-2.3.0-bin-hadoop2.7$
```

Get job results and logs

```

userclient@mycilentvm:~/spark-2.3.0-bin-hadoop2.7$ kubectl logs spark-pi-f98f5f63a14d365c84376ce4580424e8-driver
++ id -u
+ myuid=0
++ id -g
+ mygid=0
++ getent passwd 0
+ uidentry-root:x:0:0:root:/root:/bin/ash
+ '[' -z root:x:0:0:root:/root:/bin/ash ']'
+ SPARK_K8S_CMD=driver
+ '[' -z driver ']'
+ shift 1
+ SPARK_CLASSPATH=':/opt/spark/jars/*'
+ env
+ sed 's/[^]=*(.*)/\1/g'
+ grep SPARK_JAVA_OPT_
+ readarray -t SPARK_JAVA_OPTS
+ '[' -n /opt/spark/examples/jars/spark-examples_2.11-2.3.0.jar:/opt/spark/examples/jars/spark-examples_2.11-2.3.0.jar ']'
+ SPARK_CLASSPATH='/opt/spark/jars/*:/opt/spark/examples/jars/spark-examples_2.11-2.3.0.jar:/opt/spark/examples/jars/spark-examples_2.11-2.3.0.jar'
+ '[' -n '' ']'
+ case "$SPARK_K8S_CMD" in
+ CMD=${JAVA_HOME}/bin/java "${SPARK_JAVA_OPTS[@]}" -cp "$SPARK_CLASSPATH" -Xms$SPARK_DRIVER_MEMORY -Xmx$SPARK_DRIVER_MEMORY -Dspark.driver.bindAddress=$SPARK_DRIVER_ARGS)
+ exec /sbin/tini -s -- /usr/lib/jvm/java-1.8-openjdk/bin/java -Dspark.app.id=spark-24d46a514cfc4466bb2b85a3a32040db -Dspark.driver.port=7078 -Dspark.driver.classpath=/opt/spark/examples/jars/spark-examples_2.11-2.3.0.jar:/opt/spark/examples/jars/spark-examples_2.11-2.3.0.jar -Dspark.driver.blockManager.port=7079 -Dspark.master=k8s://https://kcls.eastus.cloudapp.azure.com -Dspark.kubernetes.container.image=sag61086/spark-2.3.0-Dspark.jars=/opt/spark/examples/jars/spark-examples_2.11-2.3.0.jar,/opt/spark/examples/jars/spark-examples_2.11-2.3.0.jar -Xms1g -Xmx244.0.7 org.apache.spark.examples.SparkPi
2018-03-28 17:46:31 INFO SparkContext:54 - Running Spark version 2.3.0
2018-03-28 17:46:32 WARN NativeCodeLoader:62 - Unable to load native-hadoop library for your platform... using builtin-java classes where applicable
2018-03-28 17:46:32 INFO SparkContext:54 - Submitted application: Spark Pi
2018-03-28 17:46:32 INFO SecurityManager:54 - Changing view acls to: root
2018-03-28 17:46:32 INFO SecurityManager:54 - Changing modify acls to: root
2018-03-28 17:46:32 INFO SecurityManager:54 - Changing view acls groups to:
```

```

2018-03-28 17:46:33 INFO SecurityManager:- SecurityManager: authentication disabled; ui acls disabled; users with view permissions: Set(root); groups with view permissions: Set(root); groups with modify permissions: Set(root); groups with modify permissions: Set()
2018-03-28 17:46:33 INFO Utils:54 - Successfully started service 'sparkDriver' on port 7078.
2018-03-28 17:46:33 INFO SparkEnv:54 - Registering MapOutputTracker
2018-03-28 17:46:33 INFO SparkEnv:54 - Registering BlockManagerMaster
2018-03-28 17:46:33 INFO BlockManagerMasterEndpoint:54 - Using org.apache.spark.storage.DefaultTopologyMapper for getting topology information
2018-03-28 17:46:33 INFO BlockManagerMasterEndpoint:54 - BlockManagerMasterEndpoint up
2018-03-28 17:46:33 INFO DiskLocalManager:54 - Created local directory at /tmp/blockmgr-fa4c4043-66a0-4c17-be5c-cdbf3949c62e
2018-03-28 17:46:33 INFO MemoryStore:54 - MemoryStore started with capacity 408.9 MB
2018-03-28 17:46:33 INFO SparkEnv:54 - Registering OutputCommitCoordinator
2018-03-28 17:46:33 INFO log:192 - Logging initialized @13532ms
2018-03-28 17:46:33 INFO Server:346 - jetty-9.3.z-SNAPSHOT
2018-03-28 17:46:33 INFO Server:414 - Started @13646ms
2018-03-28 17:46:33 INFO AbstractConnector:278 - Started ServerConnector@4a9f8bd3[HTTP/1.1,[http/1.1]]{@0.0.0.0:4040}
2018-03-28 17:46:33 INFO Utils:54 - Successfully started service 'SparkUI' on port 4040.
2018-03-28 17:46:33 INFO ContextHandler:781 - Started o.s.j.s.ServletContextHandler@35fe2125[/jobs,null,AVAILABLE,@spark]
2018-03-28 17:46:33 INFO ContextHandler:781 - Started o.s.j.s.ServletContextHandler@65e61854[/jobs/json,null,AVAILABLE,@spark]
2018-03-28 17:46:33 INFO ContextHandler:781 - Started o.s.j.s.ServletContextHandler@1568159f[/jobs/job,null,AVAILABLE,@spark]
2018-03-28 17:46:33 INFO ContextHandler:781 - Started o.s.j.s.ServletContextHandler@6f80fafe[/jobs/job/json,null,AVAILABLE,@spark]
2018-03-28 17:46:33 INFO ContextHandler:781 - Started o.s.j.s.ServletContextHandler@3af17be2[/stages,null,AVAILABLE,@spark]
2018-03-28 17:46:33 INFO ContextHandler:781 - Started o.s.j.s.ServletContextHandler@30387bdc[/stages/json,null,AVAILABLE,@spark]
2018-03-28 17:46:33 INFO ContextHandler:781 - Started o.s.j.s.ServletContextHandler@78772197[/stages/job,null,AVAILABLE,@spark]
2018-03-28 17:46:33 INFO ContextHandler:781 - Started o.s.j.s.ServletContextHandler@8224b4d6[/stages/stage/json,null,AVAILABLE,@spark]
2018-03-28 17:46:33 INFO ContextHandler:781 - Started o.s.j.s.ServletContextHandler@5d5d95e5[/stages/pool,null,AVAILABLE,@spark]
2018-03-28 17:46:33 INFO ContextHandler:781 - Started o.s.j.s.ServletContextHandler@303e3593[/stages/pool/json,null,AVAILABLE,@spark]
2018-03-28 17:46:33 INFO ContextHandler:781 - Started o.s.j.s.ServletContextHandler@4cf27d66[/storage/json,null,AVAILABLE,@spark]
2018-03-28 17:46:33 INFO ContextHandler:781 - Started o.s.j.s.ServletContextHandler@362a019c[/storage/json,null,AVAILABLE,@spark]
2018-03-28 17:46:33 INFO ContextHandler:781 - Started o.s.j.s.ServletContextHandler@1d9bec4d[/storage/rdd,null,AVAILABLE,@spark]
2018-03-28 17:46:33 INFO ContextHandler:781 - Started o.s.j.s.ServletContextHandler@5c48c0c0[/storage/rdd/json,null,AVAILABLE,@spark]
2018-03-28 17:46:33 INFO ContextHandler:781 - Started o.s.j.s.ServletContextHandler@10c8f62c[/environment,null,AVAILABLE,@spark]
2018-03-28 17:46:33 INFO ContextHandler:781 - Started o.s.j.s.ServletContextHandler@674c583e[/environment/json,null,AVAILABLE,@spark]
2018-03-28 17:46:33 INFO ContextHandler:781 - Started o.s.j.s.ServletContextHandler@25f7391e[/executors,null,AVAILABLE,@spark]
2018-03-28 17:46:33 INFO ContextHandler:781 - Started o.s.j.s.ServletContextHandler@3f23a300[/executors/json,null,AVAILABLE,@spark]
2018-03-28 17:46:33 INFO ContextHandler:781 - Started o.s.j.s.ServletContextHandler@5b14cb9f[/executors/threadDump,null,AVAILABLE,@spark]
2018-03-28 17:46:33 INFO ContextHandler:781 - Started o.s.j.s.ServletContextHandler@6f9b97279[/executors/threadDump/json,null,AVAILABLE,@spark]
2018-03-28 17:46:33 INFO ContextHandler:781 - Started o.s.j.s.ServletContextHandler@439a8f59[/static,null,AVAILABLE,@spark]
2018-03-28 17:46:33 INFO ContextHandler:781 - Started o.s.j.s.ServletContextHandler@64bc21ac[/,null,AVAILABLE,@spark]
2018-03-28 17:46:33 INFO ContextHandler:781 - Started o.s.j.s.ServletContextHandler@493dfb8e[/api,null,AVAILABLE,@spark]
2018-03-28 17:46:33 INFO ContextHandler:781 - Started o.s.j.s.ServletContextHandler@2f162cc0[/jobs/job/kill,null,AVAILABLE,@spark]

```

```

2018-03-28 17:46:33 INFO ContextHandler:781 - Started o.s.j.s.ServletContextHandler@5df417a7(/stages/stage/kill,null,AVAILABLE,@Spark)
2018-03-28 17:46:33 INFO SparkUI:54 - Bound SparkUI to 0.0.0.0, and started at http://spark-pi-f98f5f63a14d365c84376ce4580424e8-driver-svc.default.svc:4040
2018-03-28 17:46:34 INFO SparkContext:54 - Added JAR /opt/spark/examples/jars/spark-examples_2.11-2.3.0-jar at spark://spark-pi-f98f5f63a14d365c84376ce4580424e8-driver-svc.default.svc:4040
2018-03-28 17:46:34 INFO SparkContext:54 - Added JAR /opt/spark/examples/jars/spark-examples_2.11-2.3.0-jar with timestamp 1522259194002
2018-03-28 17:46:34 WARN KubernetesClusterManager:66 - The executor's init-container config map is not specified. Executors will therefore not attempt to fetch remote or submit binaries.
2018-03-28 17:46:34 WARN KubernetesClusterManager:66 - The executor's init-container config map key is not specified. Executors will therefore not attempt to fetch remote or submit binaries.
2018-03-28 17:46:36 INFO Utils:54 - Successfully started service 'org.apache.spark.network.netty.NettyBlockTransferService' on port 7079.
2018-03-28 17:46:36 INFO NettyBlockTransferService:54 - Server created on spark-pi-f98f5f63a14d365c84376ce4580424e8-driver-svc.default.svc:7079
2018-03-28 17:46:36 INFO BlockManager:54 - Using org.apache.spark.storage.RandomBlockReplicationPolicy for block replication policy
2018-03-28 17:46:36 INFO BlockManagerMaster:54 - Registering BlockManager BlockManagerId(driver, spark-pi-f98f5f63a14d365c84376ce4580424e8-driver-svc.default.svc, 7079, None)
2018-03-28 17:46:36 INFO BlockManagerMasterEndpoint:54 - Registering block manager spark-pi-f98f5f63a14d365c84376ce4580424e8-driver-svc.default.svc:7079 with 408.9 MB RAM, BlockManagerId(driver, spark-pi-f98f5f63a14d365c84376ce4580424e8-driver-svc.default.svc, 7079, None)
2018-03-28 17:46:36 INFO BlockManagerMaster:54 - Registered BlockManager BlockManagerId(driver, spark-pi-f98f5f63a14d365c84376ce4580424e8-driver-svc.default.svc, 7079, None)
2018-03-28 17:46:36 INFO BlockManager:54 - Initialized BlockManager: BlockManagerId(driver, spark-pi-f98f5f63a14d365c84376ce4580424e8-driver-svc.default.svc, 7079, None)
2018-03-28 17:46:36 INFO ContextHandler:781 - Started o.s.j.s.ServletContextHandler@1cc9cfb2(/metrics/json,null,AVAILABLE,@Spark)
2018-03-28 17:46:37 INFO KubernetesClusterSchedulerBackend:54 - Requesting a new executor, total executors is now 0
2018-03-28 17:46:37 INFO KubernetesClusterSchedulerBackend:54 - Requesting a new executor, total executors is now 0
2018-03-28 17:46:40 INFO KubernetesClusterSchedulerBackend:54 - Executor pod spark-pi-f98f5f63a14d365c84376ce4580424e8-exec-2 ready, launched at k8s-agent-5272049d-0 as IP 10.244.0.9:41306
2018-03-28 17:46:40 INFO KubernetesClusterSchedulerBackend:54 - Executor pod spark-pi-f98f5f63a14d365c84376ce4580424e8-exec-1 ready, launched at k8s-agent-5272049d-0 as IP 10.244.0.9:41306
2018-03-28 17:46:42 INFO KubernetesClusterSchedulerBackend:54 - Registered executor NettyRpcEndpointRef(spark-client://Executor) (10.244.0.9:41306) with minRegisteredResourcesRatio: 0.8
2018-03-28 17:46:42 INFO KubernetesClusterSchedulerBackend:54 - SchedulerBackend is ready for scheduling beginning after reached minRegisteredResourcesRatio: 0.8
2018-03-28 17:46:43 INFO BlockManagerMasterEndpoint:54 - Registering block manager 10.244.0.9:36397 with 408.9 MB RAM, BlockManagerId(1, 10.244.0.9, 36397, None)
2018-03-28 17:46:43 INFO BlockManagerMasterEndpoint:54 - Registering block manager 10.244.0.8:37461 with 408.9 MB RAM, BlockManagerId(2, 10.244.0.8, 37461, None)
2018-03-28 17:46:44 INFO SparkContext:54 - Starting job: reduce at SparkPi.scala:38
2018-03-28 17:46:44 INFO DAGScheduler:54 - Got job 0 (reduce at SparkPi.scala:38) with 2 output partitions
2018-03-28 17:46:44 INFO DAGScheduler:54 - Final stage: ResultStage 0 (reduce at SparkPi.scala:38)
2018-03-28 17:46:44 INFO DAGScheduler:54 - Parents of final stage: List()
2018-03-28 17:46:44 INFO DAGScheduler:54 - Missing parents: List()
2018-03-28 17:46:44 INFO DAGScheduler:54 - Submitting ResultStage 0 (MapPartitionsRDD[1] at map at SparkPi.scala:34), which has no missing parents
2018-03-28 17:46:44 INFO MemoryStore:54 - Block broadcast_0 stored as values in memory (estimated size 1832.0 B, free 408.9 MB)
2018-03-28 17:46:44 INFO MemoryStore:54 - Block broadcast_0_piece0 stored as bytes in memory (estimated size 1181.0 B, free 408.9 MB)
2018-03-28 17:46:44 INFO BlockManagerInfo:54 - Added broadcast_0_piece0 in memory on spark-pi-f98f5f63a14d365c84376ce4580424e8-driver-svc.default.svc:7079 (size: 1181.0 B, free: 408.9 MB)
2018-03-28 17:46:44 INFO SparkContext:54 - Created broadcast_0 from broadcast at DAGScheduler.scala:1039
2018-03-28 17:46:44 INFO DAGScheduler:54 - Submitting 2 missing tasks from ResultStage 0 (MapPartitionsRDD[1] at map at SparkPi.scala:34) (first 15 tasks are for partitions Vector(0, 1))
2018-03-28 17:46:44 INFO TaskSchedulerImpl:54 - Adding task set 0.0 with 2 tasks

```

Below image shows result of the Spark job, which is the value of Pi.

```

2018-03-28 17:46:44 INFO TaskSetManager:54 - Starting task 0.0 in stage 0.0 (TID 0, 10.244.0.9, executor 1, partition 0, PROCESS_LOCAL, 7865 bytes)
2018-03-28 17:46:44 INFO TaskSetManager:54 - Starting task 1.0 in stage 0.0 (TID 1, 10.244.0.8, executor 2, partition 1, PROCESS_LOCAL, 7865 bytes)
2018-03-28 17:46:45 INFO BlockManagerInfo:54 - Added broadcast_0_piece0 in memory on 10.244.0.9:36397 (size: 1181.0 B, free: 408.9 MB)
2018-03-28 17:46:45 INFO BlockManagerInfo:54 - Added broadcast_0_piece0 in memory on 10.244.0.8:37461 (size: 1181.0 B, free: 408.9 MB)
2018-03-28 17:46:45 INFO TaskSetManager:54 - Finished task 0.0 in stage 0.0 (TID 0) in 873 ms on 10.244.0.9 (executor 1) (1/2)
2018-03-28 17:46:45 INFO TaskSetManager:54 - Finished task 1.0 in stage 0.0 (TID 1) in 865 ms on 10.244.0.8 (executor 2) (2/2)
2018-03-28 17:46:45 INFO TaskSchedulerImpl:54 - Removed TaskSet 0.0, whose tasks have all completed, from pool
2018-03-28 17:46:45 INFO DAGScheduler:54 - ResultStage 0 (reduce at SparkPi.scala:38) finished in 1.512 s
2018-03-28 17:46:45 INFO DAGScheduler:54 - Job 0 finished: reduce at SparkPi.scala:38, took 1.601358 s
Pi is roughly 3.1339956699783498
2018-03-28 17:46:45 INFO AbstractConnector:318 - Stopped Spark@4a9f80d3(HTTP/1.1,[http://1.1])[0.0.0.0:4040]
2018-03-28 17:46:45 INFO SparkUI:54 - Stopped Spark web UI at http://spark-pi-f98f5f63a14d365c84376ce4580424e8-driver-svc.default.svc:4040
2018-03-28 17:46:45 INFO KubernetesClusterSchedulerBackend:54 - Shutting down all executors
2018-03-28 17:46:45 INFO KubernetesClusterSchedulerBackend:54 - Asking each executor to shut down
2018-03-28 17:46:45 INFO KubernetesClusterSchedulerBackend:54 - Closing Kubernetes client
2018-03-28 17:46:45 INFO MapOutputTrackerMasterEndpoint:54 - MapOutputTrackerMasterEndpoint stopped!
2018-03-28 17:46:45 INFO MemoryStore:54 - MemoryStore cleared
2018-03-28 17:46:45 INFO BlockManager:54 - BlockManager stopped
2018-03-28 17:46:45 INFO BlockManagerMaster:54 - BlockManagerMaster stopped
2018-03-28 17:46:45 INFO OutputCommitCoordinator:54 - OutputCommitCoordinatorEndpoint:54 - OutputCommitCoordinator stopped!
2018-03-28 17:46:45 INFO SparkContext:54 - Successfully stopped SparkContext
2018-03-28 17:46:45 INFO ShutdownHookManager:54 - Shutdown hook called
2018-03-28 17:46:45 INFO ShutdownHookManager:54 - Deleting directory /tmp/spark-c384233d-74a0-4883-b273-c6b9bc66555b
userclient@myclientvm:~/spark-2.3.0-bin-hadoop2.7$

```

References

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