AKS Cost Optimisation

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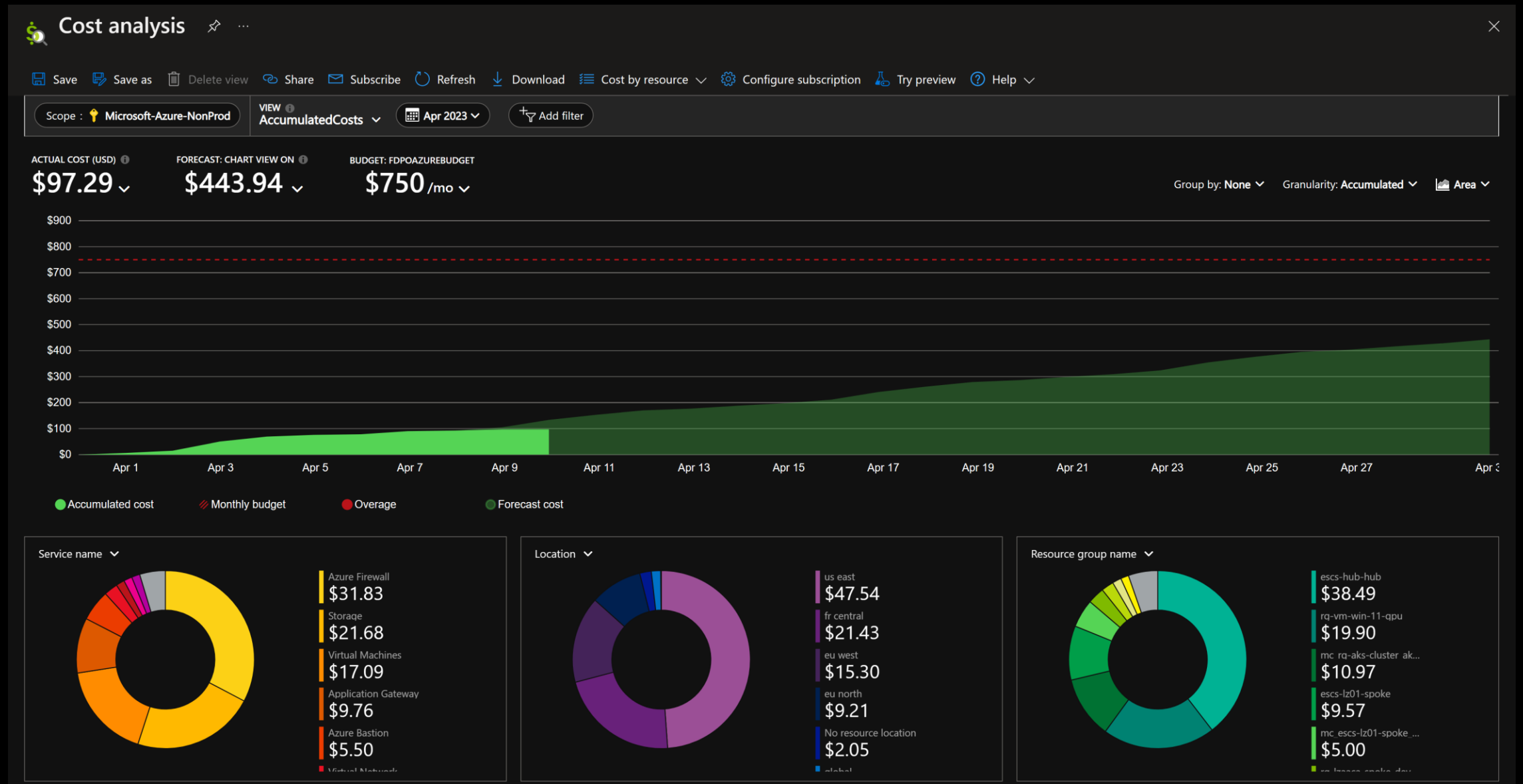
View the cost of resources in Azure portal



Reduce cost of AKS cluster

In Kubernetes:

- Optimize docker images (size & perf)
- Pod auto scalability (HPA)
- Nodes auto scalability (cluster autoscaler)

In AKS:

- Choose the right VM size (SKU)
- Stop & Start cluster or nodepools
- Free & Standard SKU for control plane

In Azure:

- Arm (cheaper) vs Intel based processors
- Azure Spot VMs (up to 80% cost reduction)
- Azure Reservations (1 or 3 years reservation)
- Azure Saving Plan (up to 65% off PAYG)
- Azure Hybrid Benefits (for Windows Server)
- Azure Dev/Test subscriptions (no SLA)

How much does AKS cost ?

AKS cost includes:

- VMSS (system & user)
- Load Balancer & IP addresses
- Network traffic between Availability Zones
- Standard/Premium SKU for the control plane
- Private Endpoint traffic if using private cluster

What is free in AKS ?

- The control plane
- Managed Identity
- AKS extensions (OSM, CSI Drivers...)

Name	Type
aks-cluster	Kubernetes service

Name	Type
3d5de69b-1c80-47fe-8860-209f23c24d2a	Public IP address
aks-agentpool-42354260-nsg	Network security group
aks-agentpool-42354260-routetable	Route table
aks-appspool-75868440-vmss	Virtual machine scale set
aks-cluster-agentpool	Managed Identity
aks-nodepool1-14384788-vmss	Virtual machine scale set
aks-vnet-42354260	Virtual network
azurekeyvaultsecretsprovider-aks-cluster	Managed Identity
ingress-appgateway	Application gateway
ingress-appgateway-appgwpip	Public IP address
ingressapplicationgateway-aks-cluster	Managed Identity
kubernetes	Load balancer
pvc-2c365e2a-349f-49b0-a0aa-b03409b23974	Disk

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Other cost:

- VNET peering with Hub network
- Application Gateway as Ingress Controller (AGIC)
- Azure Key vault for storing secrets & certificates
- Logs & metrics: Log Analytics, Prometheus & Grafana
- Persistent Volumes using Azure Disk, Blob or File
- Cost of cluster backup

Stop & start cluster (control plane + all worker nodes)

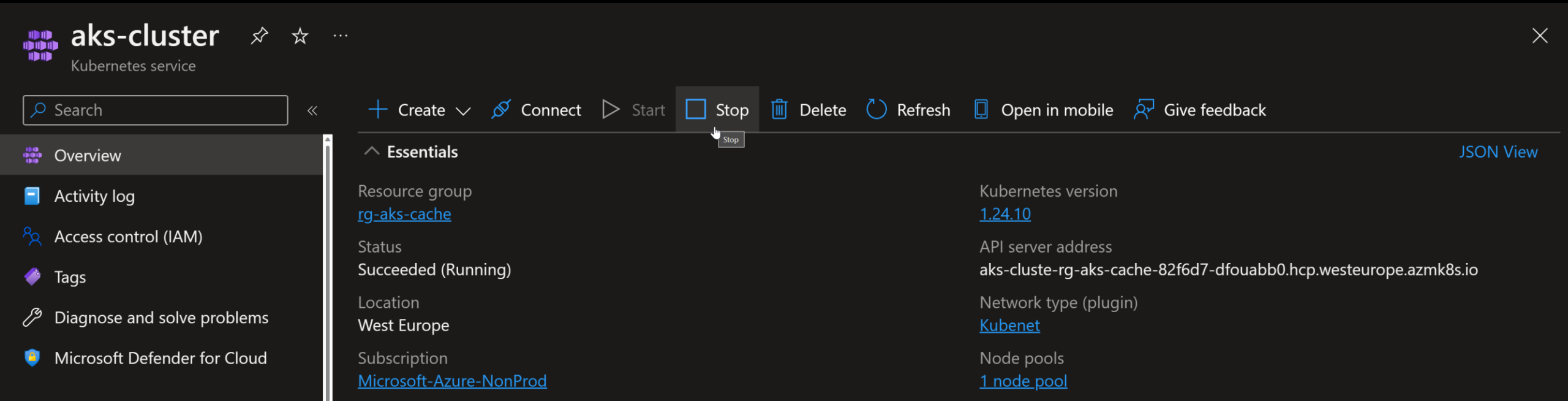
```
$ az aks start -n $AKS_NAME -g $AKS_RG
```

Could run as part of a DevOps pipeline

Stop all the cluster nodes during non-working hours (weekend, night)

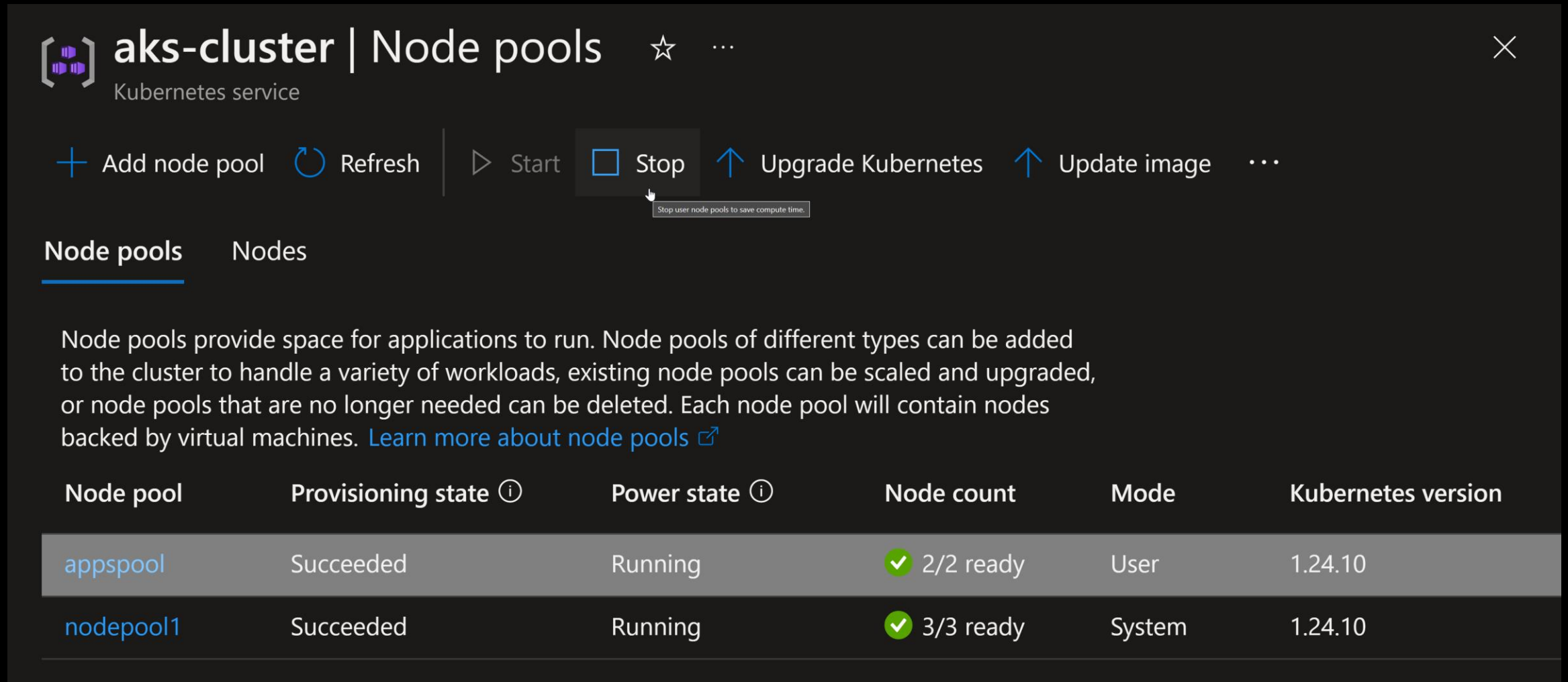
Suites more the Dev/Test clusters, not recommended for Production clusters

Save the cost of Nodepools only, not the other resources like Load Balancer, Public IP...



Stop & start user nodepools

```
az aks nodepool start --cluster-name $AKS_NAME -g $AKS_RG -n $POOL_NAME
```



Choose the right VM SKU/family

Select a VM size

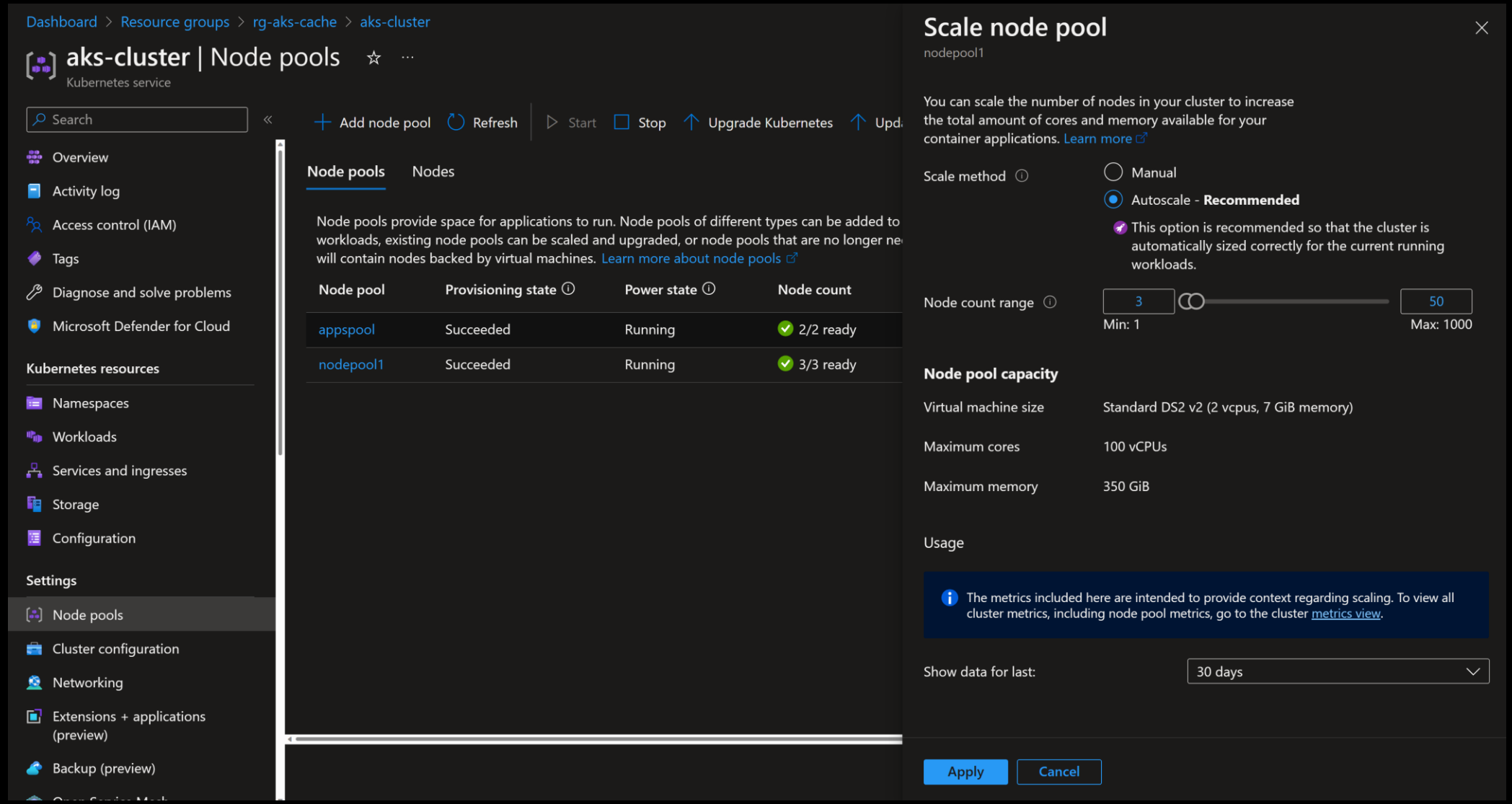
Search by VM size... | vCPUs : **All** | RAM (GiB) : **All** | Display cost : **Monthly** | Add filter

Showing 721 VM sizes. | Subscription: Microsoft-Azure-NonProd | Region: West Europe | Current size: Standard_D2ads_v5 | Learn more about VM sizes

Group by series

VM Size	Type	vCPUs	RAM (GiB)	Data disks	Max IOPS	Temp storage (GiB)	Premium disk	Cost/month
Most used by Azure users		**The most used sizes by users in Azure**						
D-Series v5		**The latest generation D family sizes recommended for your general purpose needs**						
D2ads_v5	General purpose	2	8	4	3750	75	Supported	$91.25
D2as_v5	General purpose	2	8	4	3750	0	Supported	$75.92
D2ds_v5	General purpose	2	8	4	3750	75	Supported	$99.28
D2lds_v5	General purpose	2	4	4	3750	75	Supported	$81.03
D2ls_v5	General purpose	2	4	4	3750	0	Supported	$70.81
D2pds_v5	General purpose	2	8	4	3750	75	Supported	$79.57
D2plds_v5	General purpose	2	4	4	3750	75	Supported	$64.97
D2pls_v5	General purpose	2	4	4	3750	0	Supported	$56.65
D2ps_v5	General purpose	2	8	4	3750	0	Supported	$67.16
D2s_v5	General purpose	2	8	4	3750	0	Supported	$83.95
D4ads_v5	General purpose	4	16	8	6400	150	Supported	$182.50
D4as_v5	General purpose	4	16	8	6400	0	Supported	$151.84

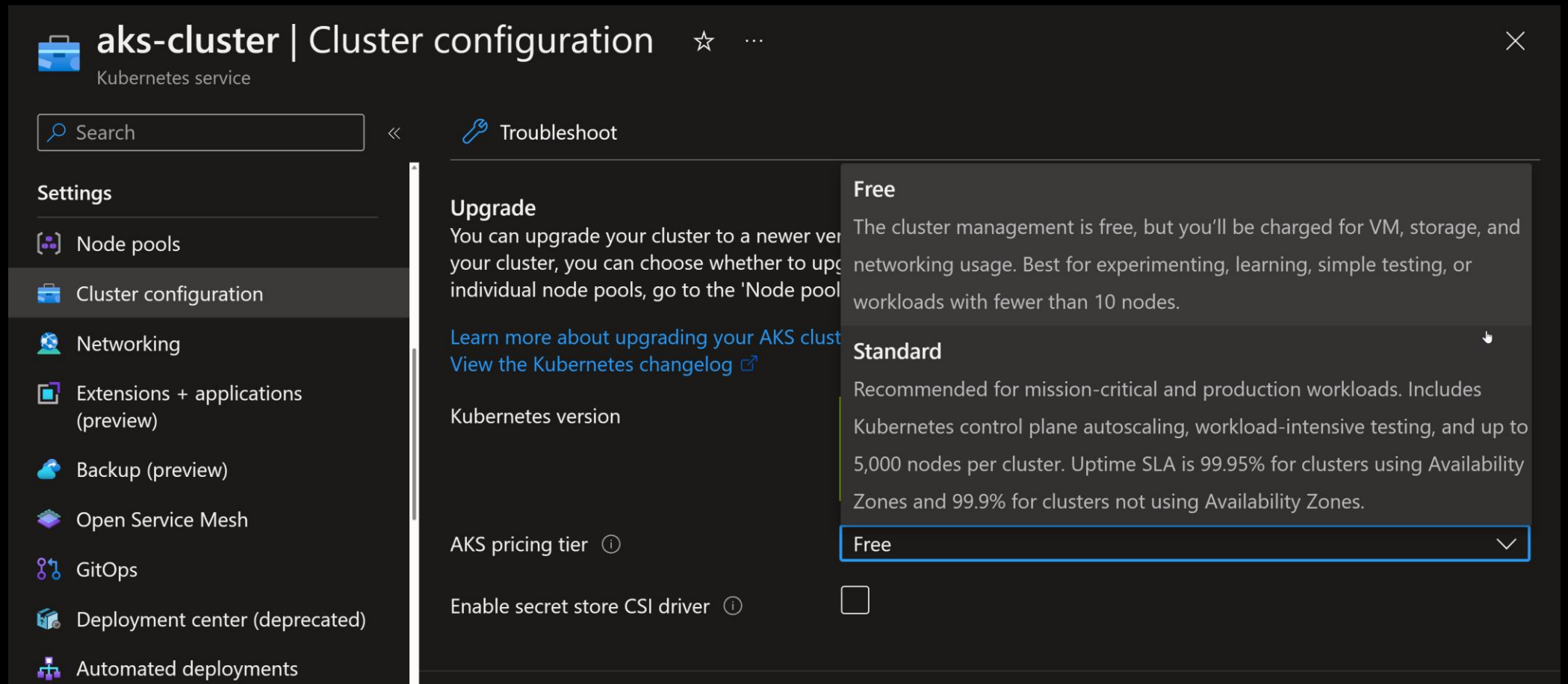
Autoscale Nodepools



Free vs Standard control plane SKU

Free SKU for Dev/Test clusters

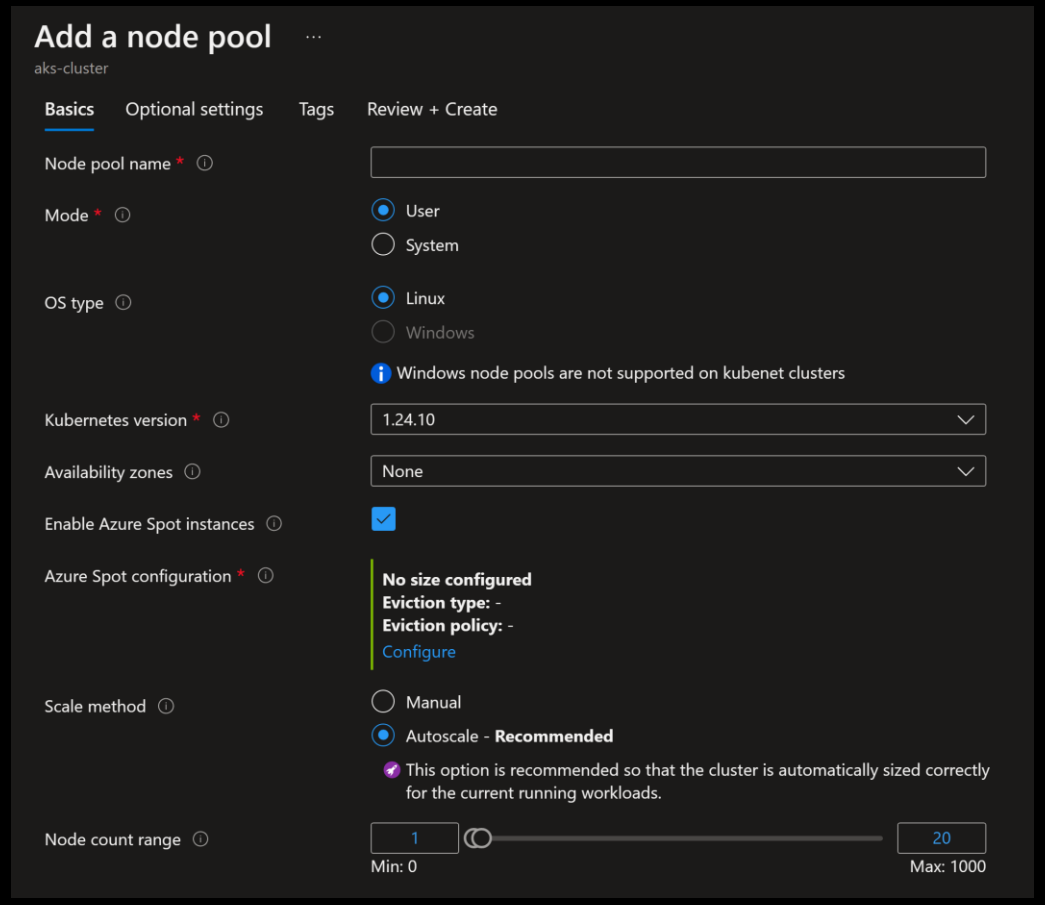
Standard SKU for Production clusters, costs about 70$ per cluster (fixed)

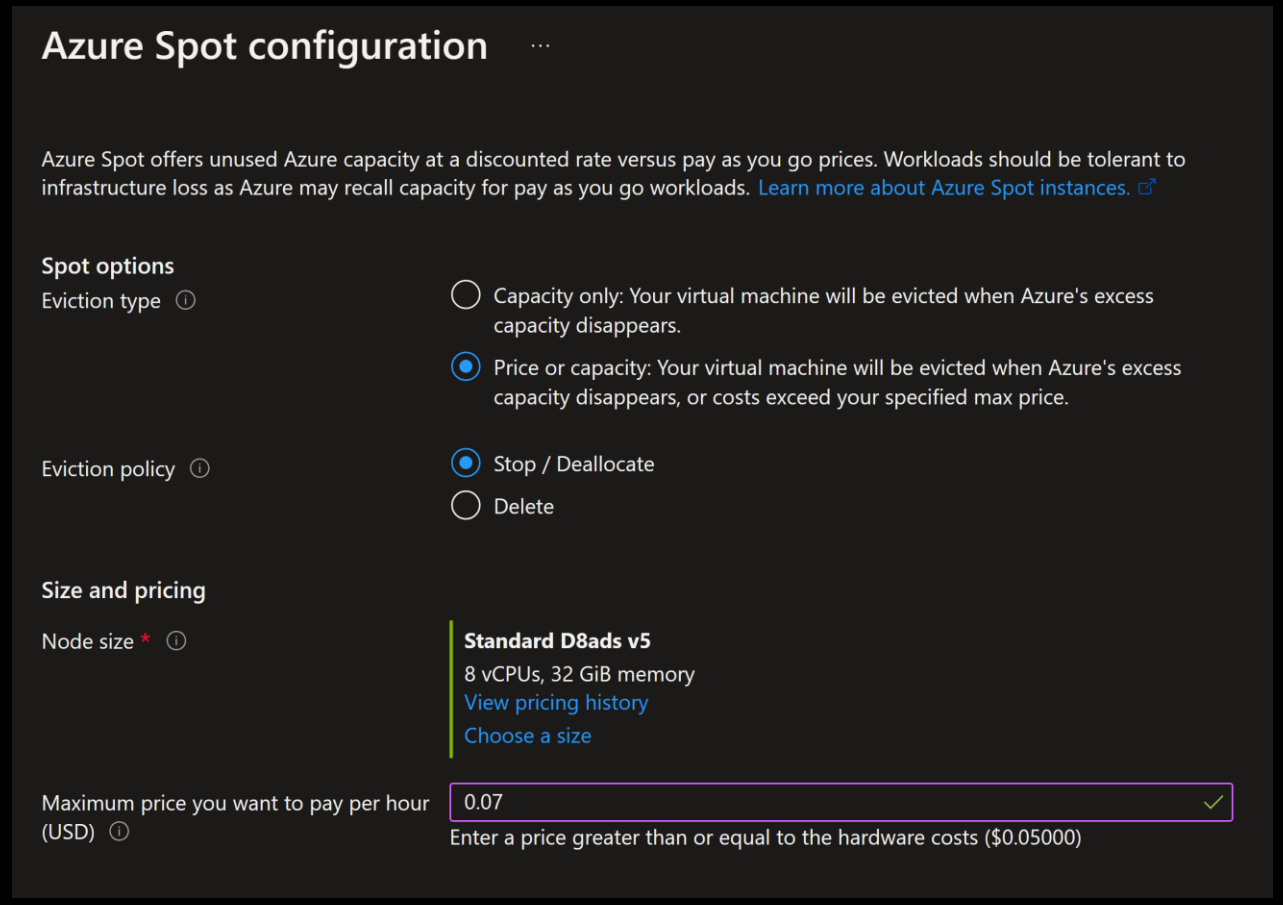


Spot Nodepools

Could be used in Dev/Test and Production clusters

Suited for running batches and stateless apps





More resources

Azure FinOps guide:

https://techcommunity.microsoft.com/t5/fasttrack-for-azure/the-azure-finops-guide/ba-p/3704132

How to reduce the total cost of ownership (TCO) of your AKS cluster:

https://techcommunity.microsoft.com/t5/fasttrack-for-azure/how-to-reduce-the-total-cost-of-ownership-tco-of-your-azure/ba-p/3706895

How to reduce the total cost of ownership (TCO) of your Azure Kubernetes Service (AKS) cluster

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By Paolo Salvatori

Published Jan 02 2023 06:26 AM 7,052 Views Listen

This article contains a few recommendations for reducing the total cost of ownership (TCO) of your Azure Kubernetes Service (AKS) cluster.

Recommendations

If you want to minimize the number of unused cores, you can use the following general guidelines to improve the density of your workloads and reduce the number of VMs to the bare minimum.

- Use the cluster autoscaler, Kubernetes Event-Driver Autoscaler (KEDA), and Horizontal Pod Autoscaler to scale in and scale out the number of pods and the number of nodes based on the traffic conditions.
- Make sure to properly set requests and limits for pods to avoid assigning too many resources in terms of CPU and memory to the user-defined workloads and improve application density. You can observe the average and maximum consumption of CPU and memory using Prometheus or Container Insights and properly configure limits and quotas for your pods in the YAML manifests, Helm charts, Kustomize manifests for your deployments. For more information, see Best practices for application developers to manage resources in Azure Kubernetes Service (AKS). There are 3rd party tools like Densify that, by gathering granular container data from frameworks like Prometheus, learning the patterns of activity, and applying policies, can suggest requests and limits for each pod container, optimizing the overall density.
- Use ResourceQuota objects to set quotas for the total amount of memory and CPU that can be used by all Pods running in a given namespace to prevent or reduce the likelihood of the noisy neighbor's issue, improve the application density, and reduce the number of agent nodes and hence the total cost of ownership. Likewise, Use LimitRange objects to configure the default requests in terms of CPU and memory for pods running in a namespace. Azure Policy integrates with AKS through built-in policies to apply at-scale enforcements and safeguards on your cluster in a centralized, consistent manner. Follow the documentation to enable the Azure Policy add-on on your cluster and apply the Ensure CPU and memory resource limits policy, ensuring CPU and memory resource limits are defined on containers in an Azure Kubernetes Service cluster.
- Use the Vertical Pod Autoscaler (VPA), based on the open-source Kubernetes version, to analyze and set CPU and memory resources required by your pods. Instead of running tests to calculate the optimal CPU and memory requests and limits for the containers in your pods, you can configure vertical Pod autoscaling to provide recommended values for CPU and memory requests and limits that you can use to update your pods manually, or you can configure vertical Pod autoscaling to update the values automatically. When configured, the Vertical Pod Autoscaler (VPA) automatically sets resource requests and limits on containers per workload based on past usage. This ensures pods are scheduled onto nodes with the required CPU and memory