AusNOG 7th September 2023 : Kubernetes autoscaling and load balancing

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Purpose of talk

- Kubernetes and containers defacto cloud operating system
- Network operators increasingly using K8S for their workloads like netops, AlOps, 5G functions
 - Take advantage of the native scaling flexibility and load balancing capabilities of kubernetes



Agenda

- Kubernetes Intro
- Setting up pod autoscaling + node auto scaling.
- Load balancing in Kubernetes pods

Use cases

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Containers Intro



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Kubernetes



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Kubernetes networking model



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Kubernetes capacity planning

- Cluster Level
- Resource Level
- Node Level

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Installing metrics server

- Install metrics server
- Once you install metrics server you can use top command

```
(base) ychao@sin-mpdlh k8shpa % kubectl top pods
NAME CPU(cores) MEMORY(bytes)
linode-kubernetes-6c5f6b644d-599w8 0m 21Mi
php-apache-5b56f9df94-kw7f6 1m 11Mi
(base) ychao@sin-mpdlh k8shpa %
```



Install Horizontal Pod Autoscaler Operator

Install horizontal pod autoscaler operator for the application deployment

(base) ychao@sin-mpdlh k8shpa % kubectl autoscale deployment linode-kubernetes --cpu-percent=10 --min=1 --max=10 Error from server (AlreadyEviste), borizontalpodautoscalere autoscaling "linode-kubernetes" already evists

```
Error from server (AlreadyExists): horizontalpodautoscalers
(base) vchao@sin-mpdlh k8shpa % kubectl get hpa -o vaml
apiVersion: v1
items:
- apiVersion: autoscaling/v2
 kind: HorizontalPodAutoscaler
 metadata:
   creationTimestamp: "2023-01-11T10:28:40Z"
   managedFields:
   - apiVersion: autoscaling/v1
     fieldsType: FieldsV1
     fieldsV1:
       f:spec:
         f:maxReplicas: {}
         f:minReplicas: {}
         f:scaleTargetRef: {}
         f:targetCPUUtilizationPercentage: {}
     manager: kubectl-autoscale
     operation: Update
     time: "2023-01-11T10:28:40Z"
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Kubernetes Node Autoscaler

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ode Pools	Autoscale Pool	Recycle All Nodes Add A Node Poo
Dedicated 4GB	Set minimum and maximum node pool constraints for LKE to resize your cluster automatically based on resource demand and overall usage. Maximum limit is 100 nodes.	Resize Pool Recycle Pool Nodes Delete Pool
	Learn More.	
	Autoscaler	
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Enable node autoscaler

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Kubernetes Pods are ephemeral

- Each Pod has its own IP address
- IP address changes as Pods are destroyed and recreated





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Kubernetes Service

- Stable IP Address
- DNS name
- Load Balancing

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Kubernetes Service Type - Cluster IP





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Kubernetes Service Type - Node Port



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- For managed K8S like LKE, CSP will spin up a node balancer with an external IP
 - Linode Cloud Controller
 Manager
 https://github.com/linode/linode-cloud-controller-

manager

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Load Balancing within pods

- Kube-proxy updates iptables within nodes
- Iptables uses statistic method with probabilities

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Use case

- By using service Kubernetes resources, one can harness the power of Kubernetes for both scalability and self-healing enabling network operators to serve millions of customers at a very high level of availability while minimizing cost
- E.g. of workload for Network Operator, include any sort of IT workloads like websites, billing and even up to 5g Core Functions on Kubernetes.

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(Anca Pavel, Fatih E. Nar, Federico Rossi, and Mathias Bogebrant, CC BY-SA 4.0)



{ select { case resp ControlMessage, statusPoll intf(w. err.Error()): *http

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PollChannel := (chan chan case status count %d", html.EscapeStr: regChan: if result { fm1 strings": "time' tvpe olChannel, statusPollChannel func admin(cc 64): if err

, count); }); htt fmt.Fprint(w, Akamai Message struct Tar nannel chan ControlMes

http.HandleFunc("/status' .fun Respons return; case

:= time.After(time.Second); select { case result := <- reqChan: if ings"; "time"); type Controllessage struct { Target string; Count nnel: respChan <- workerActi spChan := <- statusPol http.Request) { hostToke c(w http.Resp ued for Target %s, count % Print(v ACTIVE"); } else { fmt main() { controlChannel := make(cha workerActive = true; go doStuff(

false;go admin(controlChannel, statusPollChannel); for { select { case n ControlMessage, statusPollChannel chan chan bool) {http.HandleFunc(

age{Target: r.FormValue("target"), Count: count}; cc <- msg; fmt.Fprintf(

(r.Host, ":"); r.ParseForm(); count, e alue("target")), count); }); http.Ha eteChan := make(chan bool): statusPo tatus := <- workerCompleteChan: worke

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Containers Intro



