Breeze - Deploy a Production Ready Kubernetes Cluster with graphical interface

Project Breeze is an open source trusted solution allow you to create Kubernetes clusters on your internal, secure, cloud network with graphical user interface. (<u>https://github.com/wise2c-devops/breeze</u>)

Features

* Easy to run: Breeze combines all resources you need such as kubernetes components images, ansible playbooks for the deployment of kubernetes clusters into a single docker image (wise2c/playbook). It also works as a local yum repository server. You just need a linux server with docker and docker-compose installed to run Breeze.

* Simplified the process of kubernetes clusters deployment: With a few simple commands, you can get Breeze running, and then finish all the other deployment processes by the graphical interface.

* **Support offline deployment**: After 4 images (playbook, yum-repo, pagoda, deploy-ui) have been loaded on the deploy server, kubernetes clusters can be setup without internet access. Breeze works as a yum repository server and deploys a local Harbor registry and uses kubeadm to setup kubernetes clusters. All docker images will be pulled from the local Harbor registry.

* Support multi-cluster: Breeze supports multiple kubernetes clusters deployment.

* **Support high available architecture**: With Breeze, you can setup kubernetes clusters with 3 master servers and 3 etcd servers combined with haproxy and keepalived. All worker nodes will use the virtual floating ip address to communicate with the master servers.

Architecture



You just need a linux server with docker and docker-compose installed to run Breeze.

For offline deployment, just download those 4 images listed in the file docker-compose.yml.

Below is the server list in our test environment:

Hostname	IP Address	Role	OS	Components
deploy	192.168.9.10	Breeze Deploy	CentOS 7.6 x64	docker / docker-compose / Breeze
master01	192.168.9.11	K8S Master Node	CentOS 7.6 x64	K8S Master / etcd / HAProxy / Keepalived
master02	192.168.9.12	K8S Master Node	CentOS 7.6 x64	K8S Master / etcd / HAProxy / Keepalived
master03	192.168.9.13	K8S Master Node	CentOS 7.6 x64	K8S Master / etcd / HAProxy / Keepalived
worker01	192.168.9.21	K8S Worker Node	CentOS 7.6 x64	K8S Worker
harbor	192.168.9.20	Harbor	CentOS 7.6 x64	Harbor 1.7.0
	192.168.9.30	VIP		HA virtual IP address

Steps:

- 1. Prepare the deploy server (deploy / 192.168.9.10)
- (1) Install CentOS 7.6-1810 (7.5 and 7.4 are also supported) with Minimal mode and execute commands as below:
 setenforce Ø
 sed --follow-symlinks -i "s/SELINUX=enforcing/SELINUX=disabled/g" /etc/selinux/config

```
firewall-cmd --set-default-zone=trusted
firewall-cmd --complete-reload
```

(2) Install docker-compose

```
curl -L https://github.com/docker/compose/releases/download/1.21.2/docker-compose-$(uname
-s)-$(uname -m) -o /usr/local/bin/docker-compose
```

chmod +x /usr/local/bin/docker-compose

- (3) Install docker yum install docker systemctl enable docker && systemctl start docker
- (4) ssh login to other servers without password
 a) ssh keygen:
 ssh-keygen

b) execute the ssh-copy-id command: ssh-copy-id 192.168.9.11 ssh-copy-id 192.168.9.12 ssh-copy-id 192.168.9.13 ssh-copy-id 192.168.9.20 ssh-copy-id 192.168.9.21

2. Get the compose file (e.g. for Kubernetes v1.13.1)

```
curl -L https://raw.githubusercontent.com/wise2c-devops/breeze/v1.13.1/docker-compose.yml -
o docker-compose.yml
docker-compose up -d
```

3. Access the Breeze web portal: http://192.168.9.10:88



& Kubernetes部署中心 × +		-		×
← → C A Not secure 192.168.9.10:88/#/clusters	☆	6	Θ	:
+ Add clusters				
Alan Cluster name *				
Alan K8S				
Descrtipion				
My Kubernetes Cluster				
Cancel				
Developer: 睿云智合 (Wise2C) Contact us 中文 / EN				

& Kubernetes部署中心 × +		- 🗆 X
\leftrightarrow \rightarrow C A Not secure 192.168.9.10:	88/#/clusters	☆ 🗟 🛛 😁 🗄
+ Alan	Create completed Alan K8S Developer: 25-292 (Mise2C) Contact is thir (EN	

(2) Click this cluster icon to add servers:

& Kubernetes部署中心	× +				– 🗆 ×
$\leftarrow \rightarrow \mathbf{C}$ A Not secu	re 192.168.9.10:88/#/cl	usters/5ed63b7f-cf31-41e	ea-816f-86546621	2e16/hosts	☆ 🗟 \varTheta :
Host	Cluster / Alan K8S				Add host
Service components	Number	Host name	IP	Description	Operation
Install logs			暂无数据		
		Last s	tep	xt step	
	Devel	oper: 睿云智合(Wise2C) Co	ntact us	EN	

Click the "Add host" button.

& Kubernetes部署中心	× +	– 🗆 X
← → C ▲ Not s	secure 192.168.9.10:88/#/clusters/7f53a946-a1a8-45fe-a5f1-a61e3fb31f5f/hosts	☆ 🗟 \varTheta :
Host	Cluster / Alan	Add host
 Service components Install logs 	Host Host name * master01 Host ip * 192.168.9.11 Description K8S Master Node 01 Cancel Ok	ion Operation
	Developer: 睿云智合 (Wise2C) Contact us 中文 / EN	

Repeatedly adding five servers to the cluster in turn:

& Kubernetes部署中心	× +				- □ >
\leftrightarrow \rightarrow C \land Not set	ecure 192.168.9.10:8	88/#/clusters/7f53a946-a1a8	-45fe-a5f1-a61e3fb31f	5f/hosts	☆ 🔂 \varTheta
Host	Cluster / Alan	Create completed			Add host
Service components	Number	Host name	IP	Description	Operation
Install logs	1	master01	192.168.9.11	K8S Master Node 01	L D
	2	master02	192.168.9.12	K8S Master Node 02	l d
	3	master03	192.168.9.13	K8S Master Node 03	L Ū
	4	harbor	192.168.9.20	Harbor Server	L
	5	worker01	192.168.9.21	K8S Worker Node 01	l d
		La	Next	step	
		Developer: 睿云智合 (Wise2C)	Contact us 前 中文 / EM	1	

Click Next step for Service Component Definition

(3) Click on the "Add Components" button in the upper right corner to add service components and select docker, because all hosts need to be installed, so there is no need to select a server.

& Kubernetes部署中心	×	+	- 🗆 ×
← → C ▲ Not se	ecure 192	.168.9.10:88/#/clusters/7f53a946-a1a8-45fe-a5f1-a61e3fb31f5f/components	☆ 🚨 \varTheta :
H ost	Cluster	/ Alan > Start install Resit	+ Add component
Service components		Service component	Operation
Install logs		Component type *	
		docker ~	
		Version *	
		18.06.1-CE ~	
		format host name 🖗 * 🔽	
		Cancel	
		Developer: 睿云智合 (Wise2C) Contact us 中文 / EN	

Adding harbor registry components. Note: registry entry point is the entry point for the Harbor server. You can use domain name or IP address.

& Kubernetes部署中心	× +	- 🗆 X
← → C ▲ Not s	secure 192.168.9.10:88/#/clusters/7f53a946-a1a8-45fe-a5f1-a61e3fb31f5f/components	☆ 🚨 \varTheta :
H ost	Cluster / Alan > Start install @ Reset	+ Add component
Service components	Service component	Operation
Install logs	Component type *	۷ 🗴
	Version *	
	harbor hosts @ *	
	harbor entry point @	
	harbor admin password @ *	
	Cancel Ok	•

vip for k8s master: Virtual floating IP address for master servers.

NIC name: network interface name in the linux OS. Please ensure all the interfaces have the same name.

Network mask: input the network mask bit number

router id: configuration in keepalived, do not use same value for multiple clusters

virtual router id: configuration in keepalived, do not use same value for multiple clusters

& Kubernetes部署中心	× +	– 🗆 X
\leftarrow \rightarrow C \blacktriangle Not s	ecure 192.168.9.10:88/#/clusters/7f53a946-a1a8-45fe-a5f1-a61e3fb31f5f/components	☆ 🗟 \varTheta :
Host	Cluster / Alan > Start install Reset	+ Add component
 Host Service components Install logs 	Cluster / Alan Start install @ Recet	Add component Operation C C C C C C C C C C C C C
	Cancel Ok Developer: 客示報合 (Wise2C) i Contact us i 中文 / FN	
		·

Then add etcd servers:

& Kubernetes部署中心	× +	– 🗆 X
\leftarrow \rightarrow C \blacktriangle Not set	ecure 192.168.9.10:88/#/clusters/7f53a946-a1a8-45fe-a5f1-a61e3fb31f5f/components	☆ 🗟 \varTheta :
Host	Cluster / Alan > Start install Reset	+ Add component
Service components	Service component	Operation
Install logs	Component type *	۷.
	etcd ~ Version *	۷.
	3.2.24 ~	
	master01 🕲 master02 🕲 master03 😒 🗸 🗸 🗸	2
	Cancel Ok	
	Last step Next step	
	Developer: 睿云智合 (Wise2C) Contact us 中文 / EN	

Next, add the k8s components: master nodes and worker nodes. (for the first time to install a new cluster, do not check "Just add new worker nodes, do not reinstall this cluster")

Set the correct values for kubernetes entry point: VIP:6444

& Kubernetes部署中心	×	+		-		×
\leftrightarrow \rightarrow C \blacktriangle Not sec	cure 192.	.168.9.10:88/#/clusters/7f53a946-a1a8-45fe-a5f1-a61e3fb31f5f/components	☆	6	Θ	:
Host		Service component				•
Service components		Component type *		Î		h
Install logs		kubernetes Version *				I
		V1.13.1		Û		I
		kubernetes master nodes @				I
		kubenetes worker nodes @		Î		I
		kubernetes entry point @				I
		192.168.9.30;6444				
		Cancel Ok		Î		I
		sNodePort: 30900				Ţ

The last step is optional. If you want to deploy prometheus and alertmanager and grafana, just add this component:

& Kubernetes部署中心	×	+						-	
$\leftarrow \rightarrow C$ A Not set	ecure 192	.168.9.10:8	88/#/clusters/41e18	8964-d572-47fe-b	d64-349963aa21d7/component	s		☆ 🔓	A :
II Host	Cluster	/ Alan	 Start install 	Reset				+ Add c	omponent
Service components		Numbe	Service compo	onent				Operation	
Install logs		1	Component type	*				۵	
		2	prometheus Version *			~		۵	
			v2.5.0			~			
		3	PrometheusOper	ator node 🕲 *			er02, master0	L I	
			worker01 🛞			~			•
			NodePort for Pro	metheus 🚱 *			ior00 menter0		
		4	30900				.eroz, mastero	l 🖻	
			NodePort for Aler	rtManager 🛿 *			naster02, mas		
		5	NedePort for Crat	fana 🕢 t				l i	
			30902						
						Cancel Ok			
				Developer: 睿굸智	合 (Wise2C) i Contact us i 中文 /	EN			
								_	
Kubernetes静書中心 ← → C ▲ Not se	ecure 192	+ .168.9.10:8	8/#/clusters/7f53a	946-a1a8-45fe-a5	if1-a61e3fb31f5f/components			☆ 🔓	Θ:
Host	Cluster	/ Alan	Start install	Reset				+ Add com	ponent
Service components		Number	Service name	Version	Attribute	Host		Operation	
Install logs		1	docker	18.06.1-CE	format_hostname: true			ê	
		2	harbor	v1.7.0	endpoint: 192.168.9.20 password: Harbor12345	self: harbor		۵ ۵	
		3	loadbalancer	HAProxy-1.8.14 _Keepalived-1.	k8sVip: 192.168.9.30 netMask: 24 nic: ens33	self : master01, mas	ter02, master	<u>ک</u> ۱۵	
				3.5	routerID: 10 vRouterID: 160				
		4	etcd	3.2.24		self : master01, mas 03	ter02, master	L û	
		5	kubernetes	v1.13.1	AddWorkerNodesOnly: false endpoint: 192.168.9.30:6444	master: master01, r ster03 worker: worker01	naster02, ma	<u>د</u>	
		6	prometheus	v2.5.0	AlertManagerNodePort: 30903 GrafanaNodePort: 30902 PrometheusNodePort: 30900	self: worker01		<u>د</u>	
					Last step	Next step			

4. Click Next step to start deploy:

& Kubernetes部署中心	×	+					– 🗆 X
\leftarrow \rightarrow C \blacktriangle Not set	ecure 19	2.168.9.10:8	8/#/clusters/7f53	a946-a1a8-45fe-a5	5f1-a61e3fb31f5f/components		☆ 🗟 🛛 \varTheta 🗄
III Host	Cluster	/ Alan	Start install				+ Add component
Service components		Number	Service name	Version	Attribute	Host	Operation
Install logs		1	docker	18.06.1-CE	format_hostname: true		۷ (۱
		2	harbor	v1.7.0	endpoint: 192.168.9.20 password: Harbor12345	self: harbor	2
		3	loadbalance	HAProw, 1 & 14 Warning Confirm the s	k8sVip: 192.168.9.30 nefMask: 24 tart of the installation of the cluster	haster01, master02, master	2
		4	etcd		Cancel	Ok naster01, master02, master 03	2
		5	kubernetes	v1.13.1	AddWorkerNodesOnly: false endpoint: 192.168.9.30:6444	master: master01, master02, ma ster03 worker: worker01	2
		6	prometheus	v2.5.0	AlertManagerNodePort: 30903 GrafanaNodePort: 30902 PrometheusNodePort: 30900	self. worker01	2
					Last step	Next step	

Patiently waiting for all components icon to turn green which means the deployment is finished without problem.



Verify the cluster health status by commands:

kubectl get cs

kubectl get csr

kubectl get nodes -o wide

kubectl -n kube-system get pods

kubectl -n monitoring get pods

• <u>1</u> Deploy ×	• <u>2</u> Harbor ×	• <u>3</u> Master01	× 🔹 🖣 Ma	ster02 ×	• <u>5</u> Master0	3 × • <u>6</u> Worker01	× +	
[root@worker01 NAME scheduler	~]# kubectl g STATUS Healthy	et cs MESSAGE ok	E	RROR				
controller-man	ager Healthy	ok						
etcd-1	Healthy	{"health"	"true"}					
etcd-2	Healthy	{"health"	"true"}					
etcd-0	Healthy	{"health":	"true"}					
[root@worker01	· ~]#							
[root@worker01	.∼]# kubectl g	et nodes -o v	ide			00 TH 05		
NAME STA	TUS ROLES	AGE VERSIO	N INTERNAL	1P E.	XTERNAL-IP	OS-IMAGE	KERNEL-VERSION	CONTAINER-RUNTIME
master01 Rea	dy master	83m VI.13	1 192.168.	9.11 <	none>	CentOS Linux / (Core	3.10.0-957.el/.x86_64	docker://18.6.1
master02 Rea	dy master	830 VI.13	1 192.108.	9.12 <	none>	CentOS Linux 7 (Core) 3.10.0.957.el7.x80_64	docker://18.0.1
workor01 Pop	dy ⊫aster	0200 VI.13	1 192,100,	9.15 1		ContOS Linux 7 (Core) 2 10 0 057 ol7 v96 64	docker://18.6.1
	luy ⊂none> ∼l#	0100 11.13	1 192.100.	9.21 5	none>	Centos Linux / (core	3.10.0-937.007.000_04	docker://18.0.1
[root@worker0]	.∼]# kuhectl .	n kuha-svetar	apt node					
NAME	J# Kubectt -	r Kube-syster	EADY STATI	IS RES	TARTS AGE			
coredns-9dbbc7	5f6-6d715		/1 Runni	nα Θ	82m			
coredns-9dbbc7	5f6-v859a		/1 Runni	na O	82m			
kube-apiserver	-master01		/1 Runni	.ng 0	82m			
kube-apiserver	-master02		/1 Runni	.ng 0	82m			
kube-apiserver	-master03		/1 Runni	.ng 0	82m			
kube-controlle	r-manager-mast	er01 1	/1 Runni	.ng 0	82m			
kube-controller-manager-master02		er02 1	/1 Runni	.ng 0	82m			
kube-controlle	r-manager-mast	er03 1	/1 Runni	.ng 0	82m			
kube-flannel-d	s-6nwt6]	/1 Runni	.ng 0	82m			
kube-flannel-d	s-7xkd5]	/1 Runni	.ng O	81m			
kube-flannel-d	s-9wh8g		/1 Runni	ng O	82m			
Kube-flannel-d	s-tpaqt		/I Runni	.ng ⊎	82m			
kubo proxy-nog	рт 1 ғ	-	/I Runni /I Runni	.ng ⊎	M18			
kube-proxy-mitp	ar		/I Numiii /I Runni	ng O	02111 92m			
kube-proxy-utpuz			/l Runni /l Runni	ng O	82m			
kube-scheduler-masterAl			/1 Runni	ng O	82m			
kube-scheduler-master02			/1 Runni	na O	82m			
kube-scheduler	-master03		/1 Runni	.ng 0	82m			
kubernetes-das	hboard-84cf4d5	bbd-7fc2m 1	/1 Runni	.ng 0	82m			
[root@worker01	~]#							
[root@worker01	. ~]# kubectl -	n monitoring	get pods					
NAME		RE	ADY STATUS	6 REST	ARTS AGE			
alertmanager-m	ain-0	2/	2 Runnir	ig O	78m			
alertmanager-m	ain-l	2/	2 Runnir	ig O	78m			
alertmanager-m	a1n-2	2/	2 Runnir	g O	/8m			
gratana-654001	9C67-CSZG7	L/	I Runnir	ig ⊎	79m			
Rube-state-met	rics-5/05/0090; pmdb2	D-VT4VT 4/	4 Runnir 2 Puppir	ig ⊎	78m 70m			
node-exporter-	pillab2 akmd4	2/	2 Runnin 2 Punnin	ig e	7900 7000			
node-exporter-		2/	2 Runnir	ig 0	7911 70m			
node-exporter-	79rzn	2/	2 Runnir 2 Runnir	ng O	79m			
prometheus-ada	nter-748944fff	8-nsv7d 1	1 Runnir	a 0	79m			
prometheus-k8s	-0	3	3 Runnir	a 1	78m			
prometheus-k8s	-1	3/	3 Runnir	q 1	78m			
prometheus-ope	rator-7b696876	84-dl8qd 1/	1 Runnir	ig 0	79m			
[root@worker01	.~]#							

Grafana: http://node:30902



🥃 Setting up the Prometheus Op 🗙 💊 Kubernetes部署中心 🛛 🗴 🔶 Prometheus Time Series Colle: 🗙 🜎 breeze/B		-		×		
← → C ① Not secure 192.168.9.21:30900/targets	$\overrightarrow{\alpha}$	6	A	:		
Prometheus Alerts Graph Status - Help						
Targets				1		
All Unhealthy				1		
monitoring/alertmanager/0 (3/3 up) show more						
monitoring/coredns/0 (2/2 up) show more						
monitoring/etcd-k8s/0 (3/3 up) show more						
monitoring/kube-apiserver/0 (3/3 up) show more						
monitoring/kube-controller-manager/0 (3/3 up) show more						
monitoring/kube-scheduler/0 (3/3 up) show more						
monitoring/kube-state-metrics/0 (1/1 up) show more						
monitoring/kube-state-metrics/1 (1/1 up) show more						
monitoring/kubelet/0 (4/4 up) show more						
monitoring/kubelet/1 (4/4 up) show more						
monitoring/node-exporter/0 (4/4 up) show more						
monitoring/prometheus-operator/0 (1/1 up) show more						
monitoring/prometheus/0 (2/2 up) show more						
				*		

Alertmanager: http://node:30903

🥥 Setting up the Prometheus Op 🗙 💧 Kubernetes部署中心 🗙 🔶 Alertmanager 🗙 🗘 breeze/Breeze/Manual-CN.md 🗙 🕇		-		×
← → C ① Not secure 192.168.9.21:30903/#/alerts	\$	6	A	:
Alertmanager Alerts Silences Status	New Silenc	e		
	and O table in the			
Filter Group Receiver: All Siler	nced Innibited	J		
	+			
Custom matcher, e.g. env="production"				
alertname="AlertmanagerMembersInconsistent" + 00:16:18, 2018-12-26 + Info Source Silence				
severity="critical" + service="alertmanager-main" + prometheus="monitoring/k8s" + pod="alertmanager-main-2" +				
namespace="monitoring" + job="alertmanager-main" + instance="10.244.3.11:9093" + endpoint="web" +				
00:16:18, 2018-12-26 + Info 🛃 Source 🖉 Silence				
severity="critical" + service="alertmanager-main" + prometheus="monitoring/k8s" + pod="alertmanager-main-1" +				
namespace="monitoring" + job="alertmanager-main" + instance="10.244.3.9:9093" + endpoint="web" +				
00:16:18, 2018-12-26 + Info 🗠 Source 🖉 Silence				
severity="critical" + service="alertmanager-main" + prometheus="monitoring/k8s" + pod="alertmanager-main-0" +				
namespace="monitoring" + job="alertmanager-main" + instance="10.244.3.7:9093" + endpoint="web" +				•