



Jakarta Kubernetes Meetup Sept 2019

Helm Intro, The Package Manager for Kubernetes

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Back-End Engineer at Female Daily Network

medium.com/@deneuv3.4

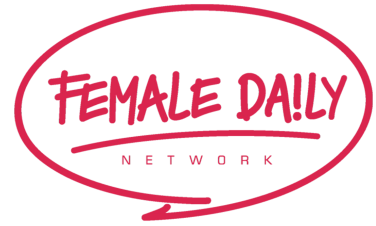
github.com/deneuv34



The background is a solid pink color. In the top right corner, there is a decorative pattern of overlapping triangles in various shades of pink and magenta, creating a geometric, stepped effect.

What is Female Daily Network?

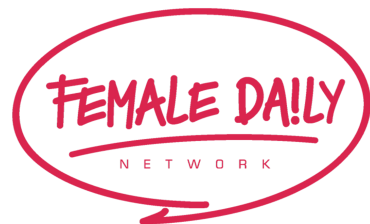
What is Kubernetes?



- Container is a runtime instance for shipped app.
- Kubernetes is container-orchestration system for automating application deployment, scaling, and management



How to deploy to K8s



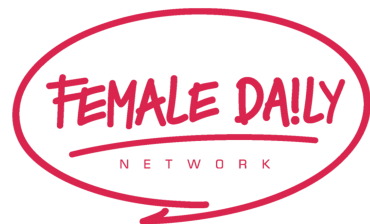
```
# app/deployment.yaml
apiVersion: apps/v1
kind: Deployment
metadata:
  name: nginx-test
  labels:
    app.kubernetes.io/name: nginx
spec:
  replicas: 1
  selector:
    matchLabels:
      app.kubernetes.io/name: nginx
  template:
    metadata:
      labels:
        app.kubernetes.io/name: nginx
    spec:
      containers:
        - name: test-vs
          image: "nginx:alpine"
          imagePullPolicy: IfNotPresent
          ports:
            - name: http
              containerPort: 80
              protocol: TCP
```

```
# app/service.yaml
apiVersion: v1
kind: Service
metadata:
  name: nginx-test
  labels:
    app.kubernetes.io/name: nginx
    helm.sh/chart: test-vs-0.1.0
    app.kubernetes.io/instance: nginx
    app.kubernetes.io/managed-by: Tiller
spec:
  type: ClusterIP
  ports:
    - port: 80
      targetPort: http
      protocol: TCP
      name: http
  selector:
    app.kubernetes.io/name: nginx
    app.kubernetes.io/instance: nginx
```

```
$ kubectl apply -f app/deployment.yaml
```

The Problems

Problems



- Edited partially is pain
- Maintain definition files → one big text file or separated files
- Rollback per service/k8s object
- More objects in k8s add-on (istio, knative, static-egress-ip)

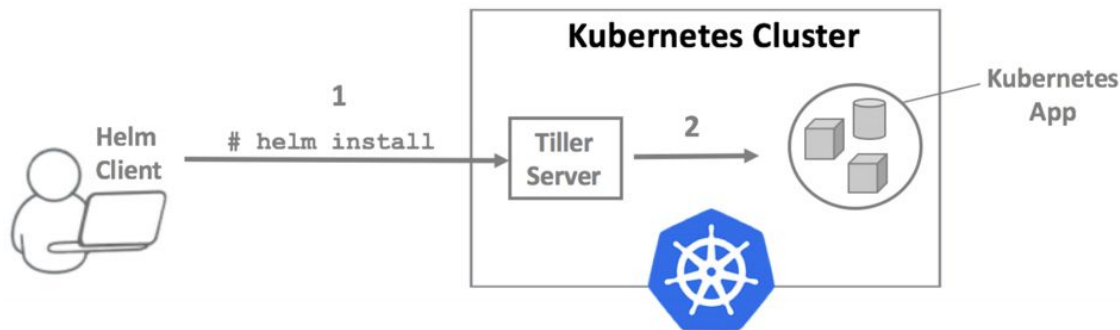




Helm

What is Helm?

- Helm is package manager like apt, yum or npm but for Kubernetes
- Contains kubernetes manifest templates, packaged, and versioned, referred as **Charts**.



```

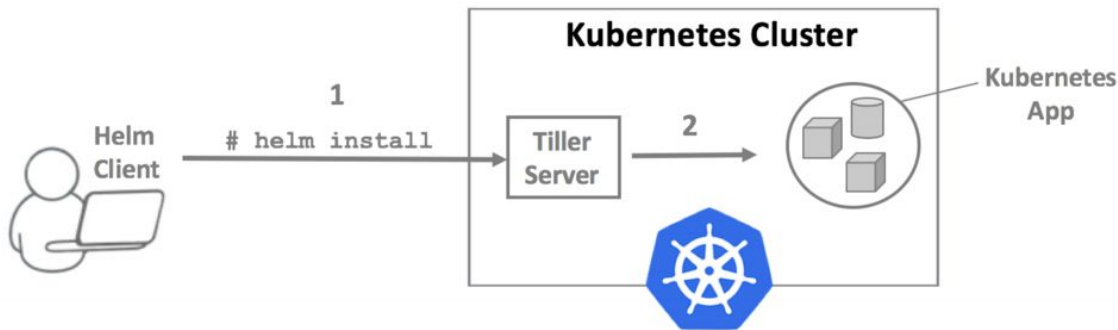
➔ ~ helm version
Client: &version.Version{SemVer:"v2.13.1", GitCommit:"618447cbf203d147601b4b9bd7f8c37a5d39fbb4", GitTreeState:"clean"}
Server: &version.Version{SemVer:"v2.14.0", GitCommit:"05811b84a3f93603dd6c2fcfe57944dfa7ab7fd0", GitTreeState:"clean"}
➔ ~ █

```

What is Helm?



- Helm's components:
 - Client
 - Tiller (server-side) that interact with k8s API

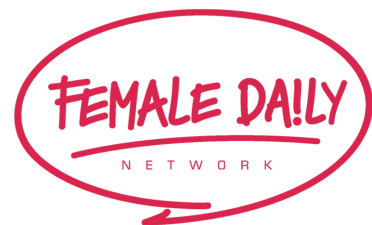


```
➔ ~ helm version
Client: &version.Version{SemVer:"v2.13.1", GitCommit:"618447cbf203d147601b4b9bd7f8c37a5d39fbb4", GitTreeState:"clean"}
Server: &version.Version{SemVer:"v2.14.0", GitCommit:"05811b84a3f93603dd6c2fcfe57944dfa7ab7fd0", GitTreeState:"clean"}
➔ ~ █
```

The background is a solid pink color. In the top right corner, there is a decorative pattern of overlapping geometric shapes, including triangles and squares, in various shades of pink and magenta.

Know the Words

Know the words...



Charts

is resource that
contains kubernetes
manifest/objects

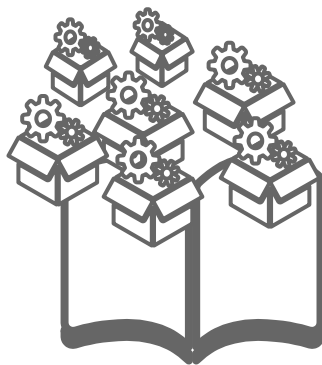
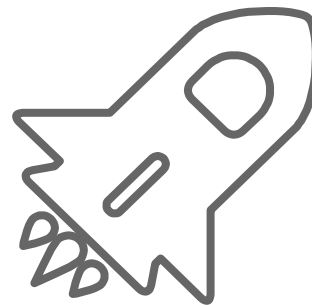


Chart Repository

is list registry of charts.



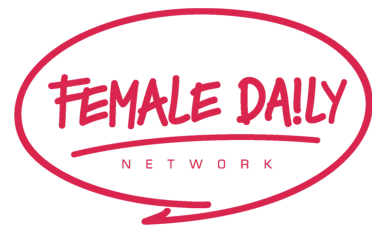
Release

is deployed
instance of charts



➔ ~ helm search | more

NAME	CHART VERSION	APP VERSION	DESCRIPTION
elastic/elasticsearch	7.3.0	7.3.0	Official Elastic helm chart for Elasticsearch
elastic/filebeat	7.3.0	7.3.0	Official Elastic helm chart for Filebeat
elastic/kibana	7.3.0	7.3.0	Official Elastic helm chart for Kibana
elastic/metricbeat	7.3.0	7.3.0	Official Elastic helm chart for Metricbeat
jetstack/cert-manager	v0.10.0-alpha.0	v0.10.0-alpha.0	A Helm chart for cert-manager
jetstack/tor-proxy	0.1.1		A Helm chart for Kubernetes
local/fdn-profile	1.0.0	1.0	FDN Profile API
local/phpmyadmin	2.2.0	4.8.5	phpMyAdmin is an mysql administration frontend
stable/acs-engine-autoscaler	2.2.2	2.1.1	DEPRECATED Scales worker nodes within agent pool
stable/aerospike	0.2.8	v4.5.0.5	A Helm chart for Aerospike in Kubernetes
stable/airflow	4.0.6	1.10.3	Airflow is a platform to programmatically author
stable/ambassador	3.3.2	0.76.0	A Helm chart for Datawire Ambassador
stable/anchore-engine	1.2.1	0.4.2	Anchore container analysis and policy evaluation
stable/apm-server	2.1.4	7.0.0	The server receives data from the Elastic APM agent
stable/ark	4.2.2	0.10.2	DEPRECATED A Helm chart for ark
stable/artifactory	7.3.1	6.1.0	DEPRECATED Universal Repository Manager support
stable/artifactory-ha	0.4.1	6.2.0	DEPRECATED Universal Repository Manager support
stable/atlantis	3.8.0	v0.8.2	A Helm chart for Atlantis https://www.runatlantis.io/
stable/auditbeat	1.1.0	6.7.0	A lightweight shipper to audit the activities of
stable/aws-cluster-autoscaler	0.3.3		Scales worker nodes within autoscaling groups.
stable/aws-iam-authenticator	0.1.0	1.0	A Helm chart for aws-iam-authenticator
stable/bitcoind	0.2.2	0.17.1	Bitcoin is an innovative payment network and a
stable/bookstack	1.1.0	0.25.2	BookStack is a simple, self-hosted, easy-to-use
stable/buildkite	0.2.4	3	DEPRECATED Agent for Buildkite
stable/burrow	1.3.0	0.25.1	Burrow is a permissionable smart contract machine
stable/centrifugo	3.1.0	2.1.0	Centrifugo is a real-time messaging server.
stable/cerebro	1.2.0	0.8.4	A Helm chart for Cerebro - a web admin tool that
stable/cert-manager	v0.6.7	v0.6.2	A Helm chart for cert-manager
stable/chaoskube	3.1.2	0.14.0	Chaoskube periodically kills random pods in your
stable/chartmuseum	2.3.2	0.8.2	Host your own Helm Chart Repository
stable/chronograf	1.1.0	1.7.12	Open-source web application written in Go and R
stable/clamav	1.0.2	1.6	An Open-Source antivirus engine for detecting t
stable/cloudserver	1.0.3	8.1.5	An open-source Node.js implementation of the Am
stable/cluster-autoscaler	3.2.0	1.13.1	Scales worker nodes within autoscaling groups.
stable/cluster-overprovisioner	0.2.1	1.0	Installs the a deployment that overprovisions t
stable/cockroachdb	2.1.12	19.1.3	CockroachDB is a scalable, survivable, strongly-
stable/collabora-code	1.0.4	4.0.3.1	A Helm chart for Collabora Office - CODE-Edition
stable/concourse	8.2.3	5.4.1	Concourse is a simple and scalable CI system.
stable/consul	3.8.1	1.5.3	Highly available and distributed service discove
stable/coredns	1.7.1	1.6.2	CoreDNS is a DNS server that chains plugins and
stable/cosbench	1.0.1	0.0.6	A benchmark tool for cloud object storage serv
stable/coscale	1.0.0	3.16.0	CoScale Agent
stable/couchbase-operator	1.0.0	1.2.0	A Helm chart to deploy the Couchbase Autonomou
stable/couchdb	2.2.0	2.3.1	A database featuring seamless multi-master sync
stable/dask	3.0.0	1.1.5	Distributed computation in Python with task sch
stable/dask-distributed	2.0.2		DEPRECATED: Distributed computation in Python

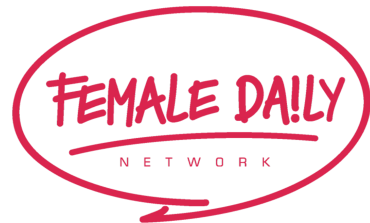


```
➔ ~ helm repo list
NAME          URL
stable        https://kubernetes-charts.storage.googleapis.com
local         http://127.0.0.1:8879/charts
elastic       https://helm.elastic.co
jetstack      https://charts.jetstack.io
➔ ~
```

➔ ~ helm list

NAME	REVISION	UPDATED	STATUS	CHART		APP VERSION	NAMESPACE
beautyroundup-prod	11	Fri Jul 19 17:19:33 2019	DEPLOYED	chea	0.1	1.0	prod
cheatsheet	2	Thu Aug 22 09:52:59 2019	DEPLOYED	chea	0.1	1.0	dev
dev-mommiestalk-group	1	Sat Aug 17 19:43:35 2019	DEPLOYED	fdta	0.1.0	1.0	dev
dev-mommiestalk-media	1	Fri Aug 16 10:09:02 2019	DEPLOYED	fdta	0.1.0	1.0	dev
dev-mommiestalk-notif	1	Fri Aug 16 17:22:04 2019	DEPLOYED	fdta	0.1.0	1.0	dev
dev-mommiestalk-tag	2	Fri Aug 16 09:56:22 2019	DEPLOYED	fdta	1.0	1.0	dev
dev-mommiestalk-talk	2	Fri Aug 16 10:00:13 2019	DEPLOYED	fdta	1.1.0	1.0	dev
dev-mommiestalk-topic	3	Fri Aug 16 09:53:50 2019	DEPLOYED	fdta	0.1.0	1.0	dev
dev-tokopedia	3	Tue Aug 20 17:51:57 2019	DEPLOYED	fdxi	0.1.0	1.0	dev
docs-api	1	Mon Aug 12 18:28:08 2019	DEPLOYED	docs	0	1.0	dev
elasticsearch	3	Fri Aug 9 14:58:25 2019	DEPLOYED	elast	1-7.2.0	7.2.0	dev
es-prod	1	Wed Jul 10 00:08:03 2019	DEPLOYED	elast	1-7.2.0	7.2.0	prod
event-dashboard	4	Fri Aug 30 06:49:02 2019	DEPLOYED	test	1	1.0	dev
eventreg	2	Mon Aug 19 21:39:10 2019	DEPLOYED	fdre		1.0	dev
fdn-chartmuseum	1	Fri Jul 19 11:00:10 2019	DEPLOYED	chai	1.3.0	0.8.2	default
istio	2	Sun Aug 25 16:52:29 2019	DEPLOYED	isti		1.2.4	istio-system
istio-init	2	Sun Aug 25 16:51:32 2019	DEPLOYED	isti	2.4	1.2.4	istio-system
md-talk	5	Thu Aug 29 16:08:31 2019	DEPLOYED	md-i	1	1.0	prod
mysql-dev	1	Wed Jul 10 00:13:56 2019	DEPLOYED	mysq		5.7.14	dev
oldelastic	1	Fri Aug 9 15:17:22 2019	DEPLOYED	elast	1-7.3.0	7.3.0	dev
prod-mommiestalk-group	1	Fri Aug 16 18:57:44 2019	DEPLOYED	fdta	0.1.0	1.0	prod
prod-mommiestalk-media	1	Fri Aug 16 19:01:53 2019	DEPLOYED	fdta	0.1.0	1.0	prod
prod-mommiestalk-tag	1	Fri Aug 16 18:59:56 2019	DEPLOYED	fdta	1.0	1.0	prod
prod-mommiestalk-talk	1	Fri Aug 16 18:59:09 2019	DEPLOYED	fdta	1.1.0	1.0	prod
prod-mommiestalk-topic	1	Fri Aug 16 18:58:29 2019	DEPLOYED	fdta	0.1.0	1.0	prod
prod-tokopedia	3	Wed Aug 21 00:07:43 2019	DEPLOYED	fdxi	0.1.0	1.0	prod
rangga-chart	5	Thu May 23 15:26:24 2019	DEPLOYED	my-c	0.1.0	1.0	dev
redis	1	Tue Jul 16 09:55:45 2019	DEPLOYED	red:		5.0.5	dev
redis-prod	1	Wed Jul 10 10:13:51 2019	DEPLOYED	red:	1	5.0.5	prod
stag-attendant	1	Wed Aug 28 10:52:55 2019	DEPLOYED	mvr:	int-1.0.4	1.0	dev
stag-companies	1	Wed Aug 28 08:16:21 2019	DEPLOYED	mvr:	.es-1.0.0	1.0	dev
stag-event	1	Wed Aug 21 10:22:34 2019	DEPLOYED	mvr:	.0.0	1.0	dev

How to create a Chart



```
$ helm create wordpress
```

```
wordpress/  
  Chart.yaml      # A YAML file containing information about the chart  
  values.yaml     # The default configuration values for this chart  
  charts/         # A directory containing any charts upon which this chart depends.  
  templates/      # A directory of templates that, when combined with values,  
                  # will generate valid Kubernetes manifest files.  
  templates/NOTES.txt # OPTIONAL: A plain text file containing short usage notes  
  LICENSE         # OPTIONAL: A plain text file containing the license for the chart  
  README.md       # OPTIONAL: A human-readable README file  
  requirements.yaml # OPTIONAL: A YAML file listing dependencies for the chart
```




How to create a Chart

- `helm install ./wordpress`
- `helm package ./wordpress`
- `helm push repo/wordpress`





Helm Use Case

- Manage package and their dependencies, and their installation → orchestration
- Fetch, search, lint, and package are available for client-side authoring Helm charts → chart versioning
- Install, delete, upgrade, and rollback operations (make use of server component called Tiller) → release management.

Where do the package live?



Chart Repository

Chart Repository

Q: What is Chart repository?

A: index.yaml!

It's contains some metadata about the chart.

Q: How to host Chart repository?

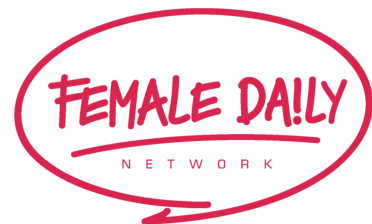
```
apiVersion: v1
entries:
  alpine:
    - created: 2016-10-06T16:23:20.499814565-06:00
      description: Deploy a basic Alpine Linux pod
      digest: 99c76e403d752c84ead610644d4b1c2f2b453a74b921f422b9dcb8a7c8b559cd
      home: https://k8s.io/helm
      name: alpine
      sources:
        - https://github.com/helm/helm
      urls:
        - https://technosophos.github.io/tscharts/alpine-0.2.0.tgz
      version: 0.2.0
    - created: 2016-10-06T16:23:20.499543808-06:00
      description: Deploy a basic Alpine Linux pod
      digest: 515c58e5f79d8b2913a10cb400ebb6fa9c77fe813287afbacf1a0b897cd78727
      home: https://k8s.io/helm
      name: alpine
      sources:
        - https://github.com/helm/helm
      urls:
        - https://technosophos.github.io/tscharts/alpine-0.1.0.tgz
      version: 0.1.0
  nginx:
    - created: 2016-10-06T16:23:20.499543808-06:00
      description: Create a basic nginx HTTP server
      digest: aaff4545f79d8b2913a10cb400ebb6fa9c77fe813287afbacf1a0b897cdffffff
      home: https://k8s.io/helm
      name: nginx
      sources:
        - https://github.com/helm/charts
      urls:
        - https://technosophos.github.io/tscharts/nginx-1.1.0.tgz
      version: 1.1.0
generated: 2016-10-06T16:23:20.499029981-06:00
```



CHARTMUSEUM



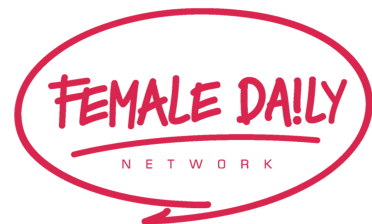
What is Chartmuseum?



Chartmuseum is an open-source chart repository server with support for cloud storage backends.



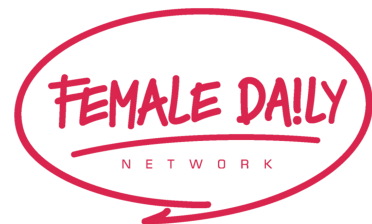
Features



- Push to repo
- Run locally using docker
- Multiple cloud storage option
- REST API to manage charts
- CLI commands



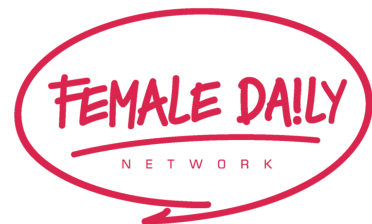
Use case



- Manage own charts repository
- Release testing
- Automate chart release



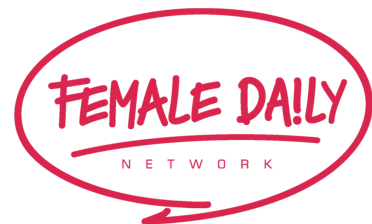
Templating Workflow



- Build Docker container
- Helm create
- Helm install
- Helm upgrade
- Helm package
- Helm delete --purge



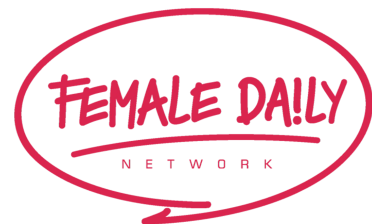
Release Workflow



1. Helm repo add
2. Helm repo update
3. Pushing to repo
4. Helm install



Workflow CI



1. Build image
2. Test
3. Helm repo add
4. Helm repo update
5. Helm install/upgrade --install --set
6. Finish



Update .gitlab-ci.yml



🕒 4 jobs for **dev** in 5 minutes and 33 seconds

🚩 **latest**

🔑 **a3a17b18** ⋮ 🔗

Pipeline Jobs 4

Update-container

✓ build-to-registry ↻

Testing

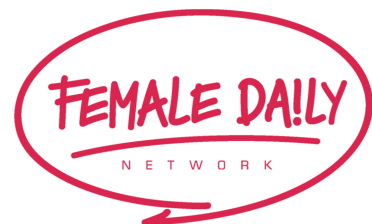
✓ ini_test_buat_n... ↻

✓ ini_testing_kedua ↻

Deploy-dev

✓ deploy_dev ↻

```
---> Running in 08d27c076777
Removing intermediate container 08d27c076777
---> 274f1a7fd08c
Successfully built 274f1a7fd08c
Successfully tagged registry.gitlab.com/fdnetworks/api/fdn-cheatsheet-collection:a3a17b18
$ docker push registry.gitlab.com/fdnetworks/api/fdn-cheatsheet-collection:$CI_COMMIT_SHORT_SHA
The push refers to repository [registry.gitlab.com/fdnetworks/api/fdn-cheatsheet-collection]
4764007ff824: Preparing
056eab57f103: Preparing
f1b5933fe4b5: Preparing
f1b5933fe4b5: Layer already exists
056eab57f103: Pushed
4764007ff824: Pushed
a3a17b18: digest: sha256:1460f1b58b87c1664f0d8a32481350acac9a0ccf54634a252851beeb28f34e55 size: 950
▼
▼
▼
Job succeeded
```



```
136 function deploy_dev() {
137     echo "=====
138     echo "Deploying to Dev..."
139     echo "=====
140
141     if [[ -n "$(helm ls -q "^cheatsheet$")" ]]; then
142         echo "Updating old release..."
143         helm upgrade --install cheatsheet fdn-charts/cheatsheet \
144             --namespace dev \
145             --set image.tag="${image_tag}" \
146             --set es_host=http://elasticsearch-master:9200 \
147             --set host=
148             --set redis_host=redis-master:6379 \
149             --wait
150
151     else
152         echo "Deploying first release..."
153         helm install --name cheatsheet fdn-charts/cheatsheet \
154             --namespace dev \
155             --set image.tag="${image_tag}" \
156             --set es_host=http://elasticsearch-master:9200 \
157             --set host=
158             --set redis_host=redis-master:6379 \
159             --wait
160     fi
161 }
```



Any question?

Thank you...