An intro to ko, developing the knative way

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IBM Cloud

Microservice(s) in Go

From local...

- A few lines of code
- Build and run locally
- `github.com/afrittoli/examples/ms/go/helloworld`

```go
package main

import (
  "flag"
  "fmt"
  "net/http"
)

func main() {
  hwPort := flag.Int("port", 8080, "Listening port
       numbers")
  flag.Parse()

  http.HandleFunc("/", func(w http.ResponseWriter,
       r *http.Request) {
    fmt.Fprintf(w, "{\"hello\": \"%s\"}", r.URL.
      Path)
  })

  http.ListenAndServe(fmt.Sprintf(":%d", *hwPort),
       nil)
}
```

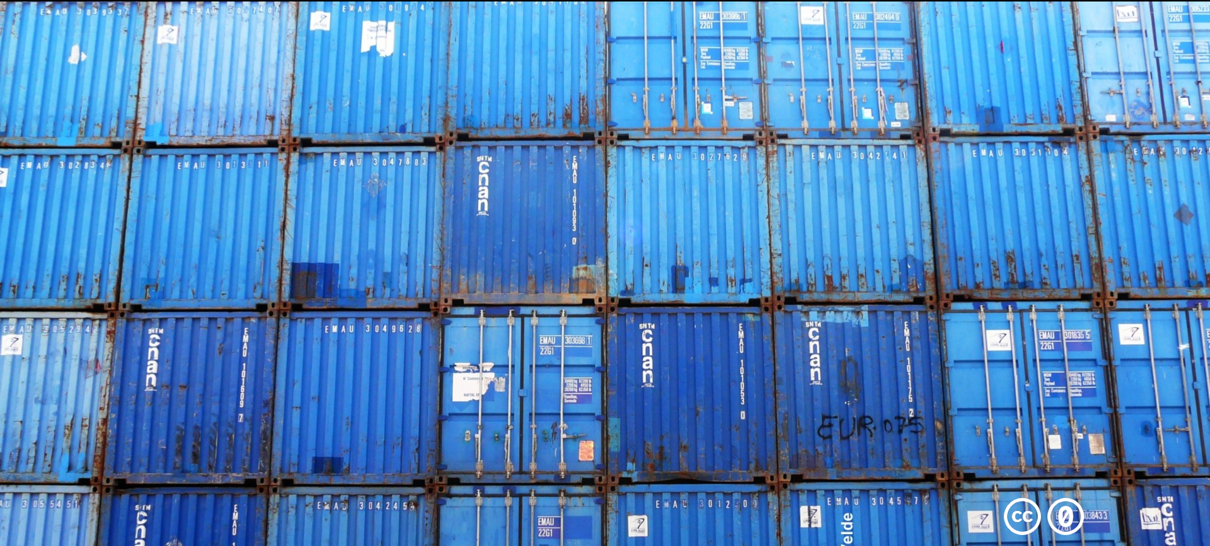
```bash
#!/bin/bash

go build
./helloworld --port 8080 &
```

…to the Cloud

- Scaling
- Resiliency
- Security

Something is missing



Containers!

- One to compile
- One to run
- A single Dockerfile for both

```
# Start by building the
      application.
FROM golang:1.8 as build

WORKDIR /go/src/github.
      com/afrittoli/
      go_helloworld
ADD . /go/src/github.com
      /afrittoli/
      go_helloworld

RUN go-wrapper download
      # "go get -d -v
      ./..."
RUN go-wrapper install

# Now copy it into our
      base image.
FROM gcr.io/distroless/
      base
COPY --from=build /go/
      bin/go_helloworld
      /helloworld
CMD ["/helloworld"]
```

Build the image
Tag the image
Push the image to the registry
Update the image version

- Kubernetes manifests
- Helm chart values

```
#!/bin/bash

# Define variables
TAG=$(git log -1 --
      pretty=%H)
REGISTRY=de.icr.io/
      knative

# Build and push the
      image
docker build .
docker tag ${REGISTRY}/
      go_helloworld:${
      TAG}
docker push ${REGISTRY}/
      go_helloworld:${
      TAG}
```

Getting Started with Ko

Invisible containers

```yaml
apiVersion: apps/v1
kind: Deployment
metadata:
  name: helloworld_ms
spec:
  replicas: 1
  selector:
    matchLabels:
      app: helloworld_ms
  template:
    metadata:
      labels:
        app: helloworld_ms
    spec:
      containers:
      - name: helloworld_ms
        # This is the import path for the Go binary to build and run.
        image: github.com/afrittoli/examples/ms/go/helloworld
        ports:
        - containerPort: 8080
```

Installing

Install go and setup your environment:

```
# Sources go in ${GOPATH}/src
# Binaries go in ${GOPATH}/bin

export GOPATH=<root of GO projects>
export GOBIN=${GOPATH}/bin # This is the default

export PATH=${GOBIN}:${PATH}
```

Install ko:

```
go get -u github.com/google/ko/cmd/ko
```

Congratulations! Ko is now available:

```
$ ko
Rapidly iterate with Go, Containers, and Kubernetes.

Usage:
  ko [flags]
  ko [command]

Available Commands:
  apply       Apply the input files with image references
     resolved to built/pushed image digests.
  create      Create the input files with image references
     resolved to built/pushed image digests.
  delete      See "kubectl help delete" for detailed usage.
  help        Help about any command
  publish     Build and publish container images from the
     given importpaths.
  resolve     Print the input files with image references
     resolved to built/pushed image digests.
  run         A variant of `kubectl run` that containerizes
     IMPORTPATH first.

Flags:
  -h, --help   help for ko

Use "ko [command] --help" for more information about a
     command.
```

Container Registry

Import paths are hashed by default:

```
github.com/afrittoli/examples/ms/go/helloworld
⟹ $KO_DOCKER_REPO/helloworld-<path-hash>
```

Import paths can be preserved
as long as the registry supports it:

```
github.com/afrittoli/examples/ms/go/helloworld
⟹ $KO_DOCKER_REPO/github.com/afrittoli/examples/ms/
go/helloworld
```

Ko can use different container registries.

Using IBM Cloud Container Registry:

```
# Login to IBM Cloud
ibmcloud login
ibmcloud cr login

# Obtain the CR endpoint
ibmcloud cr info

# Define a namespace
ibmcloud cr namespace-add knative

# Create a user API key. Read the "apikey" field from "
     key_file"
ibmcloud iam api-key-create ko-to-cr-key -d "API Key for ko"
      --file key_file

# Store credentials in ~/.docker/config.json
docker login -u iamapikey -p <apikey> <endpoint>
```

Publish, Resolve, Apply, Delete

Publish

Builds and publishes images.

Import paths:

- Fully qualified: `ko publish github.com/afrittoli/examples/ms/go/helloworld`
- Relative within `GOPATH`: `ko publish .`

Configuration:

- Registry + namespace/project: `KO_DOCKER_REPO` env variable
- Docker base image: `.ko.yaml`

Resolve

Renders kubernetes manifests.

- `ko resolve -f config/deployment.yaml`
  - Build log on stderr
  - Manifest on stdout

In details:

- Takes kubernetes style manifests
- Builds and publishes all images
- Returns kubernetes manifests with published image digests

Release management:

- Generate a release: `ko resolve -f config/ > release.yaml`
- Apply a release: `kubectl apply -f release.yaml`

Apply & Delete

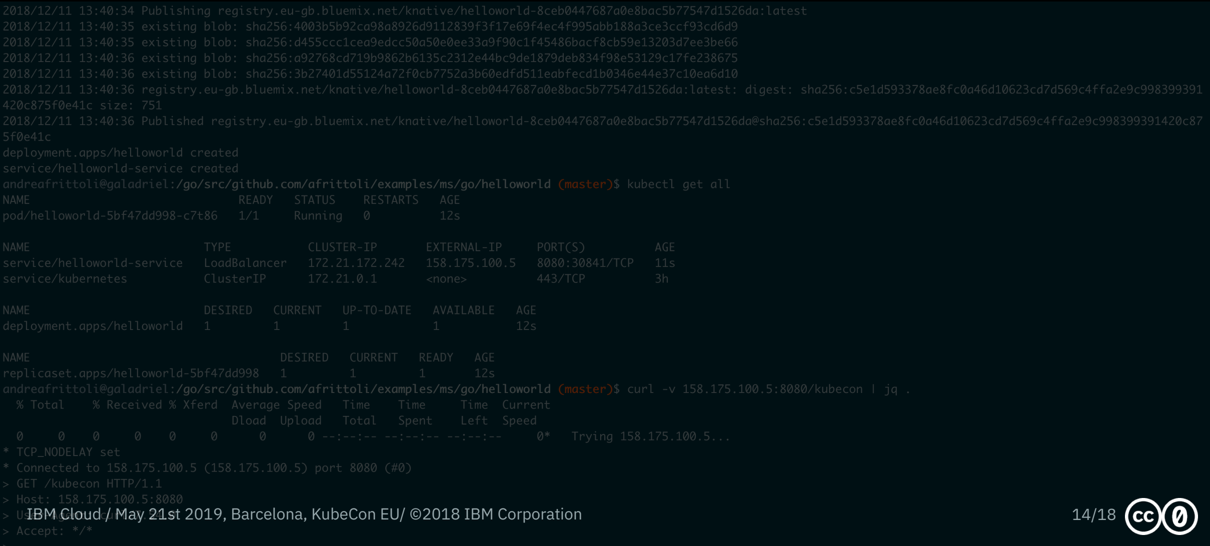
Apply:

- `ko resolve` + `kubectl apply`
- Convenience method
- Similar experience to `kubectl apply`

Delete:

- Passthrough to `kubectl delete`
- Convenience method
- Similar experience to `kubectl delete`

Demo



```
2018/12/11 13:40:34 Publishing registry.eu-gb.bluemix.net/knative/helloworld-8ceb0447687a0e8bac5b77547d1526da:latest
2018/12/11 13:40:35 existing blob: sha256:4003b5b92ca98a8926d9112839f3f17e69f4ec4f995abb188a3ce3ccf93cd6d9
2018/12/11 13:40:35 existing blob: sha256:d455ccc1cea9edcc50a50e0ee33a9f90c1f45486bacf8cb59e13203d7ee3be66
2018/12/11 13:40:36 existing blob: sha256:a92768cd719b9862b6135c2312e44bc9de1879deb834f98e53129c17fe238675
2018/12/11 13:40:36 existing blob: sha256:3b27401d55124a72f0cb7752a3b60edfd511eabfecd1b0346e44e37c10ea6d10
2018/12/11 13:40:36 registry.eu-gb.bluemix.net/knative/helloworld-8ceb0447687a0e8bac5b77547d1526da:latest: digest: sha256:c5e1d593378ae8fc0a46d10623cd7d569c4ffa2e9c998399391
420c875f0e41c size: 751
2018/12/11 13:40:36 Published registry.eu-gb.bluemix.net/knative/helloworld-8ceb0447687a0e8bac5b77547d1526da@sha256:c5e1d593378ae8fc0a46d10623cd7d569c4ffa2e9c998399391420c87
5f0e41c
deployment.apps/helloworld created
service/helloworld-service created
andreafrittoli@galadriel:/go/src/github.com/afrittoli/examples/ms/go/helloworld (master)$ kubectl get all
NAME                             READY   STATUS    RESTARTS   AGE
pod/helloworld-5bf47dd998-c7t86   1/1     Running   0          12s

NAME                         TYPE           CLUSTER-IP       EXTERNAL-IP     PORT(S)          AGE
service/helloworld-service   LoadBalancer   172.21.172.242   158.175.100.5   8080:30841/TCP   11s
service/kubernetes           ClusterIP      172.21.0.1       <none>          443/TCP          3h

NAME                         DESIRED   CURRENT   UP-TO-DATE   AVAILABLE   AGE
deployment.apps/helloworld   1         1         1            1           12s

NAME                                    DESIRED   CURRENT   READY   AGE
replicaset.apps/helloworld-5bf47dd998   1         1         1       12s
andreafrittoli@galadriel:/go/src/github.com/afrittoli/examples/ms/go/helloworld (master)$ curl -v 158.175.100.5:8080/kubecon | jq .
  % Total    % Received % Xferd  Average Speed   Time    Time     Time  Current
                                 Dload  Upload   Total   Spent    Left  Speed
  0     0    0     0    0     0      0      0 --:--:-- --:--:-- --:--:--     0*   Trying 158.175.100.5...
* TCP_NODELAY set
* Connected to 158.175.100.5 (158.175.100.5) port 8080 (#0)
> GET /kubecon HTTP/1.1
> Host: 158.175.100.5:8080
> User-Agent: curl/7.54.0
> Accept: */*
```

Ko and Knative

Knative & Ko

Ko is part of the knative developer workflow:

- Used for Build, Serving, Eventing
- Deploy locally (minikube)
  - `KO_DOCKER_REPO=ko.local ko apply -f config/`
- Deploy on a cluster
  - `KO_DOCKER_REPO=de.icr.io/knative ko apply -f config/`
- Run end to end tests
  - `ko apply -R -f test/`
- Release helper
  - `ko resolve $KO_FLAGS -f config/ > release.yaml`

Q&A

Thank You! Questions?

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References:

- github.com/afrittoli/ko_intro_talk
- github.com/google/ko