An intro to ko, developing the knative way

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IBM Cloud

Microservice(s) in Go

From local...

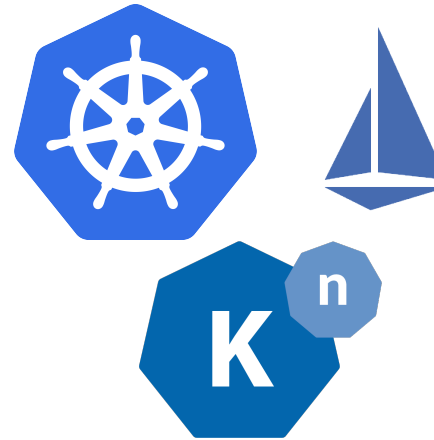
- A few lines of code
- Build and run locally
- `github.com/afrittoli/examples/ms/go/helloworld`

```
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)
}
```

```
#!/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=registry.ng.
      bluemix.net/
      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

```
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/go-containerregistry/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.
  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.

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 write token
ibmcloud cr token-add --readwrite --non-expiring --
      description "ko token"

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

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=registry.ng.bluemix.net/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/google/go-containerregistry/tree/master/cmd/ko