

kubebuilder 环境搭建

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kubebuilder 简介

Kubebuilder 是一个基于 CRD 来构建 Kubernetes API 的框架，可以使用 CRD 来构建 API、Controller 和 Admission Webhook。

kubebuilder 动机

目前扩展 Kubernetes 的 API 的方式有创建 CRD、使用 Operator SDK 等方式，都需要写很多的样本文件 (boilerplate)，使用起来十分麻烦。为了能够更方便构建 Kubernetes API 和工具，就需要一款能够事半功倍的工具，与其他 Kubernetes API 扩展方案相比，kubebuilder 更加简单易用，并获得了社区的广泛支持。

kubebuilder 工作流程

后面使用 kubebuilder 进行开发，需要借助 Windows 平台下的 GoLand 工具。

1. 创建一个新的工程目录
2. 创建一个或多个资源 API CRD 然后将字段添加到资源
3. 在控制器中实现协调循环 (reconcile loop)，watch 额外的资源
4. 在集群中运行测试 (自动安装 CRD 并自动启动控制器)
5. 更新引导集成测试测试新字段和业务逻辑
6. 使用用户提供的 Dockerfile 构建和发布容器

项目创建前置条件

1. **网络**通畅。
2. 项目文件夹具有 **可写** 权限。
3. **go** 语言环境。
4. **make** 工具环境。

5. gcc 工具环境。

在以上 5 个条件都具备的前提下，执行 `kubebuilder init` 即可成功创建一个项目。

安装 make 工具

```
1 pengling@FSZJ-PENGLING:~$ sudo apt update
2 pengling@FSZJ-PENGLING:~$ sudo apt install make
3 # 验证 make 安装
4 pengling@FSZJ-PENGLING:~$ make --version
5 GNU Make 4.2.1
6 Built for x86_64-pc-linux-gnu
7 Copyright (C) 1988-2016 Free Software Foundation, Inc.
8 License GPLv3+: GNU GPL version 3 or later
  <http://gnu.org/licenses/gpl.html>
9 This is free software: you are free to change and redistribute it.
10 There is NO WARRANTY, to the extent permitted by law.
```

安装 gcc 工具

```
1 pengling@FSZJ-PENGLING:~$ sudo apt update
2 pengling@FSZJ-PENGLING:~$ sudo apt install gcc
3 # 验证 gcc 安装
4 pengling@FSZJ-PENGLING:~$ gcc --version
5 gcc (Ubuntu 9.3.0-17ubuntu1~20.04) 9.3.0
6 Copyright (C) 2019 Free Software Foundation, Inc.
7 This is free software; see the source for copying conditions. There is NO
8 warranty; not even for MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE.
```

创建 kubebuilder 项目 (v2.3.1)

注意当前 `master=v3.1.0` 版本有问题，使用低版本，比如 `v2.3.1`。

```
1 # 创建 ~/projects/guestbook 目录
2 pengling@FSZJ-PENGLING:~$ mkdir -p ~/myprojects/kbexample
3 pengling@FSZJ-PENGLING:~/myprojects/guestbook$ ll
4 total 8
5 drwxrwxr-x 2 pengling pengling 4096 Sep  6 16:15 ./
6 drwxrwxr-x 3 pengling pengling 4096 Sep  6 16:15 ../
7
8 # 使用 kubebuilder init 创建一个项目
9 pengling@FSZJ-PENGLING:~/myprojects/kbexample$ kubebuilder init --domain
  my.domain --repo my.domain/kbexample
10 writing scaffold for you to edit...
11 Get controller runtime:
12 $ go get sigs.k8s.io/controller-runtime@v0.5.0
13 go: downloading sigs.k8s.io/controller-runtime v0.5.0
14 go: downloading k8s.io/apimachinery v0.17.2
15 go: downloading k8s.io/client-go v0.17.2
16 go: downloading github.com/go-logr/logr v0.1.0
17 go: downloading github.com/prometheus/client_golang v1.0.0
18 go: downloading github.com/gogo/protobuf v1.2.2-0.20190723190241-
  65acae22fc9d
```

```
19 go: downloading github.com/google/gofuzz v1.0.0
20 go: downloading k8s.io/klog v1.0.0
21 go: downloading github.com/evanphx/json-patch v4.5.0+incompatible
22 go: downloading golang.org/x/time v0.0.0-20190308202827-9d24e82272b4
23 go: downloading gomodules.xyz/jsonpatch/v2 v2.0.1
24 go: downloading k8s.io/api v0.17.2
25 go: downloading k8s.io/apiextensions-apiserver v0.17.2
26 go: downloading github.com/imdario/mergo v0.3.6
27 go: downloading github.com/spf13/pflag v1.0.5
28 go: downloading golang.org/x/net v0.0.0-20191004110552-13f9640d40b9
29 go: downloading golang.org/x/crypto v0.0.0-20190820162420-60c769a6c586
30 go: downloading github.com/golang/groupcache v0.0.0-20180513044358-
    24b0969c4cb7
31 go: downloading github.com/prometheus/client_model v0.0.0-20190129233127-
    fd36f4220a90
32 go: downloading github.com/prometheus/common v0.4.1
33 go: downloading gopkg.in/inf.v0 v0.9.1
34 go: downloading github.com/pkg/errors v0.8.1
35 go: downloading github.com/golang/protobuf v1.3.2
36 go: downloading github.com/googleapis/gnostic v0.3.1
37 go: downloading k8s.io/utls v0.0.0-20191114184206-e782cd3c129f
38 go: downloading github.com/davecgh/go-spew v1.1.1
39 go: downloading golang.org/x/oauth2 v0.0.0-20190604053449-0f29369cfe45
40 go: downloading k8s.io/kube-openapi v0.0.0-20191107075043-30be4d16710a
41 go: downloading github.com/google/uuid v1.1.1
42 go: downloading gopkg.in/fsnotify.v1 v1.4.7
43 go: downloading github.com/beorn7/perks v1.0.0
44 go: downloading github.com/prometheus/procfs v0.0.2
45 go: downloading golang.org/x/sys v0.0.0-20190826190057-c7b8b68b1456
46 go: downloading github.com/json-iterator/go v1.1.8
47 go: downloading github.com/modern-go/reflect2 v1.0.1
48 go: downloading sigs.k8s.io/yaml v1.1.0
49 go: downloading github.com/matttproud/golang_protobuf_extensions v1.0.1
50 go: downloading golang.org/x/text v0.3.2
51 go: downloading github.com/hashicorp/golang-lru v0.5.1
52 go: downloading github.com/google/go-cmp v0.3.0
53 go: downloading gopkg.in/yaml.v2 v2.2.4
54 go: downloading github.com/modern-go/concurrent v0.0.0-20180306012644-
    bacd9c7ef1dd
55 go: downloading google.golang.org/appengine v1.5.0
56 go: downloading github.com/evanphx/json-patch v0.5.2
57 go: downloading k8s.io/client-go v1.5.2
58 Update go.mod:
59 $ go mod tidy
60 go: downloading github.com/go-logr/zapr v0.1.0
61 go: downloading go.uber.org/zap v1.10.0
62 go: downloading github.com/onsi/ginkgo v1.11.0
63 go: downloading github.com/onsi/gomega v1.8.1
64 go: downloading github.com/stretchr/testify v1.4.0
65 go: downloading cloud.google.com/go v0.38.0
66 go: downloading go.uber.org/atomic v1.3.2
67 go: downloading go.uber.org/multierr v1.1.0
68 go: downloading github.com/pmezard/go-difflib v1.0.0
69 go: downloading github.com/hpcloud/tail v1.0.0
70 go: downloading gopkg.in/check.v1 v1.0.0-20180628173108-788fd7840127
71 go: downloading golang.org/x/xerrors v0.0.0-20190717185122-a985d3407aa7
72 go: downloading github.com/fsnotify/fsnotify v1.4.7
73 go: downloading gopkg.in/tomb.v1 v1.0.0-20141024135613-dd632973f1e7
```

```
74 go: downloading github.com/kr/pretty v0.1.0
75 go: downloading github.com/kr/text v0.1.0
76 Running make:
77 $ make
78 go: creating new go.mod: module tmp
79 go: downloading sigs.k8s.io/controller-tools v0.2.5
80 go: downloading github.com/spf13/cobra v0.0.5
81 go: downloading github.com/gobuffalo/flect v0.2.0
82 go: downloading k8s.io/apiextensions-apiserver v0.17.0
83 go: downloading k8s.io/apimachinery v0.17.0
84 go: downloading golang.org/x/tools v0.0.0-20190920225731-5eefd052ad72
85 go: downloading github.com/fatih/color v1.7.0
86 go: downloading k8s.io/api v0.17.0
87 go: downloading gopkg.in/yaml.v3 v3.0.0-20190905181640-827449938966
88 go: downloading github.com/inconshreveable/mousetrap v1.0.0
89 go: downloading github.com/matttn/go-colorable v0.1.2
90 go: downloading github.com/matttn/go-isatty v0.0.8
91 go get: added sigs.k8s.io/controller-tools v0.2.5
92 /home/pengling/go/bin/controller-gen
   object:headerFile="hack/boilerplate.go.txt" paths="./..."
93 go fmt ./...
94 go vet ./...
95 go build -o bin/manager main.go
96 Next: define a resource with:
97 $ kubebuilder create api
```