基于PXE的物理机Kubernetes集群管理方案

关于作者

- 工程师，熟悉Python以及Go语言
- Docker早期用户，容器架构实践者，开源爱好者
- 曾在多次技术活动中分享容器相关经验
- 开源软件资讯站 Porter.io 作者
- 目前在经营 KubeUp.com，致力于协助客户公司以Kubernetes为基础结合众多开源组件进行底层架构，打造基于容器技术的高效开发运维流程，同时为企业使用Kubernetes过程遇到的问题提供技术支持和服务

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website: www.adieu.me

您平常如何创建Kubernetes集群?

手动创建

- CentOS
- Ubuntu
- CoreOS

- VMWare
- OpenStack
- Cloud

- kubeadm
- bootkube
- Manual

自动创建

- Terraform
- kops

- AWS
- Aliyun
- Cloud

手动创建物理机集群

- CentOS
- Ubuntu
- CoreOS

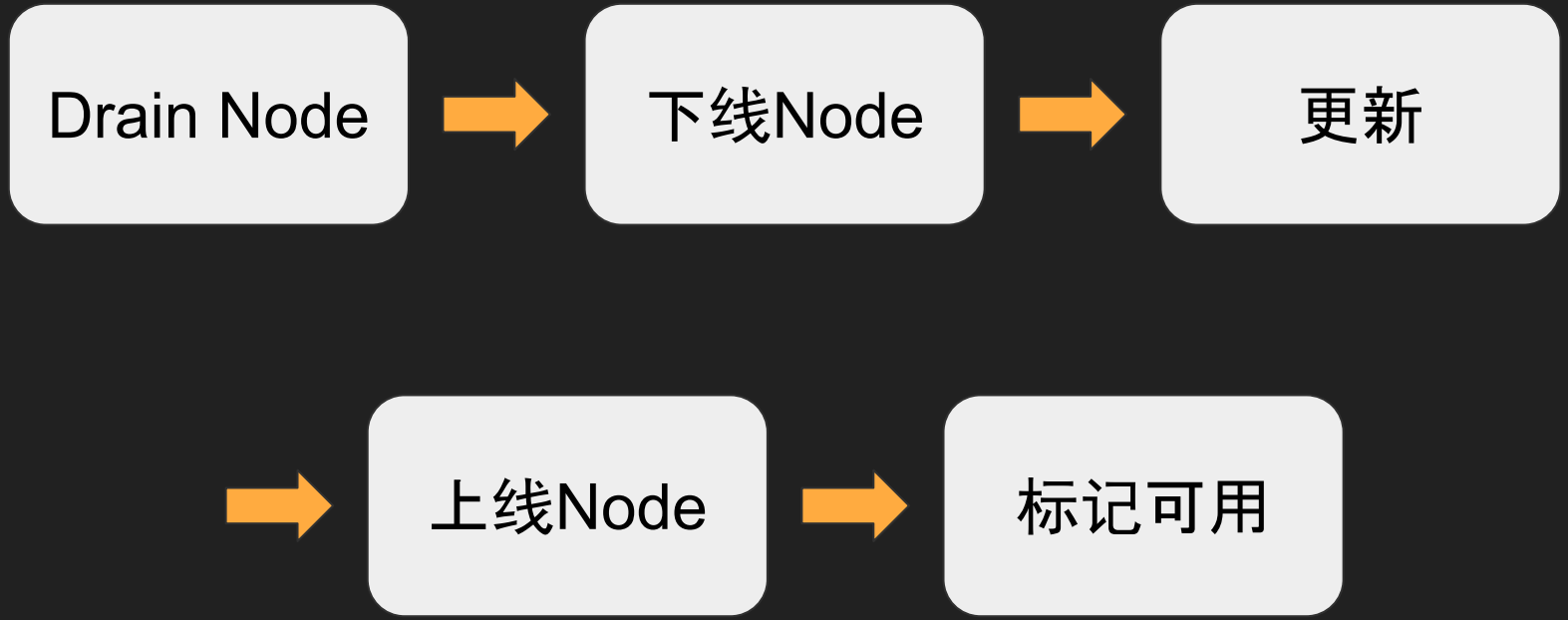
- Manual

- kubeadm
- bootkube
- Manual

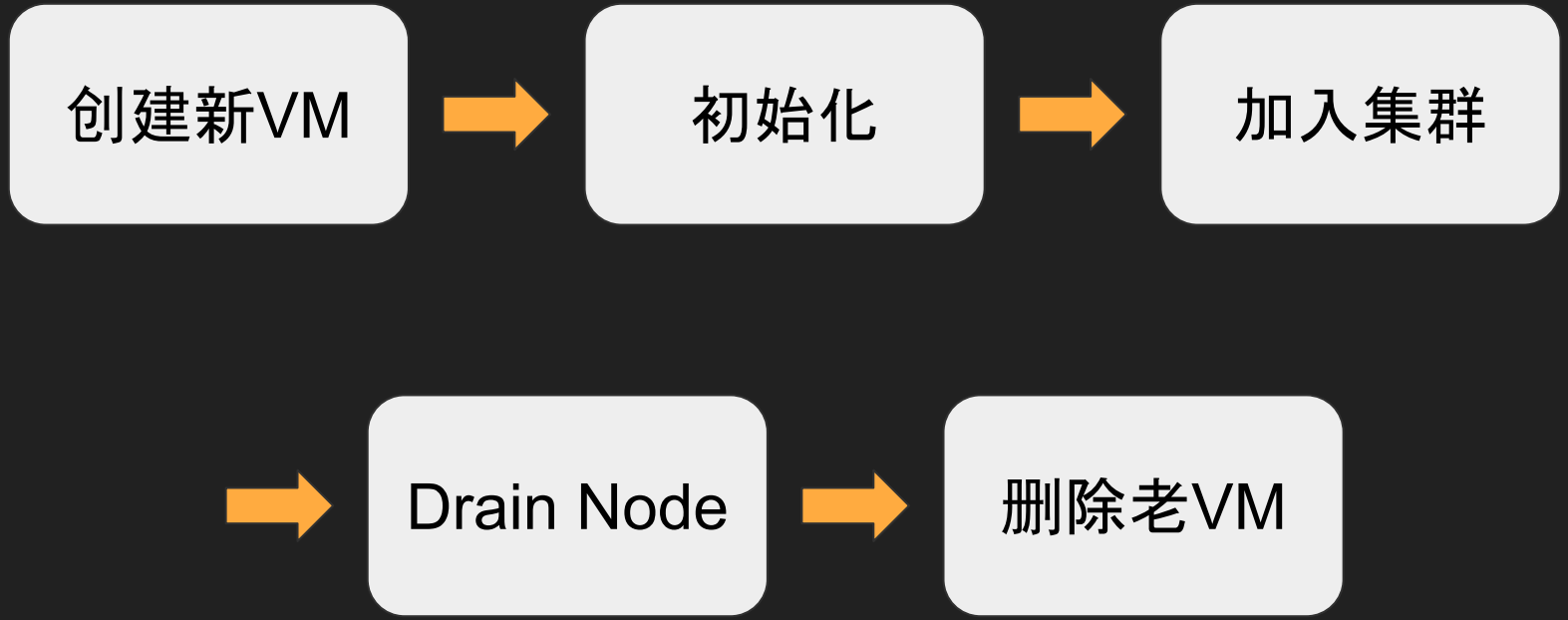
自动创建物理机集群

您平常如何升级Kubernetes集群？

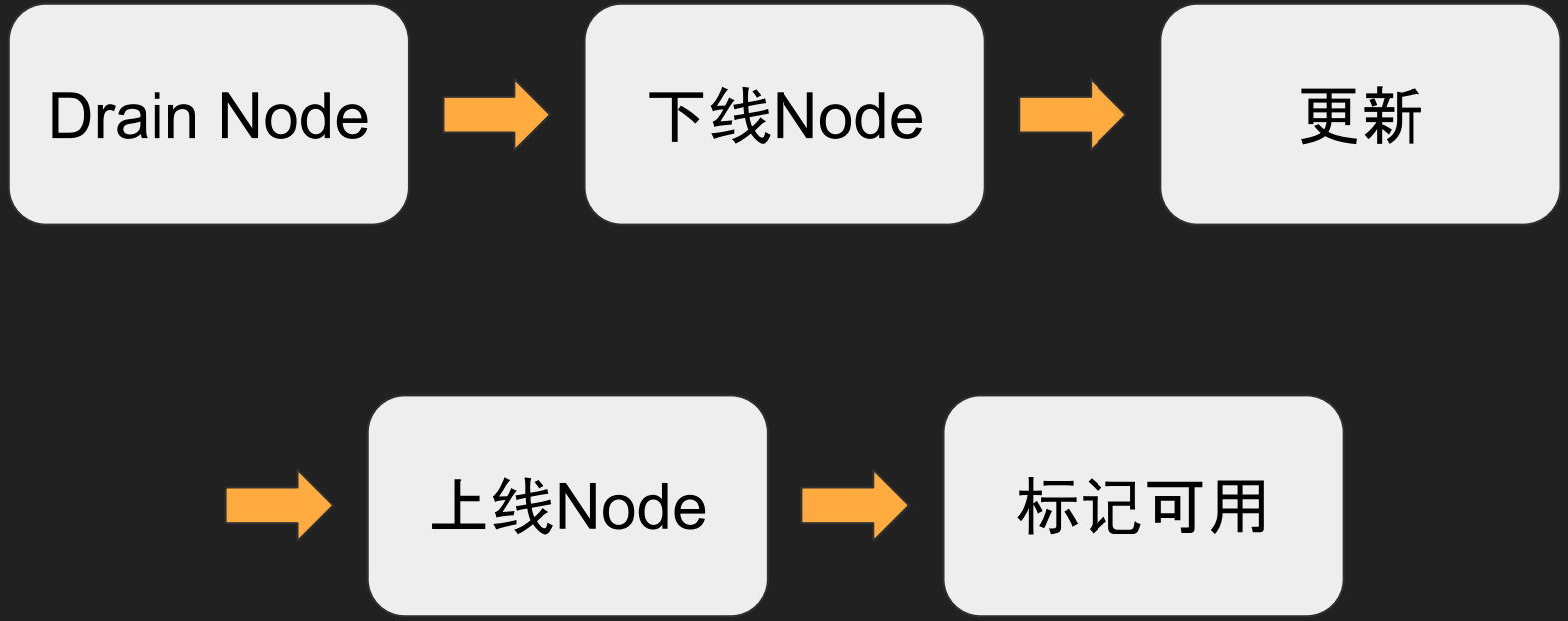
手动升级



手动升级



手动升级物理机集群



自动升级物理机集群

如何自动化运维物理机集群？

OpenStack

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From Boston to your browser, stream OpenStack Summit sessions

Browse through use cases, demos and announcements from the OpenStack Summit Boston this week.

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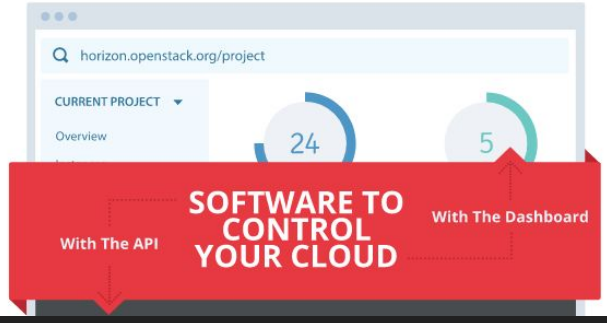
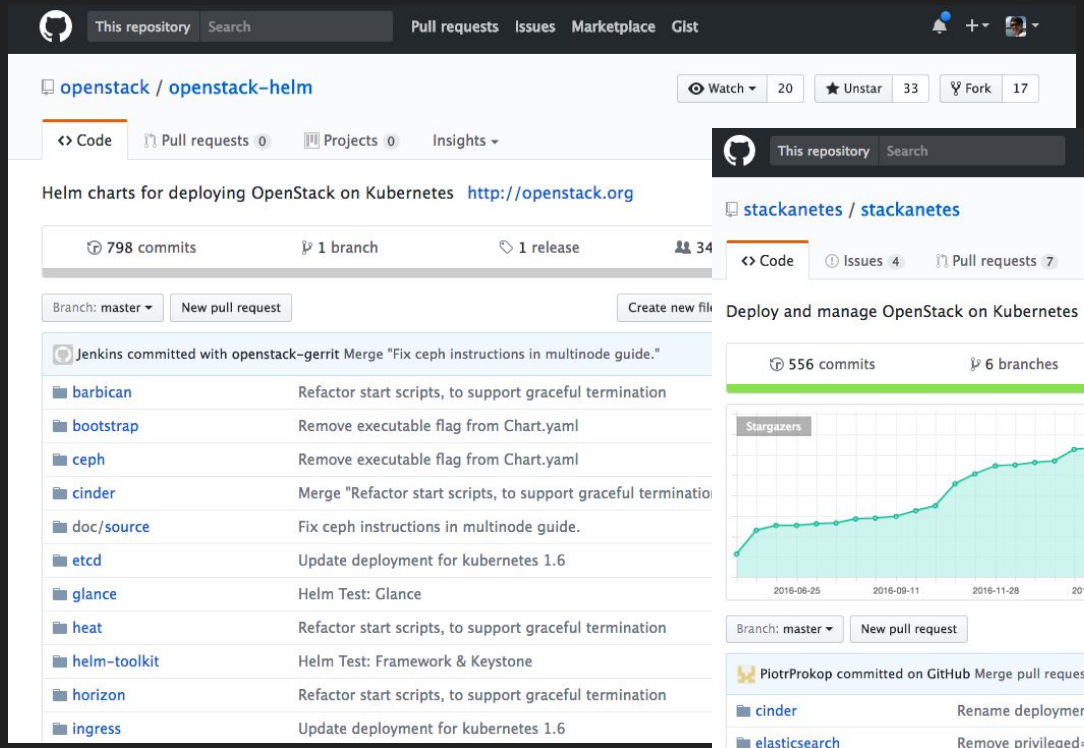
Open source software for creating private and public clouds.

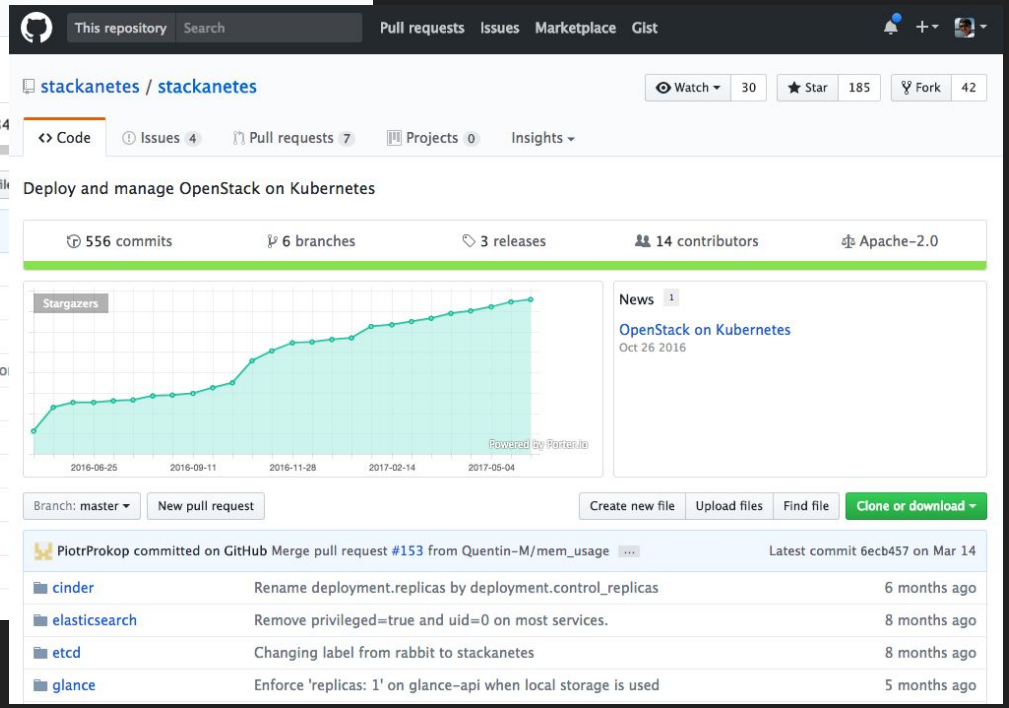
OpenStack software controls large pools of compute, storage, and networking resources throughout a datacenter, managed through a dashboard or via the OpenStack API. OpenStack works with popular enterprise and open source technologies making it ideal for heterogeneous infrastructure.

Hundreds of the world's largest brands rely on OpenStack to run their businesses every day, reducing costs and helping them move faster.



将OpenStack运行在Kubernetes之上





PXE拯救世界

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Contents
Featured content
Current events
Random article
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Interaction
Help
About Wikipedia
Community portal
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Contact page

Tools
What links here
Related changes
Upload file
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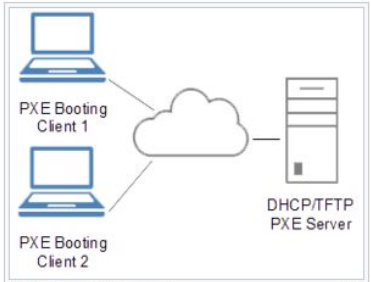
Create a book

Preboot Execution Environment

From Wikipedia, the free encyclopedia

In computing, the **Preboot eXecution Environment** (**PXE**, sometimes pronounced as *pixie*[1]) specification describes a standardized client-server environment that boots a software assembly, retrieved from a network, on PXE-enabled clients. On the client side it requires only a PXE-capable network interface controller (NIC), and uses a small set of industry-standard network protocols such as DHCP and TFTP.

The concept behind the PXE originated in the early days of protocols like BOOTP/DHCP/TFTP, and as of 2015 it forms part of the Unified Extensible Firmware Interface (UEFI) standard. In modern data centers, PXE is the most frequent choice[2] for operating system booting, installation and deployment.



A high-level PXE overview

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2 Details
3 Integration
4 Availability
5 Acceptance
6 Sibling environments
7 Descendant environments
8 IETF standards documentation
9 See also
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Overview [edit]

Since the beginning of computer networks, there has been a persistent need for client systems which can boot appropriate software images, with appropriate configuration parameters, both

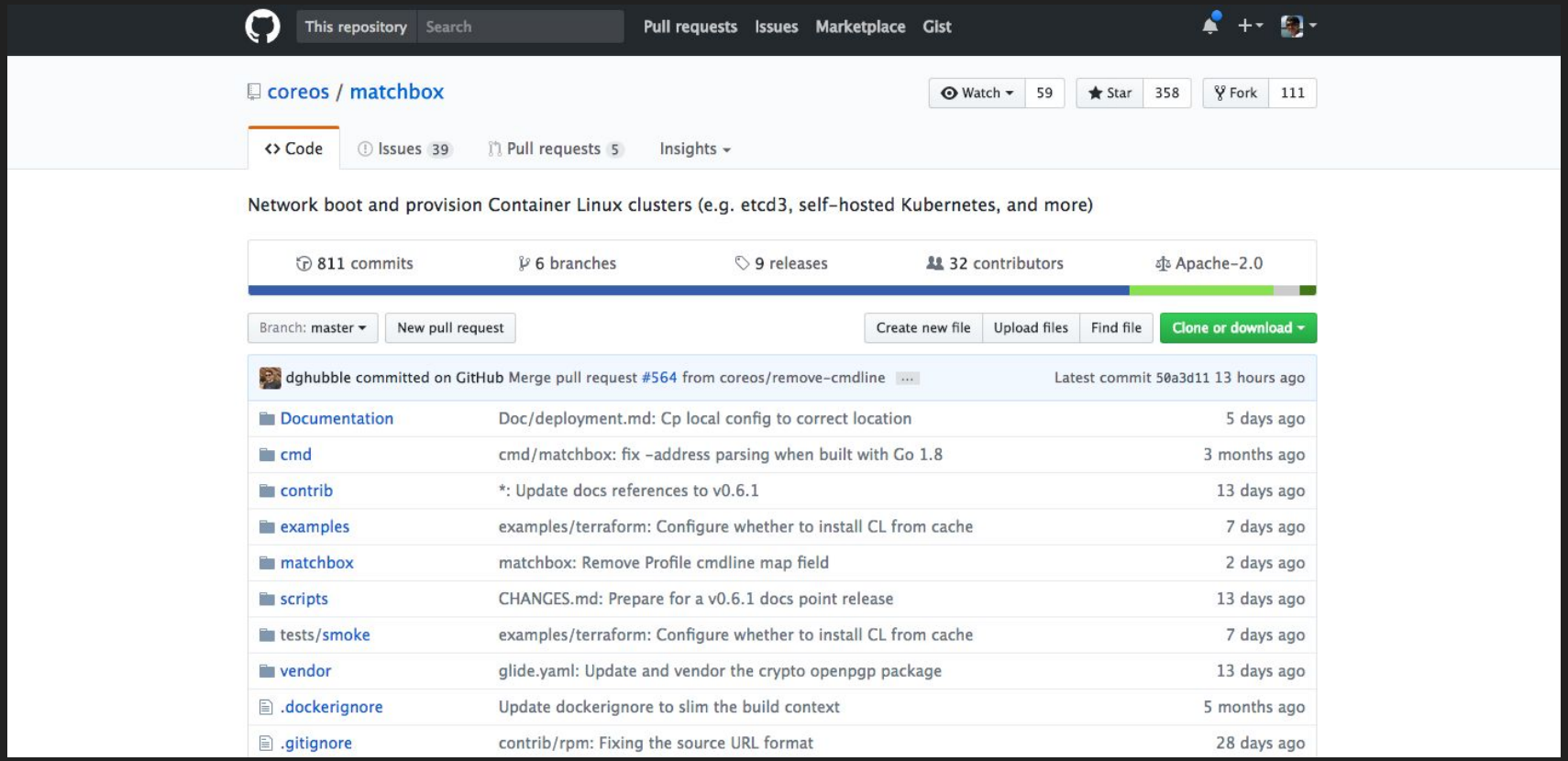
架构

- Terraform
- Archon
- 选择适合的配置系统
- 通过rpc接口控制PXE服务器

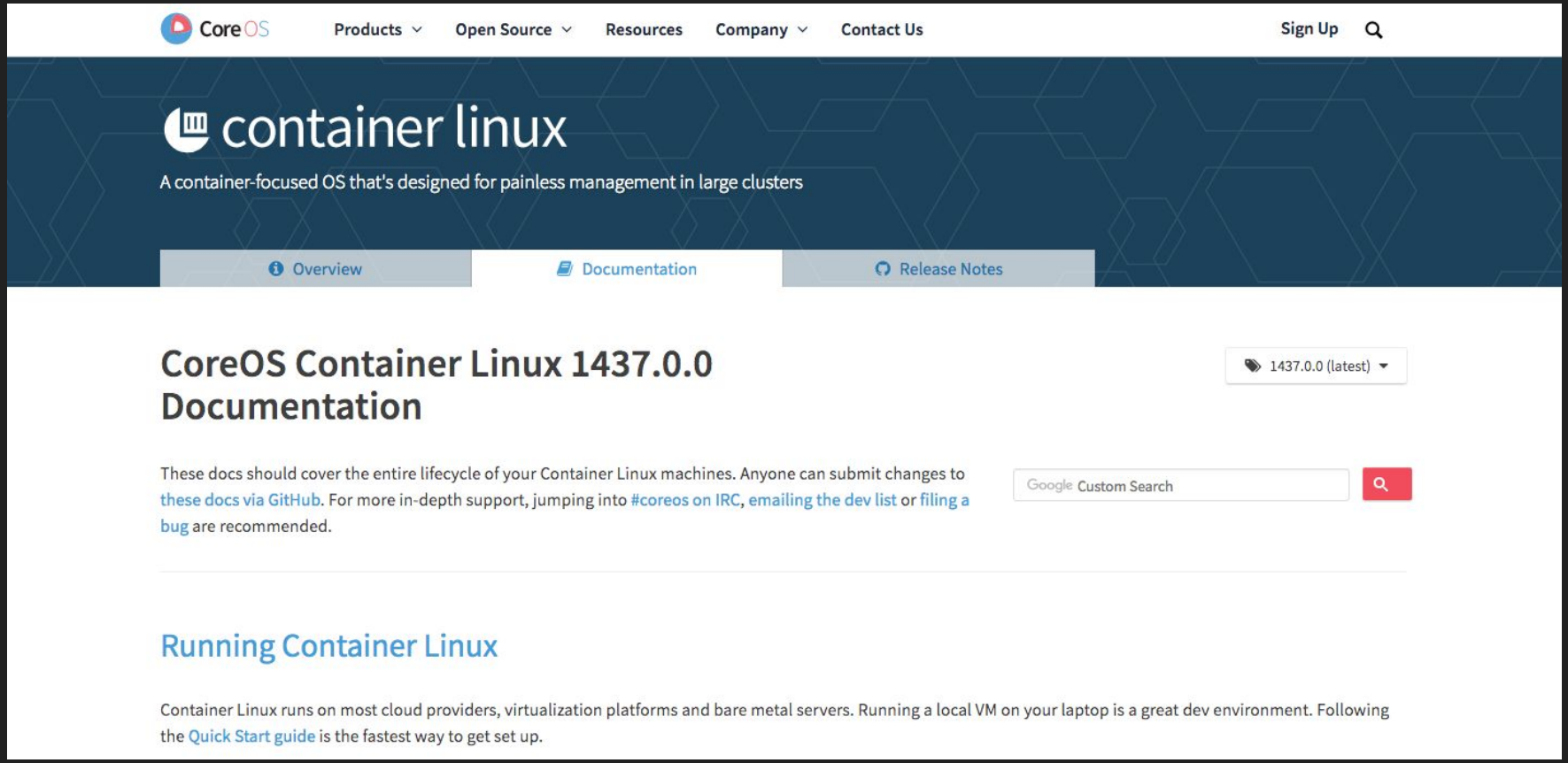
- 使用mac地址唯一的标识一台物理机
- 当物理机进行PXE启动时，将配置系统下发的配置推送给物理机

- 启动时依据PXE服务器的定义进行初始化
- 有选择的进行操作系统安装
- 不安装操作系统的主机无需进行状态管理

Matchbox


This repository
Search
Pull requests
Issues
Marketplace
Gist
coreos / matchbox
Watch 59
Star 358
Fork 111
Code
Issues 39
Pull requests 5
Insights
Network boot and provision Container Linux clusters (e.g. etcd3, self-hosted Kubernetes, and more)
811 commits
6 branches
9 releases
32 contributors
Apache-2.0
Branch: master
New pull request
Create new file
Upload files
Find file
Clone or download
dghubble committed on GitHub Merge pull request #564 from coreos/remove-cmdline
Latest commit 50a3d11 13 hours ago
Documentation Doc/deployment.md: Cp local config to correct location 5 days ago
cmd cmd/matchbox: fix -address parsing when built with Go 1.8 3 months ago
contrib *: Update docs references to v0.6.1 13 days ago
examples examples/terraform: Configure whether to install CL from cache 7 days ago
matchbox matchbox: Remove Profile cmdline map field 2 days ago
scripts CHANGES.md: Prepare for a v0.6.1 docs point release 13 days ago
tests/smoke examples/terraform: Configure whether to install CL from cache 7 days ago
vendor glide.yaml: Update and vendor the crypto openpgp package 13 days ago
.dockerignore Update dockerignore to slim the build context 5 months ago
.gitignore contrib/rpm: Fixing the source URL format 28 days ago

CoreOS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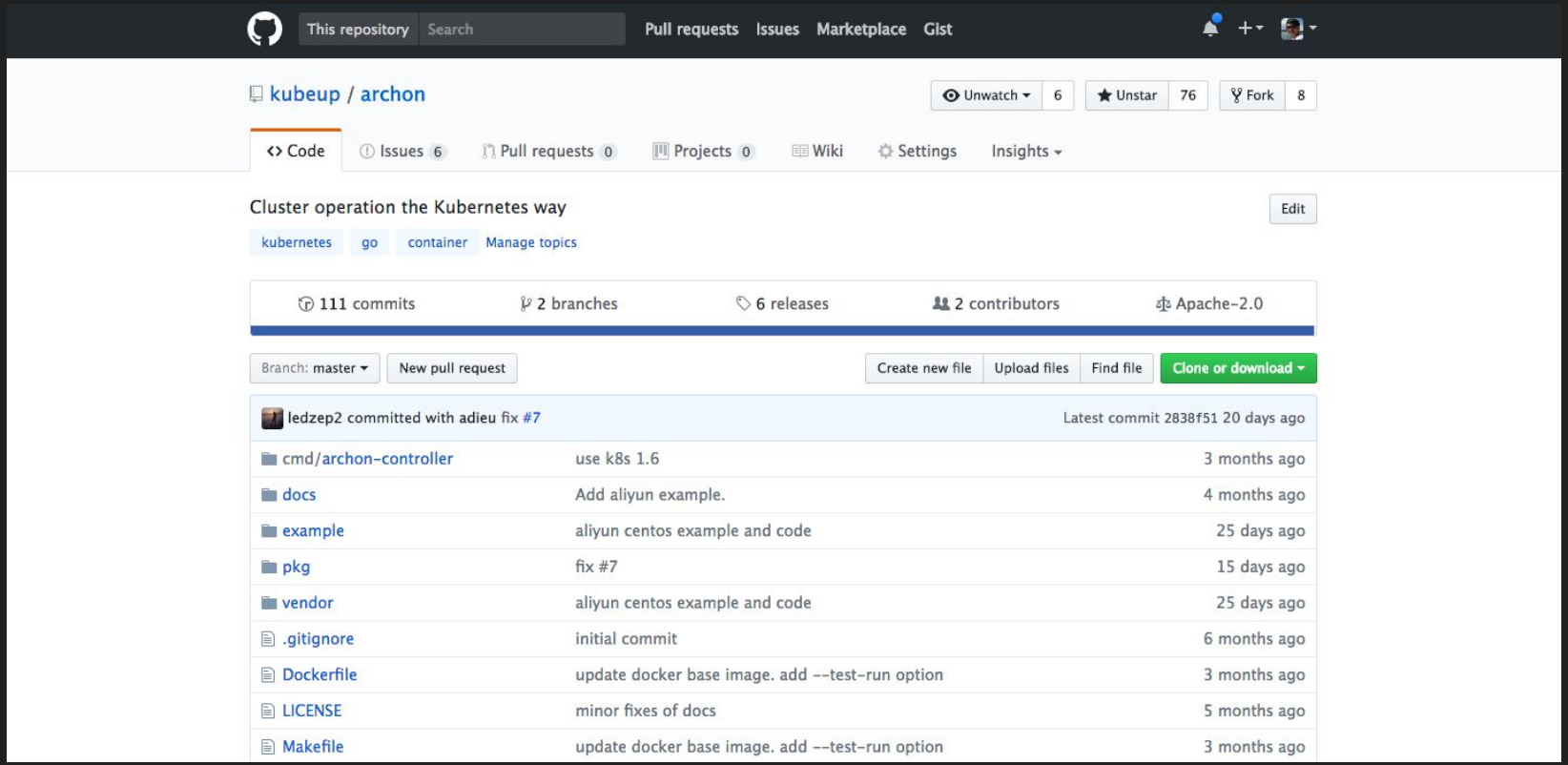
container linux
A container-focused OS that's designed for painless management in large clusters
Overview
Documentation
Release Notes
CoreOS Container Linux 1437.0.0 Documentation
1437.0.0 (latest)
These docs should cover the entire lifecycle of your Container Linux machines. Anyone can submit changes to these docs via GitHub. For more in-depth support, jumping into #coreos on IRC, emailing the dev list or filing a bug are recommended.
Google Custom Search
Running Container Linux
Container Linux runs on most cloud providers, virtualization platforms and bare metal servers. Running a local VM on your laptop is a great dev environment. Following the Quick Start guide is the fastest way to get set up.

Ignition

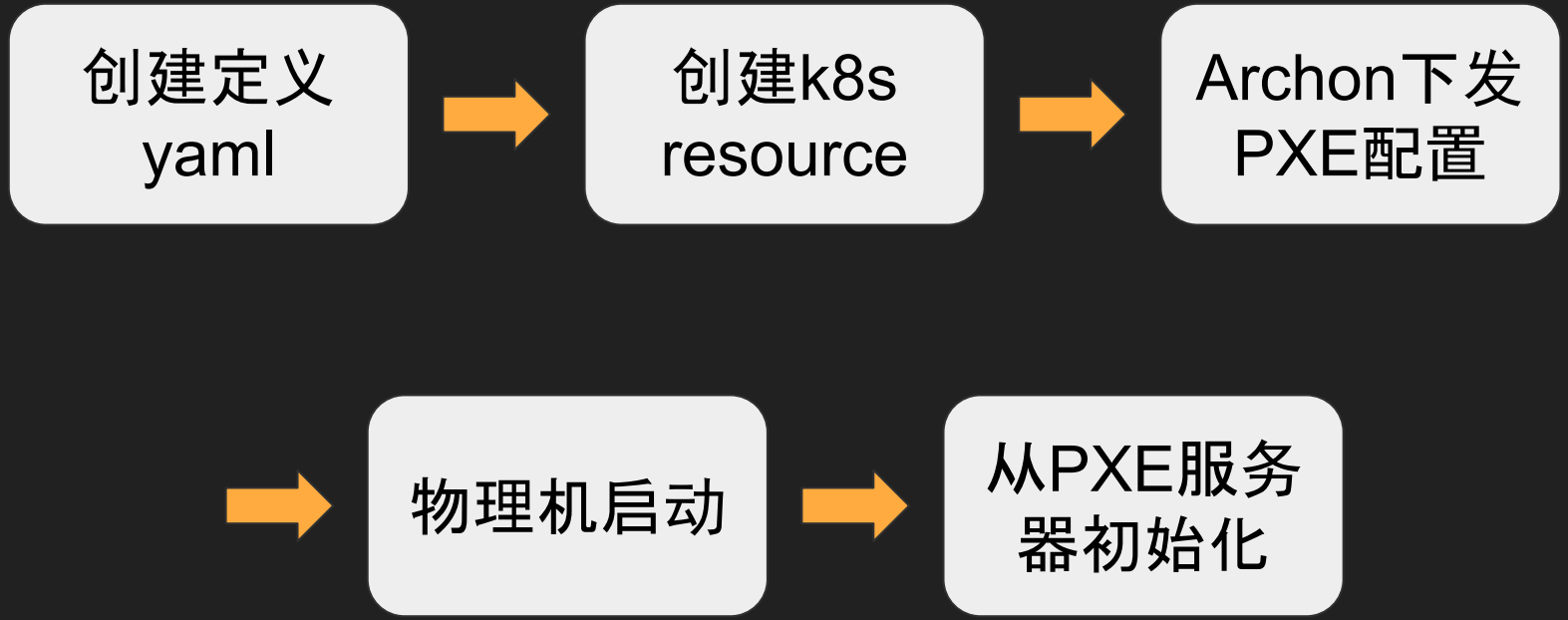
```
storage:
  {{ if index . "pxe" }}
  disks:
    - device: /dev/sda
      wipe_table: true
      partitions:
        - label: ROOT
  filesystems:
    - name: root
      mount:
        device: "/dev/sda1"
        format: "ext4"
        create:
          force: true
          options:
            - "-LROOT"
  {{end}}
```

```
systemd:
  units:
    - name: docker.service
      enable: true
    - name: locksmithd.service
      dropins:
        - name: 40-etcd-lock.conf
          contents: |
            [Service]
            Environment="REBOOT_STRATEGY=etcd-lock"
            Environment="LOCKSMITHD_ETCD_CAFILE=/etc/ssl/etcd/etcd-ca.crt"
            Environment="LOCKSMITHD_ETCD_CERTFILE=/etc/ssl/etcd/etcd-client.crt"
            Environment="LOCKSMITHD_ETCD_KEYFILE=/etc/ssl/etcd/etcd-client.key"
            Environment="LOCKSMITHD_ENDPOINT={{.etcd_endpoints}}"
    - name: kubelet.path
      enable: true
      contents: |
        [Unit]
        Description=Watch for kubeconfig
        [Path]
        PathExists=/etc/kubernetes/kubeconfig
        [Install]
        WantedBy=multi-user.target
```

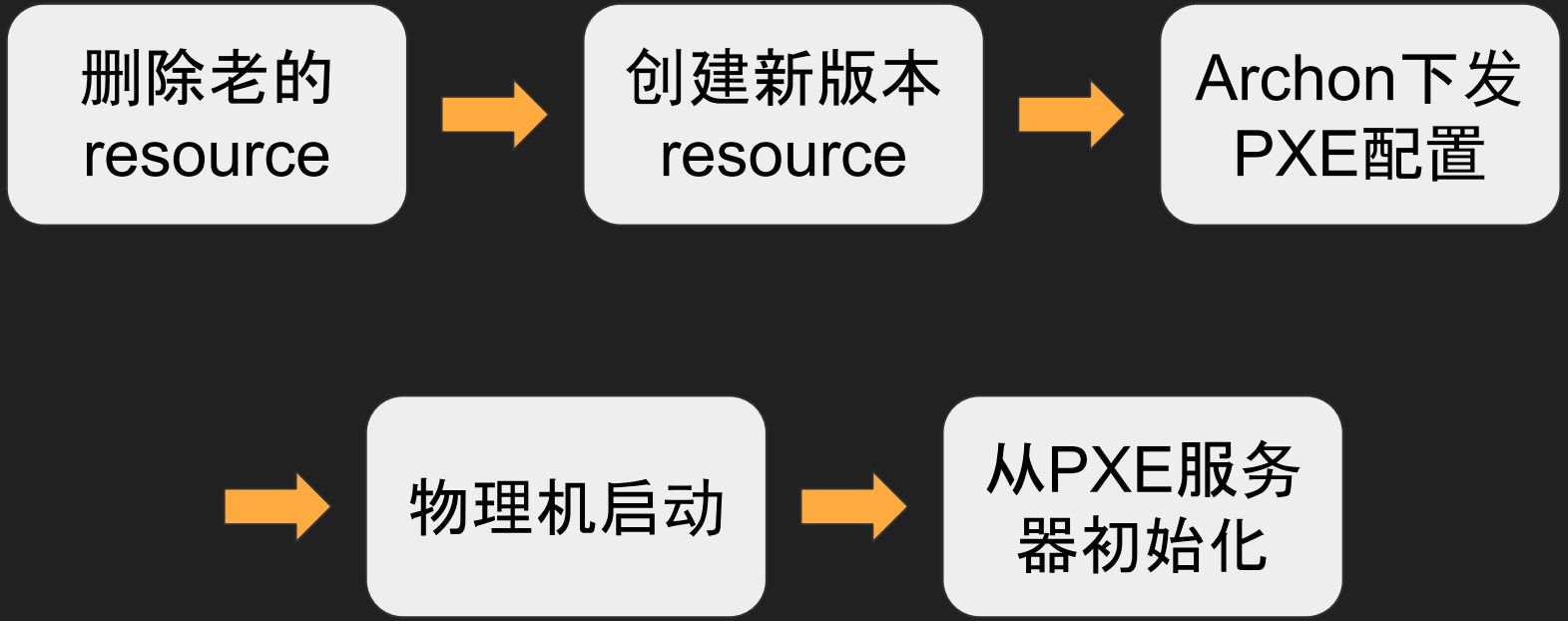
Archon


This repository
Search
Pull requests
Issues
Marketplace
Gist
kubeup / archon
Unwatch 6
Unstar 76
Fork 8
Code
Issues 6
Pull requests 0
Projects 0
Wiki
Settings
Insights
Cluster operation the Kubernetes way
Edit
kubernetes
go
container
Manage topics
111 commits
2 branches
6 releases
2 contributors
Apache-2.0
Branch: master
New pull request
Create new file
Upload files
Find file
Clone or download
ledzep2 committed with adieu fix #7
Latest commit 2838f51 20 days ago
cmd/archon-controller
use k8s 1.6
3 months ago
docs
Add aliyun example.
4 months ago
example
aliyun centos example and code
25 days ago
pkg
fix #7
15 days ago
vendor
aliyun centos example and code
25 days ago
.gitignore
initial commit
6 months ago
Dockerfile
update docker base image. add --test-run option
3 months ago
LICENSE
minor fixes of docs
5 months ago
Makefile
update docker base image. add --test-run option
3 months ago

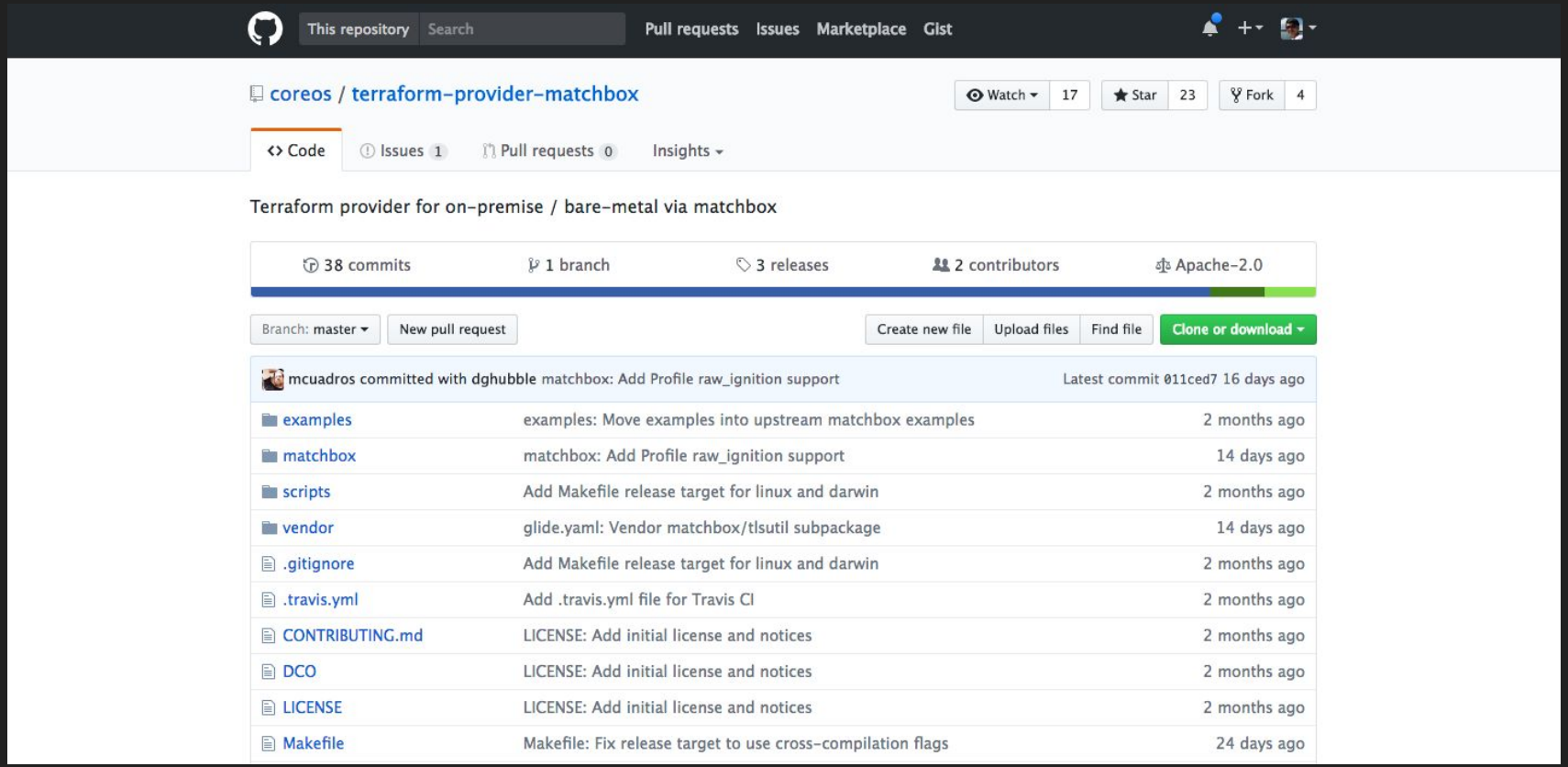
自动创建物理机集群



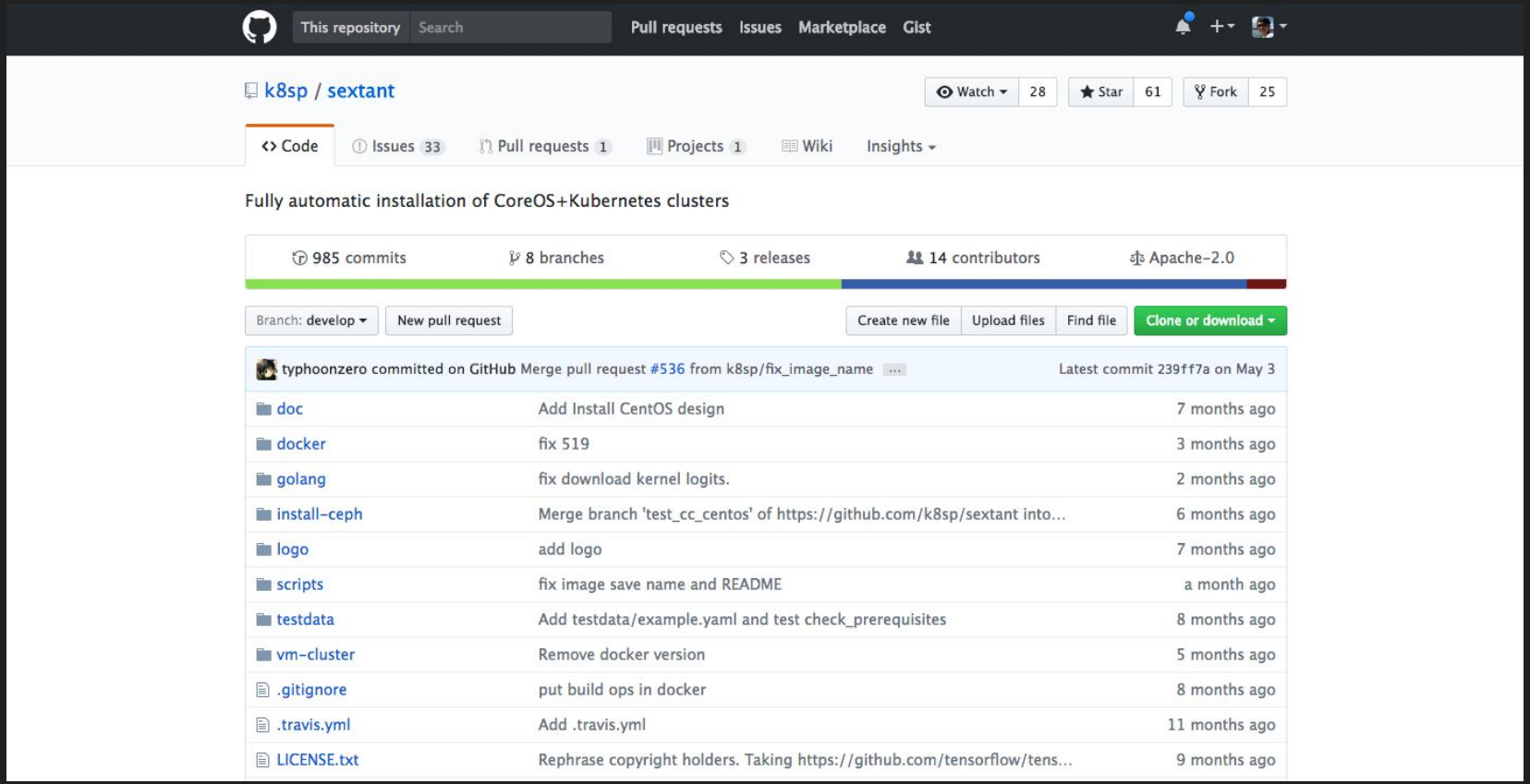
自动升级物理机集群


删除老的resource
创建新版本resource
Archon下发PXE配置
从PXE服务器初始化
物理机启动

terraform-provider-matchbox



Sextent


This repository
Search
Pull requests
Issues
Marketplace
Gist
k8sp / sextant
Watch 28
Star 61
Fork 25
Code
Issues 33
Pull requests 1
Projects 1
Wiki
Insights
Fully automatic installation of CoreOS+Kubernetes clusters
985 commits
8 branches
3 releases
14 contributors
Apache-2.0
Branch: develop
New pull request
Create new file
Upload files
Find file
Clone or download
typhoonzero committed on GitHub Merge pull request #536 from k8sp/fix_image_name
Latest commit 239ff7a on May 3
doc Add Install CentOS design 7 months ago
docker fix 519 3 months ago
golang fix download kernel logits. 2 months ago
install-ceph Merge branch 'test_cc_centos' of https://github.com/k8sp/sextant into... 6 months ago
logo add logo 7 months ago
scripts fix image save name and README a month ago
testdata Add testdata/example.yaml and test check_prerequisites 8 months ago
vm-cluster Remove docker version 5 months ago
.gitignore put build ops in docker 8 months ago
.travis.yml Add .travis.yml 11 months ago
LICENSE.txt Rephrase copyright holders. Taking https://github.com/tensorflow/tens... 9 months ago

Demo

进一步改进计划

- 基于IPMI(Intelligent Platform Management Interface)实现远程控制物理机启动顺序以及重启物理机
- 与DCIM(Data Center Infrastructure Management)系统集成，从它同步物理机基础数据，将物理机加入被管理列表
- 全套方案完全开源，欢迎感兴趣的朋友一起来完善

总结

- 在物理机集群环境中，缺少有效的远程控制手段，传统运维方法中手动比例较高
- PXE可以用来自动化安装和配置物理机操作系统
- 辅以配套的管理工具，可以实现从配置定义到配置下发一整套的物理机自动化运维方案
- 将不可变基础架构的管理思路拓展到物理机，可以将运维流程标准化和自动化，但是新的运维流程将非常依赖配置管理工具
- 使用场景很关键，需要有一定的集群规模才能平衡引入新系统带来的管理负担的增加

Q & A