



DOCKER CONTAINER LOADING

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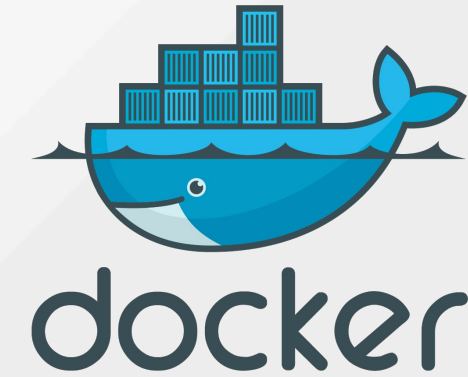
"m" for menu, "?" for other shortcuts



ROAD TRIP

| Local | Remote / Cloud |
|-------------------|--------------------------|
| Dockerfile | Docker Hub |
| Template | Continuous Integration |
| Ansible-Container | Google Container Builder |
| Packer | OpenShift S2I |
| Rocker | |
| Build Integration | |

DOCKER CLI



- docker commit

```
docker commit 3e3d3cf39 redis-server:1.0
```

- docker build

```
FROM ubuntu:14.04
RUN apt-get update && \
    apt-get install -y redis-server
EXPOSE 6379
ENTRYPOINT ["/usr/bin/redis-server"]
```

DOCKERFILE ARGS

- Dockerfile variables
- Since Docker 1.9
- Can not be used in FROM
- Filled in during build time

```
FROM busybox  
ARG uid  
USER ${uid:-jboss}  
# ...
```

```
docker build --build-arg uid=daemon ....
```

PROBLEMS

- No composition
- Too simple parameterisation
- No influence on layers
- Limited feature set
- Security

DOCKERFILE TEMPLATE

- Dockerfile generation from templates
- Build with `docker build`
- Simple built-in support (ARG)
- Engines:
fish-pepper, dogen, crane,
App::Dockerfile::Template ...

FISH-PEPPER

- **Template** system based on node.js
- **Multidimensional** parameters
- Support for **fragments**
- Docker **build** and **push** support



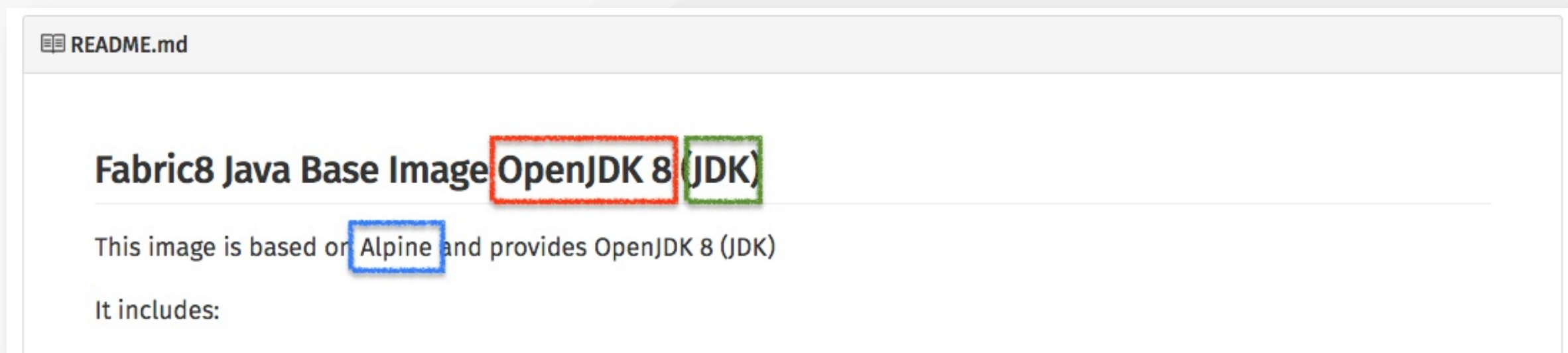
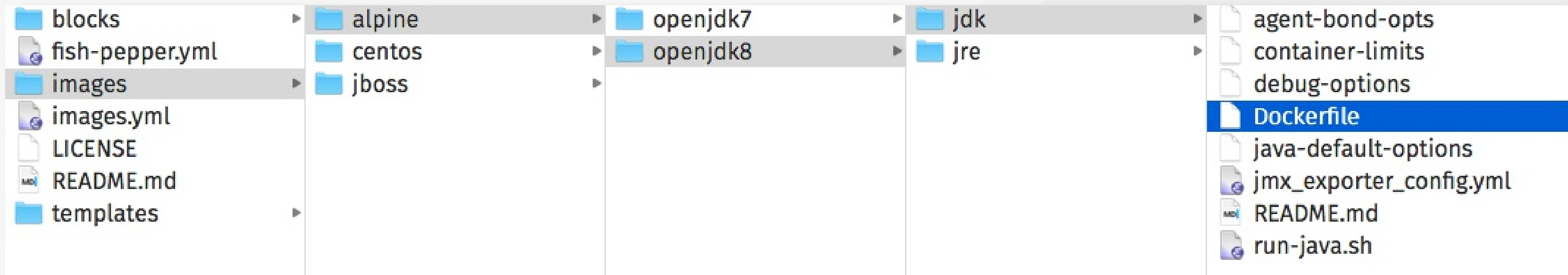
IMAGES.YML

```
fish-pepper:
  params:
    - "base"
    - "version"
    - "type"
  name: "jolokia/fish-pepper-java"
  maintainer: "Roland Huss <roland@jolokia.org>"
  # ... additional global params
config:
  version:
    openjdk7:
      java: "java:7u79"
    openjdk8:
      java: "java:8u45"
  type:
    jre:
      extension: "-jre"
    jdk:
      extension: "-jdk"
  base:
    alpine:
      from: "alpine:3.4"
  # ... additional base definitions for 'centos', 'jboss'
```


DOCKERFILE TEMPLATE

```
FROM {{= fp.config.base.from }}  
  
MAINTAINER {{= fp.maintainer }}  
  
ENV JOLOKIA_VERSION {{= fp.jolokiaVersion }}  
  
RUN chmod 755 /bin/jolokia_opts \  
    && mkdir /opt/jolokia \  
    && wget {{= fp.jolokiaUrl}} -O /opt/jolokia/jolokia.jar  
  
CMD java -jar /opt/jolokia/jolokia.jar --version
```

GENERATED BUILDS



PRO

- Simple
- Uses Docker builtin mechanism
- Docker Hub automated builds still possible
- Good for many similar builds

CONTRA

- Restricted to Dockerfiles

ANSIBLE-CONTAINER

- Tool for building Docker images with Ansible
- Simple orchestration for containers
- Manages multiple tools at once
- Easy to setup
- Uses `docker exec` and `docker cp` as Ansible connector

SETUP

```
ansible/  
  # Docker compose file for base containers  
  container.yml  
  
  # Ansible playbook  
  main.yml  
  
  # Additional roles  
  roles/  
    dev-gulp/  
    ....  
    ...  
  
  # Python and Role dependencies  
  requirements.txt  
  requirements.yml  
  
  # Ansible configuration  
  ansible.cfg
```

CONTAINER.YML

```
version: "1"
defaults:
  POSTGRES_USER: django
  ...
services:
  django:
    image: centos:7
    environment:
      DATABASE_URL: "pgsql://{{ POSTGRES_USER }}:...."
    expose:
      - "{{ DJANGO_PORT }}"
    working_dir: "{{ DJANGO_ROOT }}"
    links:
      - postgresql
    command: ['{{ DJANGO_VENV }}/bin/gunicorn', .... ]
  postgresql:
    image: postgres:9.4
    expose:
      - "5432"
    volumes:
      - '/var/lib/postgresql/data'
```

MAIN.YML

```
version: "1"  
---  
- hosts: django  
  roles:  
    - django-gunicorn
```

HOW IT WORKS

- **Start up base containers** from the specification given in `container.yaml`
- Create Ansible **inventory** on the fly
- Run `ansible-playbook` on `main.yml` for **provisioning**
- **Stop** containers
- **Commit** containers as images

PRO

- Flexible
- Reuse of Ansible roles
- Single layered images

CONTRA

- Complex system
- Longer Build times
- Single layered images

PACKER DOCKER BUILDER



- Packer: Tool for creating machine images
- Docker as a Builder
- Support of multiple provisioner
 - Shell, Ansible, Chef, Puppet ...
- Post-Processor for pushing and tagging

EXAMPLE

```
{
  "builders": [{
    "type": "docker",
    "image": "fedora",
    "export_path": "image.tar"
  }],
  "provisioners": [
    {
      "type": "ansible",
      "playbook_file": "playbooks/local.yml"
    }
  ],
  "post-processors": [{
    "type": "docker-import",
    "repository": "demo/packer-ansible",
    "tag": "0.1"
  }]
}
```

PRO

- Easy (re)usable for other builders
- Many ways to provision

CONTRA

- No meta information configurable
- Ansible only via SSH
- No caching

ROCKER

- Extension to the Dockerfile syntax
- Multiple FROM
- EXPORT/ IMPORT for copying files
- MOUNT allows reuse during build
- Tag and Push directly from Rockerfile
- Templating

EXAMPLE

```
FROM google/golang:1.4
ADD . /src
WORKDIR /src
RUN CGO_ENABLED=0 go build -a -installsuffix cgo \
    -v -o ball.o ball.go
EXPORT ball.o

FROM busybox
IMPORT ball.o /bin/ball
CMD ["/bin/ball"]

TAG ball:latest
```

PRO

- Usuable extensions used in the wild
- Natural extension of a Dockerfile
- Backwards compatible

CONTRA

- Custom format
- Lock-In

BUILD INTEGRATION

- Create Docker images from within a build
- Maven plugins (Java)
 - `fabric8io/docker-maven-plugin`
 - `fabric8io/fabric8-maven-plugin`



DOCKER-MAVEN- PLUGIN

- Building images within Maven build
- Versioned
- Assembly with dependencies
- No Docker client required

<https://github.com/fabric8io/docker-maven-plugin>

D-M-P CONFIGURATION

```
<image>
  <name>jolokia/jolokia-itest</name>
  <build>
    <from>consol/tomcat-7.0</from>
    <assemblyDescriptor>
      assembly.xml
    </assemblyDescriptor>
  </build>
  <run>
    <ports>
      <port>jolokia.port:8080</port>
    </ports>
  </run>
</image>
```

FABRIC8-MAVEN-PLUGIN

- Embeds docker-maven-plugin
- Creates Kubernetes & OpenShift descriptors
- Creates image configuration from build info
- <https://maven.fabric8.io>

mvn package fabric8:build

ZERO CONFIG

- **Generators** for Image generation

```
<build>
  <plugins>
    <plugin>
      <groupId>io.fabric8</groupId>
      <artifactId>fabric8-maven-plugin</artifactId>
      <version>3.2.7</version>
    </plugin>
    <plugin>
      <groupId>org.springframework.boot</groupId>
      <artifactId>spring-boot-maven-plugin</artifactId>
    </plugin>
  </plugins>
</build>
```

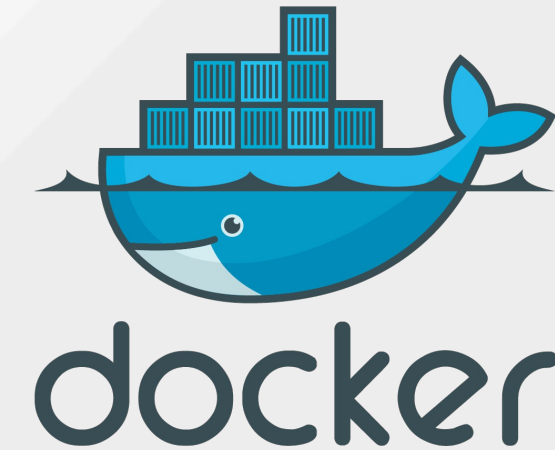
PRO

- Self contained builds
- No external requirements
- Reuse of existing build configuration

CONTRA

- Own configuration syntax
- More than one way

DOCKER HUB



- Public Docker registry
- Automated Builds via
 - manual trigger
 - GitHub webhook
 - update of a dependant build
 - HTTP POST request
- Multiple builds per repository
 - directory, tag, branch
- Tagging configurable

AUTOMATED BUILD

PUBLIC | AUTOMATED BUILD

fabric8/java-alpine-openjdk8-jdk ☆

Last pushed: 2 months ago

[Repo Info](#) [Tags](#) [Dockerfile](#) [Build Details](#) [Build Settings](#) [Collaborators](#) [Webhooks](#) [Settings](#)

Build Settings

☒ When active, builds will happen automatically on pushes.

The build rules below specify how to build your source into Docker images. The name can be a string or a regex. The Docker Tag name may contain variables. We currently support {sourcerefs}, which refers to the source branch/tag name. [Show less](#)



Source Repository
[fabric8io-images/java](#)

Here are a few examples:

| Scenario | Type | Name | Docker Tag Name | Matches | Docker Tag Built |
|--------------------|--------|--------------|----------------------|----------|------------------|
| Exact match | Branch | master | latest | master | latest |
| Match versions | Tag | /^[0-9.]+\$/ | release-{sourcerefs} | 1.2.0 | release-1.2.0 |
| Trailing modifiers | Tag | /^[0-9.]+/ | release-{sourcerefs} | 1.2.0-rc | release-1.2.0-rc |

| Type | Name | Dockerfile Location | Docker Tag Name | | |
|---------------------|-----------------------|---|------------------------|--------------|----------------------|
| <div>Branch ▾</div> | <div>master</div> | <div>/images/alpine/openjdk8/jdk/</div> | <div>latest</div> | <div>+</div> | <div>⌚ Trigger</div> |
| <div>Tag ▾</div> | <div>/^[0-9.]+/</div> | <div>/images/alpine/openjdk8/jdk/</div> | <div>Same as tag</div> | <div>-</div> | |



redhat.

PRO

- Free for Public Repos
- Easy to use
- Many triggers

CONTRA

- Dockerfile only

CONTINUOUS INTEGRATION

- Jenkins: Docker build step plugin
- Docker as Service in :
 - Travis CI, Circle CI, Codeship, Drone.io ...

CIRCLE CI

machine:

services:

- docker

deployment:

latest:

branch: master

commands:

- |
test -n "\$CI_PULL_REQUEST" || \
 (cd java/images/jboss \
 && docker build -t fabric8/s2i-java:latest . | cat - \
 && docker push fabric8/s2i-java:latest) | cat -)

release:

tag: /v[0-9]+(\.[0-9]+){2}/

commands:

- |
cd java/images/jboss && \
(docker build -t fabric8/s2i-java:\${CIRCLE_TAG/#v/} . | cat -)

PRO

- CI Integration
- Flexible configuration

CONTRA

- Lock-in

GOOGLE CONTAINER BUILDER

- Build service for Google Cloud Platform
- Image will be stored in **GCR**
- **Build Step** : Docker container executed as part of the build



EXAMPLE

- cloudbuild.yaml :

```
steps:
```

```
- name: "gcr.io/cloud-builders/docker",  
  args: [ "build", "-t", "gcr.io/devopscon-2016/java", "." ]  
images: [ "gcr.io/devopscon-2016/java" ]
```

- Build:

```
gcloud container builds submit --config cloudbuild.yaml \  
gs://devopscon-2016/container-build-example.tar.gz
```

```
...
```

```
gcloud container builds describe $BUILD_ID  
gcloud container builds list
```

BUILD STEP IMAGES

- bazel (Google's build tool)
- **docker**
- gcloud (Google Cloud SDK tool)
- git
- go
- golang-project (Go project)
- gsutil (Cloud storage access)
- wget

PRO

- Good integration into Google Cloud Platform
- Full access to all Docker features
- Easy to use

CONTRA

- Still Beta
- Not useful if not running in GCE

OPENSHIFT S2I

- OpenShift: PaaS on top of Kubernetes
- S2I : Source-to-image
- Two ingredients:
 - Source code (local or Git remote)
 - S2I Builder Image



EXAMPLE

```
oc new-app \
  centos/ruby-22-centos7~https://github.com/openshift/ruby-ex.git
```

- Start builder container
- Checkout from GitHub
- Run build
- Stop container
- Commit container to app image
- Start the app container

PRO

- Improved security
- Easy to use

CONTRA

- Limited possibilities
- Source S2I for Java is slow
- Lock-In

WRAP UP

- Dockerfiles are OK but limited
- There are many alternative ways to create Docker images
- Pick the one which fits your use case best



QUESTIONS ?

Blog <https://ro14nd.de>

Slides <https://github.com/ro14nd-talks/docker-container-loading>

