Mastering Docker

Shrikrishna Holla

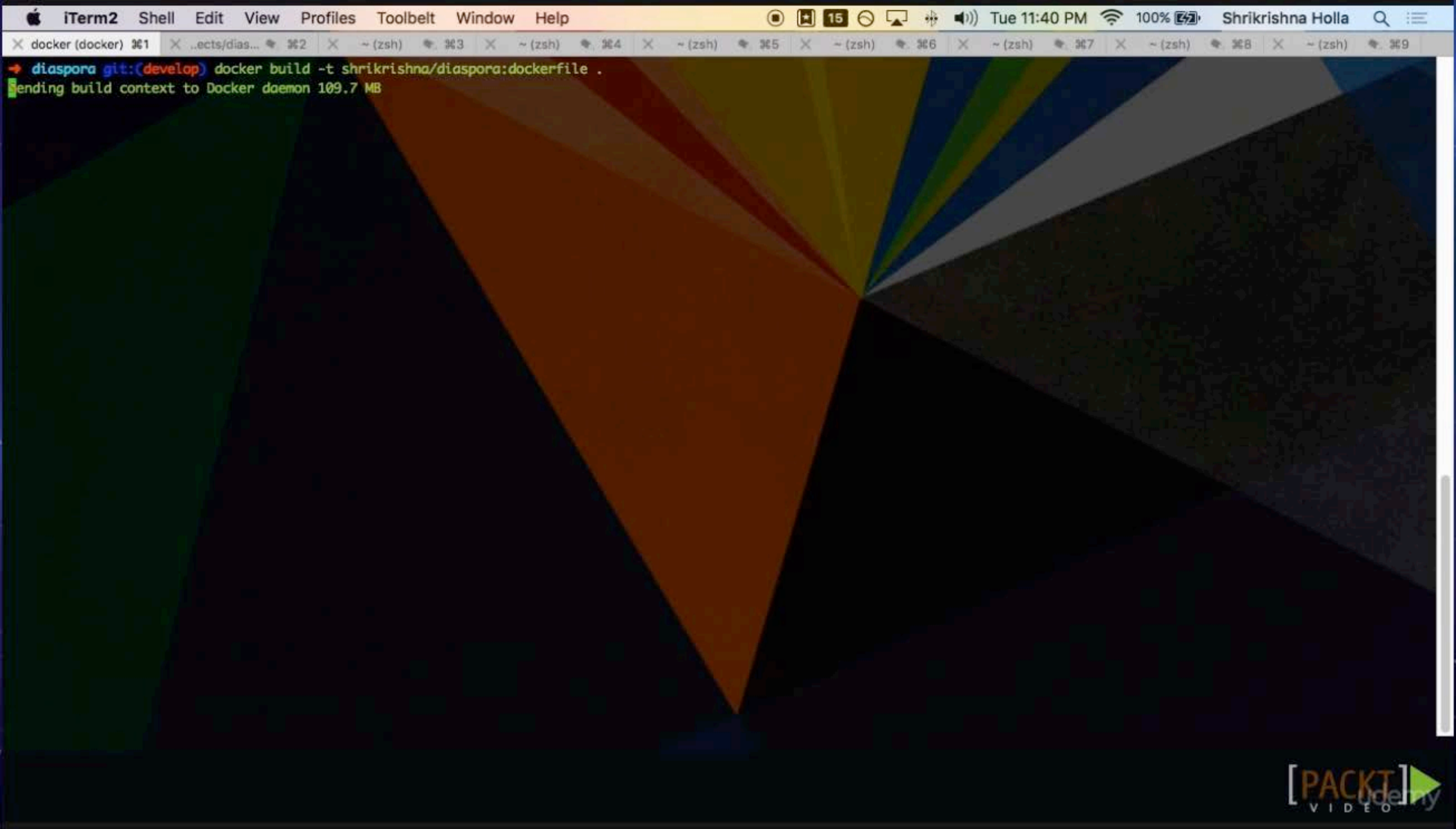
Video 1.4

Scripting Primer

In this Video, we are going to take a look at...

- Automating the build process using Dockerfile
- Docker build command
- Repeatability of builds and caching
- Container debugging

```
FROM        debian:jessie
MAINTAINER  Shrikrishna Holla <shrikrishna.holla@gmail.com>
RUN         apt-get update && apt-get install -y \
            build-essential \
            libssl-dev \
            libcurl4-openssl-dev \
            libxml2-dev \
            libxslt-dev \
            imagemagick \
            ghostscript \
            git \
            cmake \
            curl \
            libpq-dev \
            libmagickwand-dev \
            nodejs \
            gawk \
            libreadline6-dev \
            libyaml-dev \
            libsqlite3-dev \
            sqlite3 \
            autoconf \
            libgdbm-dev \
            libncurses5-dev \
            automake \
            bison \
            libffi-dev \
            && apt-get clean \
            && rm -rf /var/lib/apt/lists/*; \
            adduser --disabled-login diaspora; mkdir /diaspora;

USER        diaspora
RUN         gpg --keyserver hkp://keys.gnupg.net --recv-keys
409B6B1796C275462A1703113804BB82D39DC0E3
RUN         \curl -sSL https://get.rvm.io | bash -s stable

RUN         /bin/bash -l -c 'source "$HOME/.rvm/scripts/rvm" && rvm autolibs
read-fail && rvm install 2.2.1'

COPY        . /home/diaspora/diaspora

USER        root
RUN         /bin/bash -l -c "chown -R diaspora /home/diaspora"

USER        diaspora
WORKDIR     /home/diaspora/diaspora
ENV         DB=postgres RAILS_ENV=production
```


iTerm2 Shell Edit View Profiles Toolbelt Window Help
Tue 11:40 PM
100%
Shrikrishna Holla
docker (docker) ⌘1
..ects/dias... ⌘2
~ (zsh) ⌘3
~ (zsh) ⌘4
~ (zsh) ⌘5
~ (zsh) ⌘6
~ (zsh) ⌘7
~ (zsh) ⌘8
~ (zsh) ⌘9
diaspora git:(develop) docker build -t shrikrishna/diaspora:dockerfile .
Sending build context to Docker daemon 109.7 MB
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Key Considerations in Selecting Base Image

- Minimal size
- Availability of packages in the repositories
- Familiarity with the environment

ImageLayers | A Docker Im... | Best practices for writing D...

https://imagelayers.io/?images=ubuntu:latest,debian:jessie,centos:latest,alpine:latest,busybox:latest

IMAGE LAYERS About

CenturyLink | Hosted on CenturyLink Cloud

Total Size:	Unique Layers:	Average Layer Size:	Largest Layer Size:
516 mb	13	40 mb	197 mb

Get an Embed Badge

ImageLayers.io 95 MB / 21 Layers

Share URL | Copy URL

Docker Images Manage Images

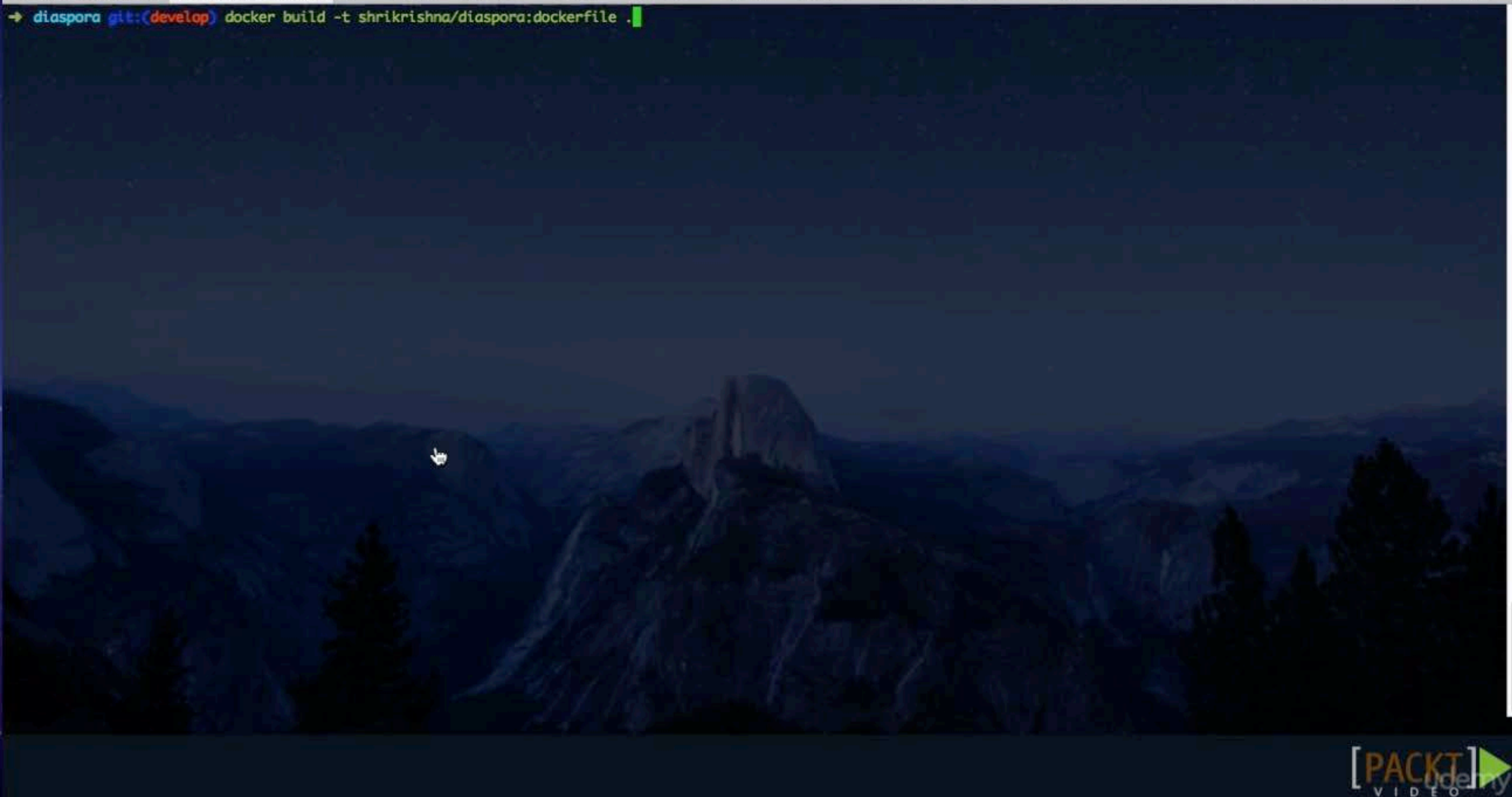
Filter images...

centos:latest	ubuntu:latest	busybox:latest	debian:jessie	alpine:latest
197 mb	188 mb	1 mb	125 mb	5 mb
Layers: 4	Layers: 4	Layers: 2	Layers: 2	Layers: 1
MAINTAINER The CentOS P.. 0 bytes	ADD file:b9504126dc55908... 188 mb	ADD file:7cdf7a89f6a004b2... 1 mb	ADD file:b5391cb13172fb5... 125 mb	ADD file:81ba6f20bdb99e6... 5 mb
ADD file:72852fc7626d2333... 197 mb	RUN echo '#!/bin/sh' > /usr... 195 kb	CMD "sh" 0 bytes	CMD "/bin/bash" 0 bytes	
LABEL name=CentOS Base... 0 bytes	RUN sed -i 's/^#\s*\(deb.*u... 2 kb			
CMD "/bin/bash"	CMD "/bin/bash"			

```
/sbin/initctl && cp -a /usr/sbin/policy-rc.d /sbin/initctl && sed -i 's/^exit.*/exit 0/' /sbin/initctl && echo 'force-unsafe-io' > /etc/dpkg/dpkg.cfg.d/docker-apt-speedup && echo 'DPkg::Post-Invoke { "rm -f /var/cache/apt/archives/*.deb /var/cache/apt/archives/partial/*.deb /var/cache/apt/*.bin || true"; };' > /etc/apt/apt.conf.d/docker-clean && echo 'APT::Update::Post-Invoke { "rm -f /var/cache/apt/archives/*.deb /var/cache/apt/archives/partial/*.deb /var/cache/apt/*.bin || true"; };' >> /etc/apt/apt.conf.d/docker-clean && echo 'Dir::Cache::pkgcache ""; Dir::Cache::srcpkgcache "";' >> /etc/apt/apt.conf.d/docker-clean && echo 'Acquire::Languages "none";' > /etc/apt/apt.conf.d/docker-no-languages && echo 'Acquire::GzipIndexes "true"; Acquire::CompressionTypes::Order:: "gz";' > /etc/apt/apt.conf.d/docker-gzip-indexes
```

```
FROM        debian:jessie
MAINTAINER  Shrikrishna Holla <shrikrishna.holla@gmail.com>
RUN         apt-get update && apt-get install -y \
            build-essential \
            libssl-dev \
            libcurl4-openssl-dev \
            libxml2-dev \
            libxslt-dev \
            imagemagick \
            ghostscript \
            git \
            cmake \
            curl \
            libpq-dev \
            libmagickwand-dev \
            nodejs \
            gawk \
            libreadline6-dev \
            libyaml-dev \
            libsqlite3-dev \
            sqlite3 \
            autoconf \
            libgdbm-dev \
            libncurses5-dev \
            automake \
            bison \
            libffi-dev \
            && apt-get clean \
            && rm -rf /var/lib/apt/lists/*; \
            adduser --disabled-login diaspora; mkdir /diaspora;

USER        diaspora
RUN         gpg --keyserver hkp://keys.gnupg.net --recv-keys
409B6B1796C275462A1703113804BB82D39DC0E3
RUN         \curl -sSL https://get.rvm.io | bash -s stable

RUN         /bin/bash -l -c 'source "$HOME/.rvm/scripts/rvm" && rvm autolibs
read-fail && rvm install 2.2.1'

COPY        . /home/diaspora/diaspora

USER        root
RUN         /bin/bash -l -c "chown -R diaspora /home/diaspora"

USER        diaspora
WORKDIR     /home/diaspora/diaspora
ENV         DB=postgres RAILS_ENV=production
```

```
➜ diaspora git:(develop) docker build -t shrikrishna/diaspora:dockerfile .
```



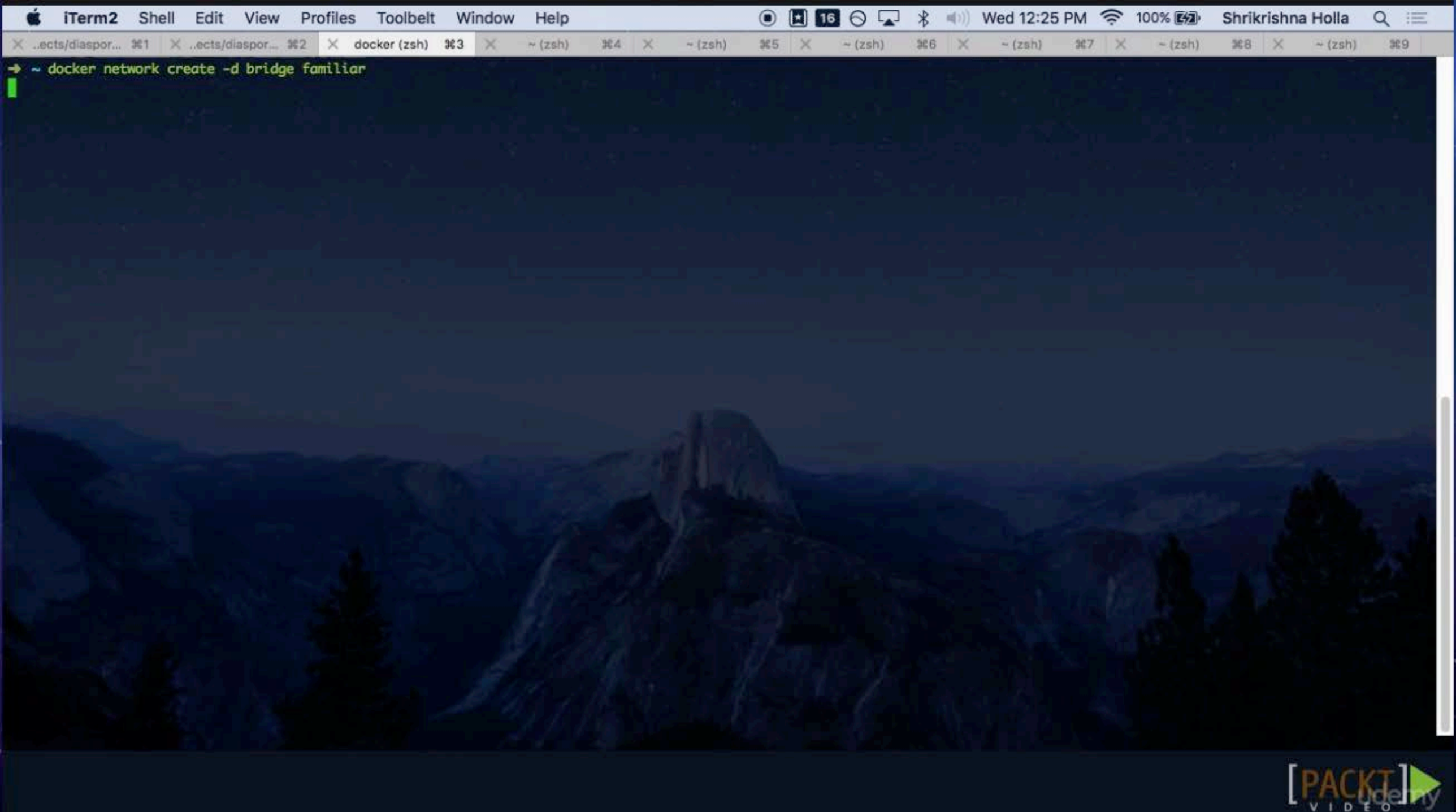
```
Step 7 : RUN /bin/bash -l -c 'source "$HOME/.rvm/scripts/rvm" && rvm autolibs read-fail && rvm install 2.2.1'
 ---> Using cache
 ---> cc5aefba2aaf
Step 8 : COPY . /home/diaspora/diaspora
 ---> Using cache
 ---> fb8a045f1bc0
Step 9 : USER root
 ---> Using cache
 ---> c6d0373e0556
Step 10 : RUN /bin/bash -l -c "chown -R diaspora /home/diaspora"
 ---> Using cache
 ---> ca1f37197418
Step 11 : USER diaspora
 ---> Using cache
 ---> 96d0ecf4122c
Step 12 : WORKDIR /home/diaspora/diaspora
 ---> Using cache
 ---> bbe60ad99bd2
Step 13 : ENV DB postgres RAILS_ENV production
 ---> Using cache
 ---> d39774aa251c
Step 14 : EXPOSE 3000
 ---> Using cache
 ---> f5adbbb82adf
Step 15 : RUN /bin/bash -l -c "gem install bundler --no-ri --no-rdoc && bundle install --without test development --with postgresql"
 ---> Using cache
 ---> 8bc868b0a0a0
Step 16 : ONBUILD /bin/bash
 ---> Using cache
 ---> ab24e482d872
Step 17 : CMD ['/bin/bash', '-l, '-c', '"bundle exec unicorn -c config/unicorn.rb"']
 ---> Using cache
 ---> 7332e398ac11
Successfully built 7332e398ac11
➜ diaspora git:(develop)
```

Best practices for writing Dockerfiles

Docker can build images automatically by reading the instructions from a `Dockerfile`, a text file that contains all the commands, in order, needed to build a given image. `Dockerfile`s adhere to a specific format and use a specific set of instructions. You can learn the basics on the Dockerfile Reference page. If you're new to writing `Dockerfile`s, you should start there.

This document covers the best practices and methods recommended by Docker, Inc. and the Docker community for creating easy-to-use, effective `Dockerfile`s. We strongly suggest you follow these recommendations (in fact, if you're creating an Official Image, you *must* adhere to these practices).

```
FROM        debian:jessie
MAINTAINER  Shrikrishna Holla <shrikrishna.holla@gmail.com>
RUN         apt-get update && apt-get install -y \
            build-essential \
            libssl-dev \
            libcurl4-openssl-dev \
            libxml2-dev \
            libxslt-dev \
            imagemagick \
            ghostscript \
            git \
            cmake \
            curl \
            libpq-dev \
            libmagickwand-dev \
            nodejs \
            gawk \
            libreadline6-dev \
            libyaml-dev \
            libsqlite3-dev \
            sqlite3 \
            autoconf \
            libgdbm-dev \
            libncurses5-dev \
            automake \
            bison \
            libffi-dev \
            && apt-get clean \
            && rm -rf /var/lib/apt/lists/*; \
            adduser --disabled-login diaspora; mkdir /diaspora;

USER        diaspora
RUN         gpg --keyserver hkp://keys.gnupg.net --recv-keys
409B6B1796C275462A1703113804BB82D39DC0E3
RUN         \curl -sSL https://get.rvm.io | bash -s stable

RUN         /bin/bash -l -c 'source "$HOME/.rvm/scripts/rvm" && rvm autolibs
read-fail && rvm install 2.2.1'

COPY        . /home/diaspora/diaspora

USER        root
RUN         /bin/bash -l -c "chown -R diaspora /home/diaspora"

USER        diaspora
WORKDIR     /home/diaspora/diaspora
ENV         DB=postgres RAILS_ENV=production
```


iTerm2 Shell Edit View Profiles Toolbelt Window Help
Wed 12:25 PM
100%
Shrikrishna Holla
..ects/diaspor... ⌘1
..ects/diaspor... ⌘2
docker (zsh) ⌘3
~ (zsh) ⌘4
~ (zsh) ⌘5
~ (zsh) ⌘6
~ (zsh) ⌘7
~ (zsh) ⌘8
~ (zsh) ⌘9
➜ ~ docker network create -d bridge familiar
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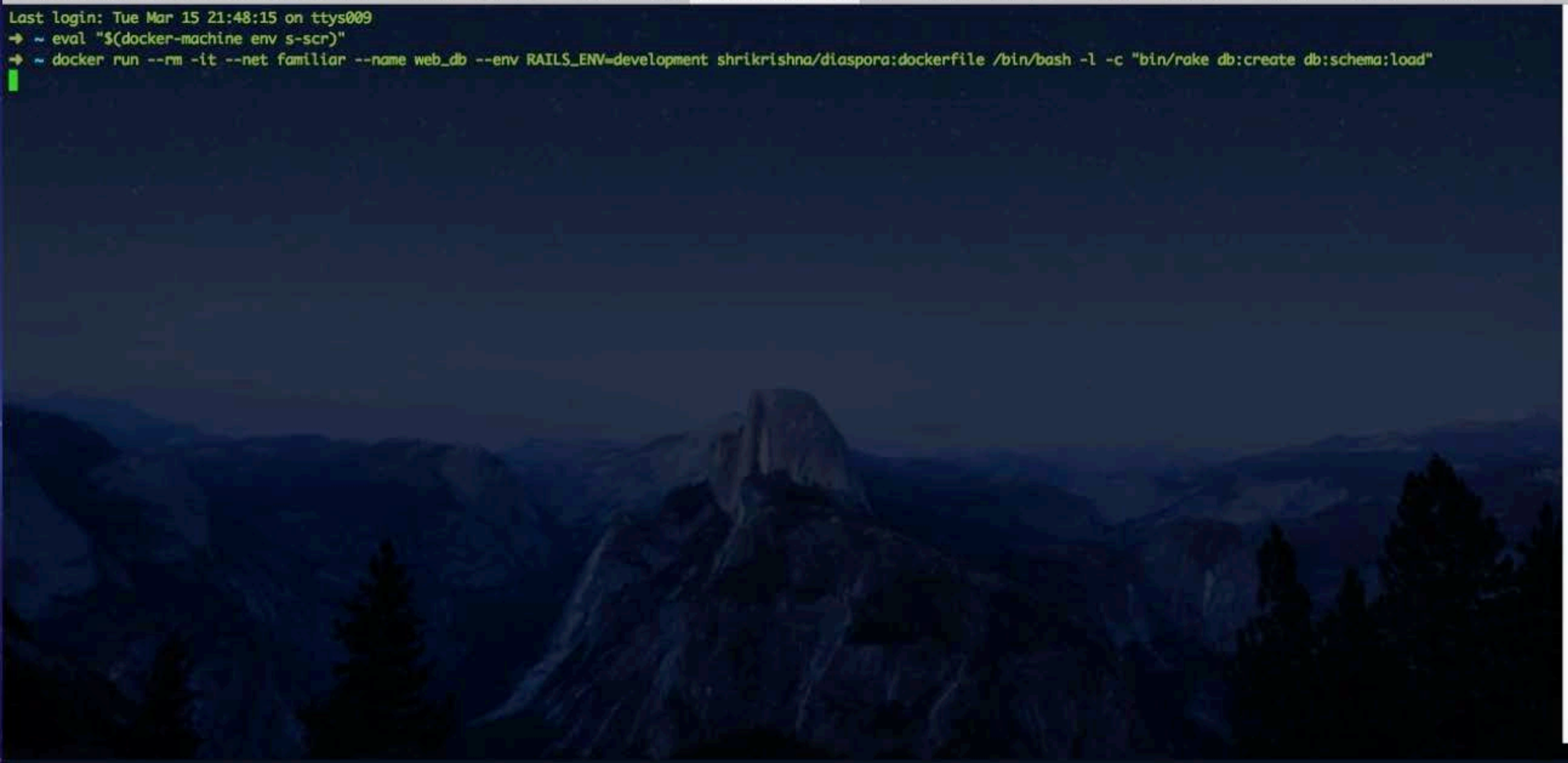
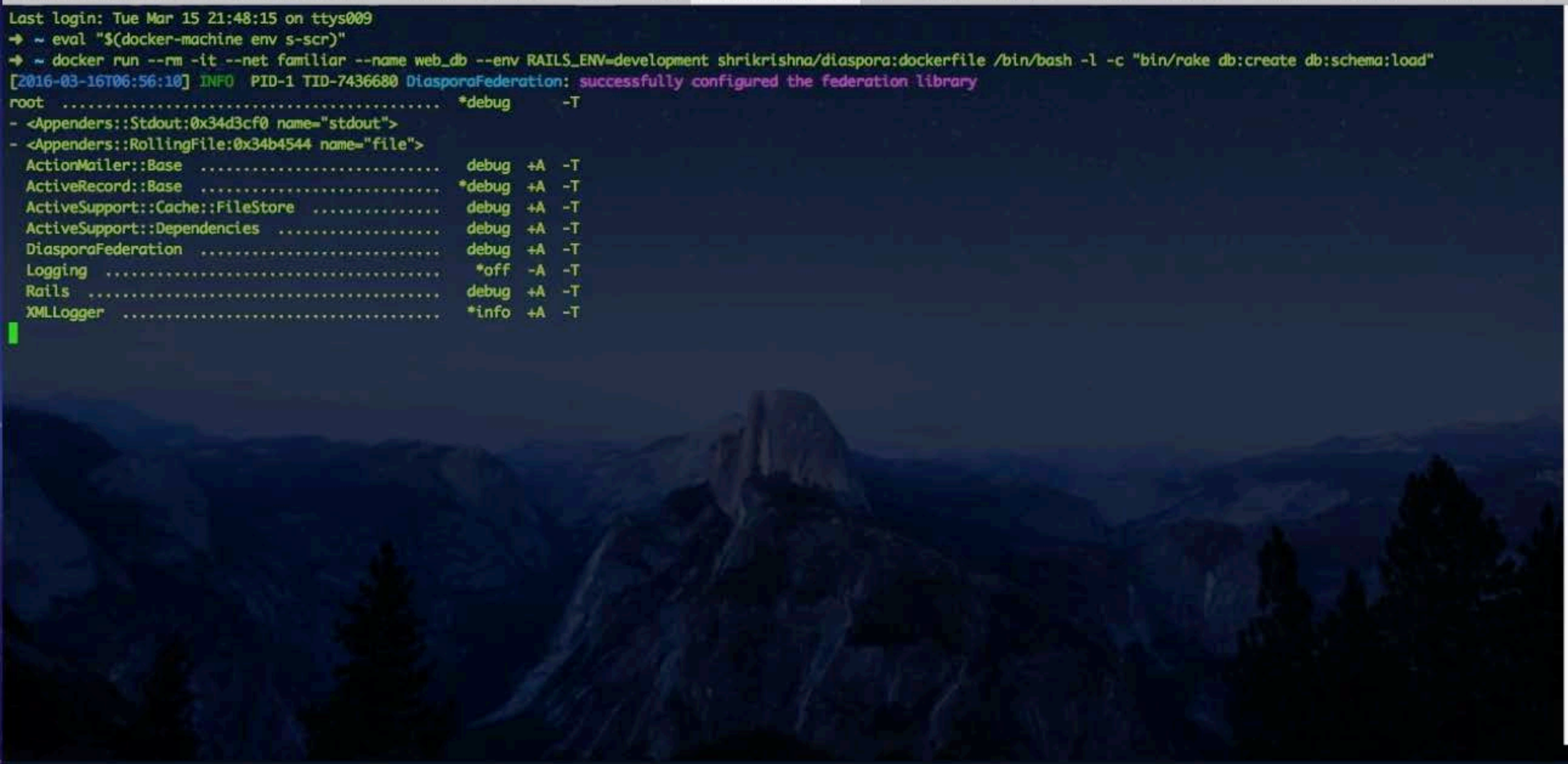
```
Last login: Tue Mar 15 21:48:15 on ttys009
➜ ~ eval "$(docker-machine env s-scr)"
➜ ~ docker run --rm -it --net familiar --name web_db --env RAILS_ENV=development shrikrishna/diaspora:dockerfile /bin/bash -l -c "bin/rake db:create db:schema:load"
```

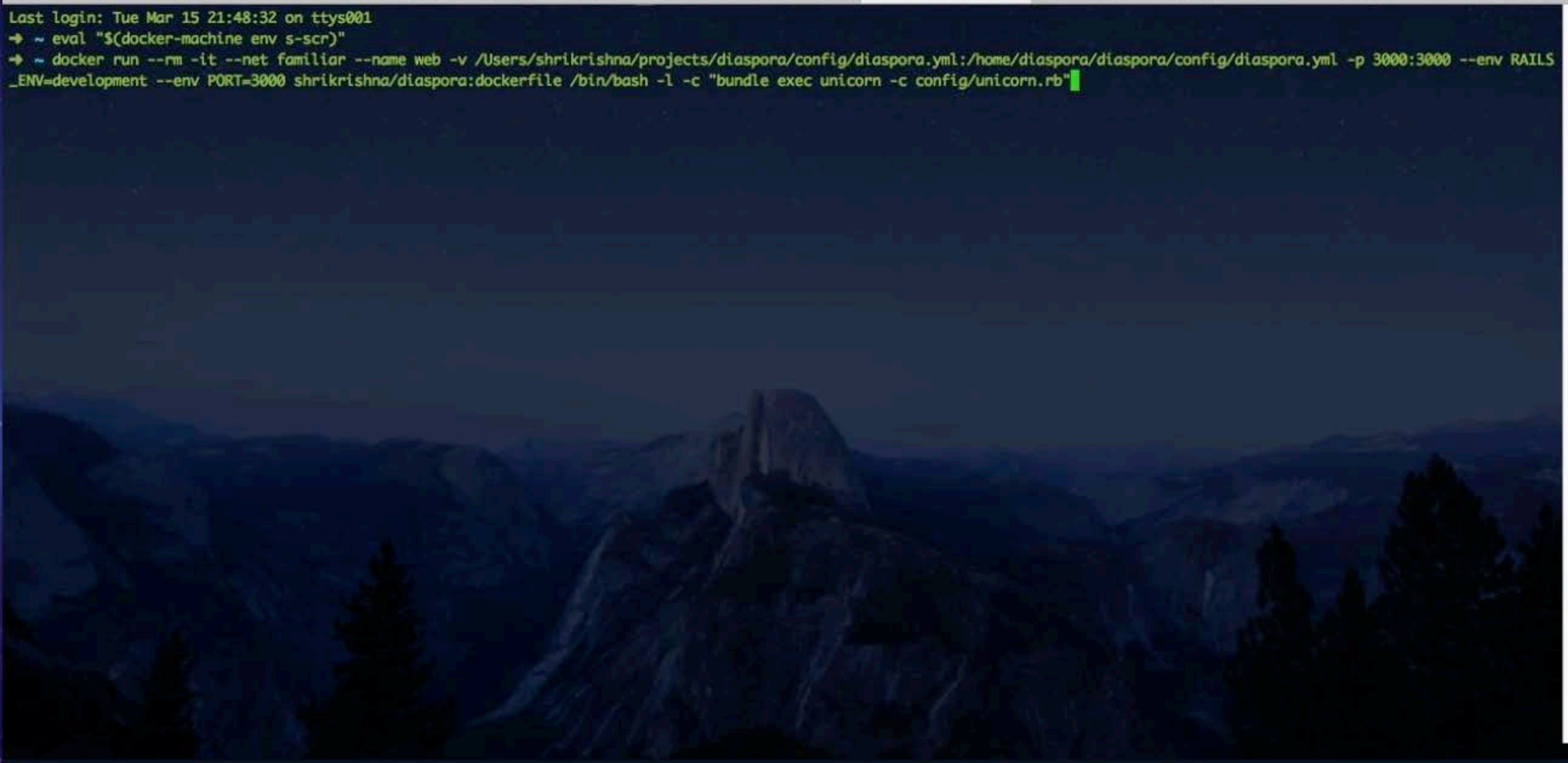


```
Last login: Tue Mar 15 21:48:15 on ttys009
➜ ~ eval "$(docker-machine env s-scr)"
➜ ~ docker run --rm -it --net familiar --name web_db --env RAILS_ENV=development shrikrishna/diaspora:dockerfile /bin/bash -l -c "bin/rake db:create db:schema:load"
[2016-03-16T06:56:10] INFO  PID-1 TID-7436680 DiasporaFederation: successfully configured the federation library
root ..................................... *debug     -T
- <Appenders::Stdout:0x34d3cf0 name="stdout">
- <Appenders::RollingFile:0x34b4544 name="file">
  ActionMailer::Base ....................... debug  +A  -T
  ActiveRecord::Base ....................... *debug  +A  -T
  ActiveSupport::Cache::FileStore .......... debug  +A  -T
  ActiveSupport::Dependencies .............. debug  +A  -T
  DiasporaFederation ....................... debug  +A  -T
  Logging .................................. *off  -A  -T
  Rails .................................... debug  +A  -T
  XMLLogger ................................ *info  +A  -T
```



```
[2016-03-16T06:56:13] DEBUG PID-1 TID-7436680 ActiveRecord::Base:    (1.4ms)  INSERT INTO "schema_migrations" (version) VALUES ('20130801063213')
[2016-03-16T06:56:13] DEBUG PID-1 TID-7436680 ActiveRecord::Base:    (1.9ms)  INSERT INTO "schema_migrations" (version) VALUES ('20140824230505')
[2016-03-16T06:56:13] DEBUG PID-1 TID-7436680 ActiveRecord::Base:    (0.9ms)  INSERT INTO "schema_migrations" (version) VALUES ('20130608171134')
[2016-03-16T06:56:13] DEBUG PID-1 TID-7436680 ActiveRecord::Base:    (0.7ms)  INSERT INTO "schema_migrations" (version) VALUES ('20130404211624')
[2016-03-16T06:56:13] DEBUG PID-1 TID-7436680 ActiveRecord::Base:    (0.8ms)  INSERT INTO "schema_migrations" (version) VALUES ('0')
[2016-03-16T06:56:13] DEBUG PID-1 TID-7436680 ActiveRecord::Base:    (1.4ms)  INSERT INTO "schema_migrations" (version) VALUES ('20140826165533')
[2016-03-16T06:56:13] DEBUG PID-1 TID-7436680 ActiveRecord::Base:    (0.6ms)  INSERT INTO "schema_migrations" (version) VALUES ('20140422134627')
[2016-03-16T06:56:13] DEBUG PID-1 TID-7436680 ActiveRecord::Base:    (1.0ms)  INSERT INTO "schema_migrations" (version) VALUES ('20140222162826')
[2016-03-16T06:56:13] DEBUG PID-1 TID-7436680 ActiveRecord::Base:    (0.6ms)  INSERT INTO "schema_migrations" (version) VALUES ('20150523004437')
[2016-03-16T06:56:13] DEBUG PID-1 TID-7436680 ActiveRecord::Base:    (1.4ms)  INSERT INTO "schema_migrations" (version) VALUES ('20150403192408')
[2016-03-16T06:56:13] DEBUG PID-1 TID-7436680 ActiveRecord::Base:    (1.1ms)  INSERT INTO "schema_migrations" (version) VALUES ('20141024170120')
[2016-03-16T06:56:13] DEBUG PID-1 TID-7436680 ActiveRecord::Base:    (0.9ms)  INSERT INTO "schema_migrations" (version) VALUES ('20140601102543')
[2016-03-16T06:56:13] DEBUG PID-1 TID-7436680 ActiveRecord::Base:    (0.6ms)  INSERT INTO "schema_migrations" (version) VALUES ('20130717104359')
[2016-03-16T06:56:13] DEBUG PID-1 TID-7436680 ActiveRecord::Base:    (0.6ms)  INSERT INTO "schema_migrations" (version) VALUES ('20141007003922')
[2016-03-16T06:56:13] DEBUG PID-1 TID-7436680 ActiveRecord::Base:    (0.6ms)  INSERT INTO "schema_migrations" (version) VALUES ('20150220001357')
[2016-03-16T06:56:13] DEBUG PID-1 TID-7436680 ActiveRecord::Base:    (1.8ms)  INSERT INTO "schema_migrations" (version) VALUES ('20131213171804')
[2016-03-16T06:56:13] DEBUG PID-1 TID-7436680 ActiveRecord::Base:    (0.8ms)  INSERT INTO "schema_migrations" (version) VALUES ('20140214104217')
[2016-03-16T06:56:13] DEBUG PID-1 TID-7436680 ActiveRecord::Base:    (0.7ms)  INSERT INTO "schema_migrations" (version) VALUES ('20150731123114')
[2016-03-16T06:56:13] DEBUG PID-1 TID-7436680 ActiveRecord::Base:    (0.7ms)  INSERT INTO "schema_migrations" (version) VALUES ('20150630221004')
[2016-03-16T06:56:13] DEBUG PID-1 TID-7436680 ActiveRecord::Base:    (0.8ms)  INSERT INTO "schema_migrations" (version) VALUES ('20130207231310')
[2016-03-16T06:56:13] DEBUG PID-1 TID-7436680 ActiveRecord::Base:    (0.7ms)  INSERT INTO "schema_migrations" (version) VALUES ('20140308154022')
[2016-03-16T06:56:13] DEBUG PID-1 TID-7436680 ActiveRecord::Base:    (0.9ms)  INSERT INTO "schema_migrations" (version) VALUES ('20141001162851')
[2016-03-16T06:56:13] DEBUG PID-1 TID-7436680 ActiveRecord::Base:    (1.1ms)  INSERT INTO "schema_migrations" (version) VALUES ('20140422134050')
[2016-03-16T06:56:13] DEBUG PID-1 TID-7436680 ActiveRecord::Base:    (0.7ms)  INSERT INTO "schema_migrations" (version) VALUES ('20140801101230')
[2016-03-16T06:56:13] DEBUG PID-1 TID-7436680 ActiveRecord::Base:    (0.9ms)  INSERT INTO "schema_migrations" (version) VALUES ('20141227120907')
[2016-03-16T06:56:13] DEBUG PID-1 TID-7436680 ActiveRecord::Base:    (0.9ms)  INSERT INTO "schema_migrations" (version) VALUES ('20130429073928')
[2016-03-16T06:56:13] DEBUG PID-1 TID-7436680 ActiveRecord::Base:    (0.6ms)  INSERT INTO "schema_migrations" (version) VALUES ('20140906192846')
[2016-03-16T06:56:13] DEBUG PID-1 TID-7436680 ActiveRecord::Base:    (0.8ms)  INSERT INTO "schema_migrations" (version) VALUES ('20130613203350')
[2016-03-16T06:56:13] DEBUG PID-1 TID-7436680 ActiveRecord::Base:    (0.7ms)  INSERT INTO "schema_migrations" (version) VALUES ('20141209041241')
[2016-03-16T06:56:13] DEBUG PID-1 TID-7436680 ActiveRecord::Base:    (0.6ms)  INSERT INTO "schema_migrations" (version) VALUES ('20131017093025')
[2016-03-16T06:56:13] DEBUG PID-1 TID-7436680 ActiveRecord::Base:    (0.8ms)  INSERT INTO "schema_migrations" (version) VALUES ('20150209230946')
[2016-03-16T06:56:13] DEBUG PID-1 TID-7436680 ActiveRecord::Base:    (0.8ms)  INSERT INTO "schema_migrations" (version) VALUES ('20150607143809')
[2016-03-16T06:56:13] DEBUG PID-1 TID-7436680 ActiveRecord::Base:    (0.9ms)  INSERT INTO "schema_migrations" (version) VALUES ('20141230214830')
[2016-03-16T06:56:14] DEBUG PID-1 TID-7436680 ActiveRecord::Base:    (1.8ms)  INSERT INTO "schema_migrations" (version) VALUES ('20140801101352')
➜ ~
```

```
Last login: Tue Mar 15 21:48:32 on ttys001
➜  ~ eval "$(docker-machine env s-scr)"
➜  ~ docker run --rm -it --net familiar --name web -v /Users/shrikrishna/projects/diaspora/config/diaspora.yml:/home/diaspora/diaspora/config/diaspora.yml -p 3000:3000 --env RAILS
_ENV=development --env PORT=3000 shrikrishna/diaspora:dockerfile /bin/bash -l -c "bundle exec unicorn -c config/unicorn.rb"
```



ImageLayers | A Docker Im... × | Best practices for writing D... × | familiar ×

192.168.99.100:3000

diaspora*

Log In

Welcome, friend.

You're about to change the Internet. Let's get you set up, shall we?

Configure your pod

Look at `config/diaspora.yml.example` and `config/database.yml.example` for help.

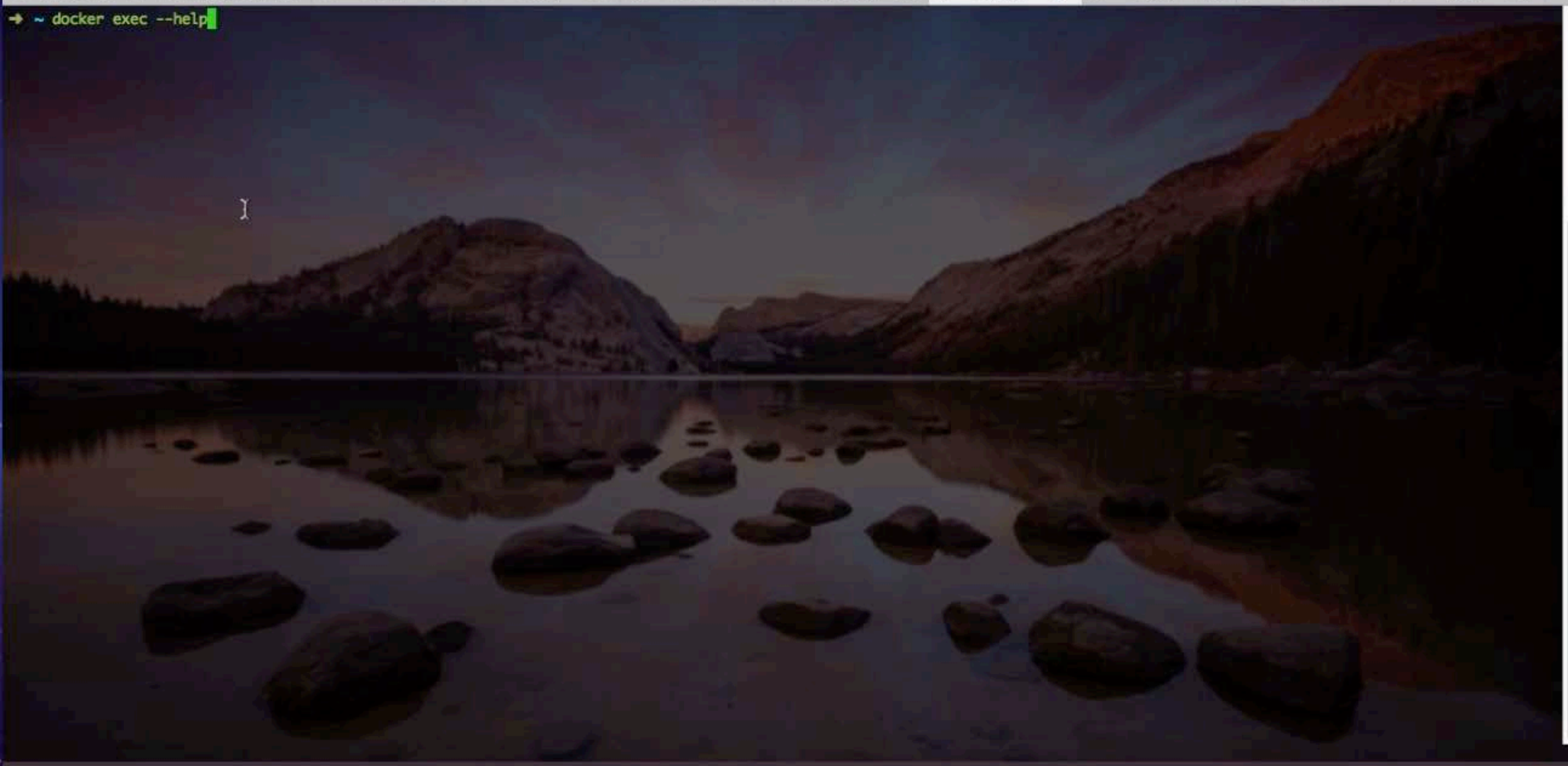
Try it out

Start by creating an account

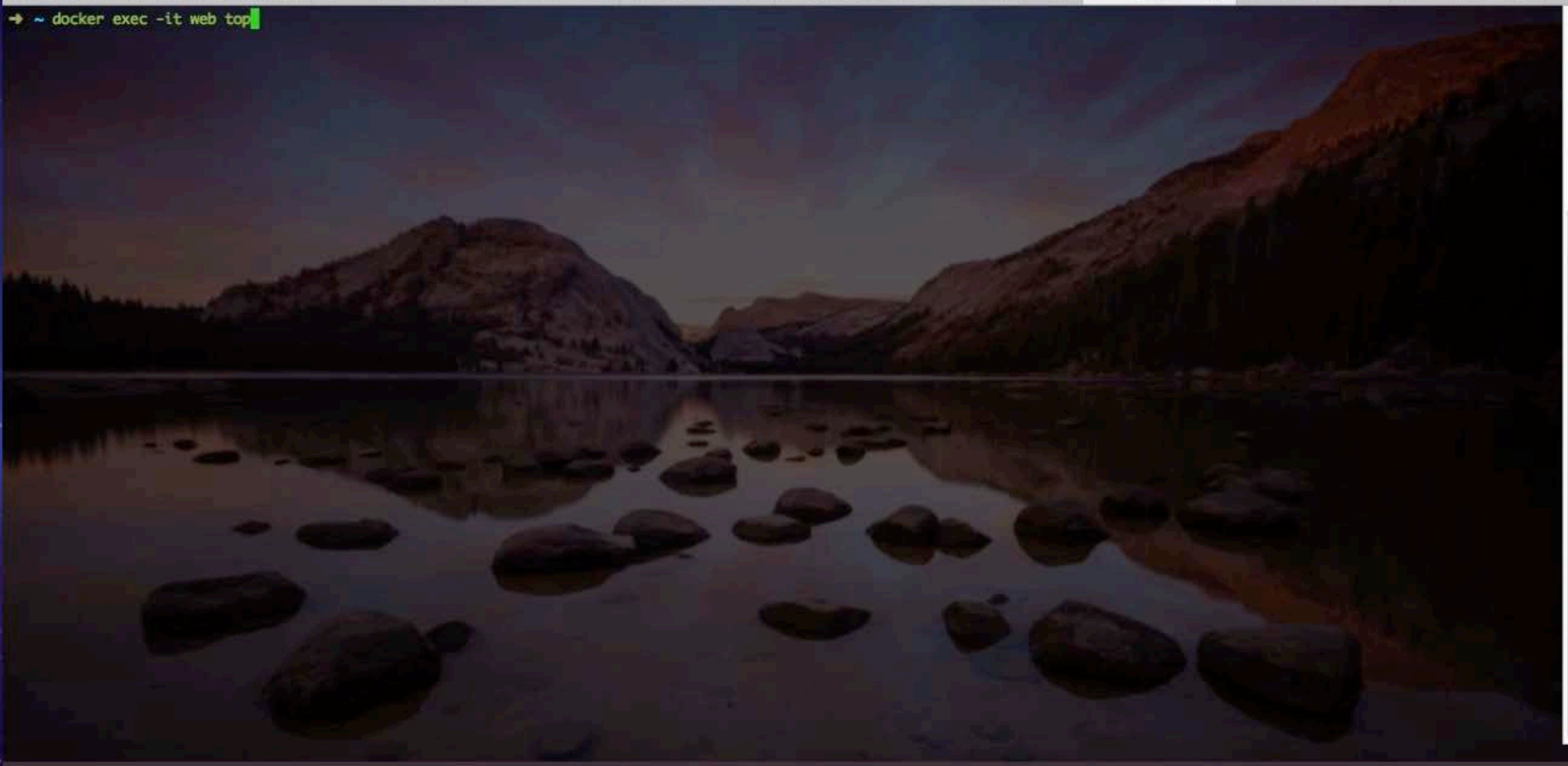
Make a contribution!

Make Diaspora even better! Fork the project on Github make some changes, and submit a pull request.

```
➜ ~ docker exec --help
```



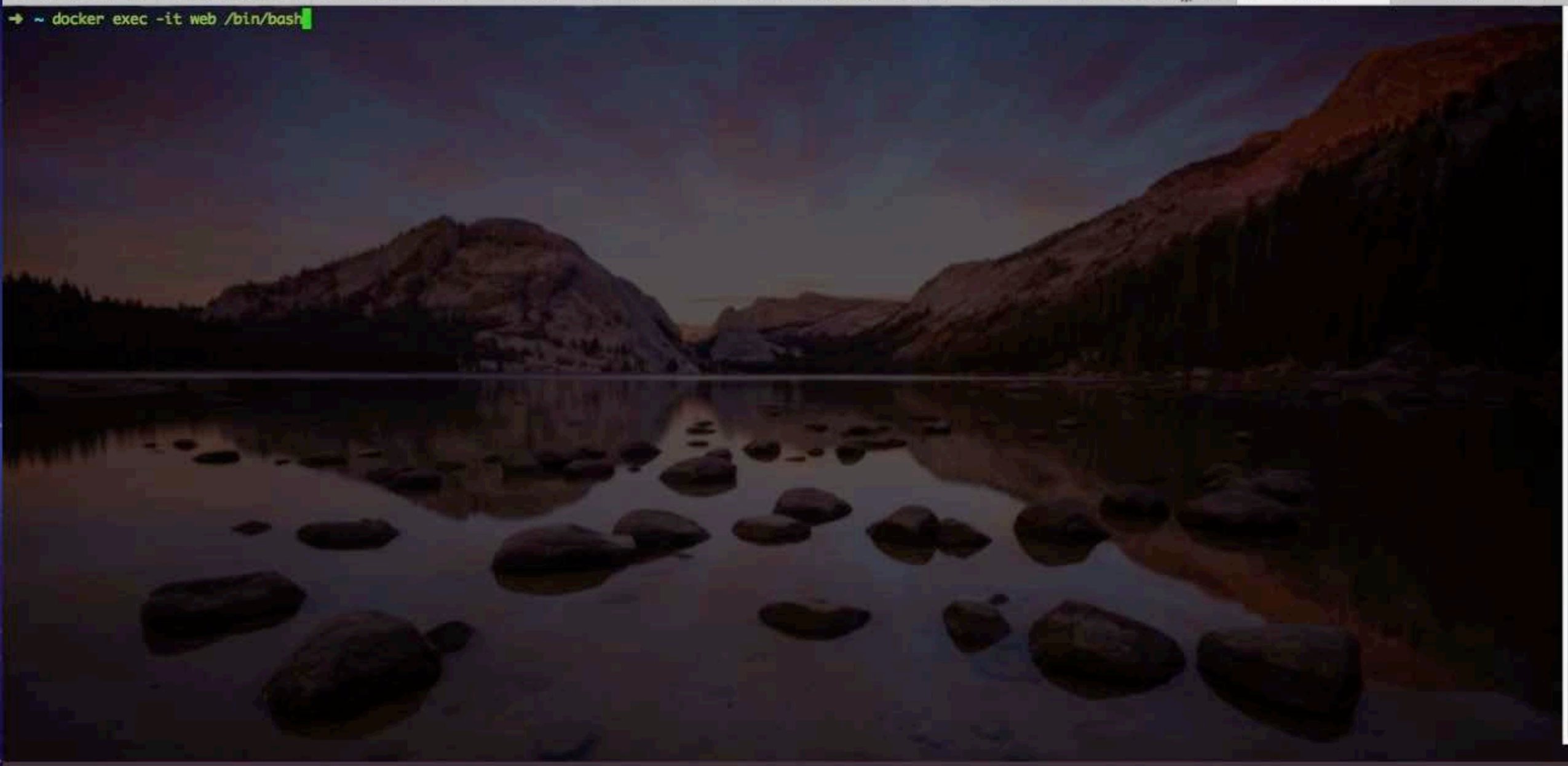
```
➜ ~ docker exec -it web top
```

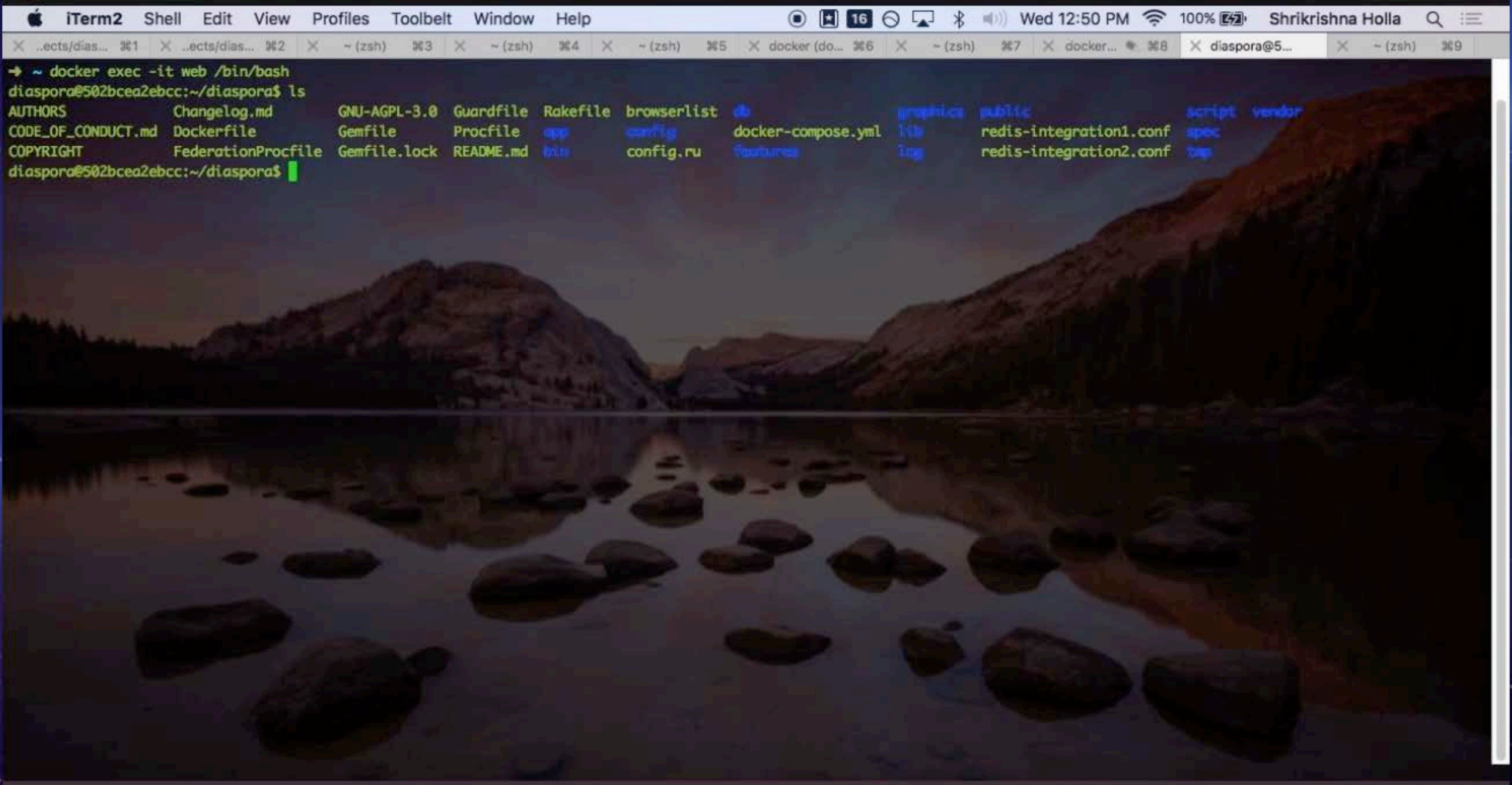


```
top - 07:20:15 up  6:37,  0 users,  load average: 0.00, 0.01, 0.05
Tasks:   3 total,   1 running,   2 sleeping,   0 stopped,   0 zombie
%Cpu(s):  1.3 us,  0.6 sy,  0.0 ni, 97.8 id,  0.1 wa,  0.0 hi,  0.2 si,  0.0 st
KiB Mem:   1020096 total,   983948 used,    36148 free,    55628 buffers
KiB Swap:  1203528 total,     7296 used,  1196232 free.   312516 cached Mem

  PID USER      PR  NI    VIRT    RES    SHR S %CPU %MEM     TIME+ COMMAND
    1 diaspora  20   0  387436 190028  11720 S  0.0 18.6   0:10.00 ruby
  152 diaspora  20   0  413512 217220   9008 S  0.0 21.3   0:14.18 ruby
  183 diaspora  20   0   21972   2272   1944 R  0.0  0.2   0:00.03 top
```

```
➜ ~ docker exec -it web /bin/bash
```





Summary

- Docker basics and internals
- Docker CLI commands
- Dockerfile
- Docker hub

Next Section

Composing Services