

Docker Lab Solution



Build a Python-based image and container for hosting/executing a Python app:

```
Dockerfile X
Dockerfile > ...
1  # Grabs Python image upon which the new image will be based
2  FROM python:alpine
3
4  # Creates a new target folder in image
5  RUN mkdir -p /usr/src/PythonApp
6
7  # Switches working directory in image to app folder
8  WORKDIR /usr/src/PythonApp
9
10 # Copies current directory contents to newly created folder
11 COPY . .
12
13 # Pulls required supporting Python packages
14 RUN pip install -r requirements.txt
15
16 # Executes new Python app
17 CMD ["python", "app.py"]
18
```

```
MINGW64:/c:/Users/a_san/source/repos/dockerlab-repo1
a_san@DESKTOP-QJENT2P MINGW64 ~/source/repos/dockerlab-repo1 (solution)
$ ls
Dockerfile  README.md  app.py  requirements.txt  string_functions.py

a_san@DESKTOP-QJENT2P MINGW64 ~/source/repos/dockerlab-repo1 (solution)
$ docker build -t python-app .
#1 [internal] load build definition from Dockerfile
#1 sha256:188d477676aa342266e9af0b722a74db2e63898e575b2729a8309f6a69526889
#1 transferring dockerfile: 32B 0.0s done
#1 DONE 0.0s

#2 [internal] load .dockerignore
#2 sha256:e9eef62e077277de044c9af21d4d0df9d95bbe388d825b68ef318c1acc5d2414
#2 transferring context: 34B done
#2 DONE 0.0s

#3 [internal] load metadata for docker.io/library/python:alpine
#3 sha256:12ca8c0b16db6c9402bc02e85393a22d46b8b9fa528503aaf95f35d81926aca7
#3 ...

#4 [auth] library/python:pull token for registry-1.docker.io
#4 sha256:d4e9272526e37b0f6c4c0b35f52f6d7625e545aa07ded4e6852b1e789f590155
#4 DONE 0.0s

#3 [internal] load metadata for docker.io/library/python:alpine
#3 sha256:12ca8c0b16db6c9402bc02e85393a22d46b8b9fa528503aaf95f35d81926aca7
#3 DONE 0.8s

#10 [1/5] FROM docker.io/library/python:alpine@sha256:ce1b9f21341e78db3c71aa1b99876161a3bd2f7b428ddf35d54c59e1fad47107
#10 sha256:15eb044c1b03ec3acd4c53a5d79813120ca7531359c91d108fbf12124e7eed15
#10 DONE 0.0s

#7 [internal] load build context
#7 sha256:23e5d41ee8cfd38256127eac99ba088b38bc767a96e7c3f21282b6992046a666
#7 transferring context: 10.01kB 0.0s done
#7 DONE 0.0s
```

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```
#5 [2/5] RUN mkdir -p /usr/src/PythonApp
#5 sha256:e5e0abb63a31a95a37478a10fe514f2ea22bb8330ba2b695e92d3a9ab9ac01e4
#5 CACHED

#6 [3/5] WORKDIR /usr/src/PythonApp
#6 sha256:ca7cf6f5253fb8c40c8db1c255d0f27fa88b1b2523e468051faf21dda7e3512a
#6 CACHED

#8 [4/5] COPY . .
#8 sha256:76179f1af99b1aa31064986777c5095068cc4dabebb23ec029c95fdbb4f5edb8
#8 DONE 0.0s

#9 [5/5] RUN pip install -r requirements.txt
#9 sha256:ee7250eab7461f071b3e85b368a0fc9f29b48d96458d819c006c142de1c5fb99
#9 1.467 Collecting arrow==0.17.0
#9 1.638 Downloading arrow-0.17.0-py2.py3-none-any.whl (50 kB)
#9 1.721 Collecting python-dateutil>=2.7.0
#9 1.750 Downloading python_dateutil-2.8.1-py2.py3-none-any.whl (227 kB)
#9 1.869 Collecting six>=1.5
#9 1.904 Downloading six-1.15.0-py2.py3-none-any.whl (10 kB)
#9 1.936 Installing collected packages: six, python-dateutil, arrow
#9 2.032 Successfully installed arrow-0.17.0 python-dateutil-2.8.1 six-1.15.0
#9 2.211 WARNING: You are using pip version 21.0; however, version 21.0.1 is available.
#9 2.211 You should consider upgrading via the '/usr/local/bin/python -m pip install --upgrade pip' command.
#9 DONE 2.3s

#11 exporting to image
#11 sha256:e8c613e07b0b7ff33893b694f7759a10d42e180f2b4dc349fb57dc6b71dcab00
#11 exporting layers
#11 exporting layers 0.1s done
#11 writing image sha256:50f9554fd1bfa4f58bf1c04f8db4c6ebe9407019f39399da847d81c941b42008 done
#11 naming to docker.io/library/python-app done
#11 DONE 0.1s
```

```
a_san@DESKTOP-QJENT2P ~
$ docker images
REPOSITORY TAG IMAGE ID CREATED SIZE
python-app latest 50f9554fd1bf 14 minutes ago 51.7MB

a_san@DESKTOP-QJENT2P ~
$ docker run -it --name python-app-cont python-app
Enter a text phrase: This is a test phrase
Current date is 2021-01-31
"This is a test phrase" contains 6 vowels
"This is a test phrase" contains the following letter counts:
3 occurrence(s) of t
2 occurrence(s) of h
2 occurrence(s) of i
4 occurrence(s) of s
2 occurrence(s) of a
2 occurrence(s) of e
1 occurrence(s) of p
1 occurrence(s) of r

a_san@DESKTOP-QJENT2P ~
$ docker ps
CONTAINER ID IMAGE COMMAND CREATED STATUS PORTS NAMES

a_san@DESKTOP-QJENT2P ~
$ docker ps -a
CONTAINER ID IMAGE COMMAND CREATED STATUS PORTS NAMES
032ae320a896 python-app "python app.py" About a minute ago Exited (0) 53 seconds ago python-app-cont

a_san@DESKTOP-QJENT2P ~
$
```

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```
a_san@DESKTOP-QJENT2P ~
$ docker start python-app-cont
python-app-cont

a_san@DESKTOP-QJENT2P ~
$ docker ps
CONTAINER ID   IMAGE     COMMAND                  CREATED        STATUS        PORTS   NAMES
032ae320a896   python-app  "python app.py"         2 minutes ago  Up 1 second   -       python-app-cont

a_san@DESKTOP-QJENT2P ~
$ docker exec -it python-app-cont python app.py
Enter a text phrase: The quick brown fox jumped over the lazy dog
Current date is 2021-01-31
"The quick brown fox jumped over the lazy dog" contains 12 vowels
"The quick brown fox jumped over the lazy dog" contains the following letter counts:
2 occurrence(s) of t
2 occurrence(s) of h
4 occurrence(s) of e
1 occurrence(s) of q
2 occurrence(s) of u
1 occurrence(s) of i
1 occurrence(s) of c
1 occurrence(s) of k
1 occurrence(s) of b
2 occurrence(s) of r
4 occurrence(s) of o
1 occurrence(s) of w
1 occurrence(s) of n
1 occurrence(s) of f
1 occurrence(s) of x
1 occurrence(s) of j
1 occurrence(s) of m
1 occurrence(s) of p
2 occurrence(s) of d
1 occurrence(s) of v
1 occurrence(s) of l
1 occurrence(s) of a
1 occurrence(s) of z
1 occurrence(s) of y
1 occurrence(s) of g

a_san@DESKTOP-QJENT2P ~
```

```
a_san@DESKTOP-QJENT2P ~
$ docker ps
CONTAINER ID   IMAGE     COMMAND                  CREATED        STATUS        PORTS   NAMES
032ae320a896   python-app  "python app.py"         3 minutes ago  Up About a minute  -       python-app-cont

a_san@DESKTOP-QJENT2P ~
$ docker exec python-app-cont ls -a
.
..
.dockerignore
.git
.gitignore
Dockerfile
README.md
__pycache__
app.py
requirements.txt
string_functions.py

a_san@DESKTOP-QJENT2P ~
$
```

Docker Lab Solution



Build a NodeJS-based image and container for hosting/executing a NodeJS app:

```
Dockerfile X
Dockerfile > ...
1  # Grabs NodeJS image upon which the new image will be based
2  FROM node:current-alpine
3
4  # Creates a new target folder in image
5  RUN mkdir -p /usr/src/NodeApp
6
7  # Switches working directory in image to app folder
8  WORKDIR /usr/src/NodeApp
9
10 # Copies current directory contents to newly created folder
11 COPY . .
12
13 # Install app dependencies
14 RUN npm install
15
16 # Executes new NodeJS app
17 CMD ["node", "server.js"]
18
```

```
a_san@DESKTOP-QJENT2P MINGW64 ~/source/repos/dockerlab-repo2 (solution)
$ ls
Dockerfile  README.md  package-lock.json  package.json  server.js  static/  views/

a_san@DESKTOP-QJENT2P MINGW64 ~/source/repos/dockerlab-repo2 (solution)
$ docker build -t node-app .
#1 [internal] load build definition from Dockerfile
#1 sha256:08d021ca7f4bbcdfc9c627d6d874c693b3f00c51cbd9225174d4bcff1e3402bf
#1 transferring dockerfile: 4568 done
#1 DONE 0.0s

#2 [internal] load .dockerignore
#2 sha256:a201063d0c23705fa487e3023f19a4873faa1a1fc64d5209bf3de28f721849ed
#2 transferring context: 698 done
#2 DONE 0.0s

#3 [internal] load metadata for docker.io/library/node:current-alpine
#3 sha256:199b329d4c2ff8be15448bc9e6b26a702fa5adb5f8f53d16a30a94d6566ed
#3 ...

#4 [auth] library/node:pull token for registry-1.docker.io
#4 sha256:d2bcd57235a09a394b8ef0c004af6d81ff2b719fea90b7d9f41e83a68761bd29
#4 DONE 0.0s

#5 [internal] load metadata for docker.io/library/node:current-alpine
#5 sha256:199b329d4c2ff8be15448bc9e6b26a702fa5adb5f8f53d16a30a94d6566ed
#5 DONE 0.9s

#6 [1/5] FROM docker.io/library/node:current-alpine@sha256:f9d36cc9a6fa414a98db937c31d7df1c73c18db8195ed431ac7f37e15d103d18
#6 sha256:a035e4eca79e01bebf96eeb9a0f3eae5035c247c206d78bee4d886c9933c4684
#6 DONE 0.0s

#8 [internal] load build context
#8 sha256:a60d95e60ec0fb7179012611b95feba2a884c9710dd3e4ee3369859f7bfbfedb
#8 transferring context: 47.64kB 0.0s done
#8 DONE 0.0s
```

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```
#6 [2/5] RUN mkdir -p /usr/src/NodeApp
#6 sha256:1c4bbb2baf2735a07cefd5ebc65e472ca5ee05a6ad1d347c433b182ea70d524a
#6 CACHED

#7 [3/5] WORKDIR /usr/src/NodeApp
#7 sha256:22d8df6c2f3fd1060d30d91f4cc4586766801f4130e01bf02b8b62cf81f75f19
#7 CACHED

#9 [4/5] COPY . .
#9 sha256:44bb60c80f88373f943e7b558f0411c02c2017df59055bcf6d0bc4f9e46f6ba1
#9 DONE 0.0s

#10 [5/5] RUN npm install
#10 sha256:56f73e322a88f0ce3561e147de6d0c55edfeb4347fd93001045aea79199386b5
#10 2.475
#10 2.475 added 69 packages, and audited 70 packages in 2s
#10 2.476
#10 2.476 found 0 vulnerabilities
#10 2.477 npm notice
#10 2.477 npm notice New minor version of npm available! 7.4.3 -> 7.5.0
#10 2.477 npm notice Changelog: <https://github.com/npm/cli/releases/tag/v7.5.0>
#10 2.477 npm notice Run 'npm install -g npm@7.5.0' to update!
#10 2.477 npm notice
#10 DONE 2.5s

#11 exporting to image
#11 sha256:e8c613e07b0b7ff33893b694f7759a10d42e180f2b4dc349fb57dc6b71dcab00
#11 exporting layers
#11 exporting layers 0.2s done
#11 writing image sha256:5585c539dc760f16c61058a614aa28a628a5671a2d7ad637a3a86496705f6778 done
#11 naming to docker.io/library/node-app done
#11 DONE 0.2s
```

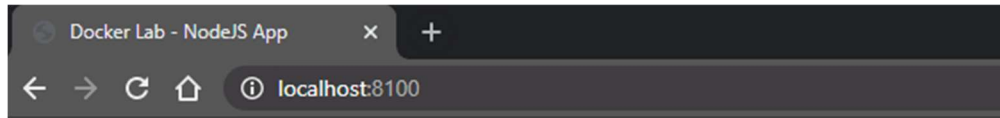
```
a_sam@DESKTOP-QJENT2P ~
$ docker images
REPOSITORY   TAG       IMAGE ID       CREATED        SIZE
node-app     latest    5585c539dc76   3 minutes ago  125MB
python-app   latest    50f9554fd1bf   25 minutes ago  51.7MB

a_sam@DESKTOP-QJENT2P ~
$ docker run -p 8100:41005 -d --name node-app-cont node-app
8ffe87e142eae540bed3ce3ed9bdd340345d61c7fd0dbcd671546ad24b72706

a_sam@DESKTOP-QJENT2P ~
$ docker logs node-app-cont
Listening on: http://8ffe87e142ea:41005

a_sam@DESKTOP-QJENT2P ~
$ docker ps -a
CONTAINER ID   IMAGE      COMMAND                  CREATED        STATUS        PORTS                               NAMES
8ffe87e142ea   node-app   "docker-entrypoint.s..." 21 seconds ago Up 20 seconds 0.0.0.0:8100->41005/tcp             node-app-cont
032ae320a896   python-app "python app.py"           11 minutes ago Up 9 minutes   python-app-cont
```


Docker Lab Solution



This lab allows you to experiment with containerizing a NodeJS app

Host Name	Execution Date/Time	Port
8ffe87e142ea	01-31-2021	41005

```
a_san@DESKTOP-QJENT2P ~  
$ docker exec node-app-cont ls -la  
.  
..  
.dockerignore  
.git  
.gitignore  
Dockerfile  
README.md  
node_modules  
package-lock.json  
package.json  
server.js  
static  
views  
  
a_san@DESKTOP-QJENT2P ~  
$ docker exec node-app-cont cat server.js  
var express = require('express');  
var exphbs = require('express-handlebars');  
var app = express();  
var os = require('os');  
var moment = require('moment');  
  
app.engine('handlebars', exphbs({defaultLayout: 'main'}));  
app.set('view engine', 'handlebars');  
app.use(express.static('static'));  
  
var port = process.env.PORT || 41005;  
var message = process.env.MESSAGE || "This lab allows you to experiment with containerizing a NodeJS app";  
  
app.get('/', function (req, res) {  
  res.render('home', {  
    message: message,  
    hostname: os.hostname(),  
    executionDate: moment().format('MM-DD-YYYY'),  
    port: port  
  });  
});  
  
app.listen(port, function () {  
  console.log("Listening on: http://%s:%s", os.hostname(), port);  
});
```

Docker Lab Solution



Cleanup:

```
a_san@DESKTOP-QJENT2P ~
$ docker ps -a
CONTAINER ID   IMAGE      COMMAND                  CREATED    STATUS    PORTS                  NAMES
8ffe87e142ea   node-app   "docker-entrypoint.s..." 4 minutes ago    Up 4 minutes    0.0.0.0:8100->41005/tcp    node-app-cont
032ae320a896   python-app "python app.py"          16 minutes ago    Up 14 minutes                    python-app-cont

a_san@DESKTOP-QJENT2P ~
$ docker rm -f node-app-cont
node-app-cont

a_san@DESKTOP-QJENT2P ~
$ docker rm -f 032ae320a896
032ae320a896

a_san@DESKTOP-QJENT2P ~
$ docker ps -a
CONTAINER ID   IMAGE      COMMAND                  CREATED    STATUS    PORTS    NAMES

a_san@DESKTOP-QJENT2P ~
$

a_san@DESKTOP-QJENT2P ~
$ docker images
REPOSITORY    TAG       IMAGE ID       CREATED        SIZE
node-app      latest    5585c539dc76   9 minutes ago  125MB
python-app    latest    50f9554fd1bf   31 minutes ago  51.7MB

a_san@DESKTOP-QJENT2P ~
$ docker rmi -f $(docker images -q)
Untagged: node-app:latest
Deleted: sha256:5585c539dc760f16c61058a614aa28a628a5671a2d7ad637a3a86496705f6778
Untagged: python-app:latest
Deleted: sha256:50f9554fd1bfa4f58bf1c04f8db4c6ebe9407019f39399da847d81c941b42008

a_san@DESKTOP-QJENT2P ~
$ docker images
REPOSITORY    TAG       IMAGE ID       CREATED    SIZE

a_san@DESKTOP-QJENT2P ~
$
```