Docker allows you to package an application with all of its dependencies into a standardized unit, called a container, for software development. A container is a stripped-to-basics version of a Linux operating system. An image is software you load into a container.

## Create the Node.js app

First, create a new directory where all the files would live. In this directory create a package.json file that describes your app and its dependencies:

{

"name": "docker\_web\_app",

"version": "1.0.0",

"description": "Node.js on Docker",

"author": "First Last <first.last@example.com>",

"main": "server.js",

"scripts": {

"start": "node server.js"

},

"dependencies": {

"express": "^4.16.1"

}

}

With your new package.json file, run npm install. If you are using npm version 5 or later, this will generate a package-lock.json file which will be copied to your Docker image.

Then, create a server.js file that defines a web app using the [Express.js](https://expressjs.com/) framework:

'use strict';

const express = require('express');

// Constants

const PORT = 8080;

const HOST = '0.0.0.0';

// App

const app = express();

app.get('/', (req, res) => {

res.send('Hello world\n');

});

app.listen(PORT, HOST);

console.log(`Running on http://${HOST}:${PORT}`);

In the next steps, we'll look at how you can run this app inside a Docker container using the official Docker image. First, you'll need to build a Docker image of your app.

## Creating a Dockerfile

Create an empty file called Dockerfile:

touch Dockerfile

Open the Dockerfile in your favorite text editor

The first thing we need to do is define from what image we want to build from. Here we will use the latest LTS (long term support) version 8 of node available from the [Docker Hub](https://hub.docker.com/):

FROM node:8

Next we create a directory to hold the application code inside the image, this will be the working directory for your application:

# Create app directory

WORKDIR /usr/src/app

This image comes with Node.js and NPM already installed so the next thing we need to do is to install your app dependencies using the npm binary. Please note that if you are using npm version 4 or earlier a package-lock.json file will not be generated.

# Install app dependencies

# A wildcard is used to ensure both package.json AND package-lock.json are copied

# where available (npm@5+)

COPY package\*.json ./

RUN npm install

# If you are building your code for production

# RUN npm install --only=production

Note that, rather than copying the entire working directory, we are only copying the package.json file. This allows us to take advantage of cached Docker layers. bitJudo has a good explanation of this [here](http://bitjudo.com/blog/2014/03/13/building-efficient-dockerfiles-node-dot-js/).

To bundle your app's source code inside the Docker image, use the COPY instruction:

# Bundle app source

COPY . .

Your app binds to port 8080 so you'll use the EXPOSE instruction to have it mapped by the docker daemon:

EXPOSE 8080

Last but not least, define the command to run your app using CMD which defines your runtime. Here we will use the basic npm start which will run node server.js to start your server:

CMD [ "npm", "start" ]

Your Dockerfile should now look like this:

FROM node:8

# Create app directory

WORKDIR /usr/src/app

# Install app dependencies

# A wildcard is used to ensure both package.json AND package-lock.json are copied

# where available (npm@5+)

COPY package\*.json ./

RUN npm install

# If you are building your code for production

# RUN npm install --only=production

# Bundle app source

COPY . .

EXPOSE 8080

CMD [ "npm", "start" ]

## .dockerignore file

Create a .dockerignore file in the same directory as your Dockerfile with following content:

node\_modules

npm-debug.log

This will prevent your local modules and debug logs from being copied onto your Docker image and possibly overwriting modules installed within your image.

## Building your image

Go to the directory that has your Dockerfile and run the following command to build the Docker image. The -t flag lets you tag your image so it's easier to find later using the docker images command:

$ docker build -t <your username>/node-web-app .

Your image will now be listed by Docker:

$ docker images

# Example

REPOSITORY TAG ID CREATED

node 8 1934b0b038d1 5 days ago

<your username>/node-web-app latest d64d3505b0d2 1 minute ago

## Run the image

Running your image with -d runs the container in detached mode, leaving the container running in the background. The -p flag redirects a public port to a private port inside the container. Run the image you previously built:

$ docker run -p 49160:8080 -d <your username>/node-web-app

Print the output of your app:

# Get container ID

$ docker ps

# Print app output

$ docker logs <container id>

# Example

Running on http://localhost:8080

If you need to go inside the container you can use the exec command:

# Enter the container

$ docker exec -it <container id> /bin/bash

## Test

To test your app, get the port of your app that Docker mapped:

$ docker ps

# Example

ID IMAGE COMMAND ... PORTS

ecce33b30ebf <your username>/node-web-app:latest npm start ... 49160->8080

In the example above, Docker mapped the 8080 port inside of the container to the port 49160 on your machine.

Now you can call your app using curl (install if needed via: sudo apt-get install curl):

$ curl -i localhost:49160

HTTP/1.1 200 OK

X-Powered-By: Express

Content-Type: text/html; charset=utf-8

Content-Length: 12

ETag: W/"c-M6tWOb/Y57lesdjQuHeB1P/qTV0"

Date: Mon, 13 Nov 2017 20:53:59 GMT

Connection: keep-alive

Hello world

We hope this tutorial helped you get up and running a simple Node.js application on Docker.

|  |
| --- |
| **Pushing Docker image** |
|  |

|  |
| --- |
| export DOCKER\_ID\_USER="username" |
|  |

|  |
| --- |
| docker login |
|  |

|  |
| --- |
| (find image id by : sudo docker images) |
|  |

|  |
| --- |
| sudo docker tag 6d0fa3d26dcb andalike/node-web-app |
|  |

sudo docker push andalike/node-web-app

SERVICES In Docker:

Save this file as docker-compose.yml wherever you want.

version: "3"

services:

web:

# replace username/repo:tag with your name and image details

image: andalike/node-web-app

deploy:

replicas: 5

resources:

limits:

cpus: "0.1"

memory: 50M

restart\_policy:

condition: on-failure

ports:

- "4000:80"

networks:

- webnet

networks:

webnet:

## Run your new load-balanced app

Before we can use the docker stack deploy command we first run:

docker swarm init

Now let’s run it. You need to give your app a name. Here, it is set to getstartedlab:

docker stack deploy -c docker-compose.yml getstartedlab

Our single service stack is running 5 container instances of our deployed image on one host. Let’s investigate.

Get the service ID for the one service in our application:

docker service ls

Look for output for the web service, prepended with your app name. If you named it the same as shown in this example, the name is getstartedlab\_web. The service ID is listed as well, along with the number of replicas, image name, and exposed ports.

A single container running in a service is called a **task**. Tasks are given unique IDs that numerically increment, up to the number of replicas you defined in docker-compose.yml. List the tasks for your service:

docker service ps getstartedlab\_web

Tasks also show up if you just list all the containers on your system, though that is not filtered by service:

docker container ls -q

## Scale the app

You can scale the app by changing the replicas value in docker-compose.yml, saving the change, and re-running the docker stack deploy command:

docker stack deploy -c docker-compose.yml getstartedlab

Docker performs an in-place update, no need to tear the stack down first or kill any containers.

Now, re-run docker container ls -q to see the deployed instances reconfigured. If you scaled up the replicas, more tasks, and hence, more containers, are started.

### Take down the app and the swarm

* Take the app down with docker stack rm:
* docker stack rm getstartedlab
* Take down the swarm.
* docker swarm leave --force