How to Containerize a Nest.js Application Using Docker and Docker Compose

Leveraging Docker and Docker Compose to seamlessly deploy and run Nest.js applications is the smart choice. Below are detailed instructions.

What are Docker and Docker Compose?

Docker is an open source development platform that provides packaging technology used in building and packaging applications along with their dependencies as portable images.

These images are then run as executable components in an isolated container environment. Running applications in these containers ensures consistent application performance across different production systems without any compatibility issues.

On the other hand, Docker Compose is a tool used in conjunction with Docker to simplify the process of defining and managing multi-container applications.

While Docker is primarily used to manage individual containers, Docker Compose allows you to manage the configuration of multiple containers that need to run as a single application.

This is especially useful when an application includes multiple services that need to work together, such as several dependent API and database services.

Before diving into the code, you need to install Docker Desktop on your local machine.

Set up the Nest.js project

This tutorial will walk through the process of setting up two Docker containers that work seamlessly as a single Nest.js application. The first container will contain a Docker image instance of the Nest.js web server, while the second container will execute the Docker PostgreSQL database image.

To get started, install the Nest.js command line tool:

```
npm i -g @nestjs/cli
```

Now, create a new Nest.js project by running the command below in your terminal.

```
nest new docker-nest-app
```

Next, the CLI tool will display several package managers for you to choose from to create a project. Click the preferred option. This example uses npm.

Finally, you can navigate to the project folder and start the development server.

```
cd docker-nest-app npm run start
```

Create database module

First, install the dependencies:

```
npm install pg typeorm @nestjs/typeorm @nestjs/config
```

Next, in the project root directory, create an **.env** file and add the following database connection configuration values:

```
DATABASE_HOST="db" DATABASE_PORT=5432 DATABASE_USER="testUser" DATABASE_PASSWORD=
```

Finally, let's go ahead and create the database module.

```
nest g module database
```

Now, after the module is created, open the database file **/database.module.ts** and include the following database configuration code:

```
import { Module } from '@nestjs/common'; import { TypeOrmModule } from '@nestjs/t
```

After setting up the Docker PostgreSQL image using this TypeORM configuration, the Nest.js application will establish a connection to the database.

Update file app.module.ts

Finally, update the main application module file to incorporate the configuration for the database module.

```
import { Module } from '@nestjs/common'; import { ConfigModule } from '@nestjs/co
```

Set up Dockerfile

The Dockerfile records the necessary set of instructions that the Docker engine needs to create a Docker image. It includes the application's source code and all its dependencies.

In the project root directory, create a new file and name it Dockerfile. Then add the following:

```
FROM node:16.3.0-alpine3.13 WORKDIR /app COPY package*.json ./ RUN npm install CO
```

In there:

1. **FROM** specifies the base image that Docker should use to build the application's image.
2. **WORKDIR** instructs Docker to set the /app directory as the working directory for the application in the container.
3. **COPY package*.json./** copies all files with that filename format from the current directory in the application to the app directory.
4. **RUN npm install** installs the required packages and dependencies required by the application in the Docker container.
5. **COPY…** instructs Docker to copy all the application's source code files from the current directory to the /app directory.
6. **RUN npm run build** builds the Nest.js application before creating the Docker image. It compiles TypeScript code to JavaScript and stores the output of the build process in a dist directory.
7. **CMD** defines the command to run when the container starts. In this case, we will run the command npm run start:dev to start the server in development mode.

This configuration allows the application to actively monitor code changes. When changes are detected, the container is automatically rebuilt.

Create Docker Compose file

In the root of the project directory, create a new **docker-compose.yml** file and add the following content:

```
version: '3.9' services: server: build: . ports: - '3000:3000' depends_on: - db
```

Docker Compose will use these instructions to build and run two images in two Docker containers. The first container, the server, will store the application's images; runs on port 3000.

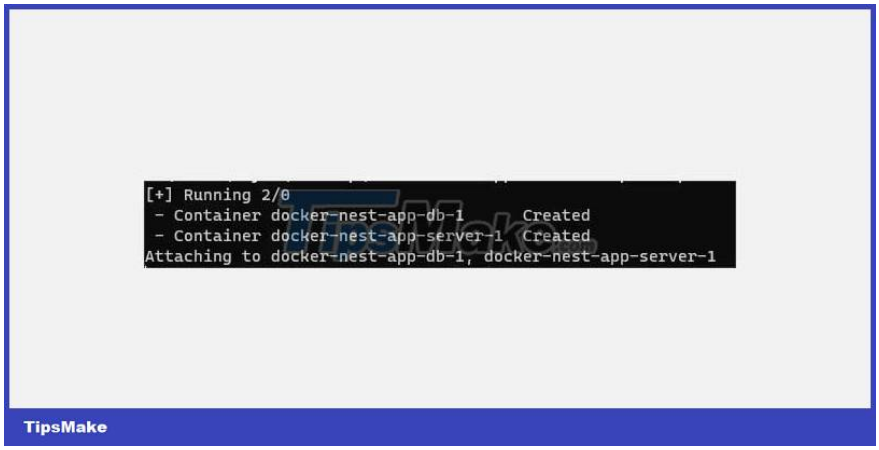
The second container will store the PostgreSQL database image. You do not need to specify a Dockerfile for this image—Docker will use the PostgreSQL image available on the Docker image registry to build it.

Start Docker Container

Finally, continue building the images and start the container by running the following command:

```
docker compose up
```

After this process completes successfully, you will see the same log information on the terminal.



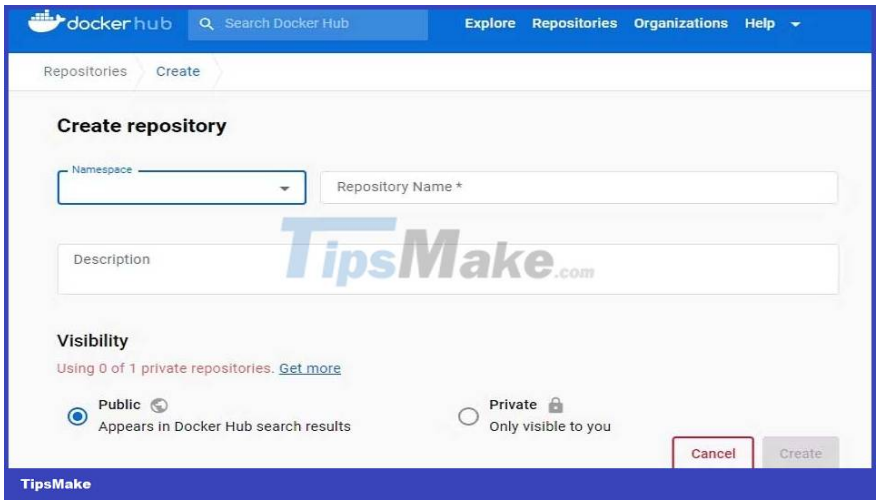
Now that both your web server and database container are running, go ahead and add more functionality to your Nest.js application. For example, you can build Nest.js CRUD REST API.

Push the Docker image to Docker Hub

Follow these steps:

1. Go to Docker Hub, sign up and login account dashboard.

2. Click the Create repository button , enter the name of **the repository** , determine its visibility by selecting **Public** or **Private** , then click **Create** .



3. Now, you need to log in to the account through the terminal by running the command below, then provide the Docker username and password.

```
docker login
```

4. Next, update the Docker image name to match this format: / with the command:

```
docker tag /
```

5. Finally, push the Docker image.

```
docker push /
```

Docker's containerization technology allows you to package an application along with all of its dependencies into a Docker image. These images can then run smoothly in containers across different development and production environments without any issues.