**Buildtime vs runtime environment variables with Next.js and Docker**

Date: [2021](https://www.saltycrane.com/blog/2021/)-04-13  |  Modified: 2021-05-06  |  Tags: [devops](https://www.saltycrane.com/blog/tag/devops/), [docker](https://www.saltycrane.com/blog/tag/docker/), [javascript](https://www.saltycrane.com/blog/tag/javascript/)

For a Next.js app, **buildtime** environment variables are variables that are used when the next build command runs. **Runtime** variables are variables used when the next start command runs.

Below are ways to set buildtime and rutime environment variables with Docker and ways to use buildtime and runtime environment variables with Next.js. Note the Dockerfile is written for simplicity to illustrate the examples. For a more optimized Next.js Docker build see my [Docker multi-stage CI example](https://www.saltycrane.com/blog/2021/04/nextjs-gitlab-cicd-docker-multi-stage-example/).

**Methods for setting environment variables with Docker**

| **Method** | **Available at buildtime** | **Available at runtime** | **Value passed to docker build** | **Value passed to docker run** |
| --- | --- | --- | --- | --- |
| ARG | ✔ |  |  |  |
| [ENV](https://www.saltycrane.com/blog/2021/04/buildtime-vs-runtime-environment-variables-nextjs-docker/#setting-static-environment-variables-for-buildtime-and-runtime) | ✔ | ✔ |  |  |
| [ARG + docker build --build-arg](https://www.saltycrane.com/blog/2021/04/buildtime-vs-runtime-environment-variables-nextjs-docker/#setting-dynamic-buildtime-environment-variables) | ✔ |  | ✔ |  |
| [ARG + ENV + docker build --build-arg](https://www.saltycrane.com/blog/2021/04/buildtime-vs-runtime-environment-variables-nextjs-docker/#setting-dynamic-buildtime-environment-variables-that-are-available-at-runtime-also) | ✔ | ✔ | ✔ |  |
| [docker run --env](https://www.saltycrane.com/blog/2021/04/buildtime-vs-runtime-environment-variables-nextjs-docker/#setting-dynamic-runtime-environment-variables) |  | ✔ |  | ✔ |

**Methods for using environment variables in Next.js**

| **Method** | **Set at** | **Available in Next.js client side rendered code (browser)** | **Available in Next.js server side rendered code** | **Available in Node.js** | **Notes** |
| --- | --- | --- | --- | --- | --- |
| [.env files](https://nextjs.org/docs/basic-features/environment-variables) | ?both? |  | ✔ |  | process.env cannot be destructured or accessed with dynamic properties |
| [NEXT\_PUBLIC\_ prefixed vars in .env files](https://nextjs.org/docs/basic-features/environment-variables#exposing-environment-variables-to-the-browser) | buildtime | ✔ | ✔ |  | process.env cannot be destructured or accessed with dynamic properties |
| [env in next.config.js](https://www.saltycrane.com/blog/2021/04/buildtime-vs-runtime-environment-variables-nextjs-docker/#using-buildtime-environment-variables) | buildtime | ✔ | ✔ |  | process.env cannot be destructured or accessed with dynamic properties |
| [publicRuntimeConfig](https://www.saltycrane.com/blog/2021/04/buildtime-vs-runtime-environment-variables-nextjs-docker/#using-runtime-environment-variables-client-side-or-server-side) | runtime | ✔ | ✔ |  | Requires page uses SSR |
| [serverRuntimeConfig](https://www.saltycrane.com/blog/2021/04/buildtime-vs-runtime-environment-variables-nextjs-docker/#using-runtime-environment-variables-server-side-only) | runtime |  | ✔ |  |  |
| [process.env](https://www.saltycrane.com/blog/2021/04/buildtime-vs-runtime-environment-variables-nextjs-docker/#using-runtime-environment-variables-server-side-not-processed-by-nextjs) | runtime |  |  | ✔ |  |

**Assume this package.json for the examples below**

{

"scripts": {

"build": "next build",

"dev": "next",

"start": "next start"

},

"dependencies": {

"next": "^10.0.9",

"react": "^17.0.2",

"react-dom": "^17.0.2"

}

}

**Setting static environment variables for buildtime and runtime**

Environment variables can be specified with the ENV instruction in a Dockerfile. Below MY\_VAR will be available to both next build and next start. For more information see <https://docs.docker.com/engine/reference/builder/#env>

**Dockerfile**

FROM node:14-alpine

ENV MY\_VAR=cake

WORKDIR /app

COPY . ./

RUN npm install

RUN npm run build

EXPOSE 3000

CMD ["npm", "start"]

**Docker build**

docker build -t mytag .

**Docker run**

docker run mytag

**Setting dynamic buildtime environment variables**

Dynamic environment variables can be passed to the docker build command using --build-arg and used in the Dockerfile with the ARG statement. Below MY\_VAR is an environment variable available to next build.

Note that MY\_VAR is not available to next start. ARG statements act like ENV statements in that they are treated like environment variables during docker build, but they are not persisted in the image. To make them available during docker run (and next start) set the value using ENV (see the next example).

For more information see <https://docs.docker.com/engine/reference/builder/#arg>

**Dockerfile**

FROM node:14-alpine

ARG MY\_VAR

WORKDIR /app

COPY . ./

RUN npm install

RUN npm run build

EXPOSE 3000

CMD ["npm", "start"]

**Docker build**

docker build --build-arg MY\_VAR=cake -t mytag .

**Docker run**

docker run mytag

**Setting dynamic buildtime environment variables that are available at runtime also**

The variable in the previous example, set using ARG, is not persisted in the Docker image so it is not available at runtime. To make it available at runtime, copy the value from ARG to ENV.

**Dockerfile**

FROM node:14-alpine

ARG MY\_VAR

ENV MY\_VAR=$MYVAR

WORKDIR /app

COPY . ./

RUN npm install

RUN npm run build

EXPOSE 3000

CMD ["npm", "start"]

**Docker build**

docker build --build-arg MY\_VAR=cake -t mytag .

**Docker run**

docker run mytag

**Setting dynamic runtime environment variables**

Dynamic environment variables can be passed to docker run using the --env flag. These will not be available to next build but they will be available to next start. For more information see <https://docs.docker.com/engine/reference/commandline/run/#set-environment-variables--e---env---env-file>

**Dockerfile**

FROM node:14-alpine

WORKDIR /app

COPY . ./

RUN npm install

RUN npm run build

EXPOSE 3000

CMD ["npm", "start"]

**Docker build**

docker build -t mytag .

**Docker run**

docker run --env MY\_VAR=cake mytag

**Using buildtime environment variables**

To use buildtime environment variables in Next.js code, set them using env in next.config.js. Then access them via process.env in your app code. NOTE: process.env cannot be destructured or used with dynamic property access. Next.js does a string substituion at build time using the webpack [DefinePlugin](https://webpack.js.org/plugins/define-plugin/). For more information see <https://nextjs.org/docs/api-reference/next.config.js/environment-variables>

**next.config.js**

module.exports = {

env: {

MY\_VAR: process.env.MY\_VAR

}

}

**my-app-file.js**

console.log(process.env.MY\_VAR)

**Using runtime environment variables (client-side or server-side)**

To use runtime environment variables (client-side or server-side), set them using publicRuntimeConfig in next.config.js. Then access them using getConfig from next/config. NOTE: this only works for Next.js pages where server-side rendering (SSR) is used. i.e. the page must use [getServerSideProps](https://nextjs.org/docs/basic-features/data-fetching#getserversideprops-server-side-rendering) or [getInitialProps](https://nextjs.org/docs/api-reference/data-fetching/getInitialProps). For more information see <https://nextjs.org/docs/api-reference/next.config.js/runtime-configuration>

**next.config.js**

module.exports = {

publicRuntimeConfig: {

MY\_VAR: process.env.MY\_VAR

}

}

**my-app-file.js**

import getConfig from "next/config";

const { publicRuntimeConfig } = getConfig();

console.log(publicRuntimeConfig.MY\_VAR)

**Using runtime environment variables (server-side only)**

To use runtime environment variables (server-side only), set them using serverRuntimeConfig in next.config.js. Then access them using getConfig from next/config. For more information see <https://nextjs.org/docs/api-reference/next.config.js/runtime-configuration>

NOTE: this applies to to files Next.js "builds". Server run files not processed by Next.js can use process.env to access environment variables. See below.

**next.config.js**

module.exports = {

serverRuntimeConfig: {

MY\_VAR: process.env.MY\_VAR

}

}

**my-app-file.js**

import getConfig from "next/config";

const { serverRuntimeConfig } = getConfig();

console.log(serverRuntimeConfig.MY\_VAR)

**Using runtime environment variables server-side (not processed by Next.js)**

For files not processed by Next.js (next build) (e.g. a server.js file run by node), runtime environment variables can be accessed on the server via process.env. NOTE: "runtime" variables here means variables used when the Node.js process runs. For more information see <https://nodejs.org/docs/latest-v14.x/api/process.html#process_process_env>

**server.js**

console.log(process.env.MY\_VAR)

**Next.js assetPrefix**

If the [Next.js assetPrefix](https://nextjs.org/docs/api-reference/next.config.js/cdn-support-with-asset-prefix) is set in next.config.js using an environment variable, the environment variable should be set at buildtime for [Next.js static pages](https://nextjs.org/docs/advanced-features/automatic-static-optimization) but set at runtime for [server rendered pages](https://nextjs.org/docs/basic-features/pages#server-side-rendering).

**next.config.js**

module.exports = {

assetPrefix: process.env.MY\_ASSET\_PREFIX

}

**Related posts**

* [Aphrodite to CSS Modules codemod](https://www.saltycrane.com/blog/2022/12/aphrodite-css-modules-codemod/) *— posted 2022-12-09*
* [Simple codemod example with jscodeshift](https://www.saltycrane.com/blog/2021/05/simple-codemod-example-jscodeshift/) *— posted 2021-05-03*
* [Next.js GitLab CI/CD Docker multi-stage example](https://www.saltycrane.com/blog/2021/04/nextjs-gitlab-cicd-docker-multi-stage-example/) *— posted 2021-04-06*
* [Next.js Cypress GitLab CI example](https://www.saltycrane.com/blog/2021/03/nextjs-cypress-gitlab-ci-example/) *— posted 2021-03-25*
* [Example Next.js GitLa](https://www.saltycrane.com/blog/2021/03/example-nextjs-gitlab-cicd-amazon-ecr-and-ecs-deploy-pipeline/)

[**2 Comments**](https://github.com/saltycrane/saltycrane-blog-comments/issues/32) ***- powered by*** [***utteranc.es***](https://utteranc.es)

[](https://github.com/andymeek)

[**andymeek**](https://github.com/andymeek) commented [on 29 Jul 2021](https://github.com/saltycrane/saltycrane-blog-comments/issues/32#issuecomment-889131496)

Great write-up, thank you!

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[](https://github.com/stefee)

[**stefee**](https://github.com/stefee) commented [on 29 Aug 2021](https://github.com/saltycrane/saltycrane-blog-comments/issues/32#issuecomment-907758103)

This is excellent. 🙌

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[](https://github.com/cweekly)

[**cweekly**](https://github.com/cweekly) commented [on 17 Nov 2021](https://github.com/saltycrane/saltycrane-blog-comments/issues/32#issuecomment-971844555)

Fantastic resource! Got a tip jar?

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[](https://github.com/savager)

[**savager**](https://github.com/savager) commented [on 28 Apr 2022](https://github.com/saltycrane/saltycrane-blog-comments/issues/32#issuecomment-1112558015)

This is the best breakdown of a complicated setup that I've seen to date. Thanks much for this resource!

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[](https://github.com/hakimelek)

[**hakimelek**](https://github.com/hakimelek) commented [on 13 Jul 2022](https://github.com/saltycrane/saltycrane-blog-comments/issues/32#issuecomment-1182767393)

Thank you, the tables are a great resource to differentiate between the different techniques on using env variables.

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[](https://github.com/awinecki)

[**awinecki**](https://github.com/awinecki) commented [on 20 Jul 2022](https://github.com/saltycrane/saltycrane-blog-comments/issues/32#issuecomment-1190233959)

Thank you! Getting a good production setup with Docker and Next.js is nontrivial, unfortunately. This article helps a lot to understand the options that are available.

🙇‍♂️

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[](https://github.com/rametta)

[**rametta**](https://github.com/rametta) commented [on 26 Aug 2022](https://github.com/saltycrane/saltycrane-blog-comments/issues/32#issuecomment-1228551193)

This was super helpful. That chart of the envs should be in the official docs!

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[](https://github.com/mohammadameer)

[**mohammadameer**](https://github.com/mohammadameer) commented [on 17 Oct 2022](https://github.com/saltycrane/saltycrane-blog-comments/issues/32#issuecomment-1281287269)

great and very helpful article thank you very much

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[](https://github.com/ToniLloyds)

[**ToniLloyds**](https://github.com/ToniLloyds) commented [on 27 Oct 2022](https://github.com/saltycrane/saltycrane-blog-comments/issues/32#issuecomment-1293537988)

Thank you so much :)

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[](https://github.com/hoangtrung99)

[**hoangtrung99**](https://github.com/hoangtrung99) commented [on 17 Mar 2023](https://github.com/saltycrane/saltycrane-blog-comments/issues/32#issuecomment-1474077637)

Looks like ENV is no longer available in the runtime environment.

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[](https://github.com/cweekly)

[**cweekly**](https://github.com/cweekly) commented [on 9 Apr 2023](https://github.com/saltycrane/saltycrane-blog-comments/issues/32#issuecomment-1501203645)

Looks like ENV is no longer available in the runtime environment.

Hi [@hoangtrung99](https://github.com/hoangtrung99), could you please elaborate?

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[](https://github.com/yalopov)

[**yalopov**](https://github.com/yalopov) commented [on 15 May 2023](https://github.com/saltycrane/saltycrane-blog-comments/issues/32#issuecomment-1548608904)

Why is this so hard? Just want to be able to change environment variables in runtime :(

Thanks btw