

Next.js on Module Federation Starter Project

This is a detailed outline of the step by step results of following the Next.js & Module Federation integration guide located at: <https://module-federation.io/practice/frameworks/next/index.html>

Step 0: Prerequisites AKA “Setup Environment”

I ensured the prereqs are matched. Here’s my node environment:

```
~/projects/web/micro-frontends (0.042s)
node -v
v20.15.0
```

Step 1: Setup Next Applications

1a) App Creation

I created both mfe1 and mfe2 next apps via create-next-app@latest with the following options; namely, with the inclusion of Typescript, ESLint, Tailwind; however, I opted out of option to: (a) use of the “App” router, (b) the creation of the “. /src” directory, and (c) customization of the “import alias” options. Here are screenshots with the summary for each of the app creation options.

MFE1	MFE2
<pre>~/projects/web/micro-frontends (1s 26.66s) npx create-next-app@latest Need to install the following packages: create-next-app@14.2.4 Ok to proceed? (y) y ? What is your project named? .. mfe1 ✓ Would you like to use TypeScript? .. No / Yes ✓ Would you like to use ESLint? .. No / Yes ✓ Would you like to use Tailwind CSS? .. No / Yes ✓ Would you like to use 'src/' directory? .. No / Yes ✓ Would you like to use App Router? (recommended) .. No / Yes ✓ Would you like to customize the default import alias (@/*)? .. No / Yes Creating a new Next.js app in /Users/calvingnuyen/projects/web/micro-frontends/mfe1. Using npm. Initializing project with template: default-tw</pre>	<pre>npx create-next-app@latest ✓ What is your project named? .. mfe2 ✓ Would you like to use TypeScript? .. No / Yes ✓ Would you like to use ESLint? .. No / Yes ✓ Would you like to use Tailwind CSS? .. No / Yes ✓ Would you like to use 'src/' directory? .. No / Yes ✓ Would you like to use App Router? (recommended) .. No / Yes ✓ Would you like to customize the default import alias (@/*)? .. No / Yes Creating a new Next.js app in /Users/calvingnuyen/projects/web/micro-frontends/mfe2. Using npm. Initializing project with template: default-tw</pre>

1b) Installing dependencies

Upon executing my batch ‘make install’ which just runs `pnpm i` on each of the MFE apps, I encounter my first error that appears to be remediated by downgrading to node version 19 LTS. Here’s the pnpm installation error.

Note: I have a Makefile that automates installing dependencies and starting up the dev server. You may see references to `make install` and `make dev` which are just aliases for changing directories and running `pnpm i` and `pnpm dev` within each MFE subdirectory.

```
~/projects/web/micro-frontends/mfe-on-nextjs-and-modfed (1m 11.41s)
make install
make install-mfe1 install-mfe2
cd mfe1; pnpm i
ERR_PNPM_META_FETCH_FAIL GET https://registry.npmjs.org/pnpm: Value of "this" must be of type URLSearchParams
```

I am able to run pnpm i with warnings but no error after switching to node v19.9.0. Here's a readout.

```
~/projects/web/micro-frontends/mfe-on-nextjs-and-modfed (5.025s)
nvm install 19 --lts
Downloading and installing node v19.9.0...
Downloading https://nodejs.org/dist/v19.9.0/node-v19.9.0-darwin-arm64.tar.xz...
#####
Computing checksum with sha256sum
Checksums matched!
Now using node v19.9.0 (npm v9.6.3)

~/projects/web/micro-frontends/mfe-on-nextjs-and-modfed (13.569s)
make install
make install-mfe1 install-mfe2
cd mfe1; pnpm i
WARN deprecated @humanwhocodes/config-array@0.11.14: Use @eslint/config-array instead
WARN deprecated rimraf@3.0.2: Rimraf versions prior to v4 are no longer supported
WARN deprecated @humanwhocodes/object-schema@2.0.3: Use @eslint/object-schema instead
WARN deprecated glob@7.2.3: Glob versions prior to v9 are no longer supported
WARN deprecated inflight@1.0.6: This module is not supported, and leaks memory. Do not use it. Check out lru-cache
much more comprehensive and powerful.
Packages: +353
+++++
Packages are hard linked from the content-addressable store to the virtual store.
Content-addressable store is at: /Users/calvingnuy/Library/pnpm/store/v3
Virtual store is at: node_modules/.pnpm

dependencies:
+ next 14.2.4
+ react 18.3.1
+ react-dom 18.3.1

devDependencies:
+ @types/node 20.14.8
+ @types/react 18.3.3
+ @types/react-dom 18.3.0
+ eslint 8.57.0 (9.5.0 is available)
+ eslint-config-next 14.2.4
+ postcss 8.4.38
+ tailwindcss 3.4.4
+ typescript 5.5.2

The integrity of 2620 files was checked. This might have caused installation to take longer.
Progress: resolved 361, reused 220, downloaded 133, added 353, done
Done in 7.5s
```

```

cd mfe2; pnpm i
WARN Moving typescript that was installed by a different package manager to "node_modules/.ignored
WARN Moving @types/node that was installed by a different package manager to "node_modules/.ignored
WARN Moving @types/react that was installed by a different package manager to "node_modules/.ignored
WARN Moving @types/react-dom that was installed by a different package manager to "node_modules/.ignored
WARN Moving postcss that was installed by a different package manager to "node_modules/.ignored
WARN 6 other warnings
WARN deprecated @humanwhocodes/config-array@0.11.14: Use @eslint/config-array instead
WARN deprecated @humanwhocodes/object-schema@2.0.3: Use @eslint/object-schema instead
WARN deprecated rimraf@3.0.2: Rimraf versions prior to v4 are no longer supported
WARN deprecated glob@7.2.3: Glob versions prior to v9 are no longer supported
WARN deprecated inflight@1.0.6: This module is not supported, and leaks memory. Do not use it. Check out
much more comprehensive and powerful.
Packages: +353
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Packages are hard linked from the content-addressable store to the virtual store.
Content-addressable store is at: /Users/calvinnguyen/Library/pnpm/store/v3
Virtual store is at: node_modules/.pnpm
Progress: resolved 361, reused 353, downloaded 0, added 353, done

dependencies:
+ next 14.2.4
+ react 18.3.1
+ react-dom 18.3.1

devDependencies:
+ @types/node 20.14.8
+ @types/react 18.3.3
+ @types/react-dom 18.3.0
+ eslint 8.57.0 (9.5.0 is available)
+ eslint-config-next 14.2.4
+ postcss 8.4.38
+ tailwindcss 3.4.4
+ typescript 5.5.2

Done in 5.8s

~/projects/web/micro-frontends/mfe-on-nextjs-and-modfed (0.039s)
node -v
v19.9.0

```

Just a cursory check, at this point, both mfe1 and mfe2 next apps without any modification are able to start up without error as evident by this console readout.

```

> mfe1@0.1.0 dev /Users/calvinnguyen/projects/web/micro-frontends/mfe-on-nextjs-and-modfed/mfe1
> next dev

▲ Next.js 14.2.4
- Local:      http://localhost:3000

✓ Starting...
Error: process.env.NEXT_PRIVATE_LOCAL_WEBPACK is not set to true, please set it to true, and "npm install webpack"
    at NextFederationPlugin.validateOptions (/Users/calvinnguyen/projects/web/micro-frontends/mfe-on-nextjs-and-modfed/mfe1/node_modules/next/dist/compiled/webpack/webpack.js:100:15)

~/projects/web/micro-frontends/mfe-on-nextjs-and-modfed
make dev
make -j 2 dev-mfe2 dev-mfe1
cd mfe2; pnpm run dev
cd mfe1; pnpm run dev

> mfe2@0.1.0 dev /Users/calvinnguyen/projects/web/micro-frontends/mfe-on-nextjs-and-modfed/mfe2
> next dev

> mfe1@0.1.0 dev /Users/calvinnguyen/projects/web/micro-frontends/mfe-on-nextjs-and-modfed/mfe1
> next dev

▲ Port 3000 is in use, trying 3001 instead.
▲ Next.js 14.2.4
- Local:      http://localhost:3001

✓ Starting...
▲ Next.js 14.2.4
- Local:      http://localhost:3000

✓ Starting...
✓ Ready in 2.1s
○ Compiling / ...
✓ Ready in 3s
✓ Compiled / in 1024ms (290 modules)
✓ Compiled in 66ms (290 modules)
GET / 200 in 1154ms
○ Compiling / ...
✓ Compiled / in 1126ms (290 modules)
✓ Compiled in 74ms (290 modules)
GET / 200 in 1267ms

```

Step 2: Configuring “NextFederationPlugin” on the Host via next.config.mjs

2a) Configuring Host side Module Federation Plugin

=> **Documentation Opportunity**: While it’s implied by the guide, it would be more clear to highlight that this step pertains to configuring the “mfe1” host app to ensure the right configuration is applied. And additionally, it may be best to have this step after we configure and expose the button component from mfe2, acting as the remote.

I’ve copied the guide’s code for next.config.mjs verbatim here. Perhaps expected; if stop here and run `make dev`, I do get a terminal console error indicating that the version of NEXT is not

the expected Private; i.e. it finds the version bootstrapped by Nexts but needs to be the full version that is bundled with Node. I will remedy that in the next step, by following the guide using an .env.local.

2b) Ensure Webpack is installed manually

This step is where I first encounter an error that I don't quite know how to work around. Here is my readout from the console that shows I successfully "manually" installed webpack but still get a "module not found" error.

=> Will you clarify what it means to have webpack "installed manually?" Does webpack normally just get implicitly bundled through some other means with Next but is not complete enough and therefore fails? And why does this step switch to using just `npm` whereas; all the preceding steps reference `pnpm` instead?

```
~/projects/web/micro-frontends/mfe-on-nextjs-and-modfed (1.961s)
(cd mfe2; npm i webpack -D)

added 3 packages, changed 13 packages, and audited 522 packages in 2s

145 packages are looking for funding
  run `npm fund` for details

found 0 vulnerabilities

~/projects/web/micro-frontends/mfe-on-nextjs-and-modfed (1.531s)
make dev-mfe2
(cd mfe2; pnpm run dev)

> mfe2@0.1.0 dev /Users/calvingnuyen/projects/web/micro-frontends/mfe-on-nextjs-and-modfed/mfe2
> next dev -p 3001

  ▲ Next.js 14.2.4
  - Local:      http://localhost:3001
  - Environments: .env

✓ Starting...
Error: Cannot find module '/Users/calvingnuyen/projects/web/micro-frontends/mfe-on-nextjs-and-modfed/mfe2/node_modules/next/dist/compiled/lib/util/makeSerializable'
Require stack:
- /Users/calvingnuyen/projects/web/micro-frontends/mfe-on-nextjs-and-modfed/mfe2/node_modules/@module-federation/enhanced/dist/src/lib/container/ContainerExposedDependency.js
- /Users/calvingnuyen/projects/web/micro-frontends/mfe-on-nextjs-and-modfed/mfe2/node_modules/@module-federation/enhanced/dist/src/lib/container/ContainerEntryModule.js
- /Users/calvingnuyen/projects/web/micro-frontends/mfe-on-nextjs-and-modfed/mfe2/node_modules/@module-federation/enhanced/dist/src/lib/container/HoistContainerReferencesPlugin.js
- /Users/calvingnuyen/projects/web/micro-frontends/mfe-on-nextjs-and-modfed/mfe2/node_modules/@module-federation/enhanced/dist/src/wrapper/HoistContainerReferencesPlugin.js
- /Users/calvingnuyen/projects/web/micro-frontends/mfe-on-nextjs-and-modfed/mfe2/node_modules/@module-federation/enhanced/dist/src/index.js
- /Users/calvingnuyen/projects/web/micro-frontends/mfe-on-nextjs-and-modfed/mfe2/node_modules/@module-federation/nextjs-mf/dist/src/plugins/NextFederationPlugin/apply-server-plugins.js
- /Users/calvingnuyen/projects/web/micro-frontends/mfe-on-nextjs-and-modfed/mfe2/node_modules/@module-federation/nextjs-mf/dist/src/plugins/NextFederationPlugin/index.js
- /Users/calvingnuyen/projects/web/micro-frontends/mfe-on-nextjs-and-modfed/mfe2/node_modules/@module-federation/nextjs-mf/dist/src/index.js
    at Module._resolveFilename (node:internal/modules/cjs/loader:1090:15)
    at /Users/calvingnuyen/projects/web/micro-frontends/mfe-on-nextjs-and-modfed/mfe2/node_modules/next/dist/server/require-hook.js:55:36
    at Module._load (node:internal/modules/cjs/loader:934:27)
    at Module.require (node:internal/modules/cjs/loader:1157:19)
    at mod.require (/Users/calvingnuyen/projects/web/micro-frontends/mfe-on-nextjs-and-modfed/mfe2/node_modules/next/dist/server/require-hook.js:65:28)
    at require (node:internal/modules/helpers:119:18)
    at Object.<anonymous> (/Users/calvingnuyen/projects/web/micro-frontends/mfe-on-nextjs-and-modfed/mfe2/node_modules/@module-federation/enhanced/dist/src/lib/container/ContainerExposedDependency.js:26:14)
    at Module._compile (node:internal/modules/cjs/loader:1275:14)
    at Module._extensions..js (node:internal/modules/cjs/loader:1329:10)
    at Module.load (node:internal/modules/cjs/loader:1133:32) {
  code: 'MODULE_NOT_FOUND',
  requireStack: [
    '/Users/calvingnuyen/projects/web/micro-frontends/mfe-on-nextjs-and-modfed/mfe2/node_modules/@module-federation/enhanced/dist/src/lib/container/ContainerExposedDependency.js',
    '/Users/calvingnuyen/projects/web/micro-frontends/mfe-on-nextjs-and-modfed/mfe2/node_modules/@module-federation/enhanced/dist/src/lib/container/ContainerEntryModule.js',
    '/Users/calvingnuyen/projects/web/micro-frontends/mfe-on-nextjs-and-modfed/mfe2/node_modules/@module-federation/enhanced/dist/src/lib/container/HoistContainerReferencesPlugin.js',
    '/Users/calvingnuyen/projects/web/micro-frontends/mfe-on-nextjs-and-modfed/mfe2/node_modules/@module-federation/enhanced/dist/src/wrapper/HoistContainerReferencesPlugin.js',
    '/Users/calvingnuyen/projects/web/micro-frontends/mfe-on-nextjs-and-modfed/mfe2/node_modules/@module-federation/enhanced/dist/src/index.js',
    '/Users/calvingnuyen/projects/web/micro-frontends/mfe-on-nextjs-and-modfed/mfe2/node_modules/@module-federation/nextjs-mf/dist/src/plugins/NextFederationPlugin/apply-server-plugins.js',
    '/Users/calvingnuyen/projects/web/micro-frontends/mfe-on-nextjs-and-modfed/mfe2/node_modules/@module-federation/nextjs-mf/dist/src/plugins/NextFederationPlugin/index.js',
    '/Users/calvingnuyen/projects/web/micro-frontends/mfe-on-nextjs-and-modfed/mfe2/node_modules/@module-federation/nextjs-mf/dist/src/index.js'
  ]
}
```