

bun-starter

minimal web development environment

A web page boils down to nothing more than a file stored inside a directory on a physical machine. A **browser** resolves the **domain name** to an **IP address** via **DNS** and connects on a **port** (443 for **HTTPS**, 80 for **HTTP**).

A port is a numbered gateway - software binds to it on the inside to offer a service, while the outside world connects to it to access that service. **Think of a Minecraft server:** players connect to a world hosted on a machine, served by one computer or many working as a network.

Software on the website's host machine listens for requests (from an internet browser) and sends or 'serves' the requested files back - hence '**server**'. Not to be confused with the hardware hosting it, which is sometimes also referred to as a **server** or **VPS** (Virtual Private Server).

HTTP governs this exchange at **OSI Layer 7** (**L7 Application**). **HTTPS** layers **TLS** encryption beneath it at Layers 5-6 (**L5 Session/L6 Presentation**), which wraps the **HTTP** content and hands it down to **TCP** at Layer 4 (**L4 Transport**).

To simplify, **HTTPS** is just **HTTP** (**L7**) over **TLS** (**L5/6**) over **TCP** (**L4**).

Request, serve, respond: these are the **primitives** of this domain - indivisible operations that everything else builds upon.

Structure

Template Files

flake.nix	environment definition
serve.ts	HTTP server
index.html	your markup
style.css	your styles
.envrc	direnv activation (commented)
.gitignore	ignored paths
README.md	this document

Generated and Committed

flake.lock	pinned Nix dependency versions
package.json	dependency declarations (when you add dependencies)
bun.lockb	pinned dependency versions (when you add dependencies)

Generated and Ignored

node_modules/	installed dependencies
.direnv/	direnv cache
server	compiled binary

Files

flake.nix declares what the environment provides (currently just Bun). Add databases, native libraries, or other tools here as needed.

flake.lock pins exact versions. Commit it for reproducibility, run `nix flake update` to get latest versions.

serve.ts:

```
// values the server needs
const port = 3000
const staticDir = "."

// how the server identifies what it sends
const contentTypes = {
  ".html": "text/html",
  ".css": "text/css",
  ...
}

// reads bytes from disc, returns response
function serveFile(path) { ... }

// returns 404 response
function notFound() { ... }

// prints request info to terminal
function log(request, status) { ... }

// brings everything to life
Bun.serve({ port, fetch })
```

index.html and **style.css** are placeholders. Replace them.

.envrc enables automatic shell activation via direnv. Uncomment and run `direnv allow` to use it.

Workflow

```
nix develop          # enter environment
bun --hot serve.ts   # run dev server at localhost:3000

                                # build production binary
bun build --compile serve.ts --outfile=server
```

The `-hot` flag reloads on file changes. The compiled binary is self-contained and runs without Bun installed.

Concepts

Request-Response

The browser sends an HTTP request (GET `/index.html`), the server reads the file and sends it back with a Content-Type header (`text/html`, `text/css`, `image/png`) so the browser knows

how to handle it.

Static vs Dynamic

Static responses serve files from disc unchanged. Dynamic responses are computed - an API endpoint runs code and returns data that never existed as a file.

Adding a dynamic endpoint:

```
if (path === "/api/weather") {  
    return Response.json({ temp: 18, conditions: "overcast" })  
}
```

Proxy

Your binary listens on port 3000. A proxy (nginx, caddy) sits in front, handles HTTPS on port 443, and forwards requests to your binary. This separates network concerns from application logic.

Environment Isolation

`nix develop` creates an isolated shell with exactly what the flake specifies. Nothing is installed globally. Clone the repo anywhere, run `nix develop`, get an identical environment.

Lock Files

`flake.lock` records exactly which package versions were resolved. Commit it to freeze versions. Delete and regenerate to update.

Extension

API routes: add conditions in `serve.ts` matching paths to responses.

Dependencies: `bun add <package>`, then commit `package.json` and `bun.lockb`.

System tools: add to the packages list in `flake.nix`.

Database: add to flake for local dev, configure production separately via environment variables.

Containers: Nix can build OCI images containing just your compiled binary.