

# readme.md for @git.zone/tsrust

A CLI build tool for Rust projects that follows the same conventions as `@git.zone/tsbuild`. It detects your `rust/` source directory, parses `Cargo.toml` (including workspaces), runs `cargo build --release`, and copies the resulting binaries into a clean `dist_rust/` directory at the project root.

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## Install

Install globally via npm:

```
npm install -g @git.zone/tsrust
```

Or as a project-level dev dependency:

```
pnpm install --save-dev @git.zone/tsrust
```

“ **⚡ No Rust required!** If `cargo` isn't found on your system, `tsrust` automatically downloads and installs a minimal Rust toolchain to `/tmp/tsrust_toolchain/`. This gives a zero-setup experience. If you already have Rust installed, `tsrust` uses your system toolchain.

# The Convention

`tsrust` mirrors the directory convention established by `tsbuild`:

Tool	Source Directory	Output Directory
<code>tsbuild</code>	<code>ts/</code>	<code>dist_ts/</code>
<code>tsrust</code>	<code>rust/</code>	<code>dist_rust/</code>

Your Rust code lives in `rust/` (or `ts_rust/` as fallback), and compiled binaries land in `dist_rust/` — ready for packaging, deployment, or further tooling.

## Usage

### 📦 Build (Default Command)

Simply run `tsrust` from your project root:

```
tsrust
```

This will:

1. Detect the Rust toolchain (system `cargo`, or auto-install to `/tmp/tsrust_toolchain/`)
2. Locate your `rust/` directory (containing `Cargo.toml`)
3. Parse the workspace to discover all `[[bin]]` targets
4. Run `cargo build --release` with full streaming output
5. Copy each binary to `dist_rust/` with executable permissions (`chmod 755`)
6. Report file sizes and total build time

#### Example output:

```
Using cargo 1.90.0 (840b83a10 2025-07-30)
Found Rust project at: rust
Detected Cargo workspace
Binary targets: rustproxy
Running: cargo build --release
  Compiling rustproxy v0.1.0
  Finished `release` profile [optimized] target(s) in 29.01s
Copied rustproxy (13.4 MB) -> dist_rust/rustproxy
```

# Automatic Rust Toolchain

`tsrust` provides a zero-setup experience through automatic toolchain management:

1. **System toolchain detected** → uses it as-is (no download, no overhead)
2. **No system toolchain** → checks `/tmp/tsrust_toolchain/` for a previously installed bundled toolchain
3. **No bundled toolchain** → downloads `rustup-init` and installs a minimal Rust toolchain (~70-90 MB download) to `/tmp/tsrust_toolchain/`

The bundled toolchain is stored in `/tmp/`, so it's cleaned up on reboot. Subsequent runs reuse the existing installation. This is ideal for CI environments and quick starts where you don't want to manage a system-wide Rust install.

Supported platforms for automatic install: Linux (x64, arm64) and macOS (x64, arm64).

## 🔧 Debug Build

Build with the debug profile instead of release:

```
tsrust --debug
```

Binaries are taken from `rust/target/debug/` instead of `rust/target/release/`.

## 🔧 Clean Before Building

Run `cargo clean` before building to force a full rebuild:

```
tsrust --clean
```

## Cross-Compilation

Cross-compile for different OS/architecture combinations using the `--target` flag:

```
# Cross-compile for a single target
tsrust --target linux_arm64
```

```
# Cross-compile for multiple targets
tsrust --target linux_arm64 --target linux_amd64

# Full Rust triples are also accepted
tsrust --target aarch64-unknown-linux-gnu
```

Supported friendly target names:

Friendly name	Rust target triple
linux_amd64	x86_64-unknown-linux-gnu
linux_arm64	aarch64-unknown-linux-gnu
linux_amd64_musl	x86_64-unknown-linux-musl
linux_arm64_musl	aarch64-unknown-linux-musl
macos_amd64	x86_64-apple-darwin
macos_arm64	aarch64-apple-darwin

When using `--target`, output binaries are named `<binname>_<os>_<arch>`:

```
dist_rust/
├─ rustproxy_linux_arm64
└─ rustproxy_linux_amd64
```

`tsrust` automatically installs missing rustup targets via `rustup target add` when needed.

## Configuration via `.smartconfig.json`

You can set default cross-compilation targets in your project's `.smartconfig.json` file so you don't need to pass `--target` flags every time:

```
{
  "@git.zone/tsrust": {
    "targets": ["linux_arm64", "linux_amd64"]
  }
}
```

When targets are configured in `.smartconfig.json`, simply running `tsrust` will cross-compile for all listed targets. CLI `--target` flags take full precedence — if any `--target` is provided, the `.smartconfig.json` targets are ignored entirely.

# 🗑️ Clean Only

Remove all build artifacts without rebuilding:

```
tsrust clean
```

This runs `cargo clean` in the Rust directory and deletes the `dist_rust/` output directory.

## Project Structure

`tsrust` expects your project to follow this layout:

```
my-project/
├─ rust/                # 🗑️Your Rust source code
│  ├─ Cargo.toml       #   Root manifest (workspace or single crate)
│  ├─ src/
│  │  └─ main.rs       #   (for single-crate projects)
│  └─ crates/          #   (for workspace projects)
│     ├─ my-binary/
│     │  ├─ Cargo.toml #   Contains [[bin]] targets
│     │  └─ src/
│     └─ my-lib/
│        └─ Cargo.toml
│           └─ src/
├─ dist_rust/          # 🗑️Output: compiled binaries go here
│  └─ my-binary
├─ ts/                 #   (your TypeScript code, built by tsbuild)
├─ dist_ts/            #   (TypeScript output)
└─ package.json
```

## Workspace Support

`tsrust` fully supports Cargo workspaces. It reads the `[workspace]` section from your root `Cargo.toml`, iterates through all `members`, and discovers binary targets from each member crate's `Cargo.toml`.

Binary target discovery follows Cargo's own rules:

- **Explicit** `[[bin]]` **entries** → uses the `name` field from each entry
- **Implicit binary** → if no `[[bin]]` is declared but `src/main.rs` exists, uses the `[package]` `name`
- **Library-only crates** → skipped (no binary output expected)

## Fallback Directory

If no `rust/` directory is found, `tsrust` checks for `ts_rust/` as a fallback. This supports projects that use the `ts_` prefix convention for all source directories.

## Programmatic API

`tsrust` exports its internals for use in other Node.js/TypeScript tools:

```
import { CargoConfig, CargoRunner, FsHelpers, TsRustCli } from '@git.zone/tsrust';

// Parse a Cargo workspace
const config = new CargoConfig('/path/to/rust');
const info = await config.parse();
console.log(info.isWorkspace); // true
console.log(info.binTargets); // ['rustproxy']

// Run cargo build
const runner = new CargoRunner('/path/to/rust');
const result = await runner.build({ debug: false, clean: false });
console.log(result.success); // true
console.log(result.exitCode); // 0

// File helpers
await FsHelpers.ensureEmptyDir('/path/to/dist_rust');
await FsHelpers.copyFile(src, dest);
await FsHelpers.makeExecutable(dest);
const size = await FsHelpers.getFileSize(dest);
console.log(FsHelpers.formatFileSize(size)); // "13.4 MB"
```

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Revision #4

Created 2026-03-28 11:08:52 UTC by foss.global Team

Updated 2026-03-28 12:15:34 UTC by foss.global Team