# **Pre-Coding Essentials (Component: .cargo/config.toml, Version/FormulaID: VM-ENGINE v0) — 3/89**

## **1) Goal & Success**

Goal: Make Cargo behavior deterministic and (by default) offline; avoid accidental dep drift.

Success: Builds/tests succeed with --locked; no network needed after first fetch/vendor; stable resolution across OS/arch.

## **2) Scope**

In scope: cargo net settings, registries/protocol, optional vendoring pointer, CLI defaults.

Out of scope: build profiles (live in Cargo.toml), per-crate deps.

## **3) Inputs → Outputs**

Inputs: Cargo (1.xx), Cargo.lock, optional vendor/ directory.

Outputs: Cargo uses sparse index, honors offline mode, resolves from vendor/ when present.

## **4) Entities/Tables**

## **5) Variables (only ones used here)**

## **6) Functions (signatures only)**

(Config file; no functions.)

## **7) Algorithm Outline (bullet steps)**

Set [net] offline = true and retry = 0.

Use [registries.crates-io] protocol = "sparse".

If vendor/ exists, set:

[source.crates-io] replace-with = "vendored-sources"

[source.vendored-sources] directory = "vendor"

(Optional) set [build] jobs = N for CI reproducibility of timings (does not affect outputs).

Do **not** set profiles here (kept in Cargo.toml).

## **8) State Flow (very short)**

Cargo reads config → resolves via sparse/vendored → builds with lockfile → no net required post-vendor.

## **9) Determinism & Numeric Rules**

Determinism via --locked, sparse index, and vendoring; no numeric rules.

## **10) Edge Cases & Failure Policy**

First-time build without vendor/: temporarily override with CARGO\_NET\_OFFLINE=0 and run cargo fetch; then re-enable offline.

Git dependencies (if any) require vendoring or pre-fetch; otherwise fail under offline.

If vendor/ is stale vs Cargo.lock, cargo build will fail—run cargo vendor and commit updates.

## **11) Test Checklist (must pass)**

With offline=1 and vendor/ present: cargo build --locked -p vm\_cli succeeds on Win/macOS/Linux.

Removing network access (firewall/airplane mode) still builds from vendor/.

cargo fetch succeeds only when CARGO\_NET\_OFFLINE=0.

cargo tree --duplicates unchanged between hosts.