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# A guide for Python Monorepos using ParaBuild

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## What is a Monorepo?

**A monorepo (monorepo/monolith/mono repo)** is a single version control repository that holds code for multiple independent projects or services. Instead of maintaining separate repositories for each microservice, a monorepo brings all related code together in one place, allowing teams to share libraries, coordinate changes across projects, and maintain a unified dependency graph. The term was popularized by Google, Meta, Microsoft, and other tech giants managing massive codebases.

## Advantages:

Atomic commits — one commit touches core library, consumer, and tests simultaneously.

Code sharing — easy to share shared libraries across services.

Refactoring — updates propagate immediately to all consumers.

Simplified dependency management — shared tools and dependency versions across teams.

Other visibility — all teams can see and work on all parts of the codebase.

## Why Bazel/Nx?

- Designed specifically for **Python/Java/Go monorepos** that also require other languages
- Requires minimal BUILD/project.json configuration (Bazel)
- Supports distributed caching across teams/CI runners, enabling global incrementalism
- Handles Python dependency conflicts, vendoring, Protobuf/GRPC, and cross-language dependencies
- Scales adequately to 100-200 developers

## Setting Bazel:

Install: Install using your distro's package manager (apt, yum, brew) or download binaries from Bazel GitHub releases. Create a minimal WORKSPACE file (or MODULE.bazel for Bzlmod) and .bazelrc configuration.

Add BUILD files: Create BUILD files in directories containing buildable targets. Define dependencies using target labels (//path/to:target).

Run builds: Execute bazel build //... to build everything, or bazel build //specific/target for specific targets. Bazel automatically caches results and rebuilds only changed targets.

Dependency management: Use bazel mod (Bzlmod) or WORKSPACE to manage external dependencies. Bazel supports Python, Java, Go, C++, and more through rules.

```
$ tree -a -I '.git|__pycache__|.venv|node_modules|.pytest_cache|.mypy_cache|.ruff_cache|.DS_Store|.idea|.vscode|.claude|.cursor|.codex|.gemini|.aiignore|.claudeignore|.cursorignore|.codexignore|.gemini/settings.*|.claude/settings.*|.claude/commands|.claude/skills|.cursor/rules|.codex/prompts|.gemini/commands|.gemini/skills|.agents/skills|.mcp.*|.cursor/mcp.*|.codex/mcp.*|.gemini/mcp.*|.claude/mcp.*|.claude/agents|.cursor/agents|.codex/agents|.gemini/agents|.claude/hooks|.cursor/hooks|.codex/hooks|.gemini/hooks|.claude/plugins|.cursor/plugins|.codex/plugins|.gemini/extensions|.claude/worktrees|.cursor/worktrees|.codex/worktrees|.gemini/worktrees|.claude/tasks|.cursor/tasks|.codex/tasks|.gemini/tasks|.claude/memory|.cursor/memory|.codex/memory|.gemini/memory|.claude/cache|.cursor/cache|.codex/cache|.gemini/cache|.claude/logs|.cursor/logs|.codex/logs|.gemini/logs|.claude/tmp|.cursor/tmp|.codex/tmp|.gemini/tmp|.claude/sessions|.cursor/sessions|.codex/sessions|.gemini/sessions|.claude/history|.cursor/history|.codex/history|.gemini/history|.claude/secrets|.cursor/secrets|.codex/secrets|.gemini/secrets|.claude/keybindings.*|.cursor/keybindings.*|.codex/keybindings.*|.gemini/keybindings.*|.claude/statusline.*|.cursor/statusline.*|.codex/statusline.*|.gemini/statusline.*|.claude/output-styles|.claude/plugin-data|.claude/projects|.claude/sessions-index.*|.claude/ide|.claude/shell-snapshots|.claude/todos|.claude/usage-data|.claude/file-history|.claude/debug|.claude/plans|.claude/paste-cache|.claude/statsig|.claude/telemetry|.claude/backups|.claude/cache-*|.claude/.*.lock|.claude/.*.tmp|.claude/.*.log|.claude/.*.pid|.claude/.*.sock|.claude/.*.db|.claude/.*.sqlite|.claude/.*.sqlite-*|.claude/.*.db-*|.claude/.*.bak|.claude/.*.orig|.claude/.*.swp|.claude/.*.swo|.claude/.*.tmp.*|.claude/.*.log.*|.claude/.*.pid.*|.claude/.*.sock.*|.claude/.*.db.*|.claude/.*.sqlite.*|.claude/.*.bak.*|.claude/.*.orig.*|.claude/.*.swp.*|.claude/.*.swo.*
```