

Memory.

Engineered context.
Not chat history.
Built to survive.

Not a tutorial. A playbook for engineers who ship every day with Claude Code — CLI and IDE.

THE BRIEF, IN THREE BEATS

- 01** Memory is **engineered** — a hierarchy of files you curate, not chat you hope survives.
- 02** Four layers: Enterprise · Project · User · Session — each with its own file, path, and job.
- 03** Hooks + checkpoints + MCP memory servers are the difference between L2 and L4.

"Claude forgot again."

— because you never told it to remember. Memory is a *system*, not a hope.

*Every "explain the codebase again" is a memory bug. Every context you re-type is **1-3k tokens** Claude already had — if the right file existed. A 20-line CLAUDE.md pays for itself in the first session.*

Memory in Claude Code isn't **chat history**. It's a **file system** you curate — every session boots from files, and the ones you wrote decide what Claude knows.

THREE COROLLARIES

- #1** The prompt is short-term. The files are long-term. If it's not in a file, it dies at `/compact``.
- #2** Every file costs tokens. A 500-line CLAUDE.md consumes ~4-8k tokens on *every* prompt. Curate ruthlessly.
- #3** Files rot faster than code. Treat CLAUDE.md like a test — if it hasn't been touched this month, it's probably wrong.

THE CLAIM

THE HONEST TRADE

The trap. Kitchen-sink CLAUDE.md — everything you might ever want Claude to know. Grows to 800 lines. Nobody reads it. Token bloat eats the context window.

The move. Think in layers: enterprise policy, project rules, personal defaults, session notes. Each file owns one job.

The result. Claude picks up where you left off — because the files told it what actually matters.

Four files. Four scopes. Higher layers **override** lower ones. All auto-loaded on session start.

LAYER	FILE PATH	WHO OWNS	GIT?	WHAT LIVES HERE
1 · Enterprise org-wide default	/Library/Application Support/ ClaudeCode/CLAUDE.md (macOS · similar paths on Linux/Win)	IT / Security team. <i>Managed device only.</i>	No – deployed via MDM.	Security policies, forbidden tools, compliance guardrails.
2 · Project team-shared	./CLAUDE.md ./.claude/settings.json (repo root)	Team. Reviewed like code.	✓ committed	Architecture, coding standards, tests, "how we work".
3 · User your defaults	~/.claude/CLAUDE.md ~/.claude/settings.json (home directory)	You. Applies to <i>all</i> your projects.	✗ never	Personal style, editor, alias'd commands, tone.
4 · Session in-flight	~/.claude/projects/<hash>/ (session log – auto-managed)	Claude Code itself.	✗ never	Chat + tool calls. Restored via --resume / --continue.

TOKEN BUDGET · ROUGH NUMBERS

Enterprise ~500-1500 tok · Project ~1500-4000 tok · User ~500-1500 tok · Session grows unbounded until /compact.
Total memory tax: ~3-7k tokens per prompt. On 200k window: 1.5-3.5% "always spent".

LOAD ORDER · HIGHER WINS

1 Enterprise → 2 Project → 3 User → 4 Session
Session prompts override User. User overrides Project. Project overrides Enterprise *only where explicit*.
Enterprise policies (bans, guardrails) are non-negotiable.

15 months, six shifts. Claude Code went from "chat with amnesia" to a **persistent workspace**.

WHEN	SHIP	WHAT IT UNLOCKED
Feb 2025 launch	Claude Code launches with CLAUDE.md	Single project-level file, auto-loaded on start. Establishes the pattern: <i>files are memory</i> .
Aug 2025 +6 months	/memory command + hierarchy	Multi-tier hierarchy (Enterprise / Project / User / Session). /memory lists all loaded files. # shortcut adds a line in-flight.
Late 2025 +9 months	Hooks lifecycle (12 events)	SessionStart · PreCompact · UserPromptSubmit · PreToolUse + 8 more. Memory becomes <i>programmable</i> .
Q1 2026 +11 months	Skills · Subagents · Plugins	Each subagent gets its own CLAUDE.md + tool scope + isolated context. Skills = reusable memory-triggers as folders with SKILL.md.
Jun 2026 +16 months	Checkpointing · /rewind · ESC ESC	Roll back <i>both</i> code and conversation. Auto-checkpoint before risky ops. Session persistence gets fixed ("amnesia fix").
Q2 2026 now	MCP memory servers ecosystem	mcp-knowledge-graph · mem0-mcp-selfhosted · memory-graph. Memory now scales <i>outside</i> the file system — knowledge graphs, vector stores, per-project notebooks.

A production CLAUDE.md has 8 sections. Each earns its token cost — or gets cut.

SECTIONS 1-4 · ORIENTATION + RULES	SECTIONS 5-8 · WORKFLOW + GUARDRAILS
§1 · Project one-liner. What this repo IS in one sentence. <i>"E-commerce checkout API. Node 20, Fastify, Postgres, Stripe."</i>	§5 · Commands cheat-sheet. <code>npm run ...</code>, migrations, generators, common one-liners. Save Claude 3 guesses per session.
§2 · Architecture map. Directories that matter. What lives where. <code>src/</code>, <code>packages/</code>, <code>infra/</code> — and what's off-limits.	§6 · Do / Don't for THIS repo. Explicit rules: <i>never touch migrations directly · always use zod at the boundary · Sentry stays in <code>src/lib/telemetry</code>.</i>
§3 · Coding standards. Style bullets Claude must follow. TypeScript strict, no any, no default exports, tests co-located.	§7 · Current focus / WIP. One paragraph on <i>what we're building right now</i>. Updated weekly, not per-PR.
§4 · Testing rules. How tests are run. What must pass before a commit. Which paths never ship without a test.	§8 · Imports. <code>@import ./docs/architecture.md</code> for deep dives. Keep the main file short; pull the rest on demand.

Target length: 100-200 lines · ~1500-4000 tokens · fits on one printed page. Anything longer, split via `@import t`.

One is 500 lines of good intentions. The other is 120 lines that survived 6 months.

THE FAILURE · 500 LINES, 6 WEEKS OLD Symptoms: • The full package.json pasted inline. <i>~200 tokens Claude never reads.</i> • "Team member David likes tabs over spaces" — 8 personal preferences that belong in <code>~/.claude/CLAUDE.md</code>. • "We migrated to Postgres last quarter" — a fact, not a rule. Belongs in a design doc. • Copy-pasted README + copy-pasted CONTRIBUTING.md. <i>Duplicated, drifted.</i> • "TODO: fix this section" from March. Still there in July. Token cost: ~7500 tokens per prompt. Cache misses often — because the file changes weekly with noise.	THE SURVIVOR · 120 LINES, 6 MONTHS OLD What kept it alive: • Every section answers "what will Claude get wrong <i>tomorrow?</i>" — not "what could someone want to know?" • No facts, only rules. "Use zod at the boundary" — not "we use zod because ..." • Deep dives are <code>@import ./docs/...</code> — loaded on demand, not on every prompt. • Reviewed like code — every change goes through PR review. • "Current focus" block updated <i>weekly</i>, deleted when the sprint ends. Token cost: ~1800 tokens. Cache-friendly — content stable. 4× cheaper per prompt.
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The 500-line rule: when your CLAUDE.md crosses 500 lines, it's a signal you're using it as a wiki. Split it into `@imports` or turn sections into skills.

The file **nobody sees** — where your personal defaults live, never committed, always loaded.

WHAT BELONGS HERE	WHAT DOES NOT BELONG
✓ Communication style. "Be terse. No preamble. Skip disclaimers." Saves ~200 tokens per response. ✓ Editor / shell defaults. "I use nvim, tmux, fish. Prefer rg over grep, fd over find." ✓ Universal language prefs. "Always use pnpm, never npm. UV, not pip. Bun, not node — unless the repo dictates otherwise." ✓ Personal safety rails. "Never rm -rf. Ask before force-push. Confirm before dropping tables." ✓ Common patterns you always use. "Prefer functional over classes. Small files. Colocated tests." Rule: if it applies to <i>every</i> repo you touch, it lives here. If it's repo-specific, it lives in the project file.	✗ Secrets. API keys, tokens, credentials. Ever. Use <code>.claude/settings.local.json</code> with env-var refs. ✗ Repo-specific facts. "This project uses Postgres" → belongs in the project's CLAUDE.md, not yours. ✗ Team conventions. "We do TDD" is a team rule; commit it. ✗ Session context. "Currently working on issue #123" — that's session-level, not personal-default. ✗ Anything you'd want a colleague to know. They can't read your ~/.claude/. If it's shared knowledge, it's the wrong file. Length target: 30-80 lines. Yours is a signature, not a manifesto.

One directory, **six things**. Know which one gets committed — and which one is *never* in git.

PATH	WHAT IT DOES	GIT?	TYPICAL SIZE
./CLAUDE.md project brain	The main memory file. 8 sections. Read on every session start. Team-shared.	✓ committed	100-200 lines
.claude/settings.json team config	Permissions · MCP servers · hook definitions · model defaults. Team-wide.	✓ committed	20-80 lines
.claude/settings.local.json your overrides	Your local tweaks. Secrets via env refs. Your API keys, your allowed commands.	✗ .gitignore'd	10-40 lines
.claude/commands/*.md slash commands	Reusable prompts triggered by /name. /review-pr, /write-migration, /refactor-tests.	✓ committed	5-50 files
.claude/agents/*.md sub-agents	Specialised agents with own context + tool scope. YAML frontmatter + prompt body.	✓ committed	3-15 files
.claude/hooks/ lifecycle scripts	Shell scripts that fire on 12 lifecycle events. Deterministic guardrails + memory triggers.	✓ committed	2-10 scripts

Each sub-agent gets a **fresh context** + its own file + its own tool scope. That's the feature.

.CLAUDE/AGENTS/REVIEWER.MD · ANATOMY

```
---
name: reviewer
description: Reviews PRs against project
  standards. Blocks merges that fail.
tools: Read, Grep, Bash(git log:*)
model: sonnet-5
---

You are a strict code reviewer. Read
the diff. Check against §3 of CLAUDE.md.
Block if: no tests · any() types · new
deps without justification.

Output format: PASS / FIX with line refs.
```

THE 3 RULES OF SUB-AGENT MEMORY

Rule 1 · Their context is fresh. They don't see your session's chat. They see *only* what the orchestrator hands them + their own file + shared CLAUDE.md.

Rule 2 · Their tools are scoped. Frontmatter tools: is a *whitelist*. Reviewer sees Read + Grep + git log — never Write, never rm. Least privilege.

Rule 3 · Their output is the memory. When a sub-agent finishes, only its *final response* returns to the orchestrator. Everything else is discarded. Design the output like an API contract.

Depth cap: 5 levels of nesting (Fable 5 launch). Any deeper and coherence collapses.

Turn one monolithic file into a **composable network**. Small root, deep only when needed.

SYNTAX · @PATH/TO/FILE

```
# CLAUDE.md · root · 40 lines

## Project
E-commerce checkout API. Node 20.

## Architecture
@docs/architecture.md

## Coding standards
@.claude/rules/typescript.md
@.claude/rules/testing.md

## Current focus
Migrating Stripe → Stripe v3.
@.claude/wip/stripe-migration.md
```

THE 5 RULES OF GOOD IMPORTS

- 01 · **Root stays short.** Target 40-80 lines. Everything deep is behind an @import.
- 02 · **One @import per concept.** One file for architecture, one for style, one for testing. Not "misc.md".
- 03 · **Depth ≤ 5.** A → B → C → D → E. Deeper collapses; you're building a graph, not a tree.
- 04 · **Never @import the whole README.** The README is for humans. Distil rules; don't copy prose.
- 05 · **WIP goes in an @import.** "Current focus" lives in .claude/wip/*.md — deleted when the sprint ends.

Why: Claude only loads what the current task needs. Cold @imports don't burn tokens until referenced.

Same files. Same commands. **Different UX** — and one gotcha you must know.

MEMORY FEATURE	CLI (CLAUDE)	VS CODE EXT	JETBRAINS PLUGIN
CLAUDE.md hierarchy (4 tiers)	✓ full · auto-load	✓ full · auto-load	✓ full · auto-load
/memory · #shortcut · @import	✓ all supported	✓ all supported	✓ all supported
--resume / --continue	✓ picker + latest	✓ UI history pane	✓ UI history pane
/rewind · checkpointing (Jun 2026)	✓ /rewind + ESC ESC	✓ + timeline UI	✓ + timeline UI
Hooks (12 lifecycle events)	✓ all fire	✓ all fire	✓ all fire
MCP servers	✓ .claude/settings.json	✓ shared config	✓ shared config
Open editor tabs → context	✗ N/A — no editor	✓ auto-included	✓ auto-included
Session store location	~/.claude/projects/<hash>/	← same path	← same path

The gotcha: IDE sessions and CLI sessions share the same on-disk store — but starting a CLI session in the same repo *while* an IDE session is open can fork the checkpoint history. Rule: one live session per repo, per machine.

Every command **changes what Claude remembers** tomorrow. Know the tradeoffs.

COMMAND	WHAT IT DOES	WHAT SURVIVES	USE WHEN
/compact manual summary	Claude writes a summary of the session, drops the raw messages, keeps the summary + CLAUDE.md files.	The summary + all loaded files. Raw chat lost.	Context hitting 70-80% full and you're mid-task.
/clear hard reset	Wipes all chat history. No summary written. CLAUDE.md re-loads on next prompt.	Only your files. Everything else — gone.	Switching tasks completely. Fresh start.
claude --resume picker	Shows a list of past sessions for this repo. Pick one to resume — full chat, tool state, checkpoints restored.	Everything — chat, tool history, checkpoints.	Coming back after hours or days.
claude --continue latest	Auto-picks the most recent session for this repo. No prompt.	Everything from the last session.	Quick "back to what I was doing".
/rewind · ESC ESC Jun 2026 · checkpoint	Rolls back <i>both</i> code AND conversation to a checkpoint. Fixes bad edits without losing history.	The state as of the checkpoint.	Bad refactor · wrong direction · destructive op.

Auto-compaction fires around **85% context full**. The PreCompact hook is your last save.

ANATOMY OF A COMPACTION

Trigger: Context ~85% full, or manual /compact.

What Claude does: Reads the whole conversation. Writes a summary (~2-4k tokens) that keeps decisions + file paths + open questions.

What survives:

- ✓ CLAUDE.md hierarchy (re-loaded)
- ✓ The compaction summary
- ✓ Currently-open files (IDE only)

What dies:

- ✗ Raw chat turns
- ✗ Tool-call transcripts (only their conclusions)
- ✗ Thinking blocks from earlier turns
- ✗ Anything you didn't tell it to remember

THE PRECOMPACT → SESSIONSTART PATTERN

The community's "pseudo-PostCompact" pattern — save state before, restore after:

```
// .claude/hooks/pre-compact.sh
echo "$CLAUDE_SESSION_ID" > \
  .claude/state/last-session.txt
cat conversation-tail.md > \
  .claude/state/pre-compact-notes.md
```

```
// .claude/hooks/session-start.sh
if [ -f .claude/state/pre-compact-notes.md ];
then cat .claude/state/pre-compact-notes.md; fi
```

Result: when Claude wakes up after compaction, it reads your *pre-compact save* as context injected on session start.

Hooks aren't just guardrails. They're **deterministic memory triggers** — code you run to shape context.

01 · SESSIONSTART

Inject context on every session

Use for: loading last-session notes, current branch, open TODOs, WIP-file diffs, sprint focus.

Example: `echo "Branch: $(git branch --show-current)"; cat .claude/state/wip.md`

02 · USERPROMPTSUBMIT

Fire on every user prompt

Use for: just-in-time context — inject the current file's tests, related migrations, or recent commits based on what the user just typed.

Also: redact secrets · block risky prompts · log the intent.

03 · PRECOMPACT

Save what's about to die

Use for: writing "decision log" for what was concluded this session, so `SessionStart` can restore it.

Example: append last N turns to `.claude/state/decisions.md`. Community pattern nicknamed *pseudo-PostCompact*.

04 · STOP & SUBAGENTSTOP

Close the loop, write the summary

Use for: write "what I did" to `.claude/state/session-log.md`. Commit-message drafts. Handoff notes.

SubagentStop: capture sub-agent findings before they're discarded — Fable 5 workflows lose everything otherwise.

Full list (12 events): `SessionStart` · `Setup` · `SessionEnd` · `UserPromptSubmit` · `UserPromptExpansion` · `PreToolUse` · `PostToolUse` · `PreCompact` · `Notification` · `Stop` · `SubagentStop` · `PrecompileHook`

Files don't scale to knowledge graphs. MCP memory servers do — use them when it earns its bill.

THE 3 SERVERS PROS ACTUALLY USE

mcp-knowledge-graph (Shane Holloway)

Local knowledge graph. Persistent across sessions. Best for capturing *relationships* — "X depends on Y", "team decided Z on date D".

mem0-mcp-selfhosted (community fork)

Long-term memory backed by your infra. Vector-search over past sessions + user prefs. Ideal when the same team hits the same codebases repeatedly.

memory-graph (Gregory Dickson)

Code-focused. Indexes patterns + relationships in your codebase. Neo4j-compatible under the hood.

FILES VS MCP · WHEN TO ESCALATE

Stay in files when:

- You have < 10 recurring context items.
- Team fits in one repo.
- Rules matter more than facts.

Reach for MCP memory when:

- Cross-repo knowledge (monorepo of monorepos).
- Relationships matter: *who owns* · *what depends*.
- You've hit "CLAUDE.md is 800 lines" and splitting via @import isn't enough.
- Team > 10 people sharing memory.

The trap: installing an MCP memory server before you exhausted CLAUDE.md + @imports. Complexity you don't need yet.

If you recognise your workflow here — **fix it this week.**

AP1 Kitchen-sink CLAUDE.md  Symptom: 500+ lines, everyone adds, nobody removes.  Fix: Split via <code>@import</code>. Root stays $\leq$ 200 lines.  Cost: ~6k extra tokens per prompt · cache misses when file changes.	AP2 Facts, not rules  Symptom: "We migrated to Postgres last quarter." History, not action.  Fix: Rewrite as a rule. <i>"All new persistence goes through <code>src/db/</code>."</i>  Cost: Tokens spent on trivia · rots into "outdated" within weeks.	AP3 Secrets in memory files  Symptom: API keys · DB URLs · tokens pasted into CLAUDE.md for "convenience".  Fix: <code>.claude/settings.local.json</code> (gitignored) with env-var refs. Never in the file that ships.  Cost: One PR leaks them all forever.
AP4 Stale WIP block  Symptom: "Currently working on Stripe migration" — from three months ago.  Fix: WIP goes in <code>.claude/wip/*.md</code> — deleted when sprint ends. Weekly reviews.  Cost: Claude confidently follows outdated priorities.	AP5 Copy-pasted README  Symptom: CLAUDE.md is 60% CONTRIBUTING.md + 40% README copy.  Fix: Distil rules · never prose. Or <code>@import</code> the source of truth.  Cost: Drift — the two files diverge in a month.	AP6 No PR review for CLAUDE.md  Symptom: Anyone edits, nobody reviews. Rules contradict each other.  Fix: Treat CLAUDE.md as code. Same PR review as <code>src/</code>. Add a CODEOWNER for it.  Cost: Rule drift — team stops trusting Claude's output.

Twelve items. Each is a **git-committed file**, not a slide.

FOUNDATION · 4

☐ 01 Project CLAUDE.md — 8 sections, 100-200 lines, committed to git.

☐ 02 Personal ~/.claude/CLAUDE.md — 30-80 lines of your defaults.

☐ 03 .claude/settings.json — team permissions, MCP servers, model defaults.

☐ 04 .claude/settings.local.json in .gitignore — secrets never leak.

STRUCTURE · 4

☐ 05 @import for deep dives — architecture, style, testing rules split into files.

☐ 06 3-6 slash commands in .claude/commands/ — /review · /migrate · /test.

☐ 07 2-5 sub-agents in .claude/agents/ — scoped tool whitelists.

☐ 08 WIP block at .claude/wip/current.md — updated weekly, deleted at sprint end.

AUTOMATION · 4

☐ 09 SessionStart hook — inject branch, WIP, last-session notes.

☐ 10 PreCompact hook — save decision log before compaction eats it.

☐ 11 Stop hook — write session summary to .claude/state/log.md.

☐ 12 CODEOWNER for CLAUDE.md — every change requires PR review.

Ship rule: if a checklist item isn't a link to a file in the repo, it doesn't exist. Slides & wikis don't count.

If you can't measure your memory, you can't **trust it**. Two KPIs. One weekly test.

TWO KPIS THAT MATTER

KPI #1 · Context recall rate

How often per week does Claude ask a question *whose answer is in your CLAUDE.md?*

Target: < 1 per week per engineer.

Method: log each "asked-again" event to `.claude/state/recall-misses.md` via a hook.

KPI #2 · Memory token tax

How many tokens does your loaded memory hierarchy consume on every prompt?

Target: < 5% of context window (~10k on 200k models).

Method: `/memory` command shows loaded files. Sum sizes. Or a `SessionStart` hook that reports the total.

THE DELETE-AND-TEST METHOD

Weekly exercise. Takes 5 minutes.

Step 1. Rename `CLAUDE.md` → `CLAUDE.md.bak`.

Step 2. Start a fresh session. Give Claude a real task from this sprint. Watch what it asks.

Step 3. Score:

- **Rules-shaped questions** ("how do you handle X?") = the file is doing its job.
- **Trivia questions** ("what's your DB?") = missing critical section.
- **No questions** = your file might be redundant with the codebase.

Step 4. Restore. Add the missing rule. Delete the redundant one. Rinse next week.

TRY IT THIS WEEK

Delete your **CLAUDE.md**.
Reopen Claude Code.
Give it your next real task.

What does it get wrong?

"NOTHING"

Your CLAUDE.md is redundant with the codebase. **Next play:** cut it in half. Everything that survives, earns its tokens.

"A FEW THINGS"

Healthy. Add those rules, delete the ones Claude never used. **Next play:** run this test *every Friday*.

"EVERYTHING"

You have no working memory. **Next play:** start with the 8-section anatomy on slide 06. Aim for a 120-line survivor in 30 days.

The rule: memory is a *system*, not a hope. Files curated. Hooks wired. Weekly test. That's the difference between "Claude forgot" and "Claude picks up where I left off".