The Claude Skills Handbook

Designing, Building, Testing, and Operating AI Capabilities at Scale

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Designing, Building, Testing, and Operating AI Capabilities at Scale

This book is a comprehensive engineering guide to building Claude Skills, modular, reusable capability packages that turn Claude into a specialized assistant for your exact domain, workflow, or organization. It is written for developers, technical leads, and AI engineers who want to build Skills that are reliable, maintainable, and production-ready. You will learn the complete lifecycle: from identifying a use case and designing the Skill architecture, through implementation, testing, and security hardening, to deployment, monitoring, and iterative improvement. The book includes complete, working Skill implementations for a wide range of scenarios, detailed architectural patterns, and the practical judgment that comes from treating Skills as first-class software artifacts rather than clever prompts.

Introduction

In October 2025 Anthropic introduced Agent Skills, a simple idea with outsized implications. A Skill is a folder containing a SKILL.md file with instructions and metadata, plus optional scripts, reference documents, and assets. Claude loads these instructions dynamically, on demand, to gain specialized capabilities for specific tasks. The format is intentionally minimal: YAML frontmatter to declare what the Skill does, Markdown to describe how to do it, and plain files for everything else. Anthropic published the specification as an open standard on December 18, 2025, and Skills now work across Claude.ai, Claude Code, the Messages API, the Agent SDK, AWS, and Microsoft Foundry.

That brevity in the specification hides depth in practice. Skills look deceptively simple,a folder and a file,but building Skills that are reliable, secure, cost-effective, and maintainable requires the same discipline you would apply to designing a well-structured software system. A vague description causes Claude to never activate the Skill. An overlong instruction set burns through context and tokens. An unguarded script opens an attack surface. A Skill that conflates five different responsibilities becomes impossible to debug, test, or evolve.

This book exists because the gap between the specification and production readiness is significant. Official documentation explains the format and basic usage. What it does not fully cover,and what separates a toy Skill from a production-grade artifact,is the engineering methodology: how to reason about Skill boundaries, how to structure instructions that are precise yet resilient, how to manage context costs across complex Skills, how to test Skills systematically, how to secure them against prompt injection and tool abuse, and how to maintain them as requirements and platforms evolve.

What You Will Learn

By the end of this book you will be able to:

- Design Skills with clear contracts and responsibilities, knowing when a Skill is the right solution versus a prompt, tool, MCP server, or agent.

- Write SKILL.md files that Claude follows reliably: concise, unambiguous instructions that specify behavior without overconstraining the model.
- Structure Skills for efficiency: using progressive disclosure to minimize token costs, separating deterministic computation from language reasoning, and loading reference material only when needed.
- Integrate Skills with Claude tools, the code execution environment, MCP servers, and external APIs to build capabilities that go beyond language generation.
- Build Skills for a wide range of domains: document generation and transformation, research and analysis, code review and development workflows, structured data processing, business automation, and multi-step orchestration.
- Test Skills rigorously: designing representative test cases, evaluating edge conditions and adversarial inputs, measuring consistency, and identifying failure modes before they reach production.
- Harden Skills against security risks: defending against prompt injection, handling untrusted content safely, managing permissions, and auditing behavior.
- Package, version, distribute, and maintain Skills as living artifacts in teams and organizations.
- Monitor Skill performance in production, diagnose problems, and iterate systematically.

Who This Book Is For

This book assumes you are already comfortable using Claude in some capacity,via the web interface, Claude Code, or the API,and that you have basic software development experience. You should understand what a context window is, how prompts shape model behavior, and what APIs and tool use look like in practice. You do not need to be an ML expert, but you should be familiar with concepts like structured data (JSON, YAML), command-line tools, and version control.

If you are a developer who has written prompts that worked once but failed three days later, this book will give you a framework for building Skills that are deterministic where it matters and flexible where it counts. If you are a technical lead evaluating whether Skills belong in your organization, this book

will help you understand the patterns, risks, and operational requirements. If you are an AI engineer building systems around Claude, this book will give you the implementation details and architectural patterns you need to ship.

How to Read This Book

The book is organized as a progression from fundamentals to advanced engineering practice.

Chapters 1 through 3 establish the foundation: what Skills are and are not, how they fit into the Claude ecosystem, and the complete anatomy of a Skill. Read these chapters first, even if you have already experimented with Skills. A precise mental model will save you from subtle mistakes later.

Chapters 4 through 8 cover core building techniques: starting with minimal Skills, writing effective instructions, designing robust input/output contracts, working with tools and external operations, and managing context and token efficiency. These chapters give you the toolkit for building Skills that actually work.

Chapters 9 through 12 present Skills for major use case categories: document generation and transformation, research and analysis, software development workflows, and data processing. Each chapter includes complete, working Skill implementations you can adapt to your own problems.

Chapters 13 through 19 address production concerns: building production-grade Skills, security and risk management, testing and validation, quality evaluation, architectural patterns and anti-patterns, packaging and distribution, and monitoring and maintenance. These chapters are where the book shifts from "how to build a Skill that works" to "how to build a Skill that you can trust at scale."

Chapters 20 and 21 are end-to-end case studies that walk through the full lifecycle of complex, real-world Skills from requirement analysis to deployment and maintenance.

The References section at the end lists all sources used in this book, linked directly so you can verify claims and dive deeper on any topic.

A Note on Verification and Accuracy

Every factual claim in this book is grounded in authoritative sources: Anthropic's official documentation, the Agent Skills open standard specification, the Claude API reference, and primary research. Where multiple sources agree, I state the consensus. Where they disagree, I surface the disagreement and explain the reasoning. Where I cannot verify a claim, I flag it explicitly as uncertain or recommended practice rather than documented fact.

Skills is a rapidly evolving ecosystem. Features, APIs, and best practices change. When this book mentions specific beta headers, API endpoints, or behavior, those reflect the state of the platform as of the time of writing. Always consult the official Anthropic documentation for the latest specifications.

Now let us begin.

Chapter 1: What Is a Claude Skill?

On October 16, 2025 Anthropic announced a capability called Agent Skills,a way to extend Claude with reusable, filesystem-based modules that encode specialized expertise, repeatable workflows, and domain knowledge. The announcement was brief. The specification is minimalist. But the implications are substantial for anyone building with Claude.

To use Skills effectively you need a precise mental model: what they are, what problems they solve, how they differ from other extensibility mechanisms in the Claude ecosystem, and where they fit architecturally. This chapter builds that model. If you skip ahead to building Skills without this foundation you will likely make decisions that seem reasonable at first but cause subtle problems later: Skills that do not activate when they should, Skills that are too expensive to run, Skills that become impossible to maintain.

The Skill Concept: A Clear Definition

A Claude Skill is a self-contained folder on a filesystem that contains:

1. A required file named SKILL.md, which includes YAML frontmatter (metadata) followed by Markdown instructions.
2. Optional supporting files organized in standard subdirectories: scripts/ for executable code, references/ for documentation loaded on demand, assets/ for templates and static resources, and evals/ for test cases.

That is the entire structural definition. A Skill is a directory convention plus a declarative file that tells Claude: "Here is a capability I have. Here is when you should use it. Here is how."

The key behaviors that distinguish Skills from other mechanisms are:

- **On-demand activation**: Skills do not consume their full context cost every time Claude runs. Claude loads only lightweight metadata at startup, then activates the full Skill instructions only when the user request matches the Skill's described purpose.

- **Procedural knowledge**: Skills encode how to do something,methodologies, checklists, quality standards, step-by-step processes. They are not primarily about granting access to external systems.
- **Portability**: The Agent Skills format is an open standard, published at agentskills.io in December 2025. Skills are not locked to a single interface; they are designed to work across Claude.ai, Claude Code, the API, and other compatible agents.
- **Versionability**: Skills are files. You can put them under version control, review changes in pull requests, roll back to previous versions, and distribute them as artifacts.

In practice a Skill transforms Claude from a general-purpose assistant into a domain specialist. Without a Skill Claude might know general principles of code review. With a code review Skill Claude follows your organization's specific review checklist, references your style guide, applies your security policies, and outputs reviews in your preferred format,every time, consistently.

Problems Skills Solve: Beyond Prompting

To understand why Skills exist you need to understand what problems they solve. Before Skills there were several common approaches to extending Claude, each with its own limitations:

- **Repeated prompts**: You write a carefully crafted prompt that gets Claude to do what you want. Next week you need it again, so you copy-paste the prompt or try to recall it from chat history. The result drifts. The prompt itself is not version-controlled. Other team members do not know it exists.
- **System instructions**: You configure Claude with a system prompt that describes its role and behavior. System prompts are always loaded, always consuming tokens, even for tasks they are not relevant to. They become bloated as you try to encode more capabilities. They are difficult to modularize.
- **Ad-hoc context dumps**: You paste reference material,your style guide, your API docs, your security checklist,directly into the conversation. This works once but is expensive in tokens, inconsistent across conversations, and impossible to maintain as a shared artifact.

Skills address each of these problems directly:

1. **Reusability**: A Skill lives in a known location. You install it once and it is available every time. You do not need to recreate or rediscover your instructions.
2. **Context efficiency**: Skills use "progressive disclosure",a design pattern where Claude loads only a lightweight description (100 tokens) to decide whether a Skill is relevant, then loads the full instructions (5,000 tokens maximum, recommended under 500 lines) only when the Skill is activated. This is dramatically cheaper than permanently loading equivalent instructions in a system prompt. Anthropic reports up to 98 percent token savings for idle Skills compared to always-active prompts.
3. **Modularity**: Each Skill has a single responsibility. You add new capabilities by adding new Skills, not by expanding an existing one into a monolith. This makes individual Skills easier to understand, test, and maintain.
4. **Institutional knowledge**: Skills capture organizational expertise,your processes, your standards, your hard-won practices,in a format that Claude can execute. They turn tribal knowledge into reusable, governable artifacts.

The Rakuten case, discussed in Anthropic's own materials, illustrates this impact: they reported an 87.5 percent reduction in completion time for a finance workflow after encoding their procedures as Skills rather than relying on engineers to manually follow documentation or repeatedly craft custom prompts.

Skills Versus Prompts and System Instructions

It is easy to confuse a Skill with "a really good prompt saved in a file." They share the same medium (Markdown instructions), but they differ in fundamental ways:

Prompts are instructions you give Claude in a conversation, typically as part of a user message or a system prompt. A prompt is ephemeral: it exists only for the duration of that interaction. If you want Claude to do the same thing tomorrow you must reproduce the prompt manually or rely on imperfect memory. Prompts are also always-loaded: if they are in the system prompt they consume tokens for every request regardless of relevance.

Skills are persistent, modular artifacts that Claude discovers and loads selectively. The Skill's description is scanned at startup to determine whether it is relevant; the full instructions are loaded only when Claude decides the Skill applies. This makes Skills dramatically more efficient for capabilities that are useful but not universally needed. A code review Skill might be irrelevant for 90 percent of your conversations, but with Skills that 90 percent do not pay the token cost for loading the code review instructions.

Think of it this way: a system prompt is a Swiss Army knife attached to Claude's belt at all times. A Skill is a specialized tool in a workshop that Claude walks to when needed. For capabilities you always need,language understanding, basic reasoning, safety guidelines,system prompts are appropriate. For capabilities that are task-specific,legal document drafting, penetration testing methodology, internal financial reporting,Skills are superior.

Skills Versus Tools, MCP Servers, and Functions

This distinction is critical and commonly misunderstood. Skills, tools, and MCP servers solve different problems, and confusing them leads to poor architecture.

Tools (and the related concept of function calling) are mechanisms for Claude to interact with external systems: APIs, databases, command-line tools, web browsers. A tool gives Claude the ability to perform an action: call an HTTP endpoint, run a database query, execute code. Tools define what Claude can do.

MCP servers (Model Context Protocol servers) are a standardized way to expose tools and data sources to Claude. MCP is a protocol,a connectivity layer,that allows Claude to discover and use tools provided by external services. Anthropic donated MCP to the Linux Foundation's Agentic AI Foundation in December 2025, and as of early 2026 there are over 10,000 active MCP servers. MCP provides access: it is the USB-C port for AI applications.

Skills are neither access nor connectivity. A Skill tells Claude how to use the access it already has. Skills encode workflow expertise: "When you are reviewing this PR, first check for these security issues, then validate against CONTRIBUTING.md, then format your review comments like this." A Skill might reference MCP tools ("Use mcp__github__get_pull_request_files to read the diff"), but the Skill itself is the methodology, not the connection.

The most accurate summary I have seen is: "MCP provides connectivity. Skills encode procedural knowledge."

Consider a concrete example. You want Claude to analyze your company's support tickets and generate a weekly summary report. An MCP server gives Claude access to your ticketing system's API. A Skill tells Claude how to analyze the tickets: which metrics to calculate, how to cluster issues, what tone and format to use for the summary, which historical trends to reference, and how to highlight anomalies. Without the MCP server Claude cannot access the data. Without the Skill Claude can access the data but does not know how to analyze it in your organization's specific way.

Skills and MCP are complementary, not competing. The best systems often use both.

Skills Versus Agents and Projects

Two more concepts to distinguish: agents and projects.

Agents in the Claude ecosystem are autonomous or semi-autonomous Claude instances configured to pursue goals, manage their own context, and execute multi-step workflows. An agent might maintain persistent state, manage conversation threads, and orchestrate complex operations over time. Skills are not agents. A Skill is a capability package that can be loaded into Claude's context within an existing conversation or agent. You might configure an agent with a set of Skills to give it specialized knowledge, but the Skill itself is not an autonomous entity.

Projects are persistent Claude workspaces with their own knowledge base, custom instructions, and file storage. A Project gives Claude memory and context that persist across conversations. Skills can be used within Projects (and Claude Code Projects have a .claude/skills/ directory), but Projects and Skills solve different problems: Projects provide persistent context and memory; Skills provide modular capabilities.

In practical terms:

- Use **system instructions** for always-needed behavior.
- Use **Skills** for task-specific expertise and repeatable workflows.
- Use **tools and MCP servers** for accessing external systems and data.

- Use **agents** for autonomous, multi-step goal pursuit.
- Use **Projects** for persistent workspace context and memory.

Where Skills Fit in the Claude Architecture

Skills are a layer in Claude's extensibility stack. To understand where they fit, consider the full architecture:

At the core is the Claude model itself,Fable, Sonnet, Haiku, or another variant,capable of language understanding, reasoning, and tool use. Claude interacts with users through various interfaces: Claude.ai (the web app), Claude Code (the terminal tool), the Messages API (for programmatic integration), and various platform integrations (AWS, Microsoft Foundry, etc.).

Skills sit between the model and the interaction. They are loaded into Claude's context based on metadata matching, giving Claude additional instructions that shape its behavior for specific tasks. Skills do not modify the model; they modify the instructions and resources Claude operates with.

The Skills layer interfaces with several other components:

- **Code execution environment**: Many Skills use Claude's code execution tool to run Python or Bash scripts. Scripts are stored in the Skill's scripts/ directory and executed in a sandboxed container. This allows Skills to perform deterministic computation,data transformation, file generation, validation,without relying on Claude's probabilistic generation for tasks better handled by code.
- **Files API**: Skills can upload reference materials and download generated outputs through the Files API. A Skill might store a style guide in references/ that Claude reads on activation, or generate an Excel file that is returned to the user with a file_id for download.
- **MCP servers**: Skills can reference MCP tools for external operations. A Skill that performs code review might instruct Claude to "Use the GitHub MCP server to fetch the pull request diff."
- **Container and persistence**: In API usage, Skills run within containers that can be reused across requests. This allows long-running workflows to maintain state (within the container's filesystem) between API calls.

Importantly, Skills are not a new compute substrate. They do not introduce new inference engines or runtime environments. They are instructions and resources that Claude reads and acts upon using the capabilities it already has. This is both their strength and their constraint: Skills are powerful because they leverage Claude's full capabilities, but they cannot extend beyond what Claude itself can do.

The Open Standard Dimension

Anthropic made a deliberate choice to publish Agent Skills as an open standard rather than a proprietary format. The specification at agentskills.io is intentionally minimal, using widely compatible conventions: YAML for metadata, Markdown for instructions, plain directory structures. This openness has practical implications:

- Skills written for Claude can potentially be used with other agents and platforms that implement the specification.
- Community contributions and third-party tooling can emerge without vendor lock-in.
- Organizations can adopt Skills as a standard format for encoding AI expertise, independent of any single implementation.

As of mid-2026 the SKILL.md format has been adopted by Claude Code, Codex CLI, Cursor, Gemini CLI, GitHub Copilot, and Meta's Muse Code. This cross-platform adoption reinforces the idea that Skills represent a general solution to a general problem: how to package AI expertise as reusable, portable artifacts.

Summary

A Claude Skill is a folder containing a SKILL.md file with metadata and instructions, plus optional scripts, references, and assets. Claude loads Skills on demand, giving it specialized capabilities for specific tasks without the permanent context cost of equivalent system instructions. Skills encode procedural knowledge,how to do things,rather than providing access to external systems (that is the job of tools and MCP). Skills are modular, versionable, portable

artifacts that solve real problems: they make Claude more consistent, more efficient, and more aligned with organizational practices.

In the next chapter I will map the broader Claude ecosystem and explain exactly how Skills integrate with APIs, interfaces, and infrastructure,because understanding the execution environment is essential to building Skills that work reliably in production.

Chapter 2: The Claude Ecosystem and Skill Context

A Skill does not exist in isolation. It is loaded, activated, and executed within the broader Claude platform,an ecosystem of APIs, interfaces, runtime environments, and management tools. If you build a Skill without understanding this ecosystem you risk creating something that works in one context but fails in another, or something that appears functional but silently violates platform constraints.

This chapter maps the Claude platform and explains how Skills integrate at each layer. By the end you will know exactly how Skills are loaded and executed across different access points, what constraints the environment imposes, and what infrastructure is available for Skill management.

The Claude Platform: Interfaces and Access Points

Claude is available through multiple interfaces, each with different capabilities and constraints for Skills. Understanding these differences is crucial because a Skill that works perfectly in Claude Code might behave differently via the API or on Claude.ai.

Claude.ai is the primary web interface for interacting with Claude. Skills are available to paid plans (Pro, Max, and Team/Enterprise). On Claude.ai you can:

- Enable Skills through Settings.
- Use built-in Skills like pptx, xlsx, docx, and pdf for document generation.
- Install custom Skills from synced sources or local directories.
- Invoke Skills by name or rely on automatic activation based on descriptions.

Claude.ai Skills do not require manual API configuration. They are loaded into conversations automatically when Claude determines they are relevant.

The Skill-creator Skill (included by default) helps you build new Skills through a guided, interactive process.

Claude Code is Anthropic's terminal-based tool for software development workflows. It is where Skills have the most mature and feature-complete support. Claude Code reads Skills from specific filesystem locations and provides dedicated commands for Skill management. Skills in Claude Code support:

- Explicit invocation via slash commands (/skill-name).
- Automatic loading based on metadata matching.
- Argument passing ($ARGUMENTS, $1, $2, etc.).
- Dynamic context injection using the !command syntax.
- Advanced frontmatter options like disable-model-invocation and context: fork.

Claude Code is the environment where you will do most Skill development and testing, because its command-line interface gives you visibility into Skill activation, token usage, and execution details.

The Messages API is the programmatic interface for integrating Claude into applications. Skills are integrated via the container parameter in Messages API requests. The Skills API (/v1/skills) provides endpoints for uploading, versioning, listing, and managing custom Skills programmatically.

API-based Skills have a specific execution model: they run inside a sandboxed code execution container with no network access and no runtime package installation. Skills uploaded via the Skills API are workspace-scoped, meaning any API key with workspace access can use them.

The Agent SDK allows you to build autonomous Claude agents that maintain persistent conversations and pursue complex goals. Skills can be attached to agents to provide domain-specific expertise. The SDK integrates Skills through the same container mechanism as the Messages API.

Platform integrations include Anthropic's offerings on AWS and Microsoft Foundry. Skills are supported on these platforms, though availability and features may differ slightly from the primary Claude Platform.

How Skills Are Loaded and Executed

The Skill lifecycle,from presence on the filesystem to actual execution,follows a specific sequence. Understanding this sequence explains why certain behaviors occur and how to debug Skills that do not activate as expected.

Discovery (metadata loading)

When Claude starts,whether in a new Claude.ai conversation, a Claude Code session, or an API request,it scans available Skills. At this stage Claude reads only the YAML frontmatter of each SKILL.md file: the name and description. This metadata is kept in context at all times and costs approximately 30 to 100 tokens per Skill, depending on description length.

The discovery phase is crucial because it determines whether a Skill is considered for activation. If Claude does not recognize a Skill's metadata during discovery, the Skill will never load. This is why description quality is so important: a vague or poorly worded description means Claude will never select the Skill, even if the instructions inside are excellent.

Activation (instruction loading)

When Claude determines that a user request matches a Skill's description, it loads the full SKILL.md body into the conversation context. This is the Markdown content that contains the actual instructions,the step-by-step procedures, the guidelines, the examples.

The activation threshold is determined by Claude's own relevance assessment. There is no explicit keyword matching mechanism exposed to users; Claude uses natural language understanding to decide whether a Skill applies. This means:

- A Skill with a description mentioning "code review" might activate when a user says "check this PR" or "review my changes",even without the exact phrase "code review."
- A Skill with a too-broad description ("help with any task") might activate too often, wasting tokens and potentially interfering with other Skills.
- A Skill with a too-narrow description might never activate, even when it is exactly what is needed.

The loaded instructions consume tokens for the remainder of the conversation. This is why keeping SKILL.md under 500 lines is recommended: you

want Claude to have the guidance it needs without overwhelming the context window.

Execution (resource loading and tool use)

Once activated, the Skill's instructions guide Claude's behavior. If the instructions reference additional resources (files in references/, scripts in scripts/, assets in assets/), Claude loads or executes them as needed.

Resource loading follows the same progressive disclosure principle: Claude reads reference documents only when the instructions direct it to, runs scripts only when needed, and accesses tools only as required by the workflow. This keeps token costs bounded even for Skills with extensive supporting materials.

Tool integration during execution

Many Skills rely on tools for their functionality:

- Code execution tools allow Scripts in scripts/ to run Python or Bash.
- File system tools allow Skills to read input files and write outputs.
- MCP tools allow Skills to interact with external services.

When a Skill uses tools, Claude follows the same tool-use patterns it uses without Skills: it decides which tool to call, constructs the arguments, executes the tool, reads the output, and continues reasoning. The Skill's instructions shape these decisions by providing guidance on which tools to prefer, how to handle errors, and how to structure results.

API Surface: Messages, Streaming, and Skills

For programmatic integrations the Messages API is the primary interface. Skills are integrated through specific request parameters and require specific tool configurations.

Request structure

A Messages API request that uses Skills has the following key components:

- model: Specifies which Claude model to use (e.g., claude-sonnet-4-6, claude-opus-4-5).
- container.skills: An array of Skill specifications. Each specification includes:

  - type: “anthropic” for built-in Skills or “custom” for uploaded Skills.
  - skill_id: The identifier for the Skill.
  - version: The version to use (e.g., “latest” or a specific version ID).
- tools: Must include the code execution tool. At minimum:
  -

  Newer versions like code_execution_20260120 or code_execution_20260521 are also valid and recommended.
- messages: The conversation content.

The Skills API (/v1/skills) provides management endpoints:

- POST /v1/skills: Create a new Skill by uploading files.
- GET /v1/skills: List Skills in the workspace.
- Additional endpoints for versioning and deletion.

Response handling

When a Skill generates a file (e.g., an Excel spreadsheet or PDF), the response includes a file_id attribute. You must use the Files API to download the actual file content using this ID. Skills do not return file content inline; they return references.

Streaming and long-running operations

For complex Skills that require extended processing, Claude may return a pause_turn stop reason, indicating that the operation is still in progress. Your integration must handle this by making a follow-up request using the same container ID to continue the operation.

Rate limits and constraints

Key API constraints to be aware of:

- Maximum of 20 Skills per request.
- Maximum upload size of 30 MB (uncompressed).
- The code execution container has a timeout (cells exceed 90 seconds in programmatic calls with newer tool versions).
- Containers are retained for up to 30 days after creation.

Projects, Environments, and Skill Scoping

Skills can exist at different scopes, and the scope determines visibility and behavior.

Personal Skills (Claude Code)

Located at ~/.claude/skills//, these Skills are available only to you on the machine where they are installed. They are ideal for personal workflows and experimentation. Personal Skills are not automatically shared with team members or other environments.

Project Skills (Claude Code)

Located at .claude/skills// within a project directory, these Skills are tied to a specific codebase or project. Any developer working in that project directory has access to these Skills. This is the recommended approach for team Skills: put them in the project repository, commit them to version control, and anyone with the repository has the Skills.

Synced Skills

Claude.ai supports syncing Skills from your account to Claude Code at ~/.claude/skills/synced/. Synced Skills behave similarly to personal Skills but are managed through the Claude.ai interface rather than the filesystem directly. When another command uses the same short name, the command takes precedence and the synced Skill runs only with its full namespace (/anthropic-skills:name).

Custom Skills on the API

Skills uploaded via the Skills API are workspace-scoped. Any API key associated with the workspace can use these Skills. They are not automatically available across different organizations or workspaces. Custom Skills on the API do not sync with Claude.ai or Claude Code; they are managed entirely through the API.

Scoped behavior matters

Different scopes have different implications for:

- Distribution: How do you get the Skill to the people who need it?
- Versioning: How do you manage changes and ensure consistency?
- Security: Who has access to the Skill and its capabilities?

Choosing the right scope is a design decision, not an implementation detail.

Authentication, API Keys, and Security Boundaries

Skills interact with the Claude platform through authenticated channels, and understanding the security model is essential.

API key requirements

Using Skills through the Messages API requires an Anthropic API key with appropriate workspace permissions. The same API key used for standard Claude API calls works for Skills; there is no separate authentication mechanism. API keys are workspace-scoped, so any key in a workspace can access Skills uploaded to that workspace.

Files API security

The Files API is workspace-scoped. Files uploaded to the API are accessible to any API key in the workspace. This creates an important security consideration: never accept a file_id from an untrusted source. If you allow users to supply file_ids in your application, a malicious user could reference files that belong to other users in the same workspace.

Container isolation

Skills run in sandboxed containers with the following constraints:

- Linux x86_64 environment with 5 GiB RAM, 5 GiB disk, 1 CPU.
- Python 3.11 and Bash available.
- No network access. Skills cannot make outbound HTTP requests directly.
- No runtime package installation in API environments. Skills must include all dependencies or rely on pre-installed packages.

These constraints protect users from malicious Skills but also limit what Skills can do. A Skill that needs network access must either use an MCP server or rely on the host environment to provide connectivity (Claude Code may have different constraints than the API sandbox).

Data retention

Skills and their usage data are not covered by Anthropic's Zero Data Retention (ZDR) policy. Skill creation and deletion are logged in the Compliance API Activity Feed. Container data and execution artifacts are retained for up to 30 days. Files uploaded via the Files API persist until explicitly deleted or expired.

Versioning, Compatibility, and Deprecation Cycles

The Claude platform evolves, and Skills must adapt. Understanding the versioning landscape helps you build Skills that remain functional over time.

API versioning

The Skills API has gone through beta phases and reached general availability in August 2026. Beta headers that were previously required (skills-2025-10-02) are no longer necessary. However, other headers and beta features (code-execution-2025-08-25, files-api-2025-04-14) may still be relevant depending on which tool versions you use.

Code execution tool versions

The code execution tool has multiple versions with different capabilities:

- code_execution_20250825: Bash and file operations.
- code_execution_20260120: Adds REPL state persistence and programmatic tool calling.
- code_execution_20260521: Enforces a 90-second limit per Python cell in programmatic calls.

Skills that rely on code execution should be tested against the specific tool version your integration uses. Behavior can differ between versions.

Model compatibility

Skills work across Claude model variants (Fable, Opus, Sonnet, Haiku), but behavior may vary. More capable models follow instructions more precisely; less capable models may miss nuances. Anthropic recommends testing Skills on multiple models to ensure consistent behavior. Haiku might fail at a complex Skill that Sonnet executes flawlessly.

Deprecation patterns

Anthropic generally provides deprecation warnings before removing features, but the pace of change in this ecosystem is rapid. Skills that work today might break tomorrow if underlying APIs change. To minimize risk:

- Pin Skill dependencies where possible (specific MCP server versions, specific tool versions).

- Monitor platform release notes for changes that might affect your Skills.
- Build Skills with defensive instructions that handle missing tools or changed behaviors gracefully.

Skill versioning

The Skills API supports versioning for custom Skills. When you upload a new version of a Skill, the previous version remains available with its own version ID. This allows you to:

- Test new versions without affecting existing usage.
- Roll back to a known-good version if a new version introduces issues.
- Maintain different versions for different environments or teams.

Summary

The Claude platform provides multiple access points for Skills, each with different capabilities and constraints. Skills are loaded through a discovery-activation-execution lifecycle that leverages progressive disclosure to minimize token costs. Integration with the API requires specific request parameters and the code execution tool. Skills exist at different scopes (personal, project, synced, workspace), and choosing the right scope affects distribution, security, and maintainability. The platform evolves rapidly, so Skills must be designed with adaptability and defensive behavior in mind.

In the next chapter I will dissect the complete anatomy of a Skill,every file, every field, every structural decision,so you understand exactly what Claude reads and how it interprets each component.

Chapter 3: The Anatomy of a Skill

This content is not available in the sample book. The book can be purchased on Leanpub at https://leanpub.com/theclaudeskillshandbook.

The skill.md File: Instructions as Code

This content is not available in the sample book. The book can be purchased on Leanpub at https://leanpub.com/theclaudeskillshandbook.

Metadata and Capability Declarations

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Supporting Files: Reference Documents and Templates

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Defining Evaluation Criteria and Rubrics

Evaluating for Correctness and Completeness

Evaluating for Efficiency and Cost

Continuous Improvement Loops

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