readme.md for @push.rocks/smartagent

A lightweight agentic loop built on **Vercel AI SDK v6** via `@push.rocks/smartai`. Register tools, get a model, call `runAgent()` — done. 🤖

Install

```
pnpm install @push.rocks/smartagent
```

Issue Reporting and Security

For reporting bugs, issues, or security vulnerabilities, please visit community.foss.global/. This is the central community hub for all issue reporting. Developers who sign and comply with our contribution agreement and go through identification can also get a code.foss.global/ account to submit Pull Requests directly.

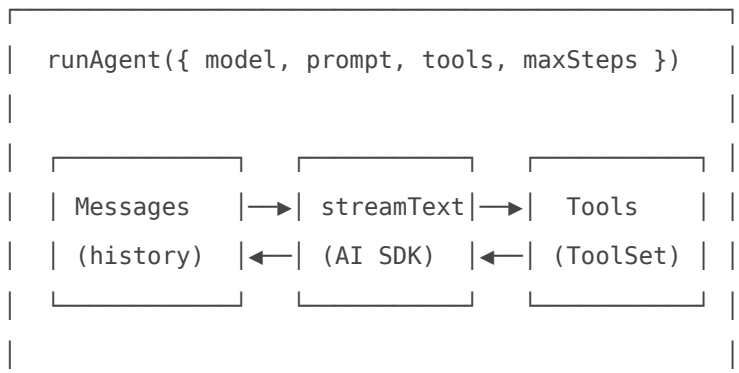
Overview

`@push.rocks/smartagent` wraps the AI SDK's `streamText` with `stopWhen: stepCountIs(n)` for **parallel multi-step tool execution**. No classes to instantiate, no lifecycle to manage — just one async function:

```
import { runAgent, tool, z } from '@push.rocks/smartagent';
import { getModel } from '@push.rocks/smartai';

const model = getModel({
  provider: 'anthropic',
  model: 'claude-sonnet-4-5-20250929',
```

```
  apiKey: process.env.ANTHROPIC_TOKEN,
});

const result = await runAgent({
  model,
  prompt: 'What is 7 + 35?',
  system: 'You are a helpful assistant. Use tools when asked.',
  tools: {
    calculator: tool({
      description: 'Perform arithmetic',
      inputSchema: z.object({
        operation: z.enum(['add', 'subtract', 'multiply', 'divide']),
        a: z.number(),
        b: z.number(),
      }),
      execute: async ({ operation, a, b }) => {
        const ops = { add: a + b, subtract: a - b, multiply: a * b, divide: a / b };
        return String(ops[operation]);
      },
    }),
  },
  maxSteps: 10,
});

console.log(result.text);    // "7 + 35 = 42"
console.log(result.steps);   // number of agentic steps taken
console.log(result.usage);   // { promptTokens, completionTokens, totalTokens }
```

Architecture



```
│  stopWhen: stepCountIs(maxSteps)                │
│  + retry with backoff on 429/529/503           │
│  + context overflow detection & recovery       │
│  + tool call repair (case-insensitive matching) │
└─────────────────────────────────────────────────┘
```

Key features:

- □□ **Multi-step agentic loop** — the model calls tools, sees results, and continues reasoning until done
- ⚡ **Parallel tool execution** — multiple tool calls in a single step are executed concurrently
- □□ **Auto-retry with backoff** — handles 429/529/503 errors with header-aware retry delays
- □□ **Tool call repair** — case-insensitive name matching + invalid tool sink prevents crashes
- □□ **Token streaming** — `onToken` and `onToolCall` callbacks for real-time progress
- □□ **Context overflow handling** — detects overflow and invokes your `onContextOverflow` callback

Core API

`runAgent(options): Promise<IAgentRunResult>`

The single entry point. Options:

Option	Type	Default	Description
`model`	`LanguageModelV3`	*required*	Model from `@push.rocks/smartai`'s `getModel()`
`prompt`	`string`	*required*	The user's task/question
`system`	`string`	`undefined`	System prompt
`tools`	`ToolSet`	`{}`	Tools the agent can call
`maxSteps`	`number`	`20`	Max agentic steps before stopping
`messages`	`ModelMessage[]`	`[]`	Conversation history (for multi-turn)

Option	Type	Default	Description
`maxRetries`	`number`	`5`	Max retries on rate-limit/server errors
`onToken`	`(delta: string) => void`	—	Streaming token callback
`onToolCall`	`(name: string) => void`	—	Called when a tool is invoked
`onContextOverflow`	`(messages) => messages`	—	Handle context overflow (e.g., compact messages)

`IAgentRunResult`

```
interface IAgentRunResult {
  text: string;              // Final response text
  finishReason: string;      // 'stop', 'tool-calls', 'length', etc.
  steps: number;             // Number of agentic steps taken
  messages: ModelMessage[];  // Full conversation for multi-turn
  usage: {
    promptTokens: number;
    completionTokens: number;
    totalTokens: number;
  };
}
```

Defining Tools □□

Tools use Vercel AI SDK's `tool()` helper with Zod schemas:

```
import { tool, z } from '@push.rocks/smartagent';

const myTool = tool({
  description: 'Describe what this tool does',
  inputSchema: z.object({
    param1: z.string().describe('What this parameter is for'),
    param2: z.number().optional(),
  }),
  execute: async ({ param1, param2 }) => {
    // Do work, return a string
```

```
    return `Result: ${param1}`;
  },
});
```

Pass tools as a flat object to `runAgent()`:

```
await runAgent({
  model,
  prompt: 'Do the thing',
  tools: { myTool, anotherTool },
  maxSteps: 10,
});
```

ToolRegistry

A lightweight helper for collecting tools:

```
import { ToolRegistry, tool, z } from '@push.rocks/smartagent';

const registry = new ToolRegistry();

registry.register('random_number', tool({
  description: 'Generate a random integer between min and max',
  inputSchema: z.object({
    min: z.number(),
    max: z.number(),
  }),
  execute: async ({ min, max }) => {
    return String(Math.floor(Math.random() * (max - min + 1)) + min);
  },
}));

registry.register('is_even', tool({
  description: 'Check if a number is even',
  inputSchema: z.object({ number: z.number() }),
  execute: async ({ number: n }) => n % 2 === 0 ? 'Yes' : 'No',
}));
```

```
const result = await runAgent({
  model,
  prompt: 'Generate a random number and tell me if it is even',
  tools: registry.getTools(),
  maxSteps: 10,
});
```

Built-in Tool Factories □□

Import from the `@push.rocks/smartagent/tools` subpath:

```
import { filesystemTool, shellTool, httpTool, jsonTool } from '@push.rocks/smartagent/tools';
```

`filesystemTool(options?)`

Returns: `read_file`, `write_file`, `list_directory`, `delete_file`

```
const tools = filesystemTool({ rootDir: '/home/user/workspace' });

await runAgent({
  model,
  prompt: 'Create a file called hello.txt with "Hello World"',
  tools,
  maxSteps: 5,
});
```

Options:

- `rootDir` — restrict all file operations to this directory. Paths outside it throw `Access denied` .

`shellTool(options?)`

Returns: `run_command`

```
const tools = shellTool({ cwd: '/tmp', allowedCommands: ['ls', 'echo', 'cat'] });

await runAgent({
```

```
  model,
  prompt: 'List all files in /tmp',
  tools,
  maxSteps: 5,
});
```

Options:

- `cwd` — working directory for commands
- `allowedCommands` — whitelist of allowed commands (if set, others are rejected)

`httpTool()`

Returns: `http_get`, `http_post`

```
const tools = httpTool();

await runAgent({
  model,
  prompt: 'Fetch the data from https://api.example.com/status',
  tools,
  maxSteps: 5,
});
```

`jsonTool()`

Returns: `json_validate`, `json_transform`

```
const tools = jsonTool();

// Direct usage:
const result = await tools.json_validate.execute({
  jsonString: '{"name":"test","value":42}',
  requiredFields: ['name', 'value'],
});
// → "Valid JSON: object with 2 keys"
```

Streaming & Callbacks □□

Monitor the agent in real-time:

```
const result = await runAgent({
  model,
  prompt: 'Analyze this data...',
  tools,
  maxSteps: 10,

  // Token-by-token streaming
  onToken: (delta) => process.stdout.write(delta),

  // Tool call notifications
  onToolCall: (toolName) => console.log(`\n□□Calling: ${toolName}`),
});
```

Context Overflow Handling □□

For long-running agents that might exceed the model's context window, use the compaction subpath:

```
import { runAgent } from '@push.rocks/smartagent';
import { compactMessages } from '@push.rocks/smartagent/compaction';

const result = await runAgent({
  model,
  prompt: 'Process all 500 files...',
  tools,
  maxSteps: 100,

  onContextOverflow: async (messages) => {
    // Summarize the conversation to free up context space
    return await compactMessages(model, messages);
  },
});
```

Output Truncation ✂

Prevent large tool outputs from consuming too much context:

```
import { truncateOutput } from '@push.rocks/smartagent';

const { content, truncated, notice } = truncateOutput(hugeOutput, {
  maxLines: 2000,   // default
  maxBytes: 50_000, // default
});
```

The built-in tool factories use `truncateOutput` internally.

Multi-Turn Conversations □□

Pass the returned `messages` back for multi-turn interactions:

```
// First turn
const turn1 = await runAgent({
  model,
  prompt: 'Create a project structure',
  tools,
  maxSteps: 10,
});

// Second turn — continues the conversation
const turn2 = await runAgent({
  model,
  prompt: 'Now add a README to the project',
  tools,
  maxSteps: 10,
  messages: turn1.messages, // pass history
});
```

Exports

Main (`@push.rocks/smartagent`)

Export	Type	Description
`runAgent`	function	Core agentic loop
`ToolRegistry`	class	Tool collection helper
`truncateOutput`	function	Output truncation utility
`ContextOverflowError`	class	Error type for context overflow
`tool`	function	Re-exported from `@push.rocks/smartai`
`z`	object	Re-exported Zod for schema definitions
`stepCountIs`	function	Re-exported from AI SDK
`jsonSchema`	function	Re-exported from `@push.rocks/smartai`

Tools (`@push.rocks/smartagent/tools`)

Export	Type	Description
`filesystemTool`	factory	File operations (read, write, list, delete)
`shellTool`	factory	Shell command execution
`httpTool`	factory	HTTP GET/POST requests
`jsonTool`	factory	JSON validation and transformation

Compaction (`@push.rocks/smartagent/compaction`)

Export	Type	Description
`compactMessages`	function	Summarize message history to free context

Dependencies

- `@push.rocks/smartai` — Provider registry, `getModel()`, re-exports `tool`/`jsonSchema`
- `ai` v6 — Vercel AI SDK (`streamText`, `stepCountIs`, `ModelMessage`)
- `zod` — Tool input schema definitions

- `@push.rocks/smartfs` — Filesystem tool implementation
- `@push.rocks/smartshell` — Shell tool implementation
- `@push.rocks/smartrequest` — HTTP tool implementation

License and Legal Information

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Company Information

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