

Package: rho.ai (via r-universe)

July 21, 2026

Type Package

Depends R (>= 4.4.0)

Title Rho AI Protocol

Version 0.0.1.9001

Description Defines S7 protocols for models, messages, content, tools, credentials, capabilities, and normalized provider event streams. Includes adapters for OpenAI, OpenAI Codex, Anthropic, GitHub Copilot, Z.ai, Kimi Code, Kimi Platform, Ollama, and deterministic provider fixtures.

License MIT + file LICENSE

Encoding UTF-8

Roxygen list(markdown = TRUE)

Imports S7, s7contract, rho.async (>= 0.0.1.9001), rho.http (>= 0.0.1.9001), yyjsonr, nanonext, digest, base64enc, keyring, rmonocypher

Suggests tinytest, knitr

Remotes RGenomicsETL/Rho/packages/rho.async,
RGenomicsETL/Rho/packages/rho.http

Additional_repositories <https://coolbutuseless.r-universe.dev>

URL <https://github.com/RGenomicsETL/Rho>,
<https://r genomicsetl.github.io/Rho/rho.ai/>

BugReports <https://github.com/RGenomicsETL/Rho/issues>

Config/roxygen2/version 8.0.0

Config/pak/sysreqs libsecret-1-dev

Repository <https://r genomicsetl.r-universe.dev>

Date/Publication 2026-07-21 22:15:31 UTC

RemoteUrl <https://github.com/RGenomicsETL/Rho>

RemoteRef HEAD

RemoteSha f3475cf000a379732d37cfb317754dec5ef2b4db

RemoteSubdir packages/rho.ai

Contents

rho_ai_auth	2
rho_ai_events	2
rho_ai_messages	3
rho_ai_operations	3
rho_ai_providers	3
rho_ai_usage	4
rho_anthropic_messages	4
rho_kimi_platform	5
rho_model_catalog	5
rho_openai_chat_wire	5
rho_openai_request_policy	6
rho_openai_responses_wire	6
rho_zai	6
Index	7

rho_ai_auth	<i>Explicit credentials, login effects, and provider catalog state</i>
-------------	--

Description

Credentials are owned by a `CredentialStore`; login interaction is owned by a `LoginIO`. Reads, refreshes, writes, prompts, and notifications are explicit async operations. `RhoModels` owns provider selection and serialized refresh gates instead of relying on process-global auth state.

Details

`rho_memory_credential_store()` keeps credentials for one R process. `rho_file_credential_store()` persists them as a versioned JSON document at an explicitly supplied path. `rho_encrypted_file_credential_store()` encrypts that document with an explicitly supplied passphrase or 32-byte key using Argon2id and XChaCha20-Poly1305. `rho_keychain_credential_store()` keeps each provider credential in the operating system’s native keychain and rejects keyring’s environment and file backends. File updates are serialized, replace the prior document, and use owner-only permissions where the platform supports them. `rho_user_credential_path()` returns R’s platform-specific user configuration path without creating it.

rho_ai_events	<i>Normalized assistant and provider event protocols</i>
---------------	--

Description

Providers emit the typed `AssistantEvent` hierarchy. Provider-specific wire events are decoded and reduced through separate S7 generics, keeping wire formats out of the agent loop.

rho_ai_messages	<i>Message content and tool contracts</i>
-----------------	---

Description

Messages contain typed content objects rather than discriminator strings. Tool execution is asynchronous, and overlap is represented by an S7 value that the agent can dispatch on.

rho_ai_operations	<i>Semantic operations, handlers, and provider activity</i>
-------------------	---

Description

A RhoOperation states what a conversation may do. A handler binds that semantic request to a concrete implementation for the selected model. Bindings record both the handler and the reason it was selected; request translators turn bindings into provider wire values while encoding a request.

Details

Provider-hosted activity is normalized as Content, never as a local ToolCall. The agent can therefore retain and report a web search without placing it in its executable tool registry.

rho_ai_providers	<i>Models, providers, and capability operations</i>
------------------	---

Description

Shared model facts live in typed capability, limits, and pricing objects. Provider-specific behavior is queried with typed operation values and S7 dispatch, avoiding a lowest-common-denominator boolean map.

Details

Provider turns are independent of byte transport. `rho_stream()` always returns normalized assistant events whether an implementation uses SSE, WebSocket, an embedded model, or a remote evaluator. `ProviderTransport` values describe executable strategies. `AutomaticTransport` is a selection policy rather than a model capability. `rho_select_provider_transport()` records the selected strategy and reason; `rho_open_provider_transport()` is the provider-open execution point.

rho_ai_usage

*Usage observations and nominal pricing***Description**

ProviderUsage records token and cache counts supplied by a provider. EstimatedUsage records an explicitly named estimator and method. UsageUnavailable records that a provider did not supply counts; it has no fabricated token counts or cost. Usage components are disjoint: input excludes cache reads and writes, while output includes any reported reasoning tokens. reasoning is an optional breakdown of output; it is never added to total a second time. The optional cache_write_1h value is a subset of cache_write.

Details

rho_price_usage() is the open pricing protocol. Its default Model method selects the highest matching long-context tier, prices every component, and returns a new counted usage value with a NominalUsageCost. It does not claim to report a subscription charge. Model subclasses may provide methods for provider-specific pricing rules.

rho_summarize_usage() preserves every typed observation and reports disjoint token totals, nominal cost, and the latest cache-hit proportion. complete is false when any turn has UsageUnavailable; cost_complete is false when a counted turn has no nominal price. Zeroes therefore never hide missing provider data.

rho_anthropic_messages

*Anthropic Messages dialect***Description**

Anthropic request construction is a reduction over typed request sections. Model catalog facts select thinking, temperature, cache, and tool-input capabilities; request methods never infer behavior from model names.

Details

AnthropicMessagesEndpoint separates the Messages dialect from endpoint authentication and transport. Anthropic and GitHub Copilot therefore share message translation and event reduction while retaining their own endpoint headers, URLs, and credentials.

Stream JSON is decoded once into typed wire events. S7 methods translate blocks, deltas, and stop reasons into the provider-neutral AssistantEvent protocol.

rho_kimi_platform	<i>Kimi Platform provider</i>
-------------------	-------------------------------

Description

Kimi Platform uses its own Chat Completions dialect. Its typed request methods preserve Kimi thinking controls, use `max_completion_tokens`, and accept explicit image content. The global and China endpoints remain separate providers because their credentials and model catalogs are scoped independently.

rho_model_catalog	<i>Runtime-compiled model catalog</i>
-------------------	---------------------------------------

Description

The catalog stores model facts as package data. `rho_model_expression()` turns a typed provider profile, protocol, and record into an inspectable R call. `rho_compile_catalog_model()` evaluates that call to produce the S7 model value used by provider dispatch. Extensions may add provider profiles, protocols, and expression methods without rewriting the catalog reader.

Details

Catalog refresh is an explicit development operation. Package installation and ordinary runtime use never contact a catalog service.

rho_openai_chat_wire	<i>OpenAI-compatible Chat Completions stream protocol</i>
----------------------	---

Description

Chat Completions chunks are parsed into typed wire values and reduced by S7 methods to the normalized `AssistantEvent` protocol.

rho_openai_request_policy	<i>Typed OpenAI Responses request composition</i>
---------------------------	---

Description

OpenAI request bodies are reductions over typed sections. Model-specific methods select the sections and their defaults; section methods alone emit wire field names and provider values. Extensions can specialize rho_openai_request_sections() for a model subclass or append a new OpenAIRequestSection with a rho_request_fields() method.

Details

Canonical thinking requests are values. ThinkingOff therefore dispatches separately from enabled levels without comparing provider wire strings.

rho_openai_responses_wire	<i>Typed OpenAI Responses wire protocol</i>
---------------------------	---

Description

The OpenAI Responses decoder maps JSON/SSE payloads to typed wire event and output-item classes before reducing them to normalized assistant events. Provider extensions may add narrower S7 methods for new item or event types.

rho_zai	<i>Z.ai provider</i>
---------	----------------------

Description

Z.ai uses the OpenAI-compatible Chat Completions protocol with explicit thinking preservation and tool-call streaming policies.

Index

AnthropicAdaptiveThinkingCapability
(rho_anthropic_messages), 4

AnthropicApi (rho_anthropic_messages), 4

AnthropicApiKeyAuth
(rho_anthropic_messages), 4

AnthropicBudgetThinkingCapability
(rho_anthropic_messages), 4

AnthropicCacheCapability
(rho_anthropic_messages), 4

AnthropicCacheRetention
(rho_anthropic_messages), 4

AnthropicClaudeCodeToolNames
(rho_anthropic_messages), 4

AnthropicEagerToolInput
(rho_anthropic_messages), 4

AnthropicExactToolNames
(rho_anthropic_messages), 4

AnthropicFineGrainedToolInput
(rho_anthropic_messages), 4

AnthropicLongCache
(rho_anthropic_messages), 4

AnthropicMessagesCompatibility
(rho_anthropic_messages), 4

AnthropicMessagesDecoder
(rho_anthropic_messages), 4

AnthropicMessagesEndpoint
(rho_anthropic_messages), 4

AnthropicMessagesModel
(rho_ai_providers), 3

AnthropicMessagesProtocol
(rho_model_catalog), 5

AnthropicModelCatalogProvider
(rho_model_catalog), 5

AnthropicNoCache
(rho_anthropic_messages), 4

AnthropicNoThinkingCapability
(rho_anthropic_messages), 4

AnthropicOAuthAuth
(rho_anthropic_messages), 4

AnthropicOAuthCredential
(rho_anthropic_messages), 4

AnthropicOAuthModelAuth
(rho_anthropic_messages), 4

AnthropicOmittedThinking
(rho_anthropic_messages), 4

AnthropicRequestSection
(rho_anthropic_messages), 4

AnthropicShortCache
(rho_anthropic_messages), 4

AnthropicSummarizedThinking
(rho_anthropic_messages), 4

AnthropicTemperatureAccepted
(rho_anthropic_messages), 4

AnthropicTemperatureCapability
(rho_anthropic_messages), 4

AnthropicTemperatureOmitted
(rho_anthropic_messages), 4

AnthropicThinkingCapability
(rho_anthropic_messages), 4

AnthropicThinkingDisplay
(rho_anthropic_messages), 4

AnthropicToolChoice
(rho_anthropic_messages), 4

AnthropicToolChoiceAny
(rho_anthropic_messages), 4

AnthropicToolChoiceAuto
(rho_anthropic_messages), 4

AnthropicToolChoiceNamed
(rho_anthropic_messages), 4

AnthropicToolChoiceNone
(rho_anthropic_messages), 4

AnthropicToolChoiceUnspecified
(rho_anthropic_messages), 4

AnthropicToolInputCapability
(rho_anthropic_messages), 4

AnthropicToolNamePolicy
(rho_anthropic_messages), 4

AnthropicWebSearch20250305

- (rho_anthropic_messages), 4
- AnthropicWebSearch20260209
 - (rho_anthropic_messages), 4
- AnthropicWebSearch20260318
 - (rho_anthropic_messages), 4
- AnthropicWebSearchBinding
 - (rho_anthropic_messages), 4
- AnthropicWebSearchProtocol
 - (rho_anthropic_messages), 4
- AnthropicWireEvent
 - (rho_anthropic_messages), 4
- ArtifactRefContent (rho_ai_messages), 3
- AssistantDoneEvent (rho_ai_events), 2
- AssistantErrorEvent (rho_ai_events), 2
- AssistantEvent (rho_ai_events), 2
- AssistantMessage (rho_ai_messages), 3
- AssistantOperationEndEvent
 - (rho_ai_operations), 3
- AssistantOperationStartEvent
 - (rho_ai_operations), 3
- AssistantPartialEvent (rho_ai_events), 2
- AssistantStartEvent (rho_ai_events), 2
- AssistantTerminalEvent (rho_ai_events), 2
- AssistantTextDeltaEvent
 - (rho_ai_events), 2
- AssistantTextEndEvent (rho_ai_events), 2
- AssistantTextStartEvent
 - (rho_ai_events), 2
- AssistantThinkingDeltaEvent
 - (rho_ai_events), 2
- AssistantThinkingEndEvent
 - (rho_ai_events), 2
- AssistantThinkingStartEvent
 - (rho_ai_events), 2
- AssistantToolCallDeltaEvent
 - (rho_ai_events), 2
- AssistantToolCallEndEvent
 - (rho_ai_events), 2
- AssistantToolCallStartEvent
 - (rho_ai_events), 2
- AssistantUpdateEvent (rho_ai_events), 2
- AuthErrorValue (rho_ai_auth), 2
- AutomaticTransport (rho_ai_providers), 3
- BufferedToolCallStreaming (rho_zai), 6
- CachedWebSocketTransport
 - (rho_ai_providers), 3
- Content (rho_ai_messages), 3
- Context (rho_ai_providers), 3
- CredentialStore (rho_ai_auth), 2
- EmbeddedExecutor (rho_ai_providers), 3
- EmbeddedTransport (rho_ai_providers), 3
- EstimatedUsage (rho_ai_usage), 4
- FauxProvider (rho_ai_providers), 3
- GitHubCopilotAnthropicApi
 - (rho_ai_auth), 2
- GitHubCopilotApi (rho_ai_auth), 2
- GitHubCopilotClientIdentity
 - (rho_ai_auth), 2
- GitHubCopilotCredential (rho_ai_auth), 2
- GitHubCopilotDeviceAuthorization
 - (rho_ai_auth), 2
- GitHubCopilotDiscoverModels
 - (rho_ai_auth), 2
- GitHubCopilotEnableKnownModels
 - (rho_ai_auth), 2
- GitHubCopilotEndpoints (rho_ai_auth), 2
- GitHubCopilotLoginModelPolicy
 - (rho_ai_auth), 2
- GitHubCopilotModelAuth (rho_ai_auth), 2
- GitHubCopilotModelCatalogProvider
 - (rho_model_catalog), 5
- GitHubCopilotModelPolicyResult
 - (rho_ai_auth), 2
- GitHubCopilotOAuthAuth (rho_ai_auth), 2
- GitHubCopilotResponsesModel
 - (rho_ai_providers), 3
- ImageContent (rho_ai_messages), 3
- KimiCodeApi (rho_ai_auth), 2
- KimiCodeApiKeyAuth (rho_ai_auth), 2
- KimiCodeDeviceAuthorization
 - (rho_ai_auth), 2
- KimiCodeIdentity (rho_ai_auth), 2
- KimiCodeModelAuth (rho_ai_auth), 2
- KimiCodeModelCatalogProvider
 - (rho_model_catalog), 5
- KimiCodeOAuthAuth (rho_ai_auth), 2
- KimiCodeOAuthCredential (rho_ai_auth), 2
- KimiCodeToken (rho_ai_auth), 2
- KimiPlatformApi (rho_kimi_platform), 5
- KimiPlatformApiKeyAuth
 - (rho_kimi_platform), 5

KimiPlatformChatCompletionsModel
 (rho_kimi_platform), 5
 KimiPlatformChinaEndpoint
 (rho_kimi_platform), 5
 KimiPlatformEndpoint
 (rho_kimi_platform), 5
 KimiPlatformGlobalEndpoint
 (rho_kimi_platform), 5
 KimiPlatformModelCatalogProvider
 (rho_model_catalog), 5
 KimiPlatformThinkingDisabled
 (rho_kimi_platform), 5
 KimiPlatformThinkingEffort
 (rho_kimi_platform), 5
 KimiPlatformThinkingEnabled
 (rho_kimi_platform), 5
 KimiPlatformThinkingRequest
 (rho_kimi_platform), 5
 KimiPlatformThinkingUnspecified
 (rho_kimi_platform), 5

 LoginIO (rho_ai_auth), 2

 Model (rho_ai_providers), 3
 ModelCapabilities (rho_ai_providers), 3
 ModelCatalog (rho_model_catalog), 5
 ModelCatalogModelNotFound
 (rho_model_catalog), 5
 ModelCatalogProvider
 (rho_model_catalog), 5
 ModelCatalogRecord (rho_model_catalog),
 5
 ModelCatalogSource (rho_model_catalog),
 5
 ModelInputAccepted (rho_ai_providers), 3
 ModelLimits (rho_ai_providers), 3
 ModelPricing (rho_ai_providers), 3
 ModelPricingTier (rho_ai_providers), 3
 ModelProtocol (rho_model_catalog), 5

 NominalUsageCost (rho_ai_usage), 4

 OAuthAuth (rho_ai_auth), 2
 OllamaProvider (rho_ai_providers), 3
 OpenAIApi (rho_ai_providers), 3
 OpenAIApiKeyAuth (rho_ai_providers), 3
 OpenAIChatCompletionsDecoder
 (rho_openai_chat_wire), 5
 OpenAIChatCompletionsModel
 (rho_ai_providers), 3

 OpenAIChatCompletionsProtocol
 (rho_model_catalog), 5
 OpenAIChatDone (rho_openai_chat_wire), 5
 OpenAIChatError (rho_openai_chat_wire),
 5
 OpenAIChatFinishSignal
 (rho_openai_chat_wire), 5
 OpenAIChatIgnored
 (rho_openai_chat_wire), 5
 OpenAIChatTextDelta
 (rho_openai_chat_wire), 5
 OpenAIChatThinkingDelta
 (rho_openai_chat_wire), 5
 OpenAIChatToolDelta
 (rho_openai_chat_wire), 5
 OpenAIChatUsageUpdate
 (rho_openai_chat_wire), 5
 OpenAIChatWireEvent
 (rho_openai_chat_wire), 5
 OpenAICodexApi (rho_ai_auth), 2
 OpenAICodexModelCatalogProvider
 (rho_model_catalog), 5
 OpenAICodexOAuthAuth (rho_ai_auth), 2
 OpenAICodexResponsesModel
 (rho_ai_providers), 3
 OpenAICodexWebSocketRequest
 (rho_ai_auth), 2
 OpenAIFunctionCallItem
 (rho_openai_responses_wire), 6
 OpenAIMessageItem
 (rho_openai_responses_wire), 6
 OpenAIModelCatalogProvider
 (rho_model_catalog), 5
 OpenAIOMittedRequestSection
 (rho_openai_request_policy), 6
 OpenAIReasoningItem
 (rho_openai_responses_wire), 6
 OpenAIRequestSection
 (rho_openai_request_policy), 6
 OpenAIResponseCompleted
 (rho_openai_responses_wire), 6
 OpenAIResponseCreated
 (rho_openai_responses_wire), 6
 OpenAIResponseDecoder
 (rho_openai_responses_wire), 6
 OpenAIResponseError
 (rho_openai_responses_wire), 6
 OpenAIResponseIgnored

- (rho_openai_responses_wire), 6
- OpenAIResponseIncomplete
 - (rho_openai_responses_wire), 6
- OpenAIResponseItem
 - (rho_openai_responses_wire), 6
- OpenAIResponseOutputItemAdded
 - (rho_openai_responses_wire), 6
- OpenAIResponseOutputItemDone
 - (rho_openai_responses_wire), 6
- OpenAIResponsesCompatibility
 - (rho_ai_providers), 3
- OpenAIResponseSlot
 - (rho_openai_responses_wire), 6
- OpenAIResponsesModel
 - (rho_ai_providers), 3
- OpenAIResponsesProtocol
 - (rho_model_catalog), 5
- OpenAIResponseTextDelta
 - (rho_openai_responses_wire), 6
- OpenAIResponseThinkingBreak
 - (rho_openai_responses_wire), 6
- OpenAIResponseThinkingDelta
 - (rho_openai_responses_wire), 6
- OpenAIResponseToolArgumentsDelta
 - (rho_openai_responses_wire), 6
- OpenAIResponseToolArgumentsDone
 - (rho_openai_responses_wire), 6
- OpenAIResponseWireEvent
 - (rho_openai_responses_wire), 6
- OpenAIUnsupportedItem
 - (rho_openai_responses_wire), 6
- OpenAIWebSearchBinding
 - (rho_openai_responses_wire), 6
- OpenAIWebSearchCallItem
 - (rho_openai_responses_wire), 6
- OpenAIWebSearchCapability
 - (rho_openai_responses_wire), 6
- OpenAIWebSearchText
 - (rho_openai_responses_wire), 6
- OpenAIWebSearchTextAndImage
 - (rho_openai_responses_wire), 6
- OperationCompleted (rho_ai_operations), 3
- OperationExecutor (rho_ai_operations), 3
- OperationFailed (rho_ai_operations), 3
- OperationHandler (rho_ai_operations), 3
- OperationInProgress
 - (rho_ai_operations), 3
- OperationPending (rho_ai_operations), 3
- OperationPlanner (rho_ai_operations), 3
- OperationStatus (rho_ai_operations), 3
- OperationUnsupported
 - (rho_ai_operations), 3
- Provider (rho_ai_providers), 3
- ProviderCapabilityResolver
 - (rho_ai_providers), 3
- ProviderContextOverflowError
 - (rho_ai_messages), 3
- ProviderErrorValue (rho_ai_providers), 3
- ProviderEventDecoder (rho_ai_events), 2
- ProviderInputCompactor
 - (rho_ai_providers), 3
- ProviderInputLimitError
 - (rho_ai_messages), 3
- ProviderInputUnsupported
 - (rho_ai_providers), 3
- ProviderOperationUnsupported
 - (rho_ai_providers), 3
- ProviderRequestSection
 - (rho_openai_request_policy), 6
- ProviderRequestSectionProtocol
 - (rho_openai_request_policy), 6
- ProviderRequestToolLargeError
 - (rho_ai_messages), 3
- ProviderRequestTranslator
 - (rho_ai_providers), 3
- ProviderTransport (rho_ai_providers), 3
- ProviderTransportSelection
 - (rho_ai_providers), 3
- ProviderTransportUnsupported
 - (rho_ai_providers), 3
- ProviderUsage (rho_ai_usage), 4
- ProviderWireEvent (rho_ai_events), 2
- ResponseItemProtocol (rho_ai_events), 2
- rho_ai_auth, 2
- rho_ai_events, 2
- rho_ai_messages, 3
- rho_ai_operations, 3
- rho_ai_providers, 3
- rho_ai_usage, 4
- rho_anthropic_auth_headers
 - (rho_anthropic_messages), 4
- rho_anthropic_beta_name
 - (rho_anthropic_messages), 4

rho_anthropic_cache_control
 (rho_anthropic_messages), 4
 rho_anthropic_claude_code_tool_names
 (rho_anthropic_messages), 4
 rho_anthropic_content_blocks
 (rho_anthropic_messages), 4
 rho_anthropic_endpoint_headers
 (rho_anthropic_messages), 4
 rho_anthropic_endpoint_http
 (rho_anthropic_messages), 4
 rho_anthropic_endpoint_url
 (rho_anthropic_messages), 4
 rho_anthropic_exact_tool_names
 (rho_anthropic_messages), 4
 rho_anthropic_local_tool_name
 (rho_anthropic_messages), 4
 rho_anthropic_long_cache
 (rho_anthropic_messages), 4
 rho_anthropic_message
 (rho_anthropic_messages), 4
 rho_anthropic_messages, 4
 rho_anthropic_messages_body
 (rho_anthropic_messages), 4
 rho_anthropic_messages_compatibility
 (rho_ai_providers), 3
 rho_anthropic_messages_decoder
 (rho_anthropic_messages), 4
 rho_anthropic_messages_request
 (rho_anthropic_messages), 4
 rho_anthropic_messages_url
 (rho_anthropic_messages), 4
 rho_anthropic_model
 (rho_anthropic_messages), 4
 rho_anthropic_no_cache
 (rho_anthropic_messages), 4
 rho_anthropic_oauth_auth
 (rho_anthropic_messages), 4
 rho_anthropic_oauth_credential
 (rho_anthropic_messages), 4
 rho_anthropic_provider
 (rho_anthropic_messages), 4
 rho_anthropic_request_sections
 (rho_anthropic_messages), 4
 rho_anthropic_short_cache
 (rho_anthropic_messages), 4
 rho_anthropic_stop_reason_error
 (rho_anthropic_messages), 4
 rho_anthropic_stop_reason_value
 (rho_anthropic_messages), 4
 rho_anthropic_system_identity
 (rho_anthropic_messages), 4
 rho_anthropic_temperature
 (rho_anthropic_messages), 4
 rho_anthropic_temperature_section
 (rho_anthropic_messages), 4
 rho_anthropic_thinking_display
 (rho_anthropic_messages), 4
 rho_anthropic_thinking_section
 (rho_anthropic_messages), 4
 rho_anthropic_tool_choice
 (rho_anthropic_messages), 4
 rho_anthropic_tool_fields
 (rho_anthropic_messages), 4
 rho_anthropic_tool_name
 (rho_anthropic_messages), 4
 rho_anthropic_tool_name_policy
 (rho_anthropic_messages), 4
 rho_api_key_auth (rho_ai_auth), 2
 rho_api_key_credential (rho_ai_auth), 2
 rho_apply_anthropic_delta
 (rho_anthropic_messages), 4
 rho_apply_thinking_control (rho_zai), 6
 rho_apply_tool_call_streaming
 (rho_zai), 6
 rho_approximate_location
 (rho_ai_operations), 3
 rho_assistant_done_event
 (rho_ai_events), 2
 rho_assistant_error_event
 (rho_ai_events), 2
 rho_assistant_event_type
 (rho_ai_events), 2
 rho_assistant_message
 (rho_ai_messages), 3
 rho_assistant_start_event
 (rho_ai_events), 2
 rho_assistant_text_delta_event
 (rho_ai_events), 2
 rho_assistant_text_end_event
 (rho_ai_events), 2
 rho_assistant_text_start_event
 (rho_ai_events), 2
 rho_assistant_thinking_delta_event
 (rho_ai_events), 2
 rho_assistant_thinking_end_event
 (rho_ai_events), 2

rho_assistant_thinking_start_event
 (rho_ai_events), 2
 rho_assistant_tool_call_delta_event
 (rho_ai_events), 2
 rho_assistant_tool_call_end_event
 (rho_ai_events), 2
 rho_assistant_tool_call_start_event
 (rho_ai_events), 2
 rho_auth_error (rho_ai_auth), 2
 rho_auth_login (rho_ai_auth), 2
 rho_auth_notify (rho_ai_auth), 2
 rho_auth_prompt (rho_ai_auth), 2
 rho_auth_refresh (rho_ai_auth), 2
 rho_auth_to_request (rho_ai_auth), 2
 rho_available_models (rho_ai_auth), 2
 rho_bind_operation (rho_ai_operations),
 3
 rho_bind_web_search
 (rho_ai_operations), 3
 rho_build_provider_request
 (rho_ai_providers), 3
 rho_catalog_bindings
 (rho_model_catalog), 5
 rho_catalog_model (rho_model_catalog), 5
 rho_catalog_models (rho_model_catalog),
 5
 rho_clamp_thinking_level
 (rho_ai_providers), 3
 rho_compact_provider_input
 (rho_ai_providers), 3
 rho_compile_catalog_model
 (rho_model_catalog), 5
 rho_complete (rho_ai_providers), 3
 rho_content_modalities
 (rho_ai_providers), 3
 rho_content_text (rho_ai_providers), 3
 rho_context (rho_ai_providers), 3
 rho_context_revision (rho_ai_messages),
 3
 rho_context_signature
 (rho_ai_messages), 3
 rho_credential_decode (rho_ai_auth), 2
 rho_credential_delete (rho_ai_auth), 2
 rho_credential_encode (rho_ai_auth), 2
 rho_credential_encryption_key
 (rho_ai_auth), 2
 rho_credential_gate (rho_ai_auth), 2
 rho_credential_modify (rho_ai_auth), 2
 rho_credential_passphrase
 (rho_ai_auth), 2
 rho_credential_read (rho_ai_auth), 2
 rho_decode_provider_event
 (rho_ai_events), 2
 rho_default_model_bindings
 (rho_model_catalog), 5
 rho_default_model_catalog
 (rho_model_catalog), 5
 rho_embedded_executor
 (rho_ai_providers), 3
 rho_embedded_provider
 (rho_ai_providers), 3
 rho_embedded_stream (rho_ai_providers),
 3
 rho_encrypted_file_credential_store
 (rho_ai_auth), 2
 rho_estimated_usage (rho_ai_usage), 4
 rho_execute_operation
 (rho_ai_operations), 3
 rho_execute_tool (rho_ai_messages), 3
 rho_faux_content_events
 (rho_ai_providers), 3
 rho_faux_message_events
 (rho_ai_providers), 3
 rho_faux_provider (rho_ai_providers), 3
 rho_file_credential_store
 (rho_ai_auth), 2
 rho_finish_anthropic_block
 (rho_anthropic_messages), 4
 rho_finish_response_item
 (rho_ai_events), 2
 rho_github_copilot_auth (rho_ai_auth), 2
 rho_github_copilot_client_identity
 (rho_ai_auth), 2
 rho_github_copilot_credential
 (rho_ai_auth), 2
 rho_github_copilot_credential_from_github_token
 (rho_ai_auth), 2
 rho_github_copilot_discover_models_policy
 (rho_ai_auth), 2
 rho_github_copilot_enable_known_models_policy
 (rho_ai_auth), 2
 rho_github_copilot_model (rho_ai_auth),
 2
 rho_github_copilot_provider
 (rho_ai_auth), 2
 rho_github_copilot_request

- (rho_ai_auth), 2
- rho_has_image_input (rho_ai_auth), 2
- rho_keychain_credential_store
 - (rho_ai_auth), 2
- rho_kimi_code_identity (rho_ai_auth), 2
- rho_kimi_code_identity_headers
 - (rho_ai_auth), 2
- rho_kimi_code_model (rho_ai_auth), 2
- rho_kimi_code_oauth_auth (rho_ai_auth), 2
- rho_kimi_code_provider (rho_ai_auth), 2
- rho_kimi_platform, 5
- rho_kimi_platform_china_endpoint
 - (rho_kimi_platform), 5
- rho_kimi_platform_global_endpoint
 - (rho_kimi_platform), 5
- rho_kimi_platform_model
 - (rho_kimi_platform), 5
- rho_kimi_platform_provider
 - (rho_kimi_platform), 5
- rho_kimi_platform_request
 - (rho_kimi_platform), 5
- rho_kimi_platform_thinking
 - (rho_kimi_platform), 5
- rho_load_anthropic_credential
 - (rho_anthropic_messages), 4
- rho_load_github_copilot_credential
 - (rho_ai_auth), 2
- rho_load_openai_codex_credential
 - (rho_ai_auth), 2
- rho_login_io (rho_ai_auth), 2
- rho_login_provider (rho_ai_auth), 2
- rho_login_strategy (rho_ai_auth), 2
- rho_map_thinking_level
 - (rho_ai_providers), 3
- rho_memory_credential_store
 - (rho_ai_auth), 2
- rho_message_initiator (rho_ai_auth), 2
- rho_model (rho_ai_providers), 3
- rho_model_auth (rho_ai_auth), 2
- rho_model_capabilities
 - (rho_ai_providers), 3
- rho_model_catalog, 5
- rho_model_expression
 - (rho_model_catalog), 5
- rho_model_limits (rho_ai_providers), 3
- rho_model_pricing (rho_ai_providers), 3
- rho_model_pricing_tier
 - (rho_ai_providers), 3
- rho_model_supports_input
 - (rho_ai_providers), 3
- rho_model_supports_transport
 - (rho_ai_providers), 3
- rho_models (rho_ai_auth), 2
- rho_models_provider (rho_ai_auth), 2
- rho_nominal_usage_cost (rho_ai_usage), 4
- rho_oauth_auth (rho_ai_auth), 2
- rho_ollama_chat_request
 - (rho_ai_providers), 3
- rho_ollama_chat_task
 - (rho_ai_providers), 3
- rho_ollama_model (rho_ai_providers), 3
- rho_ollama_provider (rho_ai_providers), 3
- rho_open_provider_transport
 - (rho_ai_providers), 3
- rho_open_provider_transport(), 3
- rho_openai_chat_content
 - (rho_openai_chat_wire), 5
- rho_openai_chat_decoder
 - (rho_openai_chat_wire), 5
- rho_openai_chat_message
 - (rho_openai_chat_wire), 5
- rho_openai_chat_request_body
 - (rho_ai_providers), 3
- rho_openai_chat_wire, 5
- rho_openai_codex_auth (rho_ai_auth), 2
- rho_openai_codex_credential
 - (rho_ai_auth), 2
- rho_openai_codex_model (rho_ai_auth), 2
- rho_openai_codex_provider
 - (rho_ai_auth), 2
- rho_openai_codex_request (rho_ai_auth), 2
- rho_openai_codex_websocket_request
 - (rho_ai_auth), 2
- rho_openai_input_content
 - (rho_openai_request_policy), 6
- rho_openai_model (rho_ai_providers), 3
- rho_openai_provider (rho_ai_providers), 3
- rho_openai_reasoning_section
 - (rho_openai_request_policy), 6
- rho_openai_request (rho_ai_providers), 3
- rho_openai_request_policy, 6
- rho_openai_request_sections

(rho_openai_request_policy), 6
 rho_openai_responses_body
 (rho_ai_providers), 3
 rho_openai_responses_compatibility
 (rho_ai_providers), 3
 rho_openai_responses_decoder
 (rho_openai_responses_wire), 6
 rho_openai_responses_url
 (rho_ai_providers), 3
 rho_openai_responses_wire, 6
 rho_openai_standard_request_sections
 (rho_openai_request_policy), 6
 rho_operation_plan (rho_ai_operations),
 3
 rho_operation_unsupported
 (rho_ai_operations), 3
 rho_plan_operations
 (rho_ai_operations), 3
 rho_plan_tools (rho_ai_providers), 3
 rho_prepare_github_copilot_models
 (rho_ai_auth), 2
 rho_price_usage (rho_ai_usage), 4
 rho_provider (rho_ai_auth), 2
 rho_provider_auth (rho_ai_auth), 2
 rho_provider_context_overflow
 (rho_ai_providers), 3
 rho_provider_dialect
 (rho_ai_providers), 3
 rho_provider_error (rho_ai_providers), 3
 rho_provider_headers
 (rho_ai_providers), 3
 rho_provider_http_error
 (rho_ai_providers), 3
 rho_provider_input_unsupported
 (rho_ai_providers), 3
 rho_provider_models (rho_ai_auth), 2
 rho_provider_request_too_large
 (rho_ai_providers), 3
 rho_provider_support
 (rho_ai_providers), 3
 rho_provider_support_value
 (rho_ai_providers), 3
 rho_provider_transports
 (rho_ai_providers), 3
 rho_provider_usage (rho_ai_usage), 4
 rho_reduce_provider_event
 (rho_ai_events), 2
 rho_request_fields
 (rho_openai_request_policy), 6
 rho_resolve_model_auth (rho_ai_auth), 2
 rho_select_provider_transport
 (rho_ai_providers), 3
 rho_select_provider_transport(), 3
 rho_start_anthropic_block
 (rho_anthropic_messages), 4
 rho_start_response_item
 (rho_ai_events), 2
 rho_stream (rho_ai_providers), 3
 rho_stream(), 3
 rho_summarize_usage (rho_ai_usage), 4
 rho_summarize_usage(), 4
 rho_supported_thinking_levels
 (rho_ai_providers), 3
 rho_text (rho_ai_messages), 3
 rho_thinking (rho_ai_messages), 3
 rho_thinking_level
 (rho_openai_request_policy), 6
 rho_thinking_levels (rho_ai_providers),
 3
 rho_tool_error_result
 (rho_ai_messages), 3
 rho_tool_overlap (rho_ai_messages), 3
 rho_tool_result (rho_ai_messages), 3
 rho_tool_result_message
 (rho_ai_messages), 3
 rho_tool_spec (rho_ai_messages), 3
 rho_transport_id (rho_ai_providers), 3
 rho_unsupported_provider_operation
 (rho_ai_providers), 3
 rho_usage_observations (rho_ai_usage), 4
 rho_usage_unavailable (rho_ai_usage), 4
 rho_user_credential_path (rho_ai_auth),
 2
 rho_user_message (rho_ai_messages), 3
 rho_validate_model_input
 (rho_ai_providers), 3
 rho_validate_tool_args
 (rho_ai_messages), 3
 rho_web_search (rho_ai_operations), 3
 rho_web_search_allowed_domains
 (rho_ai_operations), 3
 rho_web_search_blocked_domains
 (rho_ai_operations), 3
 rho_zai, 6
 rho_zai_china_coding_endpoint
 (rho_zai), 6

- rho_zai_coding_endpoint (rho_zai), 6
- rho_zai_general_endpoint (rho_zai), 6
- rho_zai_model (rho_zai), 6
- rho_zai_provider (rho_zai), 6
- rho_zai_request (rho_zai), 6
- RhoAnthropicToolReferencePlacement (rho_ai_providers), 3
- RhoApiKeyAuth (rho_ai_auth), 2
- RhoApiKeyCredential (rho_ai_auth), 2
- RhoApiKeyLogin (rho_ai_auth), 2
- RhoApproximateLocation (rho_ai_operations), 3
- RhoAuthEvent (rho_ai_auth), 2
- RhoAuthProgressEvent (rho_ai_auth), 2
- RhoAuthPrompt (rho_ai_auth), 2
- RhoAuthResolution (rho_ai_auth), 2
- RhoAuthUrlEvent (rho_ai_auth), 2
- RhoCacheRetentionOperation (rho_ai_providers), 3
- RhoCompactionOperation (rho_ai_operations), 3
- RhoContextRevision (rho_ai_messages), 3
- RhoCredential (rho_ai_auth), 2
- RhoCredentialEncryptionKey (rho_ai_auth), 2
- RhoCredentialEncryptionSecret (rho_ai_auth), 2
- RhoCredentialGate (rho_ai_auth), 2
- RhoCredentialPassphrase (rho_ai_auth), 2
- RhoDeviceCodeEvent (rho_ai_auth), 2
- RhoEmbeddedExecutor (rho_ai_providers), 3
- RhoEmbeddedProvider (rho_ai_providers), 3
- RhoEncryptedFileCredentialStore (rho_ai_auth), 2
- RhoFileCredentialStore (rho_ai_auth), 2
- RhoFullToolPlacement (rho_ai_providers), 3
- RhoFunctionEmbeddedExecutor (rho_ai_providers), 3
- RhoFunctionLoginIO (rho_ai_auth), 2
- RhoFunctionOAuthAuth (rho_ai_auth), 2
- RhoKeychainCredentialStore (rho_ai_auth), 2
- RhoLoginMethod (rho_ai_auth), 2
- RhoManualCodeAuthPrompt (rho_ai_auth), 2
- RhoMemoryCredentialStore (rho_ai_auth), 2
- RhoModelAuth (rho_ai_auth), 2
- RhoModels (rho_ai_auth), 2
- RhoNativeCompactionOperation (rho_ai_operations), 3
- RhoOAuthAuth (rho_ai_auth), 2
- RhoOAuthCredential (rho_ai_auth), 2
- RhoOAuthLogin (rho_ai_auth), 2
- RhoOpenAIToolSearchPlacement (rho_ai_providers), 3
- RhoOperation (rho_ai_operations), 3
- RhoOperationBinding (rho_ai_operations), 3
- RhoOperationPlan (rho_ai_operations), 3
- RhoProvider (rho_ai_auth), 2
- RhoProviderAuth (rho_ai_auth), 2
- RhoProviderCompactionBinding (rho_ai_operations), 3
- RhoProviderOperation (rho_ai_providers), 3
- RhoProviderSupport (rho_ai_providers), 3
- RhoProviderToolBinding (rho_ai_operations), 3
- RhoSecretAuthPrompt (rho_ai_auth), 2
- RhoSelectAuthPrompt (rho_ai_auth), 2
- RhoTextAuthPrompt (rho_ai_auth), 2
- RhoToolPlacement (rho_ai_providers), 3
- RhoToolReferencesOperation (rho_ai_providers), 3
- RhoToolSearchOperation (rho_ai_providers), 3
- RhoWebSearchAllDomains (rho_ai_operations), 3
- RhoWebSearchAllowedDomains (rho_ai_operations), 3
- RhoWebSearchBlockedDomains (rho_ai_operations), 3
- RhoWebSearchCapability (rho_ai_operations), 3
- RhoWebSearchDomainPolicy (rho_ai_operations), 3
- RhoWebSearchLocation (rho_ai_operations), 3
- RhoWebSearchLocationUnspecified (rho_ai_operations), 3
- RhoWebSearchOperation (rho_ai_operations), 3
- RhoWebSearchUnavailable

- (rho_ai_operations), 3
- SseTransport (rho_ai_providers), 3
- TextContent (rho_ai_messages), 3
- ThinkingContent (rho_ai_messages), 3
- ThinkingControl (rho_zai), 6
- ThinkingEnabled
 - (rho_openai_request_policy), 6
- ThinkingLevel
 - (rho_openai_request_policy), 6
- ThinkingOff
 - (rho_openai_request_policy), 6
- ThinkingRequest
 - (rho_openai_request_policy), 6
- ThinkingUnspecified
 - (rho_openai_request_policy), 6
- Tool (rho_ai_messages), 3
- ToolCall (rho_ai_messages), 3
- ToolCallStreamingPolicy (rho_zai), 6
- ToolErrorResult (rho_ai_messages), 3
- ToolMayOverlap (rho_ai_messages), 3
- ToolOverlap (rho_ai_messages), 3
- ToolRequiresExclusiveExecution
 - (rho_ai_messages), 3
- ToolResult (rho_ai_messages), 3
- ToolResultMessage (rho_ai_messages), 3
- ToolSpec (rho_ai_messages), 3
- Usage (rho_ai_usage), 4
- UsageCost (rho_ai_usage), 4
- UsageObservation (rho_ai_usage), 4
- UsageSummary (rho_ai_usage), 4
- UsageUnavailable (rho_ai_usage), 4
- UserMessage (rho_ai_messages), 3
- WebSearchAction (rho_ai_operations), 3
- WebSearchActionUnspecified
 - (rho_ai_operations), 3
- WebSearchCallContent
 - (rho_ai_operations), 3
- WebSearchFindInPageAction
 - (rho_ai_operations), 3
- WebSearchOpenPageAction
 - (rho_ai_operations), 3
- WebSearchResult (rho_ai_operations), 3
- WebSearchResultContent
 - (rho_ai_operations), 3
- WebSearchSearchAction
 - (rho_ai_operations), 3
- WebSearchUnknownAction
 - (rho_ai_operations), 3
- WebSocketTransport (rho_ai_providers), 3
- ZaiApi (rho_zai), 6
- ZaiApiKeyAuth (rho_zai), 6
- ZaiChatCompletionsModel (rho_zai), 6
- ZaiCodingEndpoint (rho_zai), 6
- ZaiEndpoint (rho_zai), 6
- ZaiGeneralEndpoint (rho_zai), 6
- ZaiModelCatalogProvider
 - (rho_model_catalog), 5
- ZaiThinkingControl (rho_zai), 6
- ZaiToolCallStreaming (rho_zai), 6