

Package ‘shinyOAuth’

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Title Provider-Agnostic OAuth Authentication for 'shiny' Applications

Version 0.3.0

Description Provides a simple, configurable, provider-agnostic 'OAuth 2.0' and 'OpenID Connect' (OIDC) authentication framework for 'shiny' applications using 'S7' classes. Defines providers, clients, and tokens, as well as various supporting functions and a 'shiny' module. Features include cross-site request forgery (CSRF) protection, state encryption, 'Proof Key for Code Exchange' (PKCE) handling, validation of OIDC identity tokens (nonces, signatures, claims), automatic user info retrieval, asynchronous flows, and hooks for audit logging.

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Author Luka Koning [aut, cre, cph]

Maintainer Luka Koning <koningluka@gmail.com>

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client_bearer_req	<i>Build an authorized httr2 request with Bearer token</i>
-------------------	--

Description

Convenience helper to reduce boilerplate when calling downstream APIs. It creates an `httr2::request()` for the given URL, attaches the `Authorization: Bearer <token>` header, and applies the package's standard HTTP defaults (timeout and User-Agent).

Accepts either a raw access token string or an `OAuthToken` object.

Usage

```
client_bearer_req(  
  token,  
  url,  
  method = "GET",  
  headers = NULL,  
  query = NULL,  
  follow_redirect = FALSE  
)
```

Arguments

token	Either an OAuthToken object or a raw access token string.
url	The absolute URL to call.
method	Optional HTTP method (character). Defaults to "GET".
headers	Optional named list or named character vector of extra headers to set on the request. Header names are case-insensitive. Any user-supplied Authorization header is ignored to ensure the Bearer token set by this function is not overridden.
query	Optional named list of query parameters to append to the URL.
follow_redirect	Logical. If FALSE (the default), HTTP redirects are disabled to prevent leaking the Bearer token to unexpected hosts. Set to TRUE only if you trust all possible redirect targets and understand the security implications.

Value

An `httr2` request object, ready to be further customized or performed with [httr2::req_perform\(\)](#).

Examples

```
# Make request using OAuthToken object  
# (code is not run because it requires a real token from user interaction)  
## Not run:  
# Get an OAuthToken  
# (typically provided as reactive return value by `oauth_module_server()`)  
token <- OAuthToken()  
  
# Build request  
request <- client_bearer_req(  
  token,  
  "https://api.example.com/resource",  
  query = list(limit = 5)  
)  
  
# Perform request  
response <- httr2::req_perform(request)  
  
## End(Not run)
```

custom_cache

*Create a custom cache backend (cachem-like)***Description**

Builds a minimal cachem-like cache backend object that exposes cachem-compatible methods: `$get(key, missing)`, `$set(key, value)`, `$remove(key)`, and `$info()`.

Use this helper when you want to plug a custom state store or JWKS cache into 'shinyOAuth', when `cachem::cache_mem()` or `cachem::cache_disk()` are not suitable. This may be useful specifically when you deploy a Shiny app to a multi-process environment with non-sticky workers. In such cases, you may want to use a shared external cache (e.g., database, Redis, Memcached).

The resulting object can be used in both places where 'shinyOAuth' accepts a cache-like object:

- `OAuthClient@state_store` (requires `$get`, `$set`, `$remove`; optional `$info`)
- `OAuthProvider@jwks_cache` (requires `$get`, `$set`; optional `$remove`, `$info`)

The `$info()` method is optional, but if provided and it returns a list with `max_age` (seconds), shinyOAuth will align browser cookie max-age in `oauth_module_server()` to that value.

Usage

```
custom_cache(get, set, remove, info = NULL)
```

Arguments

get	A function(key, missing = NULL) -> value. Required. Should return the stored value, or the missing argument if the key is not present. The missing parameter is mandatory because both <code>OAuthClient</code> and <code>OAuthProvider</code> validators will pass it explicitly.
set	A function(key, value) -> invisible(NULL). Required. Should store the value under the given key
remove	A function(key) -> logical or sentinel. Required. For state stores, this enforces single-use eviction. If your backend performs an atomic "get-and-delete" (e.g., SQL DELETE .. RETURNING), you may supply a function which does nothing here but returns TRUE. (The login flow will always attempt to call <code>\$remove()</code> after <code>\$get()</code> as a best-effort cleanup.) Recommended contract for interoperability and strong replay protection: • Return TRUE when a key was actually deleted or if it already did not exist • Return FALSE when they key could not be deleted or when it is unknown if they key was deleted When the return value is not TRUE, 'shinyOAuth' will attempt to retrieve the value from the state store to check if it may still be present; if that fails (i.e., key is not present), it will treat the removal as succesful. If it does find the key, it will produce an error indicating that removal did not succeed.
info	Function() -> list(max_age = seconds, ...). Optional This may be provided to because TTL information from <code>\$info()</code> is used to align browser cookie max age in <code>oauth_module_server()</code>

Value

An R6 object exposing cachem-like `$get/$set/$remove/$info` methods

Examples

```
mem <- new.env(parent = emptyenv())

my_cache <- custom_cache(
  get = function(key, missing = NULL) {
    base::get0(key, envir = mem, ifnotfound = missing, inherits = FALSE)
  },

  set = function(key, value) {
    assign(key, value, envir = mem)
    invisible(NULL)
  },

  remove = function(key) {
    if (exists(key, envir = mem, inherits = FALSE)) {
      rm(list = key, envir = mem)
      return(TRUE) # signal successful deletion
    }
    return(TRUE) # key did not exist
  },

  info = function() list(max_age = 600)
)
```

error_on_softened	<i>Throw an error if any safety checks have been disabled</i>
-------------------	---

Description

This function checks if any safety checks have been disabled via options intended for local development use only. If any such options are detected, an error is thrown to prevent accidental use in production environments.

Usage

```
error_on_softened()
```

Details

It checks for the following options:

- `shinyOAuth.skip_browser_token`: Skips browser cookie presence check
- `shinyOAuth.skip_id_sig`: Skips ID token signature verification
- `shinyOAuth.print_errors`: Enables printing of error messages

- `shinyOAuth.print_traceback`: Enables printing of tracebacks (opt-in only; default FALSE)
- `shinyOAuth.expose_error_body`: Exposes HTTP response bodies

Note: Tracebacks are only treated as a "softened" behavior when the `shinyOAuth.print_traceback` option is explicitly set to TRUE. The default is FALSE, even in interactive or test sessions.

Value

Invisible TRUE if no safety checks are disabled; otherwise, an error is thrown.

Examples

```
# Throw an error if any developer-only softening options are enabled
# Below call does not error if run with default options:
error_on_softened()

# Below call would error (is therefore not run):
## Not run:
options(shinyOAuth.skip_id_sig = TRUE)
error_on_softened()

## End(Not run)
```

get_userinfo	<i>Get user info from OAuth 2.0 provider</i>
--------------	--

Description

Fetches user information from the provider's userinfo endpoint using the provided access token. Emits an audit event with redacted details.

Usage

```
get_userinfo(oauth_client, token)
```

Arguments

oauth_client	OAuthClient object. The client must have a <code>userinfo_url</code> configured in its OAuthProvider .
token	Either an OAuthToken object or a raw access token string.

Value

A list containing the user information as returned by the provider.

Examples

```
# Please note: `get_userinfo()`, `introspect_token()`, and `refresh_token()`
# are typically not called by users of this package directly, but are called
# internally by `oauth_module_server()`. These functions are exported
# nonetheless for advanced use cases. Most users will not need to
# call these functions directly

# Example requires a real token from a completed OAuth flow
# (code is therefore not run; would error with placeholder values below)
## Not run:
# Define client
client <- oauth_client(
  provider = oauth_provider_github(),
  client_id = Sys.getenv("GITHUB_OAUTH_CLIENT_ID"),
  client_secret = Sys.getenv("GITHUB_OAUTH_CLIENT_SECRET"),
  redirect_uri = "http://127.0.0.1:8100"
)

# Have a valid OAuthToken object; fake example below
# (typically provided by `oauth_module_server()` or `handle_callback()`)
token <- handle_callback(client, "<code>", "<payload>", "<browser_token>")

# Get userinfo
user_info <- get_userinfo(client, token)

# Introspect token (if supported by provider)
introspection <- introspect_token(client, token)

# Refresh token
new_token <- refresh_token(client, token, introspect = TRUE)

## End(Not run)
```

handle_callback	<i>Handle OAuth 2.0 callback: verify state, swap code for token, verify token</i>
-----------------	---

Description

Handle OAuth 2.0 callback: verify state, swap code for token, verify token

Usage

```
handle_callback(
  oauth_client,
  code,
  payload,
  browser_token,
  decrypted_payload = NULL,
```

```

    state_store_values = NULL,
    shiny_session = NULL
  )

```

Arguments

oauth_client	An OAuthClient object representing the OAuth client configuration.
code	The authorization code received from the OAuth provider during the callback.
payload	The encrypted state payload received from the OAuth provider during the callback (this should be the same value that was generated and sent in <code>prepare_call()</code>).
browser_token	Browser token present in the user's session (this is managed by <code>oauth_module_server()</code> and should match the one used in <code>prepare_call()</code>).
decrypted_payload	Optional pre-decrypted and validated payload list (as returned by <code>state_decrypt_gcm()</code> followed by internal validation). Supplying this allows callers to validate and bind the state on the main thread before dispatching to a background worker for async flows.
state_store_values	Optional pre-fetched state store entry (a list with <code>browser_token</code> , <code>pkce_code_verifier</code> , and <code>nonce</code>). When supplied, the function will skip reading/removing from <code>oauth_client@state_store</code> and use the provided values instead. This supports async flows that prefetch and remove the single-use state entry on the main thread to avoid cross-process cache visibility issues.
shiny_session	Optional pre-captured Shiny session context (from <code>capture_shiny_session_context()</code>) to include in audit events. Used when calling from async workers that lack access to the reactive domain.

Value

An [OAuthToken](#) object containing the access token, refresh token, expiration time, user information (if requested), and ID token (if applicable). If any step of the process fails (e.g., state verification, token exchange, token validation), an error is thrown indicating the failure reason.

Examples

```

# Please note: `prepare_call()` & `handle_callback()` are typically
# not called by users of this package directly, but are called
# internally by `oauth_module_server()`. These functions are exported
# nonetheless for advanced use cases. Most users will not need to
# call these functions directly

# Below code shows generic usage of `prepare_call()` and `handle_callback()`
# (code is not run because it would require user interaction)
## Not run:
# Define client
client <- oauth_client(
  provider = oauth_provider_github(),
  client_id = Sys.getenv("GITHUB_OAUTH_CLIENT_ID"),
  client_secret = Sys.getenv("GITHUB_OAUTH_CLIENT_SECRET"),

```

```

    redirect_uri = "http://127.0.0.1:8100"
  )

  # Get authorization URL and and store state in client's state store
  # `<browser_token>` is a token that identifies the browser session
  # and would typically be stored in a browser cookie
  # (`oauth_module_server()` handles this typically)
  authorization_url <- prepare_call(client, "<b>browser_token</b>")

  # Redirect user to authorization URL; retrieve code & payload from query;
  # read also `<browser_token>` from browser cookie
  # (`oauth_module_server()` handles this typically)
  code <- "..."
  payload <- "..."
  browser_token <- "..."

  # Handle callback, exchanging code for token and validating state
  # (`oauth_module_server()` handles this typically)
  token <- handle_callback(client, code, payload, browser_token)

  ## End(Not run)

```

introspect_token

Introspect an OAuth 2.0 token

Description

Introspects an access or refresh token using RFC 7662 when the provider exposes an introspection endpoint. Returns a list including at least supported (logical) and active (logicalNA) and the parsed response (if any) under raw.

Authentication to the introspection endpoint mirrors the provider's token_auth_style:

- "header" (default): HTTP Basic with client_id/client_secret.
- "body": form fields client_id and (when available) client_secret.
- "client_secret_jwt" / "private_key_jwt": a signed JWT client assertion is generated (RFC 7523) and sent via client_assertion_type and client_assertion, with aud resolved via resolve_client_assertion_audience() (so client_assertion_audience overrides are honored).

Usage

```

introspect_token(
  oauth_client,
  oauth_token,
  which = c("access", "refresh"),
  async = FALSE,
  shiny_session = NULL
)

```

Arguments

<code>oauth_client</code>	<code>OAuthClient</code> object
<code>oauth_token</code>	<code>OAuthToken</code> object to introspect
<code>which</code>	Which token to introspect: "access" (default) or "refresh".
<code>async</code>	Logical, default FALSE. If TRUE and the <code>mirai::mirai</code> package is available, the operation is performed off the main R session using <code>mirai::mirai()</code> and this function returns a <code>mirai</code> (which implements <code>as.promise()</code>) that resolves to the result list. Requires <code>mirai</code> daemons to be configured with <code>mirai::daemons()</code> .
<code>shiny_session</code>	Optional pre-captured Shiny session context (from <code>capture_shiny_session_context()</code>) to include in audit events. Used when calling from <code>async</code> workers that lack access to the reactive domain.

Details

Best-effort semantics:

- If the provider does not expose an introspection endpoint, the function returns `supported = FALSE`, `active = NA`, and `status = "introspection_unsupported"`.
- If the endpoint responds with an HTTP error (e.g., 404/500) or the body cannot be parsed or does not include a usable `active` field, the function does not throw. It returns `supported = TRUE`, `active = NA`, and a descriptive status (for example, "http_404", "invalid_json", "missing_active"). In this context, NA means "unknown" and will not break flows unless your code explicitly requires a definitive result (i.e., `isTRUE(result$active)`).
- Providers vary in how they encode the RFC 7662 `active` field (logical, numeric, or character variants like "true"/"false", 1/0). These are normalized to logical TRUE/FALSE when possible; otherwise `active` is set to NA.

Value

A list with fields: `supported`, `active`, `raw`, `status`

Examples

```
# Please note: `get_userinfo()`, `introspect_token()`, and `refresh_token()`
# are typically not called by users of this package directly, but are called
# internally by `oauth_module_server()`. These functions are exported
# nonetheless for advanced use cases. Most users will not need to
# call these functions directly

# Example requires a real token from a completed OAuth flow
# (code is therefore not run; would error with placeholder values below)
## Not run:
# Define client
client <- oauth_client(
  provider = oauth_provider_github(),
  client_id = Sys.getenv("GITHUB_OAUTH_CLIENT_ID"),
  client_secret = Sys.getenv("GITHUB_OAUTH_CLIENT_SECRET"),
  redirect_uri = "http://127.0.0.1:8100"
```

```

)

# Have a valid OAuthToken object; fake example below
# (typically provided by `oauth_module_server()` or `handle_callback()`)
token <- handle_callback(client, "<code>", "<payload>", "<browser_token>")

# Get userinfo
user_info <- get_userinfo(client, token)

# Introspect token (if supported by provider)
introspection <- introspect_token(client, token)

# Refresh token
new_token <- refresh_token(client, token, introspect = TRUE)

## End(Not run)

```

is_ok_host

Check if URL(s) are HTTPS and/or in allowed hosts lists

Description

Returns TRUE if every input URL is either:

- a syntactically valid HTTPS URL, and (if set) whose host matches `allowed_hosts`, or
- an HTTP URL whose host matches `allowed_non_https_hosts` (e.g. `localhost`, `127.0.0.1`, `::1`), and (if set) also matches `allowed_hosts`.

If the input omits the scheme (e.g., `"localhost:8080/cb"`), this function will first attempt to validate it as HTTP (useful for loopback development), and if that fails, as HTTPS. This mirrors how helpers normalize inputs for convenience while still enforcing the same host and scheme policies.

`allowed_hosts` is thus an allowlist of hosts/domains that are permitted, while `allowed_non_https_hosts` defines which hosts are allowed to use HTTP instead of HTTPS. If `allowed_hosts` is NULL or length 0, all hosts are allowed (subject to scheme rules), but HTTPS is still required unless the host is in `allowed_non_https_hosts`.

Since `allowed_hosts` supports globs, a value like `"*"` matches any host and therefore effectively disables endpoint host restrictions. Only use a catch-all pattern when you truly intend to allow any host. In most deployments you should pin to your expected domain(s), e.g. `c(".example.com")` or a specific host name.

Wildcards: `allowed_hosts` and `allowed_non_https_hosts` support globs: `*` = any chars, `?` = one char. A leading `.example.com` matches the domain itself and any subdomain.

Any non-URLs, NAs, or empty strings cause a FALSE result.

Usage

```
is_ok_host(  
  url,  
  allowed_non_https_hosts = getOption("shinyOAuth.allowed_non_https_hosts", default =  
    c("localhost", "127.0.0.1", ">::1", "[::1]")),  
  allowed_hosts = getOption("shinyOAuth.allowed_hosts", default = NULL)  
)
```

Arguments

<code>url</code>	Single URL or vector of URLs (character; length 1 or more)
<code>allowed_non_https_hosts</code>	Character vector of hostnames that are allowed to use HTTP instead of HTTPS. Defaults to localhost equivalents. Supports globs
<code>allowed_hosts</code>	Optional allowlist of hosts/domains; if supplied (length > 0), only these hosts are permitted. Supports globs

Details

This function is used internally to validate redirect URIs in OAuth clients, but can be used elsewhere to test if URLs would be allowed. Internally, it will always determine the default values for `allowed_non_https_hosts` and `allowed_hosts` from the options `shinyOAuth.allowed_non_https_hosts` and `shinyOAuth.allowed_hosts`, respectively.

Value

Logical indicator (TRUE if all URLs pass all checks; FALSE otherwise)

Examples

```
# HTTPS allowed by default  
is_ok_host("https://example.com")  
  
# HTTP allowed for localhost  
is_ok_host("http://localhost:8100")  
  
# Restrict to a specific domain (allowlist)  
is_ok_host("https://api.example.com", allowed_hosts = c(".example.com"))  
  
# Caution: a catch-all pattern disables host restrictions  
# (only scheme rules remain). Avoid unless you truly intend it  
is_ok_host("https://anywhere.example", allowed_hosts = c("*"))
```

OAuthClient	<i>OAuthClient S7 class</i>
-------------	-----------------------------

Description

S7 class representing an OAuth 2.0 client configuration, including a provider, client credentials, redirect URI, requested scopes, and state management.

This is a low-level constructor intended for advanced use. Most users should prefer the helper constructor `oauth_client()`.

Usage

```
OAuthClient(
  provider = NULL,
  client_id = character(0),
  client_secret = character(0),
  client_private_key = NULL,
  client_private_key_kid = NA_character_,
  client_assertion_alg = NA_character_,
  client_assertion_audience = NA_character_,
  redirect_uri = character(0),
  scopes = character(0),
  state_store = cachem::cache_mem(max_age = 300),
  state_payload_max_age = 300,
  state_entropy = 64,
  state_key = random_urlsafe(n = 128),
  scope_validation = "strict",
  introspect = FALSE,
  introspect_elements = character(0)
)
```

Arguments

provider [OAuthProvider](#) object
 client_id OAuth client ID
 client_secret OAuth client secret.

Validation rules:

- Required (non-empty) when the provider authenticates the client with HTTP Basic auth at the token endpoint (`token_auth_style = "header"`, also known as `client_secret_basic`).
- Optional for public PKCE-only clients when the provider is configured with `use_pkce = TRUE` and uses form-body client authentication at the token endpoint (`token_auth_style = "body"`, also known as `client_secret_post`). In this case, the secret is omitted from token requests.

Note: If your provider issues HS256 ID tokens and `id_token_validation` is enabled, a non-empty `client_secret` is required for signature validation.

<code>client_private_key</code>	Optional private key for <code>private_key_jwt</code> client authentication at the token endpoint. Can be an <code>openssl::key</code> or a PEM string containing a private key. Required when the provider's <code>token_auth_style = 'private_key_jwt'</code> . Ignored for other auth styles.
<code>client_private_key_kid</code>	Optional key identifier (kid) to include in the JWT header for <code>private_key_jwt</code> assertions. Useful when the authorization server uses kid to select the correct verification key.
<code>client_assertion_alg</code>	Optional JWT signing algorithm to use for client assertions. When omitted, defaults to HS256 for <code>client_secret_jwt</code> . For <code>private_key_jwt</code> , a compatible default is selected based on the private key type/curve (e.g., RS256 for RSA, ES256/ES384/ES512 for EC P-256/384/521, or EdDSA for Ed25519/Ed448). If an explicit value is provided but incompatible with the key, validation fails early with a configuration error. Supported values are HS256, HS384, HS512 for <code>client_secret_jwt</code> and asymmetric algorithms supported by <code>jose::jwt_encode_sig</code> (e.g., RS256, PS256, ES256, EdDSA) for private keys.
<code>client_assertion_audience</code>	Optional override for the aud claim used when building JWT client assertions (<code>client_secret_jwt</code> / <code>private_key_jwt</code>). By default, shinyOAuth uses the exact token endpoint request URL. Some identity providers require a different audience value; set this to the exact value your IdP expects.
<code>redirect_uri</code>	Redirect URI registered with provider
<code>scopes</code>	Vector of scopes to request
<code>state_store</code>	State storage backend. Defaults to <code>cachem::cache_mem(max_age = 300)</code>. Alternative backends could include <code>cachem::cache_disk()</code> or a custom implementation (which you can create with custom_cache()). The backend must implement cachem-like methods <code>\$get(key, missing)</code>, <code>\$set(key, value)</code>, and <code>\$remove(key)</code>; <code>\$info()</code> is optional. Trade-offs: <code>cache_mem</code> is in-memory and thus scoped to a single R process (good default for a single Shiny process). <code>cache_disk</code> persists to disk and can be shared across multiple R processes (useful for multi-process deployments or when Shiny workers aren't sticky). A custom_cache() backend could use a database or external store (e.g., Redis, Memcached). See also <code>vignette("usage", package = "shinyOAuth")</code>. The client automatically generates, persists (in <code>state_store</code>), and validates the OAuth state parameter (and OIDC nonce when applicable) during the authorization code flow
<code>state_payload_max_age</code>	Positive number of seconds. Maximum allowed age for the decrypted state payload's <code>issued_at</code> timestamp during callback validation. This value is an independent freshness backstop against replay attacks on the encrypted state payload. It is intentionally decoupled from <code>state_store</code> TTL (which controls how long the single-use state entry can exist in the server-side cache, and also drives browser cookie max-age in oauth_module_server()). Default is 300 seconds.

state_entropy	Integer. The length (in characters) of the randomly generated state parameter. Higher values provide more entropy and better security against CSRF attacks. Must be between 22 and 128 (to align with <code>validate_state()</code> 's default minimum which targets ~128 bits for base64url-like strings). Default is 64, which provides approximately 384 bits of entropy
state_key	Optional per-client secret used as the state sealing key for AES-GCM AEAD (authenticated encryption) of the state payload that travels via the state query parameter. This provides confidentiality and integrity (via authentication tag) for the embedded data used during callback verification. If you omit this argument, a random value is generated via <code>random_urlsafe(128)</code>. This key is distinct from the OAuth <code>client_secret</code> and may be used with public clients. Type: character string (≥ 32 bytes when encoded) or raw vector (≥ 32 bytes). Raw keys enable direct use of high-entropy secrets from external stores. Both forms are normalized internally by cryptographic helpers. Multi-process deployments: if your app runs with multiple R workers or behind a non-sticky load balancer, you must configure a shared <code>state_store</code> and the same <code>state_key</code> across all workers. Otherwise callbacks that land on a different worker will be unable to decrypt/validate the state envelope and authentication will fail. In such environments, do not rely on the random per-process default: provide an explicit, high-entropy key (for example via a secret store or environment variable). Prefer values with substantial entropy (e.g., 64–128 base64url characters or a raw 32+ byte key). Avoid human-memorable passphrases. See also <code>vignette("usage", package = "shinyOAuth")</code>.
scope_validation	Controls how scope discrepancies are handled when the authorization server grants fewer scopes than requested. RFC 6749 Section 3.3 permits servers to issue tokens with reduced scope. • "strict" (default): Throws an error if any requested scope is missing from the granted scopes. • "warn": Emits a warning but continues authentication if scopes are missing. • "none": Skips scope validation entirely.
introspect	If TRUE, the login flow will call the provider's token introspection endpoint (RFC 7662) to validate the access token. The login is not considered complete unless introspection succeeds and returns <code>active = TRUE</code> ; otherwise the login fails and <code>authenticated</code> remains FALSE. Default is FALSE. Requires the provider to have an <code>introspection_url</code> configured.
introspect_elements	Optional character vector of additional requirements to enforce on the introspection response when <code>introspect = TRUE</code>. Supported values: • "sub": require the introspected sub to match the session subject (from ID token sub when available, else from <code>userinfo sub</code>). • "client_id": require the introspected <code>client_id</code> to match your OAuth client id. • "scope": validate introspected scope against requested scopes (respects the client's <code>scope_validation</code> mode). Default is <code>character(0)</code>. (Note

that not all providers may return each of these fields in introspection responses.)

Examples

```
if (
  # Example requires configured GitHub OAuth 2.0 app
  # (go to https://github.com/settings/developers to create one):
  nzchar(Sys.getenv("GITHUB_OAUTH_CLIENT_ID")) &&
  nzchar(Sys.getenv("GITHUB_OAUTH_CLIENT_SECRET")) &&
  interactive()
) {
  library(shiny)
  library(shinyOAuth)

  # Define client
  client <- oauth_client(
    provider = oauth_provider_github(),
    client_id = Sys.getenv("GITHUB_OAUTH_CLIENT_ID"),
    client_secret = Sys.getenv("GITHUB_OAUTH_CLIENT_SECRET"),
    redirect_uri = "http://127.0.0.1:8100"
  )

  # Choose which app you want to run
  app_to_run <- NULL
  while (!isTRUE(app_to_run %in% c(1:4))) {
    app_to_run <- readline(
      prompt = paste0(
        "Which example app do you want to run?\n",
        " 1: Auto-redirect login\n",
        " 2: Manual login button\n",
        " 3: Fetch additional resource with access token\n",
        " 4: No app (all will be defined but none run)\n",
        "Enter 1, 2, 3, or 4... "
      )
    )
  }

  if (app_to_run %in% c(1:3)) {
    cli::cli_alert_info(paste0(
      "Will run example app {app_to_run} on {.url http://127.0.0.1:8100}\n",
      "Open this URL in a regular browser (viewers in RStudio/Positron/etc. ",
      "cannot perform necessary redirects)"
    ))
  }

  # Example app with auto-redirect (1) -----

  ui_1 <- fluidPage(
    use_shinyOAuth(),
    uiOutput("login")
  )
}
```

```

server_1 <- function(input, output, session) {
  # Auto-redirect (default):
  auth <- oauth_module_server(
    "auth",
    client,
    auto_redirect = TRUE
  )

  output$login <- renderUI({
    if (auth$authenticated) {
      user_info <- auth$token@userinfo
      tagList(
        tags$p("You are logged in!"),
        tags$pre(paste(capture.output(str(user_info)), collapse = "\n"))
      )
    } else {
      tags$p("You are not logged in.")
    }
  })
}

app_1 <- shinyApp(ui_1, server_1)
if (app_to_run == "1") {
  runApp(
    app_1,
    port = 8100,
    launch.browser = FALSE
  )
}

# Example app with manual login button (2) -----

ui_2 <- fluidPage(
  use_shinyOAuth(),
  actionButton("login_btn", "Login"),
  uiOutput("login")
)

server_2 <- function(input, output, session) {
  auth <- oauth_module_server(
    "auth",
    client,
    auto_redirect = FALSE
  )

  observeEvent(input$login_btn, {
    auth$request_login()
  })

  output$login <- renderUI({
    if (auth$authenticated) {
      user_info <- auth$token@userinfo
      tagList(

```

```

        tags$p("You are logged in!"),
        tags$pre(paste(capture.output(str(user_info)), collapse = "\n"))
    )
  } else {
    tags$p("You are not logged in.")
  }
})
}

app_2 <- shinyApp(ui_2, server_2)
if (app_to_run == "2") {
  runApp(
    app_2,
    port = 8100,
    launch.browser = FALSE
  )
}

# Example app requesting additional resource with access token (3) -----

# Below app shows the authenticated username + their GitHub repositories,
# fetched via GitHub API using the access token obtained during login

ui_3 <- fluidPage(
  use_shinyOAuth(),
  uiOutput("ui")
)

server_3 <- function(input, output, session) {
  auth <- oauth_module_server(
    "auth",
    client,
    auto_redirect = TRUE
  )

  repositories <- reactiveVal(NULL)

  observe({
    req(auth$authenticated)

    # Example additional API request using the access token
    # (e.g., fetch user repositories from GitHub)
    req <- client_bearer_req(auth$token, "https://api.github.com/user/repos")
    resp <- httr2::req_perform(req)

    if (httr2::resp_is_error(resp)) {
      repositories(NULL)
    } else {
      repos_data <- httr2::resp_body_json(resp, simplifyVector = TRUE)
      repositories(repos_data)
    }
  })
}

```

```

# Render username + their repositories
output$ui <- renderUI({
  if (isTRUE(auth$authenticated)) {
    user_info <- auth$token@userinfo
    repos <- repositories()

    return(tagList(
      tags$p(paste("You are logged in as:", user_info$login)),
      tags$h4("Your repositories:"),
      if (!is.null(repos)) {
        tags$ul(
          Map(
            function(url, name) {
              tags$li(tags$a(href = url, target = "_blank", name))
            },
            repos$html_url,
            repos$full_name
          )
        )
      } else {
        tags$p("Loading repositories...")
      }
    ))
  }

  return(tags$p("You are not logged in. "))
})

app_3 <- shinyApp(ui_3, server_3)
if (app_to_run == "3") {
  runApp(
    app_3,
    port = 8100,
    launch.browser = FALSE
  )
}
}

```

OAuthProvider

OAuthProvider S7 class

Description

S7 class representing an OAuth 2.0 provider configuration. Includes endpoints, OIDC settings, and various security options which govern the OAuth and OIDC flows.

This is a low-level constructor intended for advanced use. Most users should prefer the helper constructors [oauth_provider\(\)](#) for generic OAuth 2.0 providers or [oauth_provider_oidc\(\)](#) / [oauth_provider_oidc_discover\(\)](#) for OpenID Connect providers. Those helpers enable secure defaults based on the presence of an issuer and available endpoints.

Usage

```

OAuthProvider(
  name = character(0),
  auth_url = character(0),
  token_url = character(0),
  userinfo_url = NA_character_,
  introspection_url = NA_character_,
  revocation_url = NA_character_,
  issuer = NA_character_,
  use_nonce = FALSE,
  use_pkce = TRUE,
  pkce_method = "S256",
  userinfo_required = FALSE,
  userinfo_id_selector = function(userinfo) userinfo$sub,
  userinfo_id_token_match = FALSE,
  id_token_required = FALSE,
  id_token_validation = FALSE,
  extra_auth_params = list(),
  extra_token_params = list(),
  extra_token_headers = character(0),
  token_auth_style = "header",
  jwks_cache = cachem::cache_mem(max_age = 3600),
  jwks_pins = character(0),
  jwks_pin_mode = "any",
  jwks_host_issuer_match = FALSE,
  jwks_host_allow_only = NA_character_,
  allowed_algs = c("RS256", "RS384", "RS512", "PS256", "PS384", "PS512", "ES256",
    "ES384", "ES512", "EdDSA"),
  allowed_token_types = "Bearer",
  leeway = getOption("shinyOAuth.leeway", 30)
)

```

Arguments

name	Provider name (e.g., "github", "google"). Cosmetic only; used in logging and audit events
auth_url	Authorization endpoint URL
token_url	Token endpoint URL
userinfo_url	User info endpoint URL (optional)
introspection_url	Token introspection endpoint URL (optional; RFC 7662)
revocation_url	Token revocation endpoint URL (optional; RFC 7009)
issuer	OIDC issuer URL (optional; required for ID token validation). This is the base URL that identifies the OpenID Provider (OP). It is used during ID token validation to verify the iss claim in the ID token matches the expected issuer.

	It is also used to fetch the provider's JSON Web Key Set (JWKS) for verifying ID token signatures (typically via the OIDC discovery document located at /.well-known/openid-configuration relative to the issuer URL)
use_nonce	Whether to use OIDC nonce. This adds a nonce parameter to the authorization request and validates the nonce claim in the ID token. This is recommended for OIDC flows to mitigate replay attacks
use_pkce	Whether to use PKCE. This adds a code_challenge parameter to the authorization request and requires a code_verifier when exchanging the authorization code for tokens. This prevents authorization code interception attacks
pkce_method	PKCE code challenge method ("S256" or "plain"). "S256" is recommended. "plain" should only be used for non-compliant providers that do not support "S256"
userinfo_required	Whether to fetch userinfo after token exchange. User information will be stored in the userinfo field of the returned OAuthToken object. This requires a valid userinfo_url to be set. If fetching the userinfo fails, the token exchange will fail. For the low-level constructor <code>oauth_provider()</code>, when not explicitly supplied, this is inferred from the presence of a non-empty userinfo_url: if a userinfo_url is provided, userinfo_required defaults to TRUE, otherwise it defaults to FALSE. This avoids unexpected validation errors when userinfo_url is omitted (since it is optional).
userinfo_id_selector	A function that extracts the user ID from the userinfo response. Should take a single argument (the userinfo list) and return the user ID as a string. This is used when userinfo_id_token_match is TRUE. Optional otherwise; when not supplied, some features (like subject matching) will be unavailable. Helper constructors like <code>oauth_provider()</code> and <code>oauth_provider_oidc()</code> provide a default selector that extracts the sub field.
userinfo_id_token_match	Whether to verify that the user ID ("sub") from the ID token matches the user ID extracted from the userinfo response. This requires both userinfo_required and id_token_validation to be TRUE (and thus a valid userinfo_url and issuer to be set, plus potentially setting the client's scope to include "openid", so that an ID token is returned). Furthermore, the provider's userinfo_id_selector must be configured to extract the user ID from the userinfo response. This check helps ensure the integrity of the user information by confirming that both sources agree on the user's identity. For <code>oauth_provider()</code>, when not explicitly supplied, this is inferred as TRUE only if both userinfo_required and id_token_validation are TRUE; otherwise it defaults to FALSE.
id_token_required	Whether to require an ID token to be returned during token exchange. If no ID token is returned, the token exchange will fail. This requires the provider to be a valid OpenID Connect provider and may require setting the client's scope to include "openid".

Note: At the `S7` class level, this defaults to `FALSE` so that pure OAuth 2.0 providers can be configured without OIDC. Helper constructors like `oauth_provider()` and `oauth_provider_oidc()` will enable this when an issuer is supplied or OIDC is explicitly requested.

`id_token_validation`

Whether to perform ID token validation after token exchange. This requires the provider to be a valid OpenID Connect provider with a configured issuer and the token response to include an ID token (may require setting the client's scope to include "openid").

Note: At the `S7` class level, this defaults to `FALSE`. Helper constructors like `oauth_provider()` and `oauth_provider_oidc()` turn this on when an issuer is provided or when OIDC is used.

`extra_auth_params`

Extra parameters for authorization URL

`extra_token_params`

Extra parameters for token exchange

`extra_token_headers`

Extra headers for token exchange requests (named character vector)

`token_auth_style`

How to authenticate when exchanging tokens. One of:

- "header": HTTP Basic (`client_secret_basic`)
- "body": Form body (`client_secret_post`)
- "client_secret_jwt": JWT client assertion signed with HMAC using `client_secret` (RFC 7523)
- "private_key_jwt": JWT client assertion signed with an asymmetric key (RFC 7523)

`jwt_cache`

JWKS cache backend. If not provided, a `cachem::cache_mem(max_age = 3600)` (1 hour) cache will be created. May be any `cachem`-compatible backend, including `cachem::cache_disk()` for a filesystem cache shared across workers, or a custom implementation created via `custom_cache()` (e.g., database/Redis backed).

TTL guidance: Choose `max_age` in line with your identity platform's JWKS rotation and cache-control cadence. A range of 15 minutes to 2 hours is typically sensible; the default is 1 hour. Shorter TTLs adopt new keys faster at the cost of more JWKS traffic; longer TTLs reduce traffic but may delay new keys slightly. Signature verification will automatically perform a one-time JWKS refresh when a new kid appears in an ID token.

Cache keys are internal, hashed by issuer and pinning configuration. Cache values are lists with elements `jwt` and `fetch_at` (numeric epoch seconds)

`jwt_pins`

Optional character vector of RFC 7638 JWK thumbprints (`base64url`) to pin against. If non-empty, fetched JWKS must contain keys whose thumbprints match these values depending on `jwt_pin_mode`. Use to reduce key substitution risks by pre-authorizing expected keys

`jwt_pin_mode`

Pinning policy when `jwt_pins` is provided. Either "any" (default; at least one key in JWKS must match) or "all" (every RSA/EC/OKP public key in JWKS must match one of the configured pins)

jwks_host_issuer_match	When TRUE, enforce that the discovery <code>jwks_uri</code> host matches the issuer host (or a subdomain). Defaults to FALSE at the class level, but helper constructors for OIDC (e.g., <code>oauth_provider_oidc()</code> and <code>oauth_provider_oidc_discover()</code>) enable this by default for safer config. The generic helper <code>oauth_provider()</code> will also automatically set this to TRUE when an issuer is provided and either <code>id_token_validation</code> or <code>id_token_required</code> is TRUE (OIDC-like configuration). Set explicitly to FALSE to opt out. For providers that legitimately publish JWKS on a different host (e.g., Google), prefer setting <code>jwks_host_allow_only</code> to the exact hostname rather than disabling this check
jwks_host_allow_only	Optional explicit hostname that the <code>jwks_uri</code> must match. When provided, <code>jwks_uri</code> host must equal this value (exact match). You can pass either just the host (e.g., "www.googleapis.com") or a full URL; only the host component will be used. If you need to include a port or an IPv6 literal, pass a full URL (e.g., <code>https://[::1]:8443</code>) — the port is ignored and only the hostname part is used for matching. Takes precedence over <code>jwks_host_issuer_match</code>
allowed_algs	Optional vector of allowed JWT algorithms for ID tokens. Use to restrict acceptable alg values on a per-provider basis. Supported asymmetric algorithms include RS256, RS384, RS512, PS256, PS384, PS512, ES256, ES384, ES512, and EdDSA (Ed25519/Ed448 via OKP). Symmetric HMAC algorithms HS256, HS384, HS512 are also supported but require that you supply a <code>client_secret</code> and explicitly enable HMAC verification via the option <code>options(shinyOAuth.allow_hs = TRUE)</code> . Defaults to <code>c("RS256", "RS384", "RS512", "PS256", "PS384", "PS512", "ES256", "ES384", "ES512", "EdDSA")</code> , which intentionally excludes HS*. Only include HS* if you are certain the <code>client_secret</code> is stored strictly server-side and is never shipped to, or derivable by, the browser or other untrusted environments. Prefer rotating secrets regularly when enabling this.
allowed_token_types	Character vector of acceptable OAuth token types returned by the token endpoint (case-insensitive). When non-empty, the token response MUST include <code>token_type</code> and it must be one of the allowed values; otherwise the flow fails fast with a <code>shinyOAuth_token_error</code> . When empty, no check is performed and <code>token_type</code> may be omitted by the provider. The <code>oauth_provider()</code> helper defaults to <code>c("Bearer")</code> for all providers because the package only supports Bearer tokens (i.e., <code>client_bearer_req()</code> sends <code>Authorization: Bearer</code>). This ensures that if a provider returns a non-Bearer token type (e.g., DPOP, MAC), the flow fails fast rather than misusing the token. Set <code>allowed_token_types = character()</code> explicitly to opt out of enforcement.
leeway	Clock skew leeway (seconds) applied to ID token <code>exp/iat/nbf</code> checks and state payload issued_at future check. Default 30. Can be globally overridden via option <code>shinyOAuth.leeway</code>

Examples

```
# Configure generic OAuth 2.0 provider (no OIDC)
generic_provider <- oauth_provider(
  name = "example",
```

```

    auth_url = "https://example.com/oauth/authorize",
    token_url = "https://example.com/oauth/token",
    # Optional URL for fetching user info:
    userinfo_url = "https://example.com/oauth/userinfo"
  )

  # Configure generic OIDC provider manually
  # (This defaults to using nonce & ID token validation)
  generic_oidc_provider <- oauth_provider_oidc(
    name = "My OIDC",
    base_url = "https://my-issuer.example.com"
  )

  # Configure a OIDC provider via OIDC discovery
  # (requires network access)

  # Using Auth0 sample issuer as an example
  oidc_discovery_provider <- oauth_provider_oidc_discover(
    issuer = "https://samples.auth0.com"
  )

  # GitHub preconfigured provider
  github_provider <- oauth_provider_github()

  # Google preconfigured provider
  google_provider <- oauth_provider_google()

  # Microsoft preconfigured provider
  # See `?oauth_provider_microsoft` for example using a custom tenant ID

  # Spotify preconfigured provider
  spotify_provider <- oauth_provider_spotify()

  # Slack via OIDC discovery
  # (requires network access)

  slack_provider <- oauth_provider_slack()

  # Keycloak
  # (requires configured Keycloak realm; example below is therefore not run)
  ## Not run:
  oauth_provider_keycloak(base_url = "http://localhost:8080", realm = "myrealm")

  ## End(Not run)

  # Auth0
  # (requires configured Auth0 domain; example below is therefore not run)
  ## Not run:
  oauth_provider_auth0(domain = "your-tenant.auth0.com")

  ## End(Not run)

```

```
# Okta
# (requires configured Okta domain; example below is therefore not run)
## Not run:
oauth_provider_okta(domain = "dev-123456.okta.com")

## End(Not run)
```

OAuthToken

OAuthToken S7 class

Description

S7 class representing OAuth tokens and (optionally) user information.

Usage

```
OAuthToken(
  access_token = character(0),
  refresh_token = NA_character_,
  id_token = NA_character_,
  expires_at = Inf,
  userinfo = list()
)
```

Arguments

access_token	Access token
refresh_token	Refresh token (if provided by the provider)
id_token	ID token (if provided by the provider; OpenID Connect)
expires_at	Numeric timestamp (seconds since epoch) when the access token expires. Inf for non-expiring tokens
userinfo	List containing user information fetched from the provider's userinfo endpoint (if fetched)

Examples

```
# Please note: `get_userinfo()`, `introspect_token()`, and `refresh_token()`
# are typically not called by users of this package directly, but are called
# internally by `oauth_module_server()`. These functions are exported
# nonetheless for advanced use cases. Most users will not need to
# call these functions directly

# Example requires a real token from a completed OAuth flow
# (code is therefore not run; would error with placeholder values below)
## Not run:
# Define client
client <- oauth_client(
```

```

provider = oauth_provider_github(),
client_id = Sys.getenv("GITHUB_OAUTH_CLIENT_ID"),
client_secret = Sys.getenv("GITHUB_OAUTH_CLIENT_SECRET"),
redirect_uri = "http://127.0.0.1:8100"
)

# Have a valid OAuthToken object; fake example below
# (typically provided by `oauth_module_server()` or `handle_callback()`)
token <- handle_callback(client, "<code>", "<payload>", "<browser_token>")

# Get userinfo
user_info <- get_userinfo(client, token)

# Introspect token (if supported by provider)
introspection <- introspect_token(client, token)

# Refresh token
new_token <- refresh_token(client, token, introspect = TRUE)

## End(Not run)

```

oauth_client

Create generic *OAuthClient*

Description

Create generic *OAuthClient*

Usage

```

oauth_client(
  provider,
  client_id = Sys.getenv("OAUTH_CLIENT_ID"),
  client_secret = Sys.getenv("OAUTH_CLIENT_SECRET"),
  redirect_uri,
  scopes = character(),
  state_store = cachem::cache_mem(max_age = 300),
  state_payload_max_age = 300,
  state_entropy = 64,
  state_key = random_urlsafe(128),
  client_private_key = NULL,
  client_private_key_kid = NULL,
  client_assertion_alg = NULL,
  client_assertion_audience = NULL,
  scope_validation = c("strict", "warn", "none"),
  introspect = FALSE,
  introspect_elements = character()
)

```

Arguments

provider	OAuthProvider object
client_id	OAuth client ID
client_secret	OAuth client secret. Validation rules: • Required (non-empty) when the provider authenticates the client with HTTP Basic auth at the token endpoint (<code>token_auth_style = "header"</code>, also known as <code>client_secret_basic</code>). • Optional for public PKCE-only clients when the provider is configured with <code>use_pkce = TRUE</code> and uses form-body client authentication at the token endpoint (<code>token_auth_style = "body"</code>, also known as <code>client_secret_post</code>). In this case, the secret is omitted from token requests. Note: If your provider issues HS256 ID tokens and <code>id_token_validation</code> is enabled, a non-empty <code>client_secret</code> is required for signature validation.
redirect_uri	Redirect URI registered with provider
scopes	Vector of scopes to request
state_store	State storage backend. Defaults to <code>cachem::cache_mem(max_age = 300)</code>. Alternative backends could include <code>cachem::cache_disk()</code> or a custom implementation (which you can create with custom_cache()). The backend must implement cachem-like methods <code>\$get(key, missing)</code>, <code>\$set(key, value)</code>, and <code>\$remove(key)</code>; <code>\$info()</code> is optional. Trade-offs: <code>cache_mem</code> is in-memory and thus scoped to a single R process (good default for a single Shiny process). <code>cache_disk</code> persists to disk and can be shared across multiple R processes (useful for multi-process deployments or when Shiny workers aren't sticky). A custom_cache() backend could use a database or external store (e.g., Redis, Memcached). See also <code>vignette("usage", package = "shinyOAuth")</code>. The client automatically generates, persists (in <code>state_store</code>), and validates the OAuth state parameter (and OIDC nonce when applicable) during the authorization code flow
state_payload_max_age	Positive number of seconds. Maximum allowed age for the decrypted state payload's <code>issued_at</code> timestamp during callback validation. This value is an independent freshness backstop against replay attacks on the encrypted state payload. It is intentionally decoupled from <code>state_store</code> TTL (which controls how long the single-use state entry can exist in the server-side cache, and also drives browser cookie max-age in oauth_module_server()). Default is 300 seconds.
state_entropy	Integer. The length (in characters) of the randomly generated state parameter. Higher values provide more entropy and better security against CSRF attacks. Must be between 22 and 128 (to align with <code>validate_state()</code>'s default minimum which targets ~128 bits for base64url-like strings). Default is 64, which provides approximately 384 bits of entropy

state_key	Optional per-client secret used as the state sealing key for AES-GCM AEAD (authenticated encryption) of the state payload that travels via the state query parameter. This provides confidentiality and integrity (via authentication tag) for the embedded data used during callback verification. If you omit this argument, a random value is generated via <code>random_urlsafe(128)</code>. This key is distinct from the OAuth <code>client_secret</code> and may be used with public clients. Type: character string (≥ 32 bytes when encoded) or raw vector (≥ 32 bytes). Raw keys enable direct use of high-entropy secrets from external stores. Both forms are normalized internally by cryptographic helpers. Multi-process deployments: if your app runs with multiple R workers or behind a non-sticky load balancer, you must configure a shared <code>state_store</code> and the same <code>state_key</code> across all workers. Otherwise callbacks that land on a different worker will be unable to decrypt/validate the state envelope and authentication will fail. In such environments, do not rely on the random per-process default: provide an explicit, high-entropy key (for example via a secret store or environment variable). Prefer values with substantial entropy (e.g., 64–128 base64url characters or a raw 32+ byte key). Avoid human-memorable passphrases. See also <code>vignette("usage", package = "shinyOAuth")</code>.
client_private_key	Optional private key for <code>private_key_jwt</code> client authentication at the token endpoint. Can be an <code>openssl::key</code> or a PEM string containing a private key. Required when the provider's <code>token_auth_style = 'private_key_jwt'</code>. Ignored for other auth styles.
client_private_key_kid	Optional key identifier (kid) to include in the JWT header for <code>private_key_jwt</code> assertions. Useful when the authorization server uses kid to select the correct verification key.
client_assertion_alg	Optional JWT signing algorithm to use for client assertions. When omitted, defaults to HS256 for <code>client_secret_jwt</code>. For <code>private_key_jwt</code>, a compatible default is selected based on the private key type/curve (e.g., RS256 for RSA, ES256/ES384/ES512 for EC P-256/384/521, or EdDSA for Ed25519/Ed448). If an explicit value is provided but incompatible with the key, validation fails early with a configuration error. Supported values are HS256, HS384, HS512 for <code>client_secret_jwt</code> and asymmetric algorithms supported by <code>jose::jwt_encode_sig</code> (e.g., RS256, PS256, ES256, EdDSA) for private keys.
client_assertion_audience	Optional override for the aud claim used when building JWT client assertions (<code>client_secret_jwt</code> / <code>private_key_jwt</code>). By default, shinyOAuth uses the exact token endpoint request URL. Some identity providers require a different audience value; set this to the exact value your IdP expects.
scope_validation	Controls how scope discrepancies are handled when the authorization server grants fewer scopes than requested. RFC 6749 Section 3.3 permits servers to issue tokens with reduced scope. • "strict" (default): Throws an error if any requested scope is missing from the granted scopes.

- "warn": Emits a warning but continues authentication if scopes are missing.
 - "none": Skips scope validation entirely.
- introspect** If TRUE, the login flow will call the provider's token introspection endpoint (RFC 7662) to validate the access token. The login is not considered complete unless introspection succeeds and returns `active = TRUE`; otherwise the login fails and `authenticated` remains FALSE. Default is FALSE. Requires the provider to have an `introspection_url` configured.
- introspect_elements** Optional character vector of additional requirements to enforce on the introspection response when `introspect = TRUE`. Supported values:
- "sub": require the introspected sub to match the session subject (from ID token sub when available, else from userinfo sub).
 - "client_id": require the introspected client_id to match your OAuth client id.
 - "scope": validate introspected scope against requested scopes (respects the client's `scope_validation` mode). Default is `character(0)`. (Note that not all providers may return each of these fields in introspection responses.)

Value

OAuthClient object

Examples

```
if (
  # Example requires configured GitHub OAuth 2.0 app
  # (go to https://github.com/settings/developers to create one):
  nzchar(Sys.getenv("GITHUB_OAUTH_CLIENT_ID")) &&
  nzchar(Sys.getenv("GITHUB_OAUTH_CLIENT_SECRET")) &&
  interactive()
) {
  library(shiny)
  library(shinyOAuth)

  # Define client
  client <- oauth_client(
    provider = oauth_provider_github(),
    client_id = Sys.getenv("GITHUB_OAUTH_CLIENT_ID"),
    client_secret = Sys.getenv("GITHUB_OAUTH_CLIENT_SECRET"),
    redirect_uri = "http://127.0.0.1:8100"
  )

  # Choose which app you want to run
  app_to_run <- NULL
  while (!isTRUE(app_to_run %in% c(1:4))) {
    app_to_run <- readline(
      prompt = paste0(
        "Which example app do you want to run?\n",
```

```

    " 1: Auto-redirect login\n",
    " 2: Manual login button\n",
    " 3: Fetch additional resource with access token\n",
    " 4: No app (all will be defined but none run)\n",
    "Enter 1, 2, 3, or 4... "
  )
}

if (app_to_run %in% c(1:3)) {
  cli::cli_alert_info(paste0(
    "Will run example app {app_to_run} on {.url http://127.0.0.1:8100}\n",
    "Open this URL in a regular browser (viewers in RStudio/Positron/etc. ",
    "cannot perform necessary redirects)"
  ))
}

# Example app with auto-redirect (1) -----

ui_1 <- fluidPage(
  use_shinyOAuth(),
  uiOutput("login")
)

server_1 <- function(input, output, session) {
  # Auto-redirect (default):
  auth <- oauth_module_server(
    "auth",
    client,
    auto_redirect = TRUE
  )

  output$login <- renderUI({
    if (auth$authenticated) {
      user_info <- auth$token@userinfo
      tagList(
        tags$p("You are logged in!"),
        tags$pre(paste(capture.output(str(user_info)), collapse = "\n"))
      )
    } else {
      tags$p("You are not logged in.")
    }
  })
}

app_1 <- shinyApp(ui_1, server_1)
if (app_to_run == "1") {
  runApp(
    app_1,
    port = 8100,
    launch.browser = FALSE
  )
}

```

```
# Example app with manual login button (2) -----

ui_2 <- fluidPage(
  use_shinyOAuth(),
  actionButton("login_btn", "Login"),
  uiOutput("login")
)

server_2 <- function(input, output, session) {
  auth <- oauth_module_server(
    "auth",
    client,
    auto_redirect = FALSE
  )

  observeEvent(input$login_btn, {
    auth$request_login()
  })

  output$login <- renderUI({
    if (auth$authenticated) {
      user_info <- auth$token@userinfo
      tagList(
        tags$p("You are logged in!"),
        tags$pre(paste(capture.output(str(user_info)), collapse = "\n"))
      )
    } else {
      tags$p("You are not logged in.")
    }
  })
}

app_2 <- shinyApp(ui_2, server_2)
if (app_to_run == "2") {
  runApp(
    app_2,
    port = 8100,
    launch.browser = FALSE
  )
}

# Example app requesting additional resource with access token (3) -----

# Below app shows the authenticated username + their GitHub repositories,
# fetched via GitHub API using the access token obtained during login

ui_3 <- fluidPage(
  use_shinyOAuth(),
  uiOutput("ui")
)

server_3 <- function(input, output, session) {
```

```

auth <- oauth_module_server(
  "auth",
  client,
  auto_redirect = TRUE
)

repositories <- reactiveVal(NULL)

observe({
  req(auth$authenticated)

  # Example additional API request using the access token
  # (e.g., fetch user repositories from GitHub)
  req <- client_bearer_req(auth$token, "https://api.github.com/user/repos")
  resp <- httr2::req_perform(req)

  if (httr2::resp_is_error(resp)) {
    repositories(NULL)
  } else {
    repos_data <- httr2::resp_body_json(resp, simplifyVector = TRUE)
    repositories(repos_data)
  }
})

# Render username + their repositories
output$ui <- renderUI({
  if (isTRUE(auth$authenticated)) {
    user_info <- auth$token@userinfo
    repos <- repositories()

    return(tagList(
      tags$p(paste("You are logged in as:", user_info$login)),
      tags$h4("Your repositories:"),
      if (!is.null(repos)) {
        tags$ul(
          Map(
            function(url, name) {
              tags$li(tags$a(href = url, target = "_blank", name))
            },
            repos$html_url,
            repos$full_name
          )
        )
      } else {
        tags$p("Loading repositories...")
      }
    ))
  }

  return(tags$p("You are not logged in. "))
})
}

```

```

app_3 <- shinyApp(ui_3, server_3)
if (app_to_run == "3") {
  runApp(
    app_3,
    port = 8100,
    launch.browser = FALSE
  )
}
}

```

oauth_module_server	<i>OAuth 2.0 & OIDC authentication module for Shiny applications</i>
---------------------	--

Description

This function implements a Shiny module server that manages OAuth 2.0/OIDC authentication for Shiny applications. It handles the OAuth 2.0/OIDC flow, including redirecting users to the authorization endpoint, securely processing the callback, exchanging authorization codes for tokens, verifying tokens, and managing token refresh. It also provides options for automatic or manual login flows, session expiry, and proactive token refresh.

Note: when using this module, you must include `shinyOAuth::use_shinyOAuth()` in your UI definition to load the necessary JavaScript dependencies.

Usage

```

oauth_module_server(
  id,
  client,
  auto_redirect = TRUE,
  async = FALSE,
  indefinite_session = FALSE,
  reauth_after_seconds = NULL,
  refresh_proactively = FALSE,
  refresh_lead_seconds = 60,
  refresh_check_interval = 10000,
  revoke_on_session_end = FALSE,
  tab_title_cleaning = TRUE,
  tab_title_replacement = NULL,
  browser_cookie_path = NULL,
  browser_cookie_samesite = c("Strict", "Lax", "None")
)

```

Arguments

<code>id</code>	Shiny module id
<code>client</code>	OAuthClient object

auto_redirect	If TRUE (default), unauthenticated sessions will immediately initiate the OAuth flow by redirecting the browser to the authorization endpoint. If FALSE, the module will not auto-redirect; instead, the returned object exposes helpers for triggering login manually (use: <code>\$request_login()</code>)
async	If TRUE, performs token exchange and refresh in the background using the <code>mirai::mirai</code> package, and updates values when the promise resolves. Requires the <code>promises::promises</code> and <code>mirai::mirai</code> packages, and mirai daemons to be configured with <code>mirai::daemons()</code> . If FALSE (default), token exchange and refresh are performed synchronously (which may block the Shiny event loop; it is thus strongly recommended to set <code>async = TRUE</code> in production apps)
indefinite_session	If TRUE, the module will not automatically clear the token due to access-token expiry or the <code>reauth_after_seconds</code> window, and it will not trigger automatic reauthentication when a token expires or a refresh fails. This effectively makes sessions "indefinite" from the module's perspective once a user has logged in. Note that your API calls may still fail once the provider considers the token expired; this option only affects the module's automatic clearing/redirect behavior
reauth_after_seconds	Optional maximum session age in seconds. If set, the module will remove the token (and thus set authenticated to FALSE) after this many seconds have elapsed since authentication started. By default this is NULL (no forced re-authentication). If a value is provided, the timer is reset after each successful refresh so the knob is opt-in and counts rolling session age
refresh_proactively	If TRUE, will automatically refresh tokens before they expire (if refresh token is available). The refresh is scheduled adaptively so that it executes approximately at <code>expires_at - refresh_lead_seconds</code> rather than on a coarse polling loop
refresh_lead_seconds	Number of seconds before expiry to attempt proactive refresh (default: 60)
refresh_check_interval	Fallback check interval in milliseconds for expiry/refresh (default: 10000 ms). When expiry is known, the module uses adaptive scheduling to wake up exactly when needed; this interval is used as a safety net or when expiry is unknown/infinite
revoke_on_session_end	If TRUE, automatically revokes provider tokens when the Shiny session ends (e.g., browser tab closed, session timeout). This is a best-effort operation. Revocation runs asynchronously only when the module is configured with <code>async = TRUE</code> (otherwise it runs synchronously). Requires the provider to have a <code>revocation_url</code> configured. Default is FALSE. Note that session-end revocation may not always succeed (e.g., network issues, provider unavailable), so combine with appropriate token lifetimes on the provider side.
tab_title_cleaning	If TRUE (default), removes any query string suffix from the browser tab title after the OAuth callback, so titles like "localhost:8100?code=...&state=..." become "localhost:8100"

tab_title_replacement

Optional character string to explicitly set the browser tab title after the OAuth callback. If provided, it takes precedence over `tab_title_cleaning`

browser_cookie_path

Optional cookie Path to scope the browser token cookie. By default (NULL), the path is fixed to `"/"` for reliable clearing across route changes. Provide an explicit path (e.g., `"/app"`) to narrow the cookie's scope to a sub-route. Note: when the path is `"/"` and the page is served over HTTPS, the cookie name uses the `__Host-` prefix (Secure, Path=/) for additional hardening; when the path is not `"/"`, a regular cookie name is used.

For apps deployed under nested routes or where the OAuth callback may land on a different route than the initial page, keeping the default (root path) ensures the browser token cookie is available and clearable across app routes. If you deliberately scope the cookie to a sub-path, make sure all relevant routes share that prefix.

browser_cookie_samesite

SameSite value for the browser-token cookie. One of "Strict", "Lax", or "None". Defaults to "Strict" for maximum protection against cross-site request forgery. Use "Lax" only when your deployment requires the cookie to accompany top-level cross-site navigations (for example, because of reverse-proxy flows), and document the associated risk. If set to "None", the cookie will be marked `SameSite=None`; Secure in the browser, and authentication will error on non-HTTPS origins because browsers reject `SameSite=None` cookies without the Secure attribute

Details

- Blocking vs. async behavior: when `async = FALSE` (the default), network operations like token exchange and refresh are performed on the main R thread. Transient errors are retried by the package's internal `req_with_retry()` helper, which currently uses `Sys.sleep()` for backoff. In Shiny, `Sys.sleep()` blocks the event loop for the entire worker process, potentially freezing UI updates for all sessions on that worker during slow provider responses or retry backoff. To keep the UI responsive: set `async = TRUE` so network calls run in a background process via the `mirai::mirai` package (configure daemons with `mirai::daemons(n)`), or reduce/block retries (see `vignette("usage", package = "shinyOAuth")`).
- Browser requirements: the module relies on the browser's Web Crypto API to generate a secure, per-session browser token used for state double-submit protection. Specifically, the login flow requires `window.crypto.getRandomValues` to be available. If it is not present (for example, in some very old or highly locked-down browsers), the module will be unable to proceed with authentication. In that case a client-side error is emitted and surfaced to the server as `shinyOAuth_cookie_error` containing the message `"webcrypto_unavailable"`. Use a modern browser (or enable Web Crypto) to resolve this.
- Browser cookie lifetime: the opaque browser token cookie lifetime mirrors the client's `state_store` TTL. Internally, the module reads `client@state_store$info$max_age` and uses that value for the cookie's `Max-Age/Expires`. When the cache does not expose a finite `max_age`, a conservative default of 5 minutes (300 seconds) is used to align with the built-in `cache::cache_mem(max_age = 300)` default. Separately, the state payload issued_at freshness window is controlled by the client's `state_payload_max_age` (default 300 seconds).

Value

A reactiveValues object with token, error, error_description, and authenticated, plus additional fields used by the module.

The returned reactiveValues contains the following fields:

- **authenticated**: logical TRUE when there is no error and a token is present and valid (matching the verifications enabled in the client provider); FALSE otherwise.
- **token**: OAuthToken object, or NULL if not yet authenticated. This contains the access token, refresh token (if any), ID token (if any), and userinfo (if fetched). See OAuthToken for details. Note that since OAuthToken is a S7 object, you access its fields with @, e.g., token@userinfo.
- **error**: error code string when the OAuth flow fails. Be careful with exposing this directly to users, as it may contain sensitive information which could aid an attacker.
- **error_description**: human-readable error detail when available. Be extra careful with exposing this directly to users, as it may contain even more sensitive information which could aid an attacker.
- **browser_token**: internal opaque browser cookie value; used for state double-submit protection; NULL if not yet set
- **pending_callback**: internal list(code, state); used to defer token exchange until browser_token is available; NULL otherwise.
- **pending_error**: internal list(error, error_description, state); used to defer error-response state consumption until browser_token is available; NULL otherwise.
- **pending_login**: internal logical; TRUE when a login was requested but must wait for browser_token to be set, FALSE otherwise.
- **auto_redirected**: internal logical; TRUE once the module has initiated an automatic redirect in this session to avoid duplicate redirects.
- **reauth_triggered**: internal logical; TRUE once a reauthentication attempt has been initiated (after expiry or failed refresh), to avoid loops.
- **auth_started_at**: internal numeric timestamp (as from Sys.time()) when authentication started; NA if not yet authenticated. Used to enforce reauth_after_seconds if set.
- **token_stale**: logical; TRUE when the token was kept despite a refresh failure because indefinite_session = TRUE, or when the access token is past its expiry but indefinite_session = TRUE prevents automatic clearing. This lets UIs warn users or disable actions that require a fresh token. It resets to FALSE on successful login, refresh, or logout.
- **last_login_async_used**: internal logical; TRUE if the last login attempt used async = TRUE, FALSE if it was synchronous. This is only used for testing and diagnostics.
- **refresh_in_progress**: internal logical; TRUE while a token refresh is currently in flight (async or sync). Used to prevent concurrent refresh attempts when proactive refresh logic wakes up multiple times.

It also contains the following helper functions, mainly useful when auto_redirect = FALSE and you want to implement a manual login flow (e.g., with your own button):

- **request_login()**: initiates login by redirecting to the authorization endpoint, with cookie-ensure semantics: if browser_token is missing, the module sets the cookie and defers the redirect until browser_token is present, then redirects. This is the main entry point for login when auto_redirect = FALSE and you want to trigger login from your own UI

- `logout()`: clears the current token setting authenticated to FALSE, and clears the browser token cookie. You might call this when the user clicks a "logout" button
- `build_auth_url()`: internal; builds and returns the authorization URL, also storing the relevant state in the client's `state_store` (for validation during callback). Note that this requires `browser_token` to be present, so it will throw an error if called too early (verify with `has_browser_token()` first). Typically you would not call this directly, but use `request_login()` instead, which calls it internally.
- `set_browser_token()`: internal; injects JS to set the browser token cookie if missing. Normally called automatically on first load, but you can call it manually if needed. If a token is already present, it will return immediately without changing it (call `clear_browser_token()` if you want to force a reset). Typically you would not call this directly, but use `request_login()` instead, which calls it internally if needed.
- `clear_browser_token()`: internal; injects JS to clear the browser token cookie and clears `browser_token`. You might call this to reset the cookie if you suspect it's stale or compromised. Typically you would not call this directly.
- `has_browser_token()`: internal; returns TRUE if `browser_token` is present (non-NULL, non-empty), FALSE otherwise. Typically you would not call this directly

See Also

[use_shinyOAuth\(\)](#)

Examples

```
if (
  # Example requires configured GitHub OAuth 2.0 app
  # (go to https://github.com/settings/developers to create one):
  nzchar(Sys.getenv("GITHUB_OAUTH_CLIENT_ID")) &&
  nzchar(Sys.getenv("GITHUB_OAUTH_CLIENT_SECRET")) &&
  interactive()
) {
  library(shiny)
  library(shinyOAuth)

  # Define client
  client <- oauth_client(
    provider = oauth_provider_github(),
    client_id = Sys.getenv("GITHUB_OAUTH_CLIENT_ID"),
    client_secret = Sys.getenv("GITHUB_OAUTH_CLIENT_SECRET"),
    redirect_uri = "http://127.0.0.1:8100"
  )

  # Choose which app you want to run
  app_to_run <- NULL
  while (!isTRUE(app_to_run %in% c(1:4))) {
    app_to_run <- readline(
      prompt = paste0(
        "Which example app do you want to run?\n",
        " 1: Auto-redirect login\n",
        " 2: Manual login button\n",
```

```

    " 3: Fetch additional resource with access token\n",
    " 4: No app (all will be defined but none run)\n",
    "Enter 1, 2, 3, or 4... "
  )
)
}

if (app_to_run %in% c(1:3)) {
  cli::cli_alert_info(paste0(
    "Will run example app {app_to_run} on {.url http://127.0.0.1:8100}\n",
    "Open this URL in a regular browser (viewers in RStudio/Positron/etc. ",
    "cannot perform necessary redirects)"
  ))
}

# Example app with auto-redirect (1) -----

ui_1 <- fluidPage(
  use_shinyOAuth(),
  uiOutput("login")
)

server_1 <- function(input, output, session) {
  # Auto-redirect (default):
  auth <- oauth_module_server(
    "auth",
    client,
    auto_redirect = TRUE
  )

  output$login <- renderUI({
    if (auth$authenticated) {
      user_info <- auth$token@userinfo
      tagList(
        tags$p("You are logged in!"),
        tags$pre(paste(capture.output(str(user_info)), collapse = "\n"))
      )
    } else {
      tags$p("You are not logged in.")
    }
  })
}

app_1 <- shinyApp(ui_1, server_1)
if (app_to_run == "1") {
  runApp(
    app_1,
    port = 8100,
    launch.browser = FALSE
  )
}

# Example app with manual login button (2) -----

```

```

ui_2 <- fluidPage(
  use_shinyOAuth(),
  actionButton("login_btn", "Login"),
  uiOutput("login")
)

server_2 <- function(input, output, session) {
  auth <- oauth_module_server(
    "auth",
    client,
    auto_redirect = FALSE
  )

  observeEvent(input$login_btn, {
    auth$request_login()
  })

  output$login <- renderUI({
    if (auth$authenticated) {
      user_info <- auth$token@userinfo
      tagList(
        tags$p("You are logged in!"),
        tags$pre(paste(capture.output(str(user_info)), collapse = "\n"))
      )
    } else {
      tags$p("You are not logged in.")
    }
  })
}

app_2 <- shinyApp(ui_2, server_2)
if (app_to_run == "2") {
  runApp(
    app_2,
    port = 8100,
    launch.browser = FALSE
  )
}

# Example app requesting additional resource with access token (3) -----

# Below app shows the authenticated username + their GitHub repositories,
# fetched via GitHub API using the access token obtained during login

ui_3 <- fluidPage(
  use_shinyOAuth(),
  uiOutput("ui")
)

server_3 <- function(input, output, session) {
  auth <- oauth_module_server(
    "auth",

```

```

    client,
    auto_redirect = TRUE
  )

  repositories <- reactiveVal(NULL)

  observe({
    req(auth$authenticated)

    # Example additional API request using the access token
    # (e.g., fetch user repositories from GitHub)
    req <- client_bearer_req(auth$token, "https://api.github.com/user/repos")
    resp <- httr2::req_perform(req)

    if (httr2::resp_is_error(resp)) {
      repositories(NULL)
    } else {
      repos_data <- httr2::resp_body_json(resp, simplifyVector = TRUE)
      repositories(repos_data)
    }
  })

  # Render username + their repositories
  output$ui <- renderUI({
    if (isTRUE(auth$authenticated)) {
      user_info <- auth$token@userinfo
      repos <- repositories()

      return(tagList(
        tags$p(paste("You are logged in as:", user_info$login)),
        tags$h4("Your repositories:"),
        if (!is.null(repos)) {
          tags$ul(
            Map(
              function(url, name) {
                tags$li(tags$a(href = url, target = "_blank", name))
              },
              repos$html_url,
              repos$full_name
            )
          )
        } else {
          tags$p("Loading repositories...")
        }
      ))
    }

    return(tags$p("You are not logged in. "))
  })
}

app_3 <- shinyApp(ui_3, server_3)
if (app_to_run == "3") {

```

```

    runApp(
      app_3,
      port = 8100,
      launch.browser = FALSE
    )
  }
}

```

oauth_provider	Create generic OAuthProvider
----------------	--

Description

Helper function to create an [OAuthProvider](#) object. This function provides sensible defaults and infers some settings based on the provided parameters.

Usage

```

oauth_provider(
  name,
  auth_url,
  token_url,
  userinfo_url = NA_character_,
  introspection_url = NA_character_,
  revocation_url = NA_character_,
  issuer = NA_character_,
  use_nonce = NULL,
  use_pkce = TRUE,
  pkce_method = "S256",
  userinfo_required = NULL,
  userinfo_id_token_match = NULL,
  userinfo_id_selector = function(userinfo) userinfo$sub,
  id_token_required = NULL,
  id_token_validation = NULL,
  extra_auth_params = list(),
  extra_token_params = list(),
  extra_token_headers = character(),
  token_auth_style = "header",
  jwks_cache = NULL,
  jwks_pins = character(),
  jwks_pin_mode = "any",
  jwks_host_issuer_match = NULL,
  jwks_host_allow_only = NULL,
  allowed_algs = c("RS256", "RS384", "RS512", "PS256", "PS384", "PS512", "ES256",
    "ES384", "ES512", "EdDSA"),
  allowed_token_types = c("Bearer"),
  leeway = getOption("shinyOAuth.leeway", 30)
)

```

Arguments

name	Provider name (e.g., "github", "google"). Cosmetic only; used in logging and audit events
auth_url	Authorization endpoint URL
token_url	Token endpoint URL
userinfo_url	User info endpoint URL (optional)
introspection_url	Token introspection endpoint URL (optional; RFC 7662)
revocation_url	Token revocation endpoint URL (optional; RFC 7009)
issuer	OIDC issuer URL (optional; required for ID token validation). This is the base URL that identifies the OpenID Provider (OP). It is used during ID token validation to verify the iss claim in the ID token matches the expected issuer. It is also used to fetch the provider's JSON Web Key Set (JWKS) for verifying ID token signatures (typically via the OIDC discovery document located at /.well-known/openid-configuration relative to the issuer URL)
use_nonce	Whether to use OIDC nonce. This adds a nonce parameter to the authorization request and validates the nonce claim in the ID token. This is recommended for OIDC flows to mitigate replay attacks
use_pkce	Whether to use PKCE. This adds a code_challenge parameter to the authorization request and requires a code_verifier when exchanging the authorization code for tokens. This prevents authorization code interception attacks
pkce_method	PKCE code challenge method ("S256" or "plain"). "S256" is recommended. "plain" should only be used for non-compliant providers that do not support "S256"
userinfo_required	Whether to fetch userinfo after token exchange. User information will be stored in the userinfo field of the returned OAuthToken object. This requires a valid userinfo_url to be set. If fetching the userinfo fails, the token exchange will fail. For the low-level constructor <code>oauth_provider()</code>, when not explicitly supplied, this is inferred from the presence of a non-empty userinfo_url: if a userinfo_url is provided, userinfo_required defaults to TRUE, otherwise it defaults to FALSE. This avoids unexpected validation errors when userinfo_url is omitted (since it is optional).
userinfo_id_token_match	Whether to verify that the user ID ("sub") from the ID token matches the user ID extracted from the userinfo response. This requires both userinfo_required and id_token_validation to be TRUE (and thus a valid userinfo_url and issuer to be set, plus potentially setting the client's scope to include "openid", so that an ID token is returned). Furthermore, the provider's userinfo_id_selector must be configured to extract the user ID from the userinfo response. This check helps ensure the integrity of the user information by confirming that both sources agree on the user's identity. For <code>oauth_provider()</code>, when not explicitly supplied, this is inferred as TRUE only if both userinfo_required and id_token_validation are TRUE; otherwise it defaults to FALSE.

`userinfo_id_selector`

A function that extracts the user ID from the userinfo response. Should take a single argument (the userinfo list) and return the user ID as a string.

This is used when `userinfo_id_token_match` is `TRUE`. Optional otherwise; when not supplied, some features (like subject matching) will be unavailable. Helper constructors like `oauth_provider()` and `oauth_provider_oidc()` provide a default selector that extracts the `sub` field.

`id_token_required`

Whether to require an ID token to be returned during token exchange. If no ID token is returned, the token exchange will fail. This requires the provider to be a valid OpenID Connect provider and may require setting the client's scope to include "openid".

Note: At the S7 class level, this defaults to `FALSE` so that pure OAuth 2.0 providers can be configured without OIDC. Helper constructors like `oauth_provider()` and `oauth_provider_oidc()` will enable this when an issuer is supplied or OIDC is explicitly requested.

`id_token_validation`

Whether to perform ID token validation after token exchange. This requires the provider to be a valid OpenID Connect provider with a configured issuer and the token response to include an ID token (may require setting the client's scope to include "openid").

Note: At the S7 class level, this defaults to `FALSE`. Helper constructors like `oauth_provider()` and `oauth_provider_oidc()` turn this on when an issuer is provided or when OIDC is used.

`extra_auth_params`

Extra parameters for authorization URL

`extra_token_params`

Extra parameters for token exchange

`extra_token_headers`

Extra headers for token exchange requests (named character vector)

`token_auth_style`

How to authenticate when exchanging tokens. One of:

- "header": HTTP Basic (`client_secret_basic`)
- "body": Form body (`client_secret_post`)
- "client_secret_jwt": JWT client assertion signed with HMAC using `client_secret` (RFC 7523)
- "private_key_jwt": JWT client assertion signed with an asymmetric key (RFC 7523)

`jwt_cache`

JWKS cache backend. If not provided, a `cachem::cache_mem(max_age = 3600)` (1 hour) cache will be created. May be any `cachem`-compatible backend, including `cachem::cache_disk()` for a filesystem cache shared across workers, or a custom implementation created via `custom_cache()` (e.g., database/Redis backed).

TTL guidance: Choose `max_age` in line with your identity platform's JWKS rotation and cache-control cadence. A range of 15 minutes to 2 hours is typically sensible; the default is 1 hour. Shorter TTLs adopt new keys faster at the

cost of more JWKS traffic; longer TTLs reduce traffic but may delay new keys slightly. Signature verification will automatically perform a one-time JWKS refresh when a new kid appears in an ID token.

Cache keys are internal, hashed by issuer and pinning configuration. Cache values are lists with elements `jwt` and `refresh_at` (numeric epoch seconds)

<code>jwt_pins</code>	Optional character vector of RFC 7638 JWK thumbprints (base64url) to pin against. If non-empty, fetched JWKS must contain keys whose thumbprints match these values depending on <code>jwt_pin_mode</code> . Use to reduce key substitution risks by pre-authorizing expected keys
<code>jwt_pin_mode</code>	Pinning policy when <code>jwt_pins</code> is provided. Either "any" (default; at least one key in JWKS must match) or "all" (every RSA/EC/OKP public key in JWKS must match one of the configured pins)
<code>jwt_host_issuer_match</code>	When TRUE, enforce that the discovery <code>jwt_uri</code> host matches the issuer host (or a subdomain). Defaults to FALSE at the class level, but helper constructors for OIDC (e.g., <code>oauth_provider_oidc()</code> and <code>oauth_provider_oidc_discover()</code>) enable this by default for safer config. The generic helper <code>oauth_provider()</code> will also automatically set this to TRUE when an issuer is provided and either <code>id_token_validation</code> or <code>id_token_required</code> is TRUE (OIDC-like configuration). Set explicitly to FALSE to opt out. For providers that legitimately publish JWKS on a different host (e.g., Google), prefer setting <code>jwt_host_allow_only</code> to the exact hostname rather than disabling this check
<code>jwt_host_allow_only</code>	Optional explicit hostname that the <code>jwt_uri</code> must match. When provided, <code>jwt_uri</code> host must equal this value (exact match). You can pass either just the host (e.g., "www.googleapis.com") or a full URL; only the host component will be used. If you need to include a port or an IPv6 literal, pass a full URL (e.g., <code>https://[::1]:8443</code>) — the port is ignored and only the hostname part is used for matching. Takes precedence over <code>jwt_host_issuer_match</code>
<code>allowed_algs</code>	Optional vector of allowed JWT algorithms for ID tokens. Use to restrict acceptable alg values on a per-provider basis. Supported asymmetric algorithms include RS256, RS384, RS512, PS256, PS384, PS512, ES256, ES384, ES512, and EdDSA (Ed25519/Ed448 via OKP). Symmetric HMAC algorithms HS256, HS384, HS512 are also supported but require that you supply a <code>client_secret</code> and explicitly enable HMAC verification via the option <code>options(shinyOAuth.allow_hs = TRUE)</code> . Defaults to <code>c("RS256", "RS384", "RS512", "PS256", "PS384", "PS512", "ES256", "ES384", "ES512", "EdDSA")</code> , which intentionally excludes HS*. Only include HS* if you are certain the <code>client_secret</code> is stored strictly server-side and is never shipped to, or derivable by, the browser or other untrusted environments. Prefer rotating secrets regularly when enabling this.
<code>allowed_token_types</code>	Character vector of acceptable OAuth token types returned by the token endpoint (case-insensitive). When non-empty, the token response MUST include <code>token_type</code> and it must be one of the allowed values; otherwise the flow fails fast with a <code>shinyOAuth_token_error</code> . When empty, no check is performed and <code>token_type</code> may be omitted by the provider. The <code>oauth_provider()</code> helper defaults to <code>c("Bearer")</code> for all providers because the package only supports

	Bearer tokens (i.e., <code>client_bearer_req()</code> sends Authorization: Bearer). This ensures that if a provider returns a non-Bearer token type (e.g., DPoP, MAC), the flow fails fast rather than misusing the token. Set <code>allowed_token_types = character()</code> explicitly to opt out of enforcement.
leeway	Clock skew leeway (seconds) applied to ID token exp/iat/nbf checks and state payload issued_at future check. Default 30. Can be globally overridden via option <code>shinyOAuth.leeway</code>

Value

`OAuthProvider` object

Examples

```
# Configure generic OAuth 2.0 provider (no OIDC)
generic_provider <- oauth_provider(
  name = "example",
  auth_url = "https://example.com/oauth/authorize",
  token_url = "https://example.com/oauth/token",
  # Optional URL for fetching user info:
  userinfo_url = "https://example.com/oauth/userinfo"
)

# Configure generic OIDC provider manually
# (This defaults to using nonce & ID token validation)
generic_oidc_provider <- oauth_provider_oidc(
  name = "My OIDC",
  base_url = "https://my-issuer.example.com"
)

# Configure a OIDC provider via OIDC discovery
# (requires network access)

# Using Auth0 sample issuer as an example
oidc_discovery_provider <- oauth_provider_oidc_discover(
  issuer = "https://samples.auth0.com"
)

# GitHub preconfigured provider
github_provider <- oauth_provider_github()

# Google preconfigured provider
google_provider <- oauth_provider_google()

# Microsoft preconfigured provider
# See `?oauth_provider_microsoft` for example using a custom tenant ID

# Spotify preconfigured provider
spotify_provider <- oauth_provider_spotify()

# Slack via OIDC discovery
```

```

# (requires network access)

slack_provider <- oauth_provider_slack()

# Keycloak
# (requires configured Keycloak realm; example below is therefore not run)
## Not run:
oauth_provider_keycloak(base_url = "http://localhost:8080", realm = "myrealm")

## End(Not run)

# Auth0
# (requires configured Auth0 domain; example below is therefore not run)
## Not run:
oauth_provider_auth0(domain = "your-tenant.auth0.com")

## End(Not run)

# Okta
# (requires configured Okta domain; example below is therefore not run)
## Not run:
oauth_provider_okta(domain = "dev-123456.okta.com")

## End(Not run)

```

oauth_provider_auth0 *Create an Auth0 [OAuthProvider](#) (via OIDC discovery)*

Description

Create an Auth0 [OAuthProvider](#) (via OIDC discovery)

Usage

```
oauth_provider_auth0(domain, name = "auth0", audience = NULL)
```

Arguments

domain	Your Auth0 domain, e.g., "your-domain.auth0.com"
name	Optional provider name (default "auth0")
audience	Optional audience to request in auth flows

Value

[OAuthProvider](#) object configured for the specified Auth0 domain

Examples

```
# Configure generic OAuth 2.0 provider (no OIDC)
generic_provider <- oauth_provider(
  name = "example",
  auth_url = "https://example.com/oauth/authorize",
  token_url = "https://example.com/oauth/token",
  # Optional URL for fetching user info:
  userinfo_url = "https://example.com/oauth/userinfo"
)

# Configure generic OIDC provider manually
# (This defaults to using nonce & ID token validation)
generic_oidc_provider <- oauth_provider_oidc(
  name = "My OIDC",
  base_url = "https://my-issuer.example.com"
)

# Configure a OIDC provider via OIDC discovery
# (requires network access)

# Using Auth0 sample issuer as an example
oidc_discovery_provider <- oauth_provider_oidc_discover(
  issuer = "https://samples.auth0.com"
)

# GitHub preconfigured provider
github_provider <- oauth_provider_github()

# Google preconfigured provider
google_provider <- oauth_provider_google()

# Microsoft preconfigured provider
# See `?oauth_provider_microsoft` for example using a custom tenant ID

# Spotify preconfigured provider
spotify_provider <- oauth_provider_spotify()

# Slack via OIDC discovery
# (requires network access)

slack_provider <- oauth_provider_slack()

# Keycloak
# (requires configured Keycloak realm; example below is therefore not run)
## Not run:
oauth_provider_keycloak(base_url = "http://localhost:8080", realm = "myrealm")

## End(Not run)

# Auth0
```

```
# (requires configured Auth0 domain; example below is therefore not run)
## Not run:
oauth_provider_auth0(domain = "your-tenant.auth0.com")

## End(Not run)

# Okta
# (requires configured Okta domain; example below is therefore not run)
## Not run:
oauth_provider_okta(domain = "dev-123456.okta.com")

## End(Not run)
```

oauth_provider_github *Create a GitHub OAuthProvider*

Description

Pre-configured OAuth 2.0 provider for GitHub.

Usage

```
oauth_provider_github(name = "github")
```

Arguments

name	Optional provider name (default "github")
------	---

Details

You can register a new GitHub OAuth 2.0 app in your '[Developer Settings](#)'.

Value

[OAuthProvider](#) object for use with a GitHub OAuth 2.0 app

Examples

```
# Configure generic OAuth 2.0 provider (no OIDC)
generic_provider <- oauth_provider(
  name = "example",
  auth_url = "https://example.com/oauth/authorize",
  token_url = "https://example.com/oauth/token",
  # Optional URL for fetching user info:
  userinfo_url = "https://example.com/oauth/userinfo"
)

# Configure generic OIDC provider manually
# (This defaults to using nonce & ID token validation)
generic_oidc_provider <- oauth_provider_oidc(
```

```
    name = "My OIDC",
    base_url = "https://my-issuer.example.com"
  )

# Configure a OIDC provider via OIDC discovery
# (requires network access)

# Using Auth0 sample issuer as an example
oidc_discovery_provider <- oauth_provider_oidc_discover(
  issuer = "https://samples.auth0.com"
)

# GitHub preconfigured provider
github_provider <- oauth_provider_github()

# Google preconfigured provider
google_provider <- oauth_provider_google()

# Microsoft preconfigured provider
# See `?oauth_provider_microsoft` for example using a custom tenant ID

# Spotify preconfigured provider
spotify_provider <- oauth_provider_spotify()

# Slack via OIDC discovery
# (requires network access)

slack_provider <- oauth_provider_slack()

# Keycloak
# (requires configured Keycloak realm; example below is therefore not run)
## Not run:
oauth_provider_keycloak(base_url = "http://localhost:8080", realm = "myrealm")

## End(Not run)

# Auth0
# (requires configured Auth0 domain; example below is therefore not run)
## Not run:
oauth_provider_auth0(domain = "your-tenant.auth0.com")

## End(Not run)

# Okta
# (requires configured Okta domain; example below is therefore not run)
## Not run:
oauth_provider_okta(domain = "dev-123456.okta.com")

## End(Not run)
```

oauth_provider_google *Create a Google [OAuthProvider](#)*

Description

Pre-configured [OAuthProvider](#) for Google.

Usage

```
oauth_provider_google(name = "google")
```

Arguments

name	Optional provider name (default "google")
------	---

Details

You can register a new Google OAuth 2.0 app in the [Google Cloud Console](#). Configure the client ID & secret in your [OAuthClient](#).

Value

[OAuthProvider](#) object for use with a Google OAuth 2.0 app

Examples

```
# Configure generic OAuth 2.0 provider (no OIDC)
generic_provider <- oauth_provider(
  name = "example",
  auth_url = "https://example.com/oauth/authorize",
  token_url = "https://example.com/oauth/token",
  # Optional URL for fetching user info:
  userinfo_url = "https://example.com/oauth/userinfo"
)

# Configure generic OIDC provider manually
# (This defaults to using nonce & ID token validation)
generic_oidc_provider <- oauth_provider_oidc(
  name = "My OIDC",
  base_url = "https://my-issuer.example.com"
)

# Configure a OIDC provider via OIDC discovery
# (requires network access)

# Using Auth0 sample issuer as an example
oidc_discovery_provider <- oauth_provider_oidc_discover(
  issuer = "https://samples.auth0.com"
)
```

```
# GitHub preconfigured provider
github_provider <- oauth_provider_github()

# Google preconfigured provider
google_provider <- oauth_provider_google()

# Microsoft preconfigured provider
# See `?oauth_provider_microsoft` for example using a custom tenant ID

# Spotify preconfigured provider
spotify_provider <- oauth_provider_spotify()

# Slack via OIDC discovery
# (requires network access)

slack_provider <- oauth_provider_slack()

# Keycloak
# (requires configured Keycloak realm; example below is therefore not run)
## Not run:
oauth_provider_keycloak(base_url = "http://localhost:8080", realm = "myrealm")

## End(Not run)

# Auth0
# (requires configured Auth0 domain; example below is therefore not run)
## Not run:
oauth_provider_auth0(domain = "your-tenant.auth0.com")

## End(Not run)

# Okta
# (requires configured Okta domain; example below is therefore not run)
## Not run:
oauth_provider_okta(domain = "dev-123456.okta.com")

## End(Not run)
```

oauth_provider_keycloak

Create a Keycloak [OAuthProvider](#) (via OIDC discovery)

Description

Create a Keycloak [OAuthProvider](#) (via OIDC discovery)

Usage

```
oauth_provider_keycloak(
  base_url,
  realm,
  name = paste0("keycloak-", realm),
  token_auth_style = "body"
)
```

Arguments

<code>base_url</code>	Base URL of the Keycloak server, e.g., "http://localhost:8080"
<code>realm</code>	Keycloak realm name, e.g., "myrealm"
<code>name</code>	Optional provider name. Defaults to <code>paste0('keycloak-', realm)</code>
<code>token_auth_style</code>	Optional override for token endpoint authentication method. One of "header" (client_secret_basic), "body" (client_secret_post), "private_key_jwt", or "client_secret_jwt". Defaults to "body" for Keycloak, which works for both confidential clients and public PKCE clients (secretless). If you pass NULL, discovery will infer the method from the provider's <code>token_endpoint_auth_methods_supported</code> meta-data.

Value

[OAuthProvider](#) object configured for the specified Keycloak realm

Examples

```
# Configure generic OAuth 2.0 provider (no OIDC)
generic_provider <- oauth_provider(
  name = "example",
  auth_url = "https://example.com/oauth/authorize",
  token_url = "https://example.com/oauth/token",
  # Optional URL for fetching user info:
  userinfo_url = "https://example.com/oauth/userinfo"
)

# Configure generic OIDC provider manually
# (This defaults to using nonce & ID token validation)
generic_oidc_provider <- oauth_provider_oidc(
  name = "My OIDC",
  base_url = "https://my-issuer.example.com"
)

# Configure a OIDC provider via OIDC discovery
# (requires network access)

# Using Auth0 sample issuer as an example
oidc_discovery_provider <- oauth_provider_oidc_discover(
  issuer = "https://samples.auth0.com"
)
```

```

# GitHub preconfigured provider
github_provider <- oauth_provider_github()

# Google preconfigured provider
google_provider <- oauth_provider_google()

# Microsoft preconfigured provider
# See `?oauth_provider_microsoft` for example using a custom tenant ID

# Spotify preconfigured provider
spotify_provider <- oauth_provider_spotify()

# Slack via OIDC discovery
# (requires network access)

slack_provider <- oauth_provider_slack()

# Keycloak
# (requires configured Keycloak realm; example below is therefore not run)
## Not run:
oauth_provider_keycloak(base_url = "http://localhost:8080", realm = "myrealm")

## End(Not run)

# Auth0
# (requires configured Auth0 domain; example below is therefore not run)
## Not run:
oauth_provider_auth0(domain = "your-tenant.auth0.com")

## End(Not run)

# Okta
# (requires configured Okta domain; example below is therefore not run)
## Not run:
oauth_provider_okta(domain = "dev-123456.okta.com")

## End(Not run)

```

oauth_provider_microsoft

Create a Microsoft (Entra ID) OAuthProvider

Description

Pre-configured [OAuthProvider](#) for Microsoft Entra ID (formerly Azure AD) using the v2.0 endpoints. Accepts a tenant identifier and configures the authorization, token, and userinfo endpoints directly (no discovery).

Usage

```
oauth_provider_microsoft(
  name = "microsoft",
  tenant = c("common", "organizations", "consumers"),
  id_token_validation = NULL
)
```

Arguments

name	Optional friendly name for the provider. Defaults to "microsoft"
tenant	Tenant identifier ("common", "organizations", "consumers", or directory GUID). Defaults to "common"
id_token_validation	Optional override (logical). If NULL (default), it's enabled automatically when tenant looks like a GUID, otherwise disabled

Details

The tenant can be one of the special values "common", "organizations", or "consumers", or a specific directory (tenant) ID GUID (e.g., "00000000-0000-0000-0000-000000000000").

When tenant is a specific GUID, the provider will enable strict ID token validation (issuer match). When using the multi-tenant aliases ("common", "organizations", "consumers"), the exact issuer depends on the account that signs in and therefore ID token validation is disabled by default to avoid false negatives. You can override this via `id_token_validation` if you know the environment guarantees a fixed issuer.

Note: ID token validation requires a stable issuer. For multi-tenant aliases, this provider sets `issuer` = NA and therefore also disables `use_nonce` by default (nonce validation relies on validating the ID token).

Microsoft issues RS256 ID tokens; `allowed_algs` is restricted accordingly. The `userinfo` endpoint is provided by Microsoft Graph (<https://graph.microsoft.com/oidc/userinfo>).

When configuring your [OAuthClient](#), if you do not have the option to register an app or simply wish to test during development, you may be able to use the default Azure CLI public app, with `client_id` '9391afd1-7129-4938-9e4d-633c688f93c0' (uses `redirect_uri` 'http://localhost:8100').

Value

[OAuthProvider](#) object configured for Microsoft identity platform

Examples

```
if (
  # Example requires configured Microsoft Entra ID (Azure AD) tenant:
  nzchar(Sys.getenv("MS_TENANT")) && interactive() && requireNamespace("later")
) {
  library(shiny)
  library(shinyOAuth)

  # Configure provider and client (Microsoft Entra ID with your tenant
```

```

client <- oauth_client(
  provider = oauth_provider_microsoft(
    # Provide your own tenant ID here (set as environment variable MS_TENANT)
    tenant = Sys.getenv("MS_TENANT")
  ),
  # Default Azure CLI app ID (public client; activated in many tenants):
  client_id = "04b07795-8ddb-461a-bbee-02f9e1bf7b46",
  redirect_uri = "http://localhost:8100",
  scopes = c("openid", "profile", "email")
)

# UI
ui <- fluidPage(
  use_shinyOAuth(),
  h3("OAuth demo (Microsoft Entra ID)"),
  uiOutput("oauth_error"),
  tags$hr(),
  h4("Auth object (summary)"),
  verbatimTextOutput("auth_print"),
  tags$hr(),
  h4("User info"),
  verbatimTextOutput("user_info")
)

# Server
server <- function(input, output, session) {
  auth <- oauth_module_server("auth", client)

  output$auth_print <- renderText({
    authenticated <- auth$authenticated
    tok <- auth$token
    err <- auth$error

    paste0(
      "Authenticated?",
      if (isTRUE(authenticated)) " YES" else " NO",
      "\n",
      "Has token? ",
      if (!is.null(tok)) "YES" else "NO",
      "\n",
      "Has error? ",
      if (!is.null(err)) "YES" else "NO",
      "\n\n",
      "Token (str):\n",
      paste(capture.output(str(tok)), collapse = "\n")
    )
  })

  output$user_info <- renderPrint({
    req(auth$token)
    auth$token@userinfo
  })
}

```

```

output$oauth_error <- renderUI({
  if (!is.null(auth$error)) {
    msg <- auth$error
    if (!is.null(auth$error_description)) {
      msg <- paste0(msg, ": ", auth$error_description)
    }
    div(class = "alert alert-danger", role = "alert", msg)
  }
})
}

# Need to open app in 'localhost:8100' to match with redirect_uri
# of the public Azure CLI app (above). Browser must use 'localhost'
# too to properly set the browser cookie. But Shiny only redirects to
# '127.0.0.1' & blocks process once it runs. So we disable browser
# launch by Shiny & then use 'later::later()' to open the browser
# ourselves a short moment after the app starts
later::later(
  function() {
    utils::browseURL("http://localhost:8100")
  },
  delay = 0.25
)

# Run app
runApp(shinyApp(ui, server), port = 8100, launch.browser = FALSE)
}

```

oauth_provider_oidc *Create a generic OpenID Connect (OIDC) [OAuthProvider](#)*

Description

Preconfigured [OAuthProvider](#) for OpenID Connect (OIDC) compliant providers.

Usage

```

oauth_provider_oidc(
  name,
  base_url,
  auth_path = "/authorize",
  token_path = "/token",
  userinfo_path = "/userinfo",
  introspection_path = "/introspect",
  use_nonce = TRUE,
  id_token_validation = TRUE,
  jwks_host_issuer_match = TRUE,
  allowed_token_types = c("Bearer"),
  ...
)

```

Arguments

name	Friendly name for the provider
base_url	Base URL for OIDC endpoints
auth_path	Authorization endpoint path (default: "/authorize")
token_path	Token endpoint path (default: "/token")
userinfo_path	User info endpoint path (default: "/userinfo")
introspection_path	Token introspection endpoint path (default: "/introspect")
use_nonce	Logical, whether to use OIDC nonce. Defaults to TRUE
id_token_validation	Logical, whether to validate ID tokens automatically for this provider. Defaults to TRUE
jwt_host_issuer_match	When TRUE (default), enforce that the JWKS host discovered from the provider matches the issuer host (or a subdomain). For providers that serve JWKS from a different host (e.g., Google), set <code>jwt_host_allow_only</code> to the exact hostname instead of disabling this. Disabling (FALSE) is not recommended unless you also pin JWKS via <code>jwt_host_allow_only</code> or <code>jwt_pins</code>
allowed_token_types	Character vector of allowed token types for access tokens issued by this provider. Defaults to 'Bearer'
...	Additional arguments passed to <code>oauth_provider()</code>

Value

`OAuthProvider` object

Examples

```
# Configure generic OAuth 2.0 provider (no OIDC)
generic_provider <- oauth_provider(
  name = "example",
  auth_url = "https://example.com/oauth/authorize",
  token_url = "https://example.com/oauth/token",
  # Optional URL for fetching user info:
  userinfo_url = "https://example.com/oauth/userinfo"
)

# Configure generic OIDC provider manually
# (This defaults to using nonce & ID token validation)
generic_oidc_provider <- oauth_provider_oidc(
  name = "My OIDC",
  base_url = "https://my-issuer.example.com"
)

# Configure a OIDC provider via OIDC discovery
# (requires network access)
```

```

# Using Auth0 sample issuer as an example
oidc_discovery_provider <- oauth_provider_oidc_discover(
  issuer = "https://samples.auth0.com"
)

# GitHub preconfigured provider
github_provider <- oauth_provider_github()

# Google preconfigured provider
google_provider <- oauth_provider_google()

# Microsoft preconfigured provider
# See `oauth_provider_microsoft` for example using a custom tenant ID

# Spotify preconfigured provider
spotify_provider <- oauth_provider_spotify()

# Slack via OIDC discovery
# (requires network access)

slack_provider <- oauth_provider_slack()

# Keycloak
# (requires configured Keycloak realm; example below is therefore not run)
## Not run:
oauth_provider_keycloak(base_url = "http://localhost:8080", realm = "myrealm")

## End(Not run)

# Auth0
# (requires configured Auth0 domain; example below is therefore not run)
## Not run:
oauth_provider_auth0(domain = "your-tenant.auth0.com")

## End(Not run)

# Okta
# (requires configured Okta domain; example below is therefore not run)
## Not run:
oauth_provider_okta(domain = "dev-123456.okta.com")

## End(Not run)

```

oauth_provider_oidc_discover

Discover and create an OpenID Connect (OIDC) [OAuthProvider](#)

Description

Uses the OpenID Connect discovery document at /.well-known/openid-configuration to auto-configure an [OAuthProvider](#). When present, introspection_endpoint is wired into the resulting provider for RFC 7662 support.

Usage

```
oauth_provider_oidc_discover(
    issuer,
    name = NULL,
    use_pkce = TRUE,
    use_nonce = TRUE,
    id_token_validation = TRUE,
    token_auth_style = NULL,
    allowed_algs = c("RS256", "RS384", "RS512", "PS256", "PS384", "PS512", "ES256",
        "ES384", "ES512", "EdDSA"),
    allowed_token_types = c("Bearer"),
    jwks_host_issuer_match = TRUE,
    issuer_match = c("url", "host", "none"),
    ...
)
```

Arguments

issuer	The OIDC issuer base URL (including scheme), e.g., "https://login.example.com"
name	Optional friendly provider name. Defaults to the issuer hostname
use_pkce	Logical, whether to use PKCE for this provider. Defaults to TRUE. If the discovery document indicates token_endpoint_auth_methods_supported includes "none", PKCE is required unless use_pkce is explicitly set to FALSE (not recommended)
use_nonce	Logical, whether to use OIDC nonce. Defaults to TRUE
id_token_validation	Logical, whether to validate ID tokens automatically for this provider. Defaults to TRUE
token_auth_style	Authentication style for token requests: "header" (client_secret_basic) or "body" (client_secret_post). If NULL (default), it is inferred conservatively from discovery. When PKCE is enabled and the provider advertises support for public clients via none, a secretless flow is preferred (modeled as "body" without credentials). Otherwise, the helper prefers "header" (client_secret_basic) when available, then "body" (client_secret_post). JWT-based methods are not auto-selected unless explicitly requested
allowed_algs	Character vector of allowed ID token signing algorithms. Defaults to a broad set of common algorithms, including RSA (RS*), RSA-PSS (PS*), ECDSA (ES*), and EdDSA. If the discovery document advertises supported algorithms, the intersection of advertised and caller-provided algorithms is used to avoid runtime mismatches. If there's no overlap, discovery fails with a configuration error (no fallback)

allowed_token_types	Character vector of allowed token types for access tokens issued by this provider. Defaults to 'Bearer'
jwks_host_issuer_match	When TRUE (default), enforce that the JWKS host discovered from the provider matches the issuer host (or a subdomain). For providers that serve JWKS from a different host, set jwks_host_allow_only to the exact hostname instead of disabling this. Disabling (FALSE) is not recommended unless you also pin JWKS via jwks_host_allow_only or jwks_pins
issuer_match	Character scalar controlling how strictly to validate the discovery document's issuer against the input issuer. • "url" (default): require the full issuer URL to match after trailing-slash normalization (recommended). • "host": compare only scheme + host (explicit opt-out; not recommended). • "none": do not validate issuer consistency. Prefer "url" and tighten hosts via options(shinyOAuth.allowed_hosts) when feasible.
...	Additional fields passed to oauth_provider()

Details

- ID token algorithms: by default this helper accepts common asymmetric algorithms RSA (RS*), RSA-PSS (PS*), ECDSA (ES*), and EdDSA. When the provider advertises its supported ID token signing algorithms via id_token_signing_alg_values_supported, the helper uses the intersection with the caller-provided allowed_algs. If there is no overlap, discovery fails with a configuration error. There is no automatic fallback to the discovery-advertised set.
- Token endpoint authentication methods: supports client_secret_basic (header), client_secret_post (body), public clients using none (with PKCE), as well as JWT-based methods private_key_jwt and client_secret_jwt per RFC 7523.
Important: discovery metadata lists methods supported across the provider, not per-client provisioning. This helper does not automatically select JWT-based methods just because they are advertised. By default it prefers client_secret_basic (header) when available, otherwise client_secret_post (body), and only uses public none for PKCE clients. If a provider advertises only JWT methods, you must explicitly set token_auth_style and configure the corresponding credentials on your [OAuthClient](#) (a private key for private_key_jwt, or a sufficiently strong client_secret for client_secret_jwt).
- Host policy: by default, discovered endpoints must be absolute URLs whose host matches the issuer host exactly. Subdomains are NOT implicitly allowed. If you want to allow subdomains, add a leading-dot or glob in options(shinyOAuth.allowed_hosts), e.g., .example.com or *.example.com. If a global whitelist is supplied via options(shinyOAuth.allowed_hosts), discovery will restrict endpoints to that whitelist. Scheme policy (https/http for loopback) is delegated to is_ok_host(), so you may allow non-HTTPS hosts with options(shinyOAuth.allowed_non_https_hosts) (see ?is_ok_host).

Value

[OAuthProvider](#) object configured from discovery

Examples

```
# Configure generic OAuth 2.0 provider (no OIDC)
generic_provider <- oauth_provider(
  name = "example",
  auth_url = "https://example.com/oauth/authorize",
  token_url = "https://example.com/oauth/token",
  # Optional URL for fetching user info:
  userinfo_url = "https://example.com/oauth/userinfo"
)

# Configure generic OIDC provider manually
# (This defaults to using nonce & ID token validation)
generic_oidc_provider <- oauth_provider_oidc(
  name = "My OIDC",
  base_url = "https://my-issuer.example.com"
)

# Configure a OIDC provider via OIDC discovery
# (requires network access)

# Using Auth0 sample issuer as an example
oidc_discovery_provider <- oauth_provider_oidc_discover(
  issuer = "https://samples.auth0.com"
)

# GitHub preconfigured provider
github_provider <- oauth_provider_github()

# Google preconfigured provider
google_provider <- oauth_provider_google()

# Microsoft preconfigured provider
# See `?oauth_provider_microsoft` for example using a custom tenant ID

# Spotify preconfigured provider
spotify_provider <- oauth_provider_spotify()

# Slack via OIDC discovery
# (requires network access)

slack_provider <- oauth_provider_slack()

# Keycloak
# (requires configured Keycloak realm; example below is therefore not run)
## Not run:
oauth_provider_keycloak(base_url = "http://localhost:8080", realm = "myrealm")

## End(Not run)

# Auth0
```

```
# (requires configured Auth0 domain; example below is therefore not run)
## Not run:
oauth_provider_auth0(domain = "your-tenant.auth0.com")

## End(Not run)

# Okta
# (requires configured Okta domain; example below is therefore not run)
## Not run:
oauth_provider_okta(domain = "dev-123456.okta.com")

## End(Not run)
```

oauth_provider_okta	Create an Okta OAuthProvider (via OIDC discovery)
---------------------	---

Description

Create an Okta [OAuthProvider](#) (via OIDC discovery)

Usage

```
oauth_provider_okta(domain, auth_server = "default", name = "okta")
```

Arguments

domain	Your Okta domain, e.g., "dev-123456.okta.com"
auth_server	Authorization server ID (default "default")
name	Optional provider name (default "okta")

Value

[OAuthProvider](#) object configured for the specified Okta domain

Examples

```
# Configure generic OAuth 2.0 provider (no OIDC)
generic_provider <- oauth_provider(
  name = "example",
  auth_url = "https://example.com/oauth/authorize",
  token_url = "https://example.com/oauth/token",
  # Optional URL for fetching user info:
  userinfo_url = "https://example.com/oauth/userinfo"
)

# Configure generic OIDC provider manually
# (This defaults to using nonce & ID token validation)
generic_oidc_provider <- oauth_provider_oidc(
  name = "My OIDC",
```

```
    base_url = "https://my-issuer.example.com"
  )

  # Configure a OIDC provider via OIDC discovery
  # (requires network access)

  # Using Auth0 sample issuer as an example
  oidc_discovery_provider <- oauth_provider_oidc_discover(
    issuer = "https://samples.auth0.com"
  )

  # GitHub preconfigured provider
  github_provider <- oauth_provider_github()

  # Google preconfigured provider
  google_provider <- oauth_provider_google()

  # Microsoft preconfigured provider
  # See `?oauth_provider_microsoft` for example using a custom tenant ID

  # Spotify preconfigured provider
  spotify_provider <- oauth_provider_spotify()

  # Slack via OIDC discovery
  # (requires network access)

  slack_provider <- oauth_provider_slack()

  # Keycloak
  # (requires configured Keycloak realm; example below is therefore not run)
  ## Not run:
  oauth_provider_keycloak(base_url = "http://localhost:8080", realm = "myrealm")

  ## End(Not run)

  # Auth0
  # (requires configured Auth0 domain; example below is therefore not run)
  ## Not run:
  oauth_provider_auth0(domain = "your-tenant.auth0.com")

  ## End(Not run)

  # Okta
  # (requires configured Okta domain; example below is therefore not run)
  ## Not run:
  oauth_provider_okta(domain = "dev-123456.okta.com")

  ## End(Not run)
```

oauth_provider_slack *Create a Slack [OAuthProvider](#) (via OIDC discovery)*

Description

Create a Slack [OAuthProvider](#) (via OIDC discovery)

Usage

```
oauth_provider_slack(name = "slack")
```

Arguments

name	Optional provider name (default "slack")
------	--

Value

[OAuthProvider](#) object configured for Slack

Examples

```
# Configure generic OAuth 2.0 provider (no OIDC)
generic_provider <- oauth_provider(
  name = "example",
  auth_url = "https://example.com/oauth/authorize",
  token_url = "https://example.com/oauth/token",
  # Optional URL for fetching user info:
  userinfo_url = "https://example.com/oauth/userinfo"
)

# Configure generic OIDC provider manually
# (This defaults to using nonce & ID token validation)
generic_oidc_provider <- oauth_provider_oidc(
  name = "My OIDC",
  base_url = "https://my-issuer.example.com"
)

# Configure a OIDC provider via OIDC discovery
# (requires network access)

# Using Auth0 sample issuer as an example
oidc_discovery_provider <- oauth_provider_oidc_discover(
  issuer = "https://samples.auth0.com"
)

# GitHub preconfigured provider
github_provider <- oauth_provider_github()

# Google preconfigured provider
```

```
google_provider <- oauth_provider_google()

# Microsoft preconfigured provider
# See `?oauth_provider_microsoft` for example using a custom tenant ID

# Spotify preconfigured provider
spotify_provider <- oauth_provider_spotify()

# Slack via OIDC discovery
# (requires network access)

slack_provider <- oauth_provider_slack()


# Keycloak
# (requires configured Keycloak realm; example below is therefore not run)
## Not run:
oauth_provider_keycloak(base_url = "http://localhost:8080", realm = "myrealm")

## End(Not run)


# Auth0
# (requires configured Auth0 domain; example below is therefore not run)
## Not run:
oauth_provider_auth0(domain = "your-tenant.auth0.com")

## End(Not run)


# Okta
# (requires configured Okta domain; example below is therefore not run)
## Not run:
oauth_provider_okta(domain = "dev-123456.okta.com")

## End(Not run)
```

oauth_provider_spotify

Create a Spotify [OAuthProvider](#)

Description

Pre-configured OAuth 2.0 provider for Spotify. Uses /v1/me as "userinfo". No ID token (not OIDC).

Usage

```
oauth_provider_spotify(name = "spotify")
```

Arguments

name	Optional provider name (default "spotify")
------	--

Details

Spotify requires scopes to be included in the authorization request. Set requested scopes on the client with `oauth_client(..., scopes = ...)`.

Value

[OAuthProvider](#) object for use with a Spotify OAuth 2.0 app

See Also

For an example application which using Spotify OAuth 2.0 login to display the user's listening data, see `vignette("example-spotify")`.

Examples

```
# Configure generic OAuth 2.0 provider (no OIDC)
generic_provider <- oauth_provider(
  name = "example",
  auth_url = "https://example.com/oauth/authorize",
  token_url = "https://example.com/oauth/token",
  # Optional URL for fetching user info:
  userinfo_url = "https://example.com/oauth/userinfo"
)

# Configure generic OIDC provider manually
# (This defaults to using nonce & ID token validation)
generic_oidc_provider <- oauth_provider_oidc(
  name = "My OIDC",
  base_url = "https://my-issuer.example.com"
)

# Configure a OIDC provider via OIDC discovery
# (requires network access)

# Using Auth0 sample issuer as an example
oidc_discovery_provider <- oauth_provider_oidc_discover(
  issuer = "https://samples.auth0.com"
)

# GitHub preconfigured provider
github_provider <- oauth_provider_github()

# Google preconfigured provider
google_provider <- oauth_provider_google()

# Microsoft preconfigured provider
# See `?oauth_provider_microsoft` for example using a custom tenant ID

# Spotify preconfigured provider
spotify_provider <- oauth_provider_spotify()
```

```

# Slack via OIDC discovery
# (requires network access)

slack_provider <- oauth_provider_slack()

# Keycloak
# (requires configured Keycloak realm; example below is therefore not run)
## Not run:
oauth_provider_keycloak(base_url = "http://localhost:8080", realm = "myrealm")

## End(Not run)

# Auth0
# (requires configured Auth0 domain; example below is therefore not run)
## Not run:
oauth_provider_auth0(domain = "your-tenant.auth0.com")

## End(Not run)

# Okta
# (requires configured Okta domain; example below is therefore not run)
## Not run:
oauth_provider_okta(domain = "dev-123456.okta.com")

## End(Not run)

```

prepare_call	<i>Prepare a OAuth 2.0 authorization call and build an authorization URL</i>
--------------	--

Description

This function prepares an OAuth 2.0 authorization call by generating necessary state, PKCE, and nonce values, storing them securely, and constructing the authorization URL to redirect the user to. The state and accompanying values are stored in the client's state store for later verification during the callback phase of the OAuth 2.0 flow.

Usage

```
prepare_call(oauth_client, browser_token)
```

Arguments

oauth_client An [OAuthClient](#) object representing the OAuth client configuration.
browser_token A string token (e.g., from a browser cookie) to identify the user/session.

Value

A string containing the constructed authorization URL. This URL should be used to redirect the user to the OAuth provider's authorization endpoint.

Examples

```
# Please note: `prepare_call()` & `handle_callback()` are typically
# not called by users of this package directly, but are called
# internally by `oauth_module_server()`. These functions are exported
# nonetheless for advanced use cases. Most users will not need to
# call these functions directly

# Below code shows generic usage of `prepare_call()` and `handle_callback()`
# (code is not run because it would require user interaction)
## Not run:
# Define client
client <- oauth_client(
  provider = oauth_provider_github(),
  client_id = Sys.getenv("GITHUB_OAUTH_CLIENT_ID"),
  client_secret = Sys.getenv("GITHUB_OAUTH_CLIENT_SECRET"),
  redirect_uri = "http://127.0.0.1:8100"
)

# Get authorization URL and and store state in client's state store
# `<browser_token>` is a token that identifies the browser session
# and would typically be stored in a browser cookie
# (`oauth_module_server()` handles this typically)
authorization_url <- prepare_call(client, "<browser_token>")

# Redirect user to authorization URL; retrieve code & payload from query;
# read also `<browser_token>` from browser cookie
# (`oauth_module_server()` handles this typically)
code <- "..."
payload <- "..."
browser_token <- "..."

# Handle callback, exchanging code for token and validating state
# (`oauth_module_server()` handles this typically)
token <- handle_callback(client, code, payload, browser_token)

## End(Not run)
```

refresh_token

Refresh an OAuth 2.0 token

Description

Refreshes an OAuth session by obtaining a fresh access token using the refresh token. When configured, also re-fetches userinfo and validates any new ID token returned by the provider.

Per OIDC Core Section 12.2, providers may omit the ID token from refresh responses. When omitted, the original ID token from the initial login is preserved.

If the provider does return a new ID token during refresh, `refresh_token()` requires that an original ID token from the initial login is available so it can enforce subject continuity (OIDC 12.2: sub MUST match). If no original ID token is available, refresh fails with an error.

When `id_token_validation = TRUE`, any refresh-returned ID token is also fully validated (signature and claims) in addition to the OIDC 12.2 sub continuity check.

When `userinfo_required = TRUE`, `userinfo` is re-fetched using the fresh access token. If both a new ID token and fresh `userinfo` are present and `userinfo_id_token_match = TRUE`, their subjects are verified to match.

Usage

```
refresh_token(
  oauth_client,
  token,
  async = FALSE,
  introspect = FALSE,
  shiny_session = NULL
)
```

Arguments

<code>oauth_client</code>	OAuthClient object
<code>token</code>	OAuthToken object containing the refresh token
<code>async</code>	Logical, default <code>FALSE</code> . If <code>TRUE</code> and the mirai::mirai package is available, the refresh is performed off the main R session using <code>mirai::mirai()</code> and this function returns a <code>mirai</code> (which implements <code>as.promise()</code>) that resolves to an updated <code>OAuthToken</code> . Requires <code>mirai</code> daemons to be configured with mirai::daemons() .
<code>introspect</code>	Logical, default <code>FALSE</code> . After a successful refresh, if the provider exposes an introspection endpoint, perform a best-effort introspection of the new access token for audit/diagnostics. The result is not stored on the token object.
<code>shiny_session</code>	Optional pre-captured Shiny session context (from <code>capture_shiny_session_context()</code>) to include in audit events. Used when calling from <code>async</code> workers that lack access to the reactive domain.

Value

An updated [OAuthToken](#) object with refreshed credentials.

What changes:

- `access_token`: Always updated to the fresh token
- `expires_at`: Computed from `expires_in` when provided; otherwise `Inf`
- `refresh_token`: Updated if the provider rotates it; otherwise preserved
- `id_token`: Updated only if the provider returns one (and it validates); otherwise the original from login is preserved
- `userinfo`: Refreshed if `userinfo_required = TRUE`; otherwise preserved

Validation failures cause errors: If the provider returns a new ID token that fails validation (wrong issuer, audience, expired, or subject mismatch with original), or if `userinfo` subject doesn't match the new ID token, the refresh fails with an error. In `oauth_module_server()`, this clears the session and sets `authenticated = FALSE`.

Examples

```
# Please note: `get_userinfo()`, `introspect_token()`, and `refresh_token()`
# are typically not called by users of this package directly, but are called
# internally by `oauth_module_server()`. These functions are exported
# nonetheless for advanced use cases. Most users will not need to
# call these functions directly

# Example requires a real token from a completed OAuth flow
# (code is therefore not run; would error with placeholder values below)
## Not run:
# Define client
client <- oauth_client(
  provider = oauth_provider_github(),
  client_id = Sys.getenv("GITHUB_OAUTH_CLIENT_ID"),
  client_secret = Sys.getenv("GITHUB_OAUTH_CLIENT_SECRET"),
  redirect_uri = "http://127.0.0.1:8100"
)

# Have a valid OAuthToken object; fake example below
# (typically provided by `oauth_module_server()` or `handle_callback()`)
token <- handle_callback(client, "<code>", "<payload>", "<browser_token>")

# Get userinfo
user_info <- get_userinfo(client, token)

# Introspect token (if supported by provider)
introspection <- introspect_token(client, token)

# Refresh token
new_token <- refresh_token(client, token, introspect = TRUE)

## End(Not run)
```

revoke_token

Revoke an OAuth 2.0 token

Description

Attempts to revoke an access or refresh token using RFC 7009 when the provider exposes a revocation endpoint.

Authentication mirrors the provider's token_auth_style (same as token exchange and introspection).

Best-effort semantics:

- If the provider does not expose a revocation endpoint, returns supported = FALSE, revoked = NA, and status = "revocation_unsupported".
- If the selected token value is missing, returns supported = TRUE, revoked = NA, and status = "missing_token".

- If the endpoint returns a 2xx, returns supported = TRUE, revoked = TRUE, and status = "ok".
- If the endpoint returns an HTTP error, returns supported = TRUE, revoked = NA, and status = "http_<code>".

Usage

```
revoke_token(
  oauth_client,
  oauth_token,
  which = c("refresh", "access"),
  async = FALSE,
  shiny_session = NULL
)
```

Arguments

oauth_client	OAuthClient object
oauth_token	OAuthToken object containing tokens to revoke
which	Which token to revoke: "refresh" (default) or "access"
async	Logical, default FALSE. If TRUE and the mirai::mirai package is available, the operation is performed off the main R session using <code>mirai::mirai()</code> and this function returns a mirai (which implements <code>as.promise()</code>) that resolves to the result list. Requires mirai daemons to be configured with mirai::daemons() .
shiny_session	Optional pre-captured Shiny session context (from <code>capture_shiny_session_context()</code>) to include in audit events. Used when calling from async workers that lack access to the reactive domain.

Value

A list with fields: supported, revoked, status

use_shinyOAuth	<i>Add JavaScript dependency to the UI of a Shiny app</i>
----------------	---

Description

Adds the package's client-side JavaScript helpers as an `htmlDependency` to your Shiny UI. This enables features such as redirection and setting the browser cookie token.

Without adding this to the UI of your app, the `oauth_module_server()` will not function.

Usage

```
use_shinyOAuth(inject_referrer_meta = TRUE)
```

Arguments

`inject_referrer_meta`

If TRUE (default), injects a `<meta name="referrer" content="no-referrer">` tag into the document head. This reduces the risk of leaking OAuth callback query parameters (like code and state) via the Referer header to third-party subresources during the initial callback page load.

Details

Place this near the top-level of your UI (e.g., inside `fluidPage()` or `tagList()`), similar to how you would use `shinyjs::useShinyjs()`.

Value

A `tagList` containing a singleton dependency tag that ensures the JS file `inst/www/shinyOAuth.js` is loaded

See Also

[oauth_module_server\(\)](#)

Examples

```
ui <- shiny::fluidPage(  
  use_shinyOAuth(),  
  # ...  
)
```

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