
EULexistdb Documentation

Release 0.22.0-dev

Emory University Libraries

August 04, 2016

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EULexistdb is a library for accessing, querying, and updating an [eXist-db](#) XML database using idiomatic Python. [ExistDB](#) provides basic read-write access. EULexistdb doesn't require [Django](#), but when they're used together, developers can define `XmlModel` subclasses to automate [XQuery](#) searching of the eXist database based on the model's [XPath](#) fields. Even without Django configuration, developers can utilize this automatic XQuery generation by constructing a [QuerySet](#) referencing an [XmlObject](#) subclass and a database.

1.1 existdb – Store and retrieve data in an eXist database

Interact with eXist-db XML databases.

This package provides classes to ease interaction with eXist XML databases. It contains the following modules:

- `eulexistdb.db` – Connect to the database and query
- `eulexistdb.query` – Query `XmlObject` models from eXist with semantics like a Django QuerySet

1.1.1 Direct database access

Connect to an eXist XML database and query it.

This module provides `ExistDB` and related classes for connecting to an eXist-db database and executing XQuery queries against it.

When used with Django, `ExistDB` can pull configuration settings directly from Django settings. If you create an instance of `ExistDB` without specifying a server url, it will attempt to configure an eXist database based on Django settings, using the configuration names documented below.

Projects that use this module should include the following settings in their `settings.py`:

```
# Exist DB Settings
EXISTDB_SERVER_USER = 'user'
EXISTDB_SERVER_PASSWORD = 'password'
EXISTDB_SERVER_URL = "http://megaserver.example.com:8042/exist"
EXISTDB_ROOT_COLLECTION = "/sample_collection"
```

To configure a timeout for most eXist connections, specify the desired time in seconds as `EXISTDB_TIMEOUT`; if none is specified, the global default socket timeout will be used.

Note: Any configured `EXISTDB_TIMEOUT` will be ignored by the **existdb** management command, since reindexing a large collection could take significantly longer than a normal timeout would allow for.

If you are using an eXist index configuration file, you can add another setting to specify your configuration file:

```
EXISTDB_INDEX_CONFIGFILE = "/path/to/my/exist_index.xconf"
```

This will allow you to use the `existdb` management command to manage your index configuration file in eXist.

If you wish to specify options for fulltext queries, you can set a dictionary of options like this:

```
EXISTDB_FULLTEXT_OPTIONS = {'default-operator': 'and'}
```

Note: Python `xmlrpclib` does not support extended types, some of which are used in eXist returns. This does not currently affect the functionality exposed within `ExistDB`, but may cause issues if you use the `ExistDB.server` XML-RPC connection directly for other available eXist XML-RPC methods. If you do make use of those, you may want to enable XML-RPC patching to handle the return types:

```
from eulexistdb import patch
patch.request_patching(patch.XMLRpcLibPatch)
```

If you are writing unit tests against code that uses `eulexistdb`, you may want to take advantage of `eulexistdb.testutil.TestCase` for loading fixture data to a test eXist-db collection, and `eulexistdb.testutil.ExistDBTestSuiteRunner`, which has logic to set up and switch configurations between a development and test collections in eXist.

class `eulexistdb.db.ExistDB` (`server_url`[, `resultType`[, `encoding`[, `verbose`]]])

Connect to an eXist database, and manipulate and query it.

Construction doesn't initiate server communication, only store information about where the server is, to be used in later communications.

Parameters

- **server_url** – The eXist server URL. New syntax (as of 0.20) expects primary eXist url and *not* the `/xmlrpc` endpoint; for backwards compatibility, urls that include `/xmlrpc` are still handled, and will be parsed to set exist server path as well as username and password if specified. Note that username and password parameters take precedence over username and password in the server url if both are specified.
- **username** – exist username, if any
- **password** – exist user password, if any
- **resultType** – The class to use for returning `query()` results; defaults to `QueryResult`
- **encoding** – The encoding used to communicate with the server; defaults to “UTF-8”
- **verbose** – When True, print XML-RPC debugging messages to stdout
- **timeout** – Specify a timeout for xmlrpc connection requests. If not specified, the global default socket timeout value will be used.
- **keep_alive** – Optional parameter, to disable requests built-in session handling; can also be configured in django settings with `EXISTDB_SESSION_KEEP_ALIVE`

getDocument (`name`)

Retrieve a document from the database.

Parameters **name** – database document path to retrieve

Return type string contents of the document

createCollection (`collection_name`[, `overwrite`])

Create a new collection in the database.

Parameters

- **collection_name** – string name of collection
- **overwrite** – overwrite existing document?

Return type boolean indicating success

removeCollection (*collection_name*)

Remove the named collection from the database.

Parameters **collection_name** – string name of collection

Return type boolean indicating success

hasCollection (*collection_name*)

Check if a collection exists.

Parameters **collection_name** – string name of collection

Return type boolean

load (*xml*, *path* [, *overwrite*])

Insert or overwrite a document in the database.

Note: This method will automatically overwrite existing content at the same path without notice. This is a change from versions prior to 0.20.

Parameters

- **xml** – string or file object with the document contents
- **path** – destination location in the database

Return type boolean indicating success

query (*xquery* [, *start* [, *how_many*]])

Execute an XQuery query, returning the results directly.

Parameters

- **xquery** – a string XQuery query
- **start** – first index to return (1-based)
- **how_many** – maximum number of items to return
- **cache** – boolean, to cache a query and return a session id (optional)
- **session** – session id, to retrieve a cached session (optional)
- **release** – session id to be released (optional)

Return type the `resultType` specified at the creation of this ExistDB; defaults to [*QueryResult*](#).

executeQuery (*xquery*)

Execute an XQuery query, returning a server-provided result handle.

Parameters **xquery** – a string XQuery query

Return type an integer handle identifying the query result for future calls

querySummary (*result_id*)

Retrieve results summary from a past query.

Parameters **result_id** – an integer handle returned by [*executeQuery*](#) ()

Return type a dict describing the results

The returned dict has four fields:

- **queryTime**: processing time in milliseconds
- **hits**: number of hits in the result set
- **documents**: a list of lists. Each identifies a document and takes the form [*doc_id*, *doc_name*, *hits*], where:
 - *doc_id*: an internal integer identifier for the document
 - *doc_name*: the name of the document as a string
 - *hits*: the number of hits within that document
- **doctype**: a list of lists. Each contains a doctype public identifier and the number of hits found for this doctype.

getHits (*result_id*)

Get the number of hits in a query result.

Parameters **result_id** – an integer handle returned by `executeQuery()`

Return type integer representing the number of hits

retrieve (*result_id*, *position*)

Retrieve a single result fragment.

Parameters

- **result_id** – an integer handle returned by `executeQuery()`
- **position** – the result index to return
- **highlight** – enable search term highlighting in result; optional, defaults to False

Return type the query result item as a string

releaseQueryResult (*result_id*)

Release a result set handle in the server.

Parameters **result_id** – an integer handle returned by `executeQuery()`

createCollection (*collection_name*, *overwrite=False*)

Create a new collection in the database.

Parameters

- **collection_name** – string name of collection
- **overwrite** – overwrite existing document?

Return type boolean indicating success

create_account (*username*, *password*, *groups*)

Create a user account; returns true if the user was created, false if the user already exists. Any other exist exception is re-raised.

create_group (*group*)

Create a group; returns true if the group was created, false if the group already exists. Any other exist exception is re-raised.

describeDocument (**args*, ***kwargs*)

Return information about a document in eXist. Includes name, owner, group, created date, permissions, mime-type, type, content-length. Returns an empty dictionary if document is not found.

Parameters `document_path` – string full path to document in eXist

Return type dictionary

executeQuery (**args*, ***kwargs*)

Execute an XQuery query, returning a server-provided result handle.

Parameters `xquery` – a string XQuery query

Return type an integer handle identifying the query result for future calls

getCollectionDescription (**args*, ***kwargs*)

Retrieve information about a collection.

Parameters `collection_name` – string name of collection

Return type boolean

getDoc (*name*)

Alias for `getDocument()`.

getDocument (*name*)

Retrieve a document from the database.

Parameters `name` – database document path to retrieve

Return type string contents of the document

getHits (**args*, ***kwargs*)

Get the number of hits in a query result.

Parameters `result_id` – an integer handle returned by `executeQuery()`

Return type integer representing the number of hits

getPermissions (**args*, ***kwargs*)

Retrieve permissions for a resource in eXist.

Parameters `resource` – full path to a collection or document in eXist

Return type ExistPermissions

hasCollection (*collection_name*)

Check if a collection exists.

Parameters `collection_name` – string name of collection

Return type boolean

hasCollectionIndex (*collection_name*)

Check if the specified collection has an index configuration in eXist.

Note: according to eXist documentation, index config file does not *have* to be named *collection.xconf* for reasons of backward compatibility. This function assumes that the recommended naming conventions are followed.

Parameters `collection` – name of the collection with an index to be removed

Return type boolean indicating collection index is present

hasDocument (**args*, ***kwargs*)

Check if a document is present in eXist.

Parameters `document_path` – string full path to document in eXist

Return type boolean

load (*xml*, *path*)

Insert or overwrite a document in the database.

Note: This method will automatically overwrite existing content at the same path without notice. This is a change from versions prior to 0.20.

Parameters

- **xml** – string or file object with the document contents
- **path** – destination location in the database

Return type boolean indicating success

loadCollectionIndex (*collection_name*, *index*)

Load an index configuration for the specified collection. Creates the eXist system config collection if it is not already there, and loads the specified index config file, as per eXist collection and index naming conventions.

Parameters

- **collection_name** – name of the collection to be indexed
- **index** – string or file object with the document contents (as used by *load()*)

Return type boolean indicating success

moveDocument (**args*, ***kwargs*)

Move a document in eXist from one collection to another.

Parameters

- **from_collection** – collection where the document currently exists
- **to_collection** – collection where the document should be moved
- **document** – name of the document in eXist

Return type boolean

query (**args*, ***kwargs*)

Execute an XQuery query, returning the results directly.

Parameters

- **xquery** – a string XQuery query
- **start** – first index to return (1-based)
- **how_many** – maximum number of items to return
- **cache** – boolean, to cache a query and return a session id (optional)
- **session** – session id, to retrieve a cached session (optional)
- **release** – session id to be released (optional)

Return type the *resultType* specified at the creation of this ExistDB; defaults to *QueryResult*.

querySummary (**args*, ***kwargs*)

Retrieve results summary from a past query.

Parameters **result_id** – an integer handle returned by *executeQuery()*

Return type a dict describing the results

The returned dict has four fields:

- **queryTime**: processing time in milliseconds
- **hits**: number of hits in the result set
- **documents**: a list of lists. Each identifies a document and takes the form [*doc_id*, *doc_name*, *hits*], where:
 - *doc_id*: an internal integer identifier for the document
 - *doc_name*: the name of the document as a string
 - *hits*: the number of hits within that document
- **doctype**: a list of lists. Each contains a **doctype public** identifier and the number of hits found for this doctype.

reindexCollection (*collection_name*)

Reindex a collection. Reindex will fail if the eXist user does not have the correct permissions within eXist (must be a member of the DBA group).

Parameters **collection_name** – string name of collection

Return type boolean success

releaseQueryResult (**args*, ***kwargs*)

Release a result set handle in the server.

Parameters **result_id** – an integer handle returned by *executeQuery()*

removeCollection (**args*, ***kwargs*)

Remove the named collection from the database.

Parameters **collection_name** – string name of collection

Return type boolean indicating success

removeCollectionIndex (*collection_name*)

Remove index configuration for the specified collection. If index collection has no documents or subcollections after the index file is removed, the configuration collection will also be removed.

Parameters **collection** – name of the collection with an index to be removed

Return type boolean indicating success

removeDocument (**args*, ***kwargs*)

Remove a document from the database.

Parameters **name** – full eXist path to the database document to be removed

Return type boolean indicating success

retrieve (**args*, ***kwargs*)

Retrieve a single result fragment.

Parameters

- **result_id** – an integer handle returned by *executeQuery()*
- **position** – the result index to return
- **highlight** – enable search term highlighting in result; optional, defaults to False

Return type the query result item as a string

setPermissions (*args, **kwargs)
Set permissions on a resource in eXist.

Parameters

- **resource** – full path to a collection or document in eXist
- **permissions** – int or string permissions statement

class eulexistdb.db.**QueryResult** (node=None, context=None, **kwargs)
The results of an eXist XQuery query

count
The number of results returned in this chunk

hits
The total number of hits found by the search

results
The result documents themselves as nodes, starting at `start` and containing `count` members

exception eulexistdb.db.**ExistDBException**
A handy wrapper for all errors returned by the eXist server.

1.1.2 Object-based searching

Provide a prettier, more Pythonic approach to eXist-db access.

This module provides `QuerySet` modeled after `Django QuerySet` objects. It's not dependent on Django at all, but it aims to function as a stand-in replacement in any context that expects one.

class eulexistdb.query.**QuerySet** (model=None, xpath=None, using=None, collection=None, xquery=None, fulltext_options=None)
Lazy eXist database lookup for a set of objects.

Parameters

- **model** – the type of object to return from `__getitem__()`. If set, the resulting xml nodes will be wrapped in objects of this type. Some methods, like `filter()` and `only()` only make sense if this is set. While this argument can be any callable object, it is typically a subclass of `XmlObject`.
- **xpath** – an `XPath` expression where this `QuerySet` will begin filtering. Typically this is left out, beginning with an unfiltered collection: Filtering is then added with `filter()`.
- **using** – The `ExistDB` to query against.
- **collection** – If set, search only within a particular eXist-db collection. Otherwise search all collections.
- **xquery** – Override the entire `Xquery` object used for internal query serialization. Most code will leave this unset, which uses a default `Xquery`.
- **fulltext_options** – optional dictionary of fulltext options to be used as settings for any full-text queries. See <http://demo.exist-db.org/lucene.xml#N1047C> for available options. Requires a version of eXist that supports this feature.

all()
Return all results.

This method returns an identical copy of the `QuerySet`.

also (*fields)

Return additional data in results.

Parameters **fields** – names of fields in the QuerySet’s model

This method returns an updated copy of the QuerySet: It does not modify the original. When results are returned from the updated copy, they will contain the specified additional fields.

For special fields available, see *only()*.

For performance considerations, see note on *only()*.

also_raw (**fields)

Return an additional field by raw xpath. Similar to (and can be combined with) *also()*, but xpath is not pulled from the model. Use this when you want to retrieve a field with a different xpath than the one configured in your model. See *Xquery.return_only()* for details on specifying xpaths in raw mode.

Parameters

- **fields** – field name and xpath in keyword-args notation. If **field** is the name of a field on the associated model, the result of the raw xpath should be accessible on the return object as the normal property.
- **xpath** – xpath for retrieving the specified field

Can be combined with *also()*.

Example usage:

```
qs.also_raw(field_matches='count(util:expand(%(xq_var)s//field)//exist:match)')
```

count ()

Return the cached query hit count, executing the query first if it has not yet executed.

distinct ()

Return distinct results.

This method returns an updated copy of the QuerySet: It does not modify the original. When results are returned from the updated copy, they will contain only distinct results.

exclude (**kwargs)

Filter the QuerySet to return a subset of the documents that do **not** contain any of the filters. Uses the same syntax and allows for the same filters as *filter()*.

filter (combine='AND', **kwargs)

Filter the QuerySet to return a subset of the documents.

Arguments take the form *lookuptype* or *field__lookuptype*, where *field* is the name of a field in the QuerySet’s model and *lookuptype* is one of:

- **exact** – The field or object matches the argument value.
- **contains** – The field or object contains the argument value.
- **startswith** – The field or object starts with the argument value.
- **fulltext_terms** – the field or object contains any of the the argument terms anywhere in the full text; requires a properly configured lucene index. By default, highlighting is enabled when this filter is used. To turn it off, specify an additional filter of *highlight=False*. Recommend using *fulltext_score* for ordering, in return fields.
- **highlight** - highlight search terms; when used with *fulltext_terms*, should be specified as a boolean (enabled by default); when used separately, takes a string using the same search format as *fulltext_terms*, but content will be returned even if it does not include the search terms. Requires a properly configured lucene index.

- **in** - field or object is present in a list of values
- **exists** - field or object is or is not present in the document; if True, field must be present; if False, must not be present.
- **document_path** - restrict the query to a single document; this must be a document path as returned by `eXist`, with full db path
- **gt, gte, lt, lte** - greater than, greater than or equal, less than, less than or equal

Field may be in the format of `field__subfield` when field is an `NodeField` or `NodeListField` and subfield is a configured element on that object.

Field may also be one of the predefined ‘special’ fields; see `only()` for the list of fields.

Any number of these filter arguments may be passed. This method returns an updated copy of the QuerySet: It does not modify the original.

Parameters combine – optional; specify how the filters should be combined. Defaults to `AND`; also supports `OR`.

get (***kwargs*)

Get a single result identified by filter arguments.

Takes any number of `filter()` arguments. Unlike `filter()`, though, this method returns exactly one item. If the filter expressions match no items, or if they match more than one, this method throws an exception.

Raises a `eulexistdb.exceptions.DoesNotExist` exception if no matches are found; raises a `eulexistdb.exceptions.ReturnedMultiple` exception if more than one match is found.

getDocument (*docname*)

Get a single document from the server by filename.

only (**fields*)

Limit results to include only specified fields.

Parameters fields – names of fields in the QuerySet’s model

This method returns an updated copy of the QuerySet: It does not modify the original. When results are returned from the updated copy, they will contain only the specified fields.

Special fields available:

- **fulltext_score** - lucene query; should only be used when a fulltext query has been used
- **document_name, collection_name** - document or collection name where xml content is stored in `eXist`
- **hash** - generate and return a SHA-1 checksum of the root element being queried
- **last_modified** - `DateTimeField` for the date the document the xml element belongs to was last modified

NOTE: Be aware that this will result in an XQuery with a constructed return. For large queries, this may have a significant impact on performance. For more details, see <http://exist.sourceforge.net/tuning.html#N103A2>.

only_raw (***fields*)

Limit results to include only specified fields, and return the specified field by xpath. Similar to (and can be combined with) `only()`. See `Xquery.return_only()` for details on specifying xpaths in raw mode.

See `also_raw()` for more details and usage example.

or_filter (**kwargs)

Filter the QuerySet to return a subset of the documents, but combine the filters with OR instead of AND. Uses the same syntax and allows for the same filters as `filter()` with the exception that currently predefined special fields (see `only()`) are not supported.

order_by (field)

Order results returned according to a specified field. By default, all sorting is case-sensitive and in ascending order.

Parameters field – the name (a string) of a field in the QuerySet’s model. If the field is prefixed with ‘-’, results will be sorted in descending order. If the field is prefixed with ‘~’, results will use a case-insensitive sort. The flags ‘-’ and ‘~’ may be combined in any order.

Example usage:

```
queryset.filter(fulltext_terms='foo').order_by('-fulltext_score')
queryset.order_by('~name')
```

This method returns an updated copy of the QuerySet. It does not modify the original.

order_by_raw (xpath, ascending=True)

Order results returned by a raw XPath.

Parameters xpath – the xpath to be used

This method returns an updated copy of the QuerySet. It does not modify the original.

Example usage:

```
qs.order_by_raw('min(%(xq_var)s//date/string())')
```

query_result_type

Custom query result return type used to access a batch of results wrapped in an exist result as returned by the REST API. Extends `eulexistdb.db.QueryResult` to add an item-level result mapping based, using `return_type` if appropriate.

reset ()

Reset filters and cached results on the QuerySet.

This modifies the current query set, removing all filters, and resetting cached results.

result_id

Return the cached server result id, executing the query first if it has not yet executed.

return_type

Return type that will be used for initializing results returned from eXist queries. Either the subclass of `XmlObject` passed in to the constructor as model, or, if `only()` or `also()` has been used, a dynamically created instance of `XmlObject` with the xpaths modified based on the constructed xml return.

using (collection)

Specify the eXist collection to be queried.

If you are using an `eulexistdb.models.XmlModel` to generate queries against an eXist collection other than the one defined in `settings.EXISTDB_ROOT_COLLECTION`, you should use this function.

class `eulexistdb.query.XmlQuery` (node=None, context=None, **kwargs)

`XmlObject` class to allow describing queries in xml.

1.1.3 Django tie-ins for eulexistdb

Custom Template Tags

eulexistdb Management commands

The following management command will be available when you include *eulexistdb* in your django `INSTALLED_APPS` and rely on the existdb settings described above.

For more details on these commands, use `manage.py <command> help`

- **existdb** - update, remove, and show information about the index configuration for a collection index; reindex the configured collection based on that index configuration

testutil Unit Test utilities

debug_panel Debug Toolbar Panel

1.2 Change & Version Information

The following is a summary of changes and improvements to *eulexistdb*. New features in each version should be listed, with any necessary information about installation or upgrade notes.

1.2.1 0.21.1

- Clean up reference to old overwrite parameter no longer used in *db.load* method; explicitly test load method [#12](#)
- Code cleanup based on landscape.io scan.

1.2.2 0.21

- Removed unused kwargs from *db.ExistDB* init method [#1](#)
- *db.ExistDB* *create_group* and *create_account* methods now re-raise unexpected errors [#2](#)
- Improved timeout handling; fixes timeouts on REST API requests [#3](#)
- bugfix: make Django settings actually optional
- Require eulxml 1.1.2 to handle duplicate `xml:id` attributes included in a single exist result. (Duplicate id test case contributed by [@liddubeau](#) in [PR #5](#))
- Add opt-in patch for extended type handling in xmlrpc. Contributed by [@liddubeau](#) in [PR #6](#), resolves [#4](#)
- Removed *overwrite* option from *eulexistdb.ExistDB.load* (no longer applicable under the REST API, and misleading) [#9](#)
- Improved django-debug-toolbar integration. [#7](#), [#8](#)
- Updated *Existdb.DB* initialization parameters to restore support for xmlrpc-style urls with username and password used in previous versions of eulexistdb. [#10](#)
- Bugfix: xquery xpath prep now handles nested function calls
- Updated unit tests so they can be run with and without django, in order to test that eulexistdb works properly without django.

- Configured unit tests on travis-ci to test with and without django.

1.2.3 0.20

- **NOTE:** `Existdb.DB` initialization parameters has changed; server url is no longer expected to include full xmlrpc path.
- Updated and tested for compatibility with eXist-db 2.2
- Improved `eulexistdb.query.QuerySet` efficiency when retrieving results (now retrieves chunked results using eXist REST API, making fewer requests to the server)
- Simple xml-based query syntax now supported via `eulexistdb.query.XmlQuery`
- Updated for compatibility with current versions of Django
- Now uses `requests` <<http://docs.python-requests.org/>> for REST API access and as XML-RPC transport for improved handling and connection pooling.
- New custom django-debug-toolbar panel to view existdb xqueries used to generate a django page.

1.2.4 0.19.2

- Unittest2 and Django test runner are now optional when using testutils.

1.2.5 0.19.1

- Basic support for preceding/following/preceding-sibling/following-sibling queries when returning additional fields from a query via `XmlModel`.
- Bugfix: support xml returns for xpaths ending with `node()` or `*`

1.2.6 0.19

- New method for sorting a `eulexistdb.query.QuerySet` by a raw XPath, for those cases when the desired sort xpath cannot be specified as an `xmlmap` field: `eulexistdb.query.QuerySet.order_by_raw()`
- The Django `manage.py` script for managing eXist-DB index configuration files now takes optional username and password credentials, for use with sites that run in guest mode or with limited access.
- bugfix: `QuerySet` greater than and less than filters no longer assume numeric values should be treated as numbers, to allow comparison of string values of numbers.
- bugfix: `Xquery` now correctly generates xqueries with more than one where statement.

1.2.7 0.18

- New filters and operators supported on `eulexistdb.query.QuerySet`: `*exists` - filter on the presence of absence of a node `*` comparison operators `gt`, `gte`, `lt`, `lte`
- Support for excluding documents using all existing filters with new method `eulexistdb.query.QuerySet.exclude()`.

1.2.8 0.17

- Support for restricting xqueries to a single document in `eulexistdb.query.QuerySet` with `document_path` filter.

1.2.9 0.16

- Development requirements can now be installed as an optional requirement of the eulexistdb package (`pip install "eulexistdb[dev]"`).
- Unit tests have been updated to use `nose`
- Provides a `nose` plugin to set up and tear down an eXist database collection for tests, as an alternative to the custom test runners.

1.2.10 0.15.2

- Update to latest released version of `eulxml` (0.18.0) with backwards-incompatible `DateField/DateTimeField` change.

1.2.11 0.15.1 - Bugfix Release

- Support Python 2.7.
- Rearrange test code to support easier recombination.

1.2.12 0.15.0 - Initial Release

- Split out existdb-specific components from `eulcore`; now depends on `eulxml`.

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