
InterlockLedgerAPI Documentation

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INTERLOCK LEDGER

This package is a python client to the InterlockLedger Node REST API. It connects to InterlockLedger nodes, allowing the creation of chains, interlocks, and storage of records and documents. This client requires the InterlockLedger Node Server version 5.6.61 and API v6.0.0.

THE INTERLOCKLEDGER

An InterlockLedger network is a peer-to-peer network of nodes. Each node runs the InterlockLedger software. All communication between nodes is point-to-point and digitally signed, but not mandatorily encrypted. This means that data is shared either publicly or on a need-to-know basis, depending on the application.

In the InterlockLedger, the ledger is composed of myriads of independently permissioned chains, comprised of blockchained records of data, under the control of their owners, but that are tied by Interlockings, that avoid them having their content/history being rewritten even by their owners. For each network the ledger is the sum of all chains in the participating nodes.

A chain is a sequential list of records, back chained with signatures/hashes to the previous records, so that no changes in them can go undetected. A record is tied to some enabled Application, that defines the metadata associate with it, and the constraints defined in this public metadata, forcibly stored in the network genesis chain, is akin to validation that each correct implementation of the node software is able to enforce, but more importantly, any external logic can validate the multiple dimensions of validity for records/chains/interlockings/the ledger.

1.1 Setting Up the InterlockLedger API client

1.1.1 How to Use

To use the *il2_rest* package, you can add the *il2_rest* folder to your project and import the package.

```
>>> import il2_rest as il2
>>> node = il2.RestNode(cert_file='documenter.pfx', cert_pass='pwd')
```

1.1.2 Installing

The package can also be installed by running the following command on the *setup.py* folder:

```
$ pip3 install .
```

1.1.3 Dependencies

The `il2_rest` package was implemented using Python 3.6.9 and requires the following packages:

- colour (0.1.5)
- packaging (19.2)
- pyOpenSSL (19.1.0)
- requests (2.22.0)
- uri (2.0.1)
- pylint (0.2.0)

1.2 Quickstart Tutorial

1.2.1 The Basics

To use the `il2_rest` client, you need to create an instance of the `RestNode` by passing a certificate file and the address of the node (default value is `localhost`).

Note: The certificate must be already imported to the InterlockLedger node and be permissioned on the desired chain. See the InterlockLedger node manual.

With the `RestNode` class, it is possible to retrieve details of the node, such as the list of valid apps in the network, peers, mirrors and chains.

```
>>> import il2_rest as il2
>>>
>>> node = il2.RestNode(cert_file='documenter.pfx', cert_pass='password', address=
↳ 'your.node.address', port=32020)
>>> print(node.details)
Node 'Node for il2tester on Apollo' Node!qh8D-FVQ8-2ng_EIDN8C9m3pOLAtz0BXKuCh9OBD6U
Running il2 node#3.6.0 using [Message Envelope Wire Format #1] with Peer2Peer#2.1.0
Network Apollo
Color #20f9c7
Owner il2tester #Owner!yj...<REDACTED>...zk
Roles: Interlocking,Mirror,PeerRegistry,Relay,User
Chains: 20i...<REDACTED>..._fc, 5rA...<REDACTED>...Pso
```

To see and store records and documents, you need to use an instance of the `RestChain`. You can get `RestChain` instances by retrieving the list of chains in the network:

```
>>> for chain in node.chains:
...     print(chain)
...
Chain 'My first chain' #cA7CTUJxkcpGMpuGtg59kB9z5B1lR-gQ4k4xBn8VAuo
Chain 'Second chain' #5rA_Fp9mhn3jb26G2Lsue5gWjxUdjLIWAs8Xvkg5Pso
Chain '3.6.2 chain name' #A1wCG9hHhuVNB8hyOALHokYsWyTumHU0vRxtcK-iDKE
```

Or by its chain id:


```
>>> chain = node.chain_by_id('A1wCG9hHhuVNB8hyOALHokYsWyTumHU0vRxtcK-iDKE')
>>> print(chain)
Chain '3.6.2 chain name' #A1wCG9hHhuVNB8hyOALHokYsWyTumHU0vRxtcK-iDKE
```

Besides retrieving and storing records and documents, the `RestChain` class also allows to manage the active apps in the chain, see/permit keys, and do interlocks.

1.2.2 Storing JSON Documents

The JSON Documents App allows you to store a custom JSON:

```
>>> chain = node.chain_by_id('A1wCG9hHhuVNB8hyOALHokYsWyTumHU0vRxtcK-iDKE')
>>> json_data = {
...     "field1" : 1,
...     "field2" : "Test",
...     "field3": [1,2,3],
...     "field4" : {
...         "value1" : 10,
...         "value2" : 20
...     }
... }
>>> new_json_document = chain.store_json_document(json_data)
>>> print(new_json_document)
```

1.2.3 Storing Multi-Documents

It is possible to store multiple documents in a single record of a chain. First you will need to begin a transaction:

```
>>> chain = node.chain_by_id('A1wCG9hHhuVNB8hyOALHokYsWyTumHU0vRxtcK-iDKE')
>>> resp = chain.documents_begin_transaction(comment = 'Using parameters')
>>> transaction_id = resp.transactionId
```

Then, you can add as many files you wish using the transaction id:

```
>>> chain.documents_transaction_add_item(transaction_id, "item1.txt", "./test.txt",
↳ "text/plain")
>>> chain.documents_transaction_add_item(transaction_id, "item2.txt", "./test2.txt",
↳ "text/plain", "This file has a comment.")
```

When you are done, all you need to do is commit the transaction:

```
>>> locator = chain.documents_transaction_commit(transaction_id)
```

To download the files stored in a chain, you will need to use the locator of a multi-document record. You can store a single file of a multi-document record using the index of the file in the record:

```
>>> chain.download_single_document_at(locator, 0, '/path/to/download/')
```

Or you can download all files in a compressed in a single file:

```
>>> chain.download_documents_as_zip(locator, '/path/to/download/')
```

1.2.4 Managing Keys

You can see the list of keys permitted in the chain by using the following script:

```
>>> for key in chain.permitted_keys :
...     print(key)
...
Key 'emergency!AlwCG9hHhuVNB8hyOALHokYsWyTumHU0vRxtcK-iDKE' Key!-
↳bLg6Sklpj3Bhnn8A7VXkGnyED2oWHn9AhjpKiPL7sK0
  Purposes: [Protocol,Action]
  Actions permitted:
    App #0 Action 131
Key 'manager!AlwCG9hHhuVNB8hyOALHokYsWyTumHU0vRxtcK-iDKE' Key!
↳QX5JpVthlQ5acCf3x05gCFyc5HEHQQwsbwnJDXyVROM
  Purposes: [Protocol,Action,KeyManagement]
  Actions permitted:
    App #2 Actions 500,501
    App #1 Actions 300,301
```

If you are using a certificate allowed to permit keys, you can permit other key in the chain:

Note: To permit other keys, the certificate must be already imported to the Interlockledger node with actions for App #2 and actions 500,501.

```
>>> from il2_rest.models import KeyPermitModel
>>> key_model = KeyPermitModel(app=4, appActions=[1000, 1001], key_id='Key!
↳MJ0kidltB324mfkiOG0aBlEocPA#SHA1',
...     name='documenter', publicKey='PubKey!KpgQEPgItqh<...REDACTED...>
↳BZk4axWhFbTDrxADAQAB#RSA',
...     purposes=[KeyPurpose.Action, KeyPurpose.Protocol])
>>> keys = chain.permit_keys([key_model])
>>> for key in keys :
...     print(keys)
...
Key 'emergency!AlwCG9hHhuVNB8hyOALHokYsWyTumHU0vRxtcK-iDKE' Key!-
↳bLg6Sklpj3Bhnn8A7VXkGnyED2oWHn9AhjpKiPL7sK0
  Purposes: [Protocol,Action]
  Actions permitted:
    App #0 Action 131
Key 'manager!AlwCG9hHhuVNB8hyOALHokYsWyTumHU0vRxtcK-iDKE' Key!
↳QX5JpVthlQ5acCf3x05gCFyc5HEHQQwsbwnJDXyVROM
  Purposes: [Protocol,Action,KeyManagement]
  Actions permitted:
    App #2 Actions 500,501
    App #1 Actions 300,301
Key 'documenter' Key!MJ0kidltB324mfkiOG0aBlEocPA#SHA1
  Purposes: [Action,Protocol]
  Actions permitted:
    App #4 Actions 1000,1001
```

1.2.5 Permitting Apps

To check the active apps in the chain:

```
>>> print(chain.active_apps)
[0, 1, 2, 3, 5]
```

To permit new apps:

```
>>> apps = chain.permit_apps([4])
>>> print(apps)
[4]
```

1.2.6 Forcing Interlocks

The Interlocking is one of the concepts that grant immutability in IL2. They are made automatically by the network, this way there is no need for your application to worry about them. However, if you need to force an Interlocking, you can use the following code:

```
>>> from il2_rest.models import ForceInterlockModel
>>> force_model = ForceInterlockModel(targetChain=
↳ 'or7lzOG0vzH3GeNUTPqJI41CY0rVcEWgw6IEBmSSDxI')
>>> interlock_model = chain.force_interlock(model=force_model)
Interlocked chain or7lzOG0vzH3GeNUTPqJI41CY0rVcEWgw6IEBmSSDxI at record #11 (offset:
↳ 14308) with hash aneZJyR81OiqFzoQ0px4ZDFRCSNS9LzxbGUNueQKAtg#SHA256
```

If you need to check the interlockings of a chain:

```
>>> for interlock in chain.interlocks().items :
...     print(interlock)
```

1.3 The il2_rest package

This reference manual details the functions, modules and objects included in the *il2_rest* API.

1.3.1 Client module

This module has the classes needed to connect and communicate with the InterlockLedger REST API.

1.3.1.1 RestChain

```
class il2_rest.client.RestChain(rest, chainId, **kwargs)
    Bases: object
```

REST API client to the InterlockLedger chain.

Note: It is not recommended to create an instance of *RestChain* outside of an instance of *RestNode*.

Parameters

- **rest** (*RestNode*) – Instance of the node.
- **chainId** (*il2_rest.models.ChainIdModel*) – Chain model.

id
Chain id.
Type `str`

name
Chain name.
Type `str`

licensingStatus
Licensing status.
Type `str`

property active_apps
Enumerate apps that are currently permitted on this chain.
Type `list of int`

add_record(model)
Add a new record.
Parameters **model** (`il2_rest.models.NewRecordModel`) – Model with the description of the new record.
Returns Added record information.
Return type `il2_rest.models.RecordModel`

Example

```
>>> node = RestNode(cert_file='recorder.pfx', cert_pass='password',  
↳port=32020)  
>>> chain = node.chain_by_id('cRPeHOITV_t1ZQS9CIL7Yi3djJ33ynZCdSRsEnOvX40')  
>>> model = NewRecordModel(applicationId=1, payloadTagId=300,  
...                          payloadBytes=bytes([248, 52, 7, 5, 0, 0, 20, 2, 1, 4]))  
>>> record = chain.add_record(model)  
>>> print(record)  
{  
  "applicationId": 1,  
  "chainId": "cRPeHOITV_t1ZQS9CIL7Yi3djJ33ynZCdSRsEnOvX40",  
  "createdAt": "2020-02-13T18:59:50.9033962-03:00",  
  "hash": "mAwajCPH1c369GZLLXWsd_E7WkkZ2tdLS3LsZWbCPnw#SHA256",  
  "payloadTagId": 300,  
  "serial": 4,  
  "type": "Data",  
  "version": 2,  
  "payloadBytes": "+DQHBQAAFAIBBA=="  
}
```

**add_record_as_json(applicationId=None, payloadTagId=None, payload=None,
rec_type=<RecordType.Data: 'Data'>, model=None)**

Add a new record with a payload encoded as JSON. The JSON value will be mapped to the payload tagged format as described by the metadata associated with the payloadTagId

Parameters

- **applicationId** (`int`) – Application id of the record.
- **payloadTagId** (`int`) – Payload tag id of the record.

- **payload** (int) – Payload data encoded as json
- **rec_type** (*il2_rest.enumerations.RecordType*) – Type of record.
- **model** (*il2_rest.models.NewRecordModelAsJson*) – Model with the description of the new record as JSON. **NOTE:** if model is not None, the other arguments will be ignored.

Returns Added record information.

Return type *il2_rest.models.RecordModel*

Example

```
>>> node = RestNode(cert_file='recorder.pfx', cert_pass='password',
↳port=32020)
>>> chain = node.chain_by_id('tdiy2HnWv-4a_h5T4Xy8l93CQ0lVkJeu2r5qgSlALMY')
>>> model = NewRecordModelAsJson(applicationId=1, payloadTagId=300, rec_json={
↳'tagId': 300, 'version': 0, 'apps': [4]})
>>> record = chain.add_record_as_json(model=model)
>>> print(record)
{
  "applicationId": 1,
  "chainId": "tdiy2HnWv-4a_h5T4Xy8l93CQ0lVkJeu2r5qgSlALMY",
  "createdAt": "2020-02-13T18:56:44.3002447-03:00",
  "hash": "Y8Xb9FpTkxj38xlwzcaZXm8fUq-NYxODVcyOQtzJ3c#SHA256",
  "payloadTagId": 300,
  "serial": 4,
  "type": "Data",
  "version": 2,
  "payload": {
    "tagId": 300,
    "version": 0,
    "apps": [
      4
    ]
  }
}
```

add_record_unpacked (*applicationId*, *payloadTagId*, *rec_bytes*, *rec_type*=<*RecordType.Data*:
'Data'>)

Add a new record with an unpacked payload. Payload inner bytes **MUST** go in the body, in binary form. These inner bytes will be prefixed with the payloadTagId and the length, both encoded as ILInt, as required to assemble the record effective payload.

Parameters

- **applicationId** (int) – Application id of the record.
- **payloadTagId** (int) – Payload tag id of the record.
- **rec_type** (*il2_rest.enumerations.RecordType*) – Type of record.
- **rec_bytes** (bytes) – Payload bytes.

Returns Added record information.

Return type *il2_rest.models.RecordModel*

Example

```
>>> node = RestNode(cert_file='recorder.pfx', cert_pass='password',
↳port=32020)
>>> chain = node.chain_by_id('VzCJczfgBeIiIBlnTRbmtsPriqwrkHqtF2yt8nhTcjM')
>>> record = chain.add_record_unpacked(applicationId=1, payloadTagId=300, rec_
↳bytes=bytes([5, 0, 0, 20, 2, 1, 4]))
>>> print(record)
{
  "applicationId": 1,
  "chainId": "VzCJczfgBeIiIBlnTRbmtsPriqwrkHqtF2yt8nhTcjM",
  "createdAt": "2020-02-13T19:01:37.5175345-03:00",
  "hash": "cY7krS7BSJcBi7Ickq-u4iI6V6lYoKULfQtEZGJ-mC0#SHA256",
  "payloadTagId": 300,
  "serial": 4,
  "type": "Data",
  "version": 2,
  "payloadBytes": "+DQHBQAAFAIBBA=="
}
```

documents_begin_transaction (*comment=None, compression=None, generatePublicDirectory=None, iterations=None, encryption=None, password=None, model=None*)

Begin a transaction to store a set of documents. May rollback on timeout or errors.

Parameters

- **comment** (*str*) – Any additional information about the set of documents to be stored.
- **compression** (*il2_rest.enumerations.DocumentsCompression*) – Compression algorithm. The compression algorithm can be as follows:
 - NONE: No compression. Simply store the bytes;
 - GZIP: Compression of the data using the gzip standard;
 - BROTLI: Compression of the data using the brotli standard;
 - ZSTD: Compression of the data using the ZStandard from Facebook (In the future).
- **generatePublicDirectory** (*bool*) – If the publically viewable PublicDirectory field should be created.
- **iterations** (*int*) – Override for the number of PBE iterations to generate the key.
- **encryption** (*str*) – The encryption descriptor in the <pbe>-<hash>-<cipher>-<level> format Examples:
 - "PBKDF2-SHA256-AES256-LOW"
 - "PBKDF2-SHA512-AES256-MID"
 - "PBKDF2-SHA256-AES128-HIGH"
- **password** (*bytes*) – Password as bytes if Encryption is not null.
- **model** (*il2_rest.models.DocumentsBeginTransactionModel*, optional) –

Returns Started transaction identifier and limits.

Return type *il2_rest.models.DocumentsTransactionModel*

Examples

Begin transaction using a `il2_rest.models.DocumentsBeginTransactionModel`:

```
>>> from il2_rest.models import DocumentsBeginTransactionModel
>>> node = RestNode(cert_file='documenter.pfx', cert_pass='password')
>>> chain = node.chain_by_id('A1wCG9hHhuVNB8hyOALHokYsWyTumHU0vRxtcK-iDKE')
>>> model = DocumentsBeginTransactionModel(chain='EbAfcWGwCwzuiEtSwIwYQYIHy-
↳g05CZl6jrcBAYuYRI',
...                                     comment='Using model')
>>> resp = chain.documents_transaction_metadata('EbAfcWGwCwzuiEtSwIwYQYIHy-
↳g05CZl6jrcBAYuYRIe')
>>> print(resp)
```

The same can be done passing all the information as parameters:

```
>>> node = RestNode(cert_file='documenter.pfx', cert_pass='password')
>>> chain = node.chain_by_id('A1wCG9hHhuVNB8hyOALHokYsWyTumHU0vRxtcK-iDKE')
>>> resp = chain.documents_begin_transaction(comment='Using parameters')
>>> print(resp)
```

documents_transaction_add_item(*transaction_id*, *name*, *filepath*, *content_type=None*, *comment=None*)

Adds another document to a pending transaction of multi-documents.

Parameters

- **transaction_id** (*str*) – Id of the ongoing transaction.
- **name** (*str*) – File name.
- **filepath** (*str*) – Path to the file to upload.
- **content_type** (*str*, optional) – File mime-type. If None, it will try to guess the mime-type based on the file extension.
- **comment** (*str*, optional) – Additional comment.

Returns True if success

Return type bool

Example

```
After beginning a transaction, you can add as many items as you wish:
>>> node = RestNode(cert_file='documenter.pfx', cert_pass='password')
>>> chain = node.chain_by_id('A1wCG9hHhuVNB8hyOALHokYsWyTumHU0vRxtcK-iDKE')
>>> resp = chain.documents_begin_transaction(comment='Using parameters')
>>> transaction_id = resp.transactionId
>>> chain.documents_transaction_add_item(transaction_id, "item1.txt", "/test.txt")
>>> chain.documents_transaction_add_item(transaction_id, "item2.txt", "/test2.txt", comment="This
file has a comment.")
```

documents_transaction_commit(*transaction_id*)

Store set of uploaded documents.

Note: Rementer to save the locator after committing.

Parameters **transaction_id** (*str*) – Id of the ongoing transaction.

Returns Documents storage locator.

Return type `str`

Example

```
>>> node = RestNode(cert_file='documenter.pfx', cert_pass='password')
>>> chain = node.chain_by_id('AlwCG9hHhuVNB8hyOALHokYsWyTumHU0vRxtcK-iDKE')
>>> resp = chain.documents_begin_transaction(comment='Using parameters')
>>> transaction_id = resp.transactionId
>>> chain.documents_transaction_add_item(transaction_id, "item1.txt", "text/
↳plain", "./test.txt")
>>> chain.documents_transaction_add_item(transaction_id, "item2.txt", "text/
↳plain", "./test2.txt", "This file has a comment.")
>>> locator = chain.documents_transaction_commit(transaction_id)
```

documents_transaction_metadata (*locator*)

Retrieve the metadata for the set of documents from chain.

Parameters **locator** (`str`) – A Documents Storage Locator.

Returns Metadata associated to a Multi-Document Storage Locator

Return type `il2_rest.models.DocumentsMetadataModel`

Example

```
>>> node = RestNode(cert_file='documenter.pfx', cert_pass='password')
>>> chain = node.chain_by_id('AlwCG9hHhuVNB8hyOALHokYsWyTumHU0vRxtcK-iDKE')
>>> resp = chain.documents_transaction_metadata('EbAfcWGwCwzuiEtSwIwYQYIH-
↳g05CZl6jrcBAYuYRIe')
>>> print(resp)
```

documents_transaction_status (*transaction_id*)

Get the ongoing status of a transaction.

Parameters **transaction_id** (`str`) – Id of the transaction.

Returns Transaction identifier and limits.

Return type `il2_rest.models.DocumentsTransactionModel`

Example

```
>>> node = RestNode(cert_file='documenter.pfx', cert_pass='password')
>>> chain = node.chain_by_id('AlwCG9hHhuVNB8hyOALHokYsWyTumHU0vRxtcK-iDKE')
>>> resp = chain.documents_transaction_status('IZqVW6p7z4hVdWzv')
>>> print(resp)
```

download_documents_as_zip (*locator*, *dst_path*='.')

Download a compressed file with all documents to a folder (default: current folder).

Parameters

- **locator** (`str`) – A Documents Storage Locator.
- **dst_path** (`str`) – Download the file to this folder.

Example

```
>>> node = RestNode(cert_file='documenter.pfx', cert_pass='password')
>>> chain = node.chain_by_id('AlwCG9hHhuVNB8hyOALHokYsWyTumHU0vRxtcK-iDKE')
>>> chain.download_documents_as_zip('EbAfcWGwCwzuiEtSwIwQYIHg-
↳g05CZl6jrcBAYuYRIe', '/path/to/download/')

```

download_single_document_at (*locator, index, dst_path='./'*)

Download document by position from the set of documents to a folder (default: current folder).

Parameters

- **locator** (str) – A Documents Storage Locator.
- **index** (int) – Index of the file.
- **dst_path** (str) – Download the file to this folder.

Example

```
>>> node = RestNode(cert_file='documenter.pfx', cert_pass='password')
>>> chain = node.chain_by_id('AlwCG9hHhuVNB8hyOALHokYsWyTumHU0vRxtcK-iDKE')
>>> chain.download_single_document_at('EbAfcWGwCwzuiEtSwIwQYIHg-
↳g05CZl6jrcBAYuYRIe', 0, '/path/to/download/')

```

force_interlock (*model*)

Forces an interlock on a target chain.

Parameters **model** (*il2_rest.models.ForceInterlockModel*) – Force interlock command details.

Returns Interlocking details.

Return type *il2_rest.models.InterlockingRecordModel*

Example

```
>>> node = RestNode(cert_file='mykeymanager.pfx', cert_pass='password',
↳port=32020)
>>> chain = node.chain_by_id('VzCJczfgBeIiIBlnTRbmtsPriqwrkHqtF2yt8nhTcjM')
>>> model = ForceInterlockModel(targetChain='8fox30W54ZkzM-shfUeU5C7ad-
↳fsf5nICwNpkCUk5w')
>>> interlocks = chain.force_interlock(model)
>>> for il in interlocks :
...     print(il)
...
Interlocked chain 8fox30W54ZkzM-shfUeU5C7ad-__fsf5nICwNpkCUk5w at record #14
↳(offset: 13671) with hash RyvOZIjnoUG4QX7FwQs3f6BqDfnOPb3txgXJNxLxtDo#SHA256
{
    "applicationId": 3,
    "chainId": "VzCJczfgBeIiIBlnTRbmtsPriqwrkHqtF2yt8nhTcjM",
    "createdAt": "2020-02-19T22:22:02.924546-03:46",
    "hash": "pGNSXOoI822Y_7F1ZNXw-x002ufXXbrQjNXpTMkZJpQ#SHA256",
    "payloadTagId": 600,
    "serial": 7,
    "type": "Data",
    "version": 2,

```

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```

    "payloadBytes": "+QFgUgUBACs jAAEA8fox30W54ZkzM+shfUeU5C7ad+/
    ↪fsf5nICwNpkCUk5wKDgr5NG8nIgEARyvOZI jnoUG4QX7FwQs3f6BqDfnOPb3txgXJNxLxtDo=",
    "interlockedChainId": "8fox30W54ZkzM-shfUeU5C7ad-_fsf5nICwNpkCUk5w",
    "interlockedRecordHash": "RyvOZI jnoUG4QX7FwQs3f6BqDfnOPb3txgXJNxLxtDo
    ↪#SHA256",
    "interlockedRecordOffset": 13671,
    "interlockedRecordSerial": 14
  }

```

interlocks (*howManyFromLast=0, page=0, pageSize=10*)

Get list of interlocks registered for the chain.

Parameters

- **howManyFromLast** (int) – How many interlocking records to return. If omitted or 0 returns all.
- **page** (int) – Page to return.
- **pageSize** (int) – Number of items per page. If 0 returns all.

Returns List of interlocks registered in the chain.**Return type** `il2_rest.models.PageOfModel` of `il2_rest.models.InterlockingRecordModel`**json_document_at** (*serial*)

Get a specific JSON document stored in the chain. :param serial: Serial number of the record. :type serial: int

Returns JSON document record.**Return type** `il2_rest.models.JsonDocumentRecordModel`**permit_apps** (*apps_to_permit*)

Add apps to the permitted list for the chain.

Parameters **apps_to_permit** (list of int) – List of apps (by number) to be permitted.**Returns** Enumerate apps that are currently permitted on this chain.**Return type** list of int**Example**

```

>>> node = RestNode(cert_file='recorder.pfx', cert_pass='password',
    ↪port=32020)
>>> chain = node.chain_by_id('A1wCG9hHhuVNB8hyOALHokYsWyTumHU0vRxtcK-iDKE')
>>> apps = chain.permit_apps([4])
>>> print(apps)
[4]

```

permit_keys (*keys_to_permit*)

Add keys to the permitted list for the chain.

Parameters **keys_to_permit** (list of `il2_rest.models.KeyPermitModel`) – List of keys to permitted.**Returns** Enumerate keys that are currently permitted on chain.**Return type** list of `il2_rest.models.KeyModel`

Example

```

>>> node = RestNode(cert_file='mykeymanager.pfx', cert_pass='password',
↳port=32020)
>>> chain = node.chain_by_id('20ic_KPTCIDfrlwQPKBHdKKp1a6ADaFtBvBjvFmf_fc')
>>> model_1 = KeyPermitModel(app=4, appActions=[1000, 1001], key_id='Key!
↳MJ0kidltB324mfkiOG0aBlEocPA#SHA1',
...     name='documenter', publicKey='PubKey!KpgQEPgItqh<...
↳REDACTED...>BZk4axWhFbTDrxADAQAB#RSA',
...     purposes=[KeyPurpose.Action, KeyPurpose.Protocol])
>>> model_2 = KeyPermitModel(key_id='Key!aWJWFHYDmUXCTCPIW2Ugih5l4XQ#SHA1',
↳name='recorder',
...     publicKey='PubKey!KpgQEPgItxD<...REDACTED...>
↳t1RvQCHPYtRADAQAB#RSA',
...     purposes=[KeyPurpose.Action, KeyPurpose.Protocol],
...     permissions=[AppPermissions(appId=1, actionIds=[300,301,306,
↳302,304,303,305,307]))])
>>> keys = chain.permit_keys([model_1, model_2])
>>> for key in keys :
...     print(keys)
...
Key 'documenter' Key!MJ0kidltB324mfkiOG0aBlEocPA#SHA1
Purposes: [Action,Protocol]
Actions permitted:
App #4 Actions 1000,1001
Key 'recorder' Key!aWJWFHYDmUXCTCPIW2Ugih5l4XQ#SHA1
Purposes: [Action,Protocol]
Actions permitted:
App #1 Actions 300,301,306,302,304,303,305,307
Key 'mykeymanager' Key!-u07iGMWlkUm3WVBqS867AI-Lbw#SHA1
Purposes: [KeyManagement,Action,Protocol]
Actions permitted:
App #2 Actions 500,501
Key 'emergency!20ic_KPTCIDfrlwQPKBHdKKp1a6ADaFtBvBjvFmf_fc' Key!
↳vckqYtMYIcetbunEJc4w-whbnqtZc9a9qlNp5PePm2E
Purposes: [Protocol,Action]
Actions permitted:
App #0 Action 131
Key 'manager!20ic_KPTCIDfrlwQPKBHdKKp1a6ADaFtBvBjvFmf_fc' Key!hLZkEjBRofw1U-
↳JRkXfFdtBWfyM4sZNx8L3R5acakb4
Purposes: [Protocol,Action,KeyManagement]
Actions permitted:
App #2 Actions 500,501
App #1 Actions 300,301

```

property permitted_keys

Enumerate keys that are currently permitted on chain.

Type list of *il2_rest.models.KeyModel*

record_at (serial)

Get an specific record.

Parameters **serial** (int) – Record serial number.

Returns Record with the specific serial number.

Return type *il2_rest.models.RecordModel*

record_at_as_json (serial)

Get an specific record with payload mapped to json.

Parameters **serial** (int) – Record serial number.

Returns Record mapped to JSON with the specific serial number.

Return type `il2_rest.models.RecordModelAsJson`

records (*firstSerial=None, lastSerial=None, page=0, pageSize=10, lastToFirst=False*)

Get list of records starting from a given serial number.

Parameters

- **firstSerial** (int, optional) – Starting serial number.
- **lastSerial** (int, optional) – Last serial number.
- **page** (int, optional) – Page to return (Default is 0).
- **pageSize** (int, optional) – Number of items per page (Default is 10). If 0 returns all.
- **lastToFirst** (int, optional) – If True, return the list of records in reverse order (Default is False).

Returns List of records in the given interval.

Return type `il2_rest.models.PageOfModel` of `il2_rest.models.RecordModel`

records_as_json (*firstSerial=None, lastSerial=None, page=0, pageSize=10, lastToFirst=False*)

Get list of records with payload mapped to JSON starting from a given serial number.

Parameters

- **firstSerial** (int, optional) – Starting serial number.
- **lastSerial** (int, optional) – Last serial number.
- **page** (int, optional) – Page to return (Default is 0).
- **pageSize** (int, optional) – Number of items per page (Default is 10). If 0 returns all.
- **lastToFirst** (int, optional) – If True, return the list of records in reverse order (Default is False).

Returns List of records mapped to JSON in the given interval.

Return type `il2_rest.models.PageOfModel` of `il2_rest.models.RecordModelAsJson`

store_json_document (*payload*)

Store a JSON document record.

Parameters **payload** (dict) – A valid JSON.

Returns Added JSON document details.

Return type `il2_rest.models.JsonDocumentRecordModel`

Example

```

>>> node = RestNode(cert_file='documenter.pfx', cert_pass='password')
>>> chain = node.chain_by_id('A1wCG9hHhuVNB8hyOALHokYsWyTumHU0vRxtcK-iDKE')
>>> json_data = {
...     "field1" : 1,
...     "field2" : "Test",
...     "field3": [1,2,3],
...     "field4" : {
...         "value1" : 10,
...         "value2" : 20
...     }
... }
>>> new_json_document = chain.store_json_document(json_data)
>>> print(new_json_document)

```

property summary

Chain details

Type `il2_rest.models.ChainSummaryModel`

1.3.1.2 RestNetwork

class `il2_rest.client.RestNetwork` (*rest*)

Bases: `object`

Informations about the node network.

Parameters `rest` (*RestNode*) – Node of the network.

property apps

List of valid apps in the network.

Type `AppsModel`

1.3.1.3 RestNode

class `il2_rest.client.RestNode` (*cert_file*, *cert_pass*, *port=32032*, *address='localhost'*, *verify_ca=True*)

Bases: `object`

REST API client to the InterlockLedger node.

You'll try to establish a bi-authenticated https connection with the configured node API address and port. The client-side certificate used to connect needs to be configured with the proper layered authorization role in the node configuration file and imported into a key permitted to update the chain that will be used.

Parameters

- **cert_file** (*str*) – Path to the .pfx certificate. Please refer to the InterlockLedger manual to see how to create and import the certificate into the node.
- **cert_pass** (*str*) – Password of the .pfx certificate.
- **port** (*int*) – Port number to connect.
- **address** (*str*) – Address of the node.
- **verify_ca** (*bool*) – If True, checks CA.

base_uri

The base URI address of the node.

Type `uri.URI`

network

Network information client.

Type `RestNetwork`

add_mirrors_of (*new_mirrors*)

Add new mirrors in this node.

Parameters **new_mirrors** (list of str) – List of chain ids you want to mirror.

Returns List of the chain information.

Return type list of `il2_rest.models.ChainIdModel`

property api_version

IL2 API version.

Type `str`

property certificate_name

Certificate friendly name.

Type `str`

chain_by_id (*chain_id*)

Get a chain by id.

Parameters **chain_id** (str) – Chain id.

Returns Chain instance with the corresponding id.

Return type `RestChain`

Example

```
>>> node = RestNode(cert_file='documenter.pfx', cert_pass='password',
↳port=32020)
>>> chain = node.chain_by_id('A1wCG9hHhuVNB8hyOALHokYsWyTumHU0vRxtcK-iDKE')
>>> print(chain)
Chain '3.6.2 chain name' #A1wCG9hHhuVNB8hyOALHokYsWyTumHU0vRxtcK-iDKE
```

property chains

List of chain instances.

Type list of `RestChain`

create_chain (*model*)

Create a new chain.

Parameters **model** (`il2_rest.models.ChainCreationModel`) – Model with the new chain attributes.

Returns Chain created model.

Return type `il2_rest.models.ChainCreatedModel`

Example

```
>>> node = RestNode(cert_file='admin.pfx', cert_pass='password', port=32020)
>>> new_chain = ChainCreationModel(name='New chain name', description='New_
↳chain',
...     managementKeyPassword='keyPassword', emergencyClosingKeyPassword=
↳'closingPassword')
>>> resp = node.create_chain(new_chain)
>>> print(resp)
Chain 'New chain name' #cRPeHOITV_t1ZQS9CIL7Yi3djJ33ynZCdSRsEnOvX40
```

property details

Get node details.

Type `il2_rest.models.NodeDetailsModel`

property documents_config

Get documents upload configuration.

Type `il2_rest.models.DocumentUploadConfigurationModel`

interlocks_of(chain)

Get the list of interlocking records pointing to a target chain instance.

Parameters **chain** (str) – Chain id.

Returns List of interlockings.

Return type list of `il2_rest.models.InterlockingRecordModel`

Example

```
>>> node = RestNode(cert_file='documenter.pfx', cert_pass='password')
>>> interlocks = node.interlocks_of('8fox30W54ZkzM-shfUeU5C7ad-_
↳fsf5nICwNpkCUk5w')
>>> for interlock in interlocks :
...     print(interlock)
...
Interlocked chain 8fox30W54ZkzM-shfUeU5C7ad-_fsf5nICwNpkCUk5w at record #14_
↳(offset: 13671) with hash RyvOZIjnoUG4QX7FwQs3f6BqDfnOPb3txgXJNxLxtDo#SHA256
{
    "applicationId": 3,
    "chainId": "A1wCG9hHhuVNB8hyOALHokYsWyTumHU0vRxtcK-idKE",
    "createdAt": "2020-02-26T23:17:03.018975-03:75",
    "hash": "0QjOJ-WQjauOF7qXeOxXabHxUgBR_KBNDZVDECbsszw#SHA256",
    "payloadTagId": 600,
    "serial": 9,
    "type": "Data",
    "version": 2,
    "payloadBytes": "+QFgUgUBACsjAAEA8fox30W54ZkzM+shfUeU5C7ad+/
↳fsf5nICwNpkCUk5wKDgr5NG8nIgEARYvOZIjnoUG4QX7FwQs3f6BqDfnOPb3txgXJNxLxtDo=",
    "interlockedChainId": "8fox30W54ZkzM-shfUeU5C7ad-_fsf5nICwNpkCUk5w",
    "interlockedRecordHash": "RyvOZIjnoUG4QX7FwQs3f6BqDfnOPb3txgXJNxLxtDo
↳#SHA256",
    "interlockedRecordOffset": 13671,
    "interlockedRecordSerial": 14
}
```

property mirrors

Get list of mirrors instances.

Type list of *RestChain*

property peers

Get list of known peers.

Type list of *il2_rest.models.PeerModel*

1.3.2 Models module

Resource models available in the InterlockLedger REST API.

1.3.2.1 CustomEncoder

```
class il2_rest.models.CustomEncoder (*,          skipkeys=False,          ensure_ascii=True,
                                     check_circular=True,          allow_nan=True,
                                     sort_keys=False,    indent=None,    separators=None,
                                     default=None)
```

Bases: `json.encoder.JSONEncoder`

Custom JSON encoder for the IL2 REST API models.

default (*obj*)

Set the behavior of the encoder depending on the type of obj.

1.3.2.2 BaseModel

```
class il2_rest.models.BaseModel
```

Bases: `object`

Base class for all models.

```
classmethod from_json (json_data)
```

Convert a dict (JSON like) to a *BaseModel* object.

Parameters *json_data* (`dict`) – JSON object to be converted.

Returns return an instance of the JSON model.

Return type *BaseModel*

```
json (hide_null=True, return_as_str=False)
```

Convert a *BaseModel* class to a dict (JSON like).

Parameters

- **hide_null** (`bool`, optional) – If True, discards every item (key, value) where value is None.
- **return_as_str** (`bool`, optional) – If True, return the JSON as a string instead of a dict.

Returns return obj as a JSON

Return type `dict/str`

```
classmethod to_json (obj, hide_null=True, return_as_str=False)
```

Convert an object to a dict (JSON like).

Parameters

- **obj** (*list/dict/BaseModel*) – Object to be converted to JSON.
- **hide_null** (*bool*, optional) – If True, discards every item (key, value) where value is None.
- **return_as_str** (*bool*, optional) – If True, return the JSON as a string instead of a dict.

Returns return obj as a JSON

Return type dict/str

1.3.2.3 AppsModel

class `il2_rest.models.AppsModel` (*network=None, validApps=[], **kwargs*)

Bases: `il2_rest.models.BaseModel`

Details of the InterlockApps available in the chain.

Parameters

- **network** (*str*) – Network name.
- **validApps** (*list of PublishedApp/list of dict*) – List of currently valid apps for this network.
- ****kwargs** – Arbitrary keyword arguments.

network

Network name

Type str

validApps

Currently valid apps for this network

Type list of *PublishedApp*

class `PublishedApp` (*alternativeId=None, appVersion=None, description=None, app_id=None, name=None, publisherId=None, dataModels=None, publisherName=None, reservedILTagIds=None, simplifiedHashCode=None, start=None, version=None, **kwargs*)

Bases: `il2_rest.models.BaseModel`

InterlockApp permitted in the chain.

alternativeId

Alternative id for the application.

Type int

appVersion

Application semantic version, with four numeric parts.

Type *version*

description

Description of the application.

Type str

id

Unique id for the application.

Type int

name

Application name.

Type `str`

publisherId

Publisher id, which is the identifier for the key the publisher uses to sign the workflow requests in its own chain. It should match the PublisherName

Type `str`

publisherName

Publisher name as registered in the Genesis chain of the network.

Type `str`

dataModels

The list of data models for the payloads of the records stored in the chains.

Type list of *DataModel*

reservedILTagIds

The list of ranges of ILTagIds to reserve for the application.

Type list of *il2_rest.util.LimitedRange*

simplifiedHashCode

Hash code.

Type `int`

start

The start date for the validity of the app, but if prior to the effective publication of the app will be overridden with the publication date and time. If a string is passed, it will be automatically converted to `datetime.datetime`, as long as the string is in the 'yyyy-mm-ddTHH:MM:SS+HH:MM' format.

Type `datetime.datetime/str`

version

Version of the application.

Type `int`

alternativeId

Alternative id for the application.

Type `int`

appVersion

Application semantic version, with four numeric parts.

Type *version*

description

Description of the application.

Type `str`

id

Unique id for the application.

Type `int`

name

Application name.

Type `str`

publisherId

Publisher id, which is the identifier for the key the publisher uses to sign the workflow requests in its own chain. It should match the PublisherName

Type `str`

publisherName

Publisher name as registered in the Genesis chain of the network.

Type `str`

dataModels

The list of data models for the payloads of the records stored in the chains.

Type list of *DataModel*

reservedILTagIds

The list of ranges of ILTagIds to reserve for the application.

Type list of *il2_rest.util.LimitedRange*

simplifiedHashCode

Hash code.

Type `int`

start

The start date for the validity of the app, but if prior to the effective publication of the app will be overridden with the publication date and time.

Type `datetime.datetime`

version

Version of the application.

Type `int`

__eq__ (*other*)

bool: Return True if self and other have the same id and appVersion.

__lt__ (*other*)

bool: Return self.id < other.id. If self and other have the same id, return self.appVersion < other.appVersion.

__str__ ()

str: String representation of the published app.

property compositeName

Concatenation of the App's publisher name, name and version.

Type `str`

1.3.2.4 AppPermissions

class `il2_rest.models.AppPermissions` (*appId=None, actionIds=[], **kwargs*)

Bases: *il2_rest.models.BaseModel*

App permissions

appId

App to be permitted (by number)

Type `int`

actionIds

App actions to be permitted by number.

Type list of `int`

__str__ ()

str: String representation of app permissions.

classmethod `from_str` (*permissions*)

Parse a string into an *AppPermissions* object.

Parameters `permissions` (`str`) – App permissions in the format used by the JSON response (`'#<appId>,<actionId_1>,...,<actionId_n>'`).

Returns return an `AppPermissions` instance.

Return type `AppPermissions`

`to_str()`
`str`: String representation of app permissions in the JSON format (`'#<appId>,<actionId_1>,...,<actionId_n>'`).

1.3.2.5 DataModel

class `il2_rest.models.DataModel` (`description=None`, `dataFields=None`, `indexes=None`, `payloadName=None`, `payloadTagId=None`, `version=None`, `**kwargs`)

Bases: `il2_rest.models.BaseModel`

Data model for the payloads and actions for the records the application stores in the chains.

description

Description of the data model.

Type `str`

dataFields

The list of data fields.

Type list of `DataModel.DataFieldModel`

indexes

List of indexes for records of this type.

Type list of `DataModel.DataIndexModel`

payloadName

Name of the record model.

Type `str`

payloadTagId

Tag id for this payload type. It must be a number in the reserved ranges.

Type `int`

version

Version of this data model, should start from 1.

Type `int`

class `DataFieldModel` (`cast=None`, `elementTagId=None`, `isOpaque=None`, `isOptional=None`, `description=None`, `Enumeration=None`, `enumerationAsFlags=None`, `name=None`, `serializationVersion=None`, `subDataFields=None`, `tagId=None`, `version=None`, `**kwargs`)

Bases: `il2_rest.models.BaseModel`

Metadata for field definition.

cast

Type of the data field.

Type `il2_rest.enumerations.DataFieldCast`

elementTagId

The type of the field in case it is an array.

Type `int`

isOpaque
If `True` the field is stored in raw bytes.
Type `bool`

isOptional
Indicate if data field is optional.
Type `bool`

name
Name of the data field.
Type `str`

serializationVersion
Data field definition version.
Type `int`

subDataFields
If the data field is composed of more fields, indicates the metadata of the subdata fields.
Type list of `DataModel.DataFieldModel`

tagId
Type of the field. (see tags in the InterlockLedger node documentation)
Type `int`

version
Version of the data field.
Type `int`

class DataIndexModel (*elements=None, isUnique=None, name=None, **kwargs*)
Bases: `il2_rest.models.BaseModel`
Index of the data model.

elements
Elements of the index.
Type list of `DataModel.DataIndexModel.DataIndexElementModel`

isUnique
Indicate if the data field is unique.
Type `bool`

name
Name of the index.
Type `str`

class DataIndexElementModel (*descendingOrder=None, fieldPath=None, function=None, **kwargs*)
Bases: `il2_rest.models.BaseModel`
Data index element.

descendingOrder
Indicate if the field is ordered in descending order.
Type `bool`

fieldPath
Path of the data field to be indexed.
Type `str`

function
To be defined.
Type `str`

1.3.2.6 ExportedKeyFile

```
class il2_rest.models.ExportedKeyFile (keyFileBytes=None, keyFileName=None, key-  
                                     Name=None, **kwargs)  
    Bases: il2_rest.models.BaseModel  
    Key file info.  
    keyFileBytes  
        Key file in bytes.  
        Type bytes  
    keyFileName  
        Filename of the key.  
        Type str  
    keyName  
        Name of the key.  
        Type str
```

1.3.2.7 ChainIdModel

```
class il2_rest.models.ChainIdModel (chain_id=None, name=None, licensingStatus=None,  
                                     **kwargs)  
    Bases: il2_rest.models.BaseModel  
    Chain Id  
    id  
        Unique record id.  
        Type str  
    name  
        Chain name.  
        Type str  
    licensingStatus  
        Licensing status.  
        Type str  
    __eq__ (other)  
        bool: Return self.id == other.id.  
    __hash__ ()  
        int: Hash representation of self.  
    __lt__ (other)  
        bool: Return self.id < other.id.  
    __str__ ()  
        str: String representation of the ChainIdModel.
```

1.3.2.8 ChainCreatedModel

```
class il2_rest.models.ChainCreatedModel (chain_id=None, name=None, keyFiles=[],
                                         **kwargs)
    Bases: il2_rest.models.ChainIdModel
    Chain created response.

    id
        Unique record id.
        Type str

    keyFiles
        Emergency key file names.
        Type list of ExportedKeyFile

    name
        Chain name.
        Type str
```

1.3.2.9 ChainCreationModel

```
class il2_rest.models.ChainCreationModel (name, emergencyClosingKeyPassword,
                                           managementKeyPassword, additionalApps=None, description=None, emergencyClosingKeyStrength=<KeyStrength.ExtraStrong: 'ExtraStrong'>, managementKeyStrength=<KeyStrength.Strong: 'Strong'>, keysAlgorithm=<Algorithms.RSA: 'RSA'>, operatingKeyStrength=<KeyStrength.Normal: 'Normal'>, parent=None, **kwargs)
    Bases: il2_rest.models.BaseModel
    Chain creation parameters.

    additionalApps
        List of additional apps (only numeric ids).
        Type list of int

    description
        Description (perhaps intended primary usage).
        Type str

    emergencyClosingKeyPassword
        Emergency closing key password.
        Type str

    emergencyClosingKeyStrength
        Emergency closing key strength of key.
        Type il2_rest.enumerations.KeyStrength

    managementKeyPassword
        Key management key password.
        Type str
```

managementKeyStrength

Key management strength of key.

Type `il2_rest.enumerations.KeyStrength`

keysAlgorithm

Keys algorithm.

Type `il2_rest.enumerations.Algorithms`

name

Name of the chain.

Type `str`

operatingKeyStrength

Operating key strength of key.

Type `il2_rest.enumerations.KeyStrength`

parent

Parent record Id.

Type `str`

1.3.2.10 ChainSummaryModel

```
class il2_rest.models.ChainSummaryModel (chain_id=None, name=None, activeApps=[],  
                                         description=None, isClosedForNewTransactions=False, lastRecord=None, **kwargs)
```

Bases: `il2_rest.models.ChainIdModel`

Chain summary.

activeApps

List of active apps (only the numeric ids).

Type `list of int`

description

Description (perhaps intended primary usage).

Type `str`

isClosedForNewTransactions

Indicates if the chain accepts new records.

Type `bool`

lastRecord

Serial number of the last record.

Type `int`

1.3.2.11 DocumentUploadConfigurationModel

```
class il2_rest.models.DocumentUploadConfigurationModel (defaultCompression=None,
                                                         defaultEncryption=None,
                                                         fileSizeLimit=None,      it-
                                                         erations=None,      permit-
                                                         tedContentTypes=None,
                                                         timeOutInMinutes=None,
                                                         **kwargs)
```

Bases: `il2_rest.models.BaseModel`

Node configuration of uploaded documents.

Parameters

- **defaultCompression** (`str`) – Default compression algorithm.
- **defaultEncryption** (`str`) – Default encryption algorithm.
- **fileSizeLimit** (`int`) – Maximum file size.
- **iterations** (`int`) – Default number of PBE iterations to generate the key.
- **permittedContentTypes** (`list of str`) – List of content types mime-type/extension.
- **timeOutInMinutes** (`int`) – Timeout in minutes.

defaultCompression

Default compression algorithm.

Type `str`

defaultEncryption

Default encryption algorithm.

Type `str`

fileSizeLimit

Maximum file size.

Type `int`

iterations

Default number of PBE iterations to generate the key.

Type `int`

permittedContentTypes

List of content types mime-type/extension.

Type `list of str`

timeOutInMinutes

Timeout in minutes.

Type `int`

1.3.2.12 DocumentsBeginTransactionModel

```
class il2_rest.models.DocumentsBeginTransactionModel(chain, comment=None, encryption=None, compression=None, generatePublicDirectory=None, iterations=None, password=None, **kwargs)
```

Bases: `il2_rest.models.BaseModel`

Parameters for starting a transaction to store many documents in a single InterlockLedger record.

Parameters

- **chain** (`str`) – Id of the chain where the set of documents should be stored.
- **comment** (`str`) – Any additional information about the set of documents to be stored.
- **compression** (`il2_rest.enumerations.DocumentsCompression`) – Compression algorithm.
- **encryption** (`str`) – The encryption descriptor in the <pbe>-<hash>-<cipher>-<level> format
- **generatePublicDirectory** (`bool`) – If the publically viewable PublicDirectory field should be created.
- **iterations** (`int`) – Override for the number of PBE iterations to generate the key.
- **password** (`bytes`) – Password as bytes if Encryption is not null.

chain

Id of the chain where the set of documents should be stored.

Type `str`

comment

Any additional information about the set of documents to be stored.

Type `str`

compression

Compression algorithm. The compression algorithm can be as follows:

- NONE: No compression. Simply store the bytes;
- GZIP: Compression of the data using the gzip standard;
- BROTLI: Compression of the data using the brotli standard;
- ZSTD: Compression of the data using the ZStandard from Facebook (In the future).

Type `il2_rest.enumerations.DocumentsCompression`

encryption

The encryption descriptor in the <pbe>-<hash>-<cipher>-<level> format. Examples:

- “PBKDF2-SHA256-AES256-LOW”
- “PBKDF2-SHA512-AES256-MID”
- “PBKDF2-SHA256-AES128-HIGH”

Type `str`

generatePublicDirectory

If the publically viewable PublicDirectory field should be created.

Type bool

iterations

Override for the number of PBE iterations to generate the key.

Type int

password

Password as bytes if Encryption is not null.

Type bytes

1.3.2.13 DocumentsMetadataModel

```
class il2_rest.models.DocumentsMetadataModel (comment=None,      compression=None,
                                              encryption=None,      encryptionParam-
                                              eters=None,          eters=None,      publicDirectory=None,
                                              **kwargs)
```

Bases: `il2_rest.models.BaseModel`

Metadata associated to a Multi-Document Storage Locator.

Parameters

- **comment** (str) – Any additional information about this set of documents
- **compression** (str) – Compression algorithm.
- **encryption** (str) – The encryption descriptor in the <pbe>-<hash>-<cipher>-<level> format.
- **encryptionParameters** (list of `EncryptionParameters`/list of str) – The parameters used to make the encryption of the set of documents.
- **publicDirectory** (`DirectoryEntry`/str) – List of stored documents.

comment

Any additional information about this set of documents

Type str

compression

Compression algorithm.

Type str

encryption

The encryption descriptor in the <pbe>-<hash>-<cipher>-<level> format.

Type str

encryptionParameters

The parameters used to make the encryption of the set of documents.

Type list of `EncryptionParameters`

publicDirectory

List of stored documents.

Type `DirectoryEntry`

```
class DirectoryEntry (name=None, comment=None, mimeType=None, **kwargs)
```

Bases: `il2_rest.models.BaseModel`

Entry for each stored document in this MultiDocument set

name

Document file name.

Type `str`

iterations

Any provided additional information about the document file.

Type `str`

mimeType

Mime Type for the document content

Type `str`

```
class EncryptionParameters (iterations=None, salt=None, **kwargs)
```

Bases: `il2_rest.models.BaseModel`

The parameters used to make the encryption of the set of documents.

iterations

Number of iterations to generate the key.

Type `str`

salt

Salt value to feed the cypher engine.

Type `str`

1.3.2.14 ForceInterlockModel

```
class il2_rest.models.ForceInterlockModel (hashAlgorithm=<HashAlgorithms.SHA256:  
                                             'SHA256'>, minSerial=0, targetChain=None,  
                                             **kwargs)
```

Bases: `il2_rest.models.BaseModel`

Force interlock command details.

hashAlgorithm

Hash algorithm to use.

Type `il2_rest.enumerations.HashAlgorithms`

minSerial

Required minimum of the serial of the last record in target chain whose hash will be pulled.

Type `int`

targetChain

Id of chain to be interlocked.

Type `str`

__str__()

(`str`): String representation of the interlock.

1.3.2.15 KeyModel

```
class il2_rest.models.KeyModel (key_id=None, name=None, permissions=None, publicKey=None, purposes=None, **kwargs)
```

Bases: `il2_rest.models.BaseModel`

Key model

Parameters

- **key_id** (`str`) – Unique key id.
- **name** (`str`) – Key name.
- **permissions** (list of `AppPermissions`) – List of Apps and Corresponding Actions to be permitted by numbers.
- **publicKey** (`str`) – Key public key.
- **purposes** (list of `il2_rest.enumerations.KeyPurpose`/`str`) – Key valid purposes.
- ****kwargs** – Arbitrary keyword arguments.

id

Unique key id.

Type `str`

name

Key name.

Type `str`

permissions

List of Apps and Corresponding Actions to be permitted by numbers.

Type list of `AppPermissions`

publicKey

Key public key.

Type `str`

purposes

Key valid purposes.

Type list of `il2_rest.enumerations.KeyPurpose`/`str`

__str__()

(`str`): String representation of the key details.

property actionable

Return True if 'Action' is in the list of purposes.

Type (`bool`)

1.3.2.16 KeyPermitModel

```
class il2_rest.models.KeyPermitModel (key_id=None, name=None, permissions=None,  
                                     publicKey=None, purposes=[], app=None, ap-  
                                     pActions=None, **kwargs)
```

Bases: `il2_rest.models.BaseModel`

Key to permit.

Parameters

- **key_id** (str) – Unique key id.
- **name** (str) – Key name.
- **permissions** (list of `AppPermissions`) – List of Apps and Corresponding Actions to be permitted by numbers.
- **publicKey** (str) – Key public key.
- **purposes** (list of `il2_rest.enumerations.KeyPurpose`/str) – Key valid purposes.
- **app** (int) – App to be permitted (by number). *Note:* If app and appActions is passed as parameter, permissions parameter will be ignored.
- **appActions** (list of int) – App actions to be permitted by number. *Note:* If app and appActions is passed as parameter, permissions parameter will be ignored.
- ****kwargs** – Arbitrary keyword arguments.

id

Unique key id.

Type str

name

Key name.

Type str

permissions

List of Apps and Corresponding Actions to be permitted by numbers.

Type list of `AppPermissions`

publicKey

Key public key.

Type str

purposes

Key valid purposes.

Type list of `il2_rest.enumerations.KeyPurpose`/str

1.3.2.17 NewRecordModelBase

```
class il2_rest.models.NewRecordModelBase (applicationId=None,
                                           rec_type=<RecordType.Data: 'Data'>,
                                           **kwargs)

Bases: il2_rest.models.BaseModel

Base model for new Record.

applicationId
    Application id this record is associated with.

    Type int

rec_type
    Block type. Most records are of the type 'Data'. Corresponds to the 'type' field in the JSON.

    Type il2_rest.enumerations.RecordType
```

1.3.2.18 NewRecordModelAsJson

```
class il2_rest.models.NewRecordModelAsJson (applicationId=None,
                                              rec_type=<RecordType.Data: 'Data'>,
                                              rec_json=None, payloadTagId=None,
                                              **kwargs)

Bases: il2_rest.models.NewRecordModelBase

New record model to be added to the chain as a JSON.

JSON
    The payload data matching the metadata for PayloadTagId.

    Type dict

payloadTagId
    The tag id for the payload, as registered for the application.

    Type il2_rest.enumerations.RecordType

property to_query_string
    Request query representation.

    Type (str)
```

1.3.2.19 NewRecordModel

```
class il2_rest.models.NewRecordModel (applicationId=None, rec_type=<RecordType.Data:
                                         'Data'>, payloadBytes=None, **kwargs)

Bases: il2_rest.models.NewRecordModelBase

New record model to be added to the chain as raw bytes.

payloadBytes
    The payload in bytes. Must match the bytes schema of the application Id.

    Type dict
```

1.3.2.20 NodeCommonModel

```
class il2_rest.models.NodeCommonModel (color=None, node_id=None, name=None, network=None, ownerId=None, ownerName=None, roles=None, softwareVersions=None, **kwargs)
```

Bases: `il2_rest.models.BaseModel`

Node/Peer common details

color

Mapping color.

Type `Color`

id

Unique node id

Type `str`

name

Node name.

Type `str`

network

Network this node participates on.

Type `str`

ownerId

Node owner id

Type `str`

ownerName

Node owner name.

Type `str`

roles

List of active roles running in the node

Type `list of str`

softwareVersions

Version of software running the Node.

Type `Versions`

property fancy_color

Return the color as its name or the corresponding hexadecimal values.

Type `(str)`

1.3.2.21 NodeDetailsModel

```
class il2_rest.models.NodeDetailsModel (color=None, node_id=None, name=None, network=None, ownerId=None, ownerName=None, roles=None, softwareVersions=None, chains=[], **kwargs)
```

Bases: `il2_rest.models.NodeCommonModel`

Node details

chains

List of owned records, only the ids

Type list of str

1.3.2.22 PeerModel

```
class il2_rest.models.PeerModel (color=None, node_id=None, name=None, network=None, ownerId=None, ownerName=None, roles=None, softwareVersions=None, address=None, port=None, protocol=None, **kwargs)
```

Bases: `il2_rest.models.NodeCommonModel`

Peer details.

address

Network address to contact the peer.

Type str

port

Port the peer is listening.

Type int

protocol

Network protocol the peer is listening.

Type `il2_rest.enumerations.NetworkProtocol`

1.3.2.23 RecordModelBase

```
class il2_rest.models.RecordModelBase (applicationId=None, chainId=None, createdAt=None, rec_hash=None, payloadTagId=None, serial=None, rec_type=None, version=None, reference=None, network=None, **kwargs)
```

Bases: `il2_rest.models.BaseModel`

Base model for records.

Parameters

- **applicationId** (int) – Application id this record is associated with.
- **chainId** (str) – Chain id that owns this record.
- **createdAt** (datetime.datetime/str) – Time of record creation. If a string is passed, it will be automatically converted to datetime.datetime, as long as the string is in the 'yyyy-mm-ddTHH:MM:SS+HH:MM' format.
- **rec_hash** (str) – Hash of the full encoded bytes of the record.

- **payloadTagId**(int) – The payload’s TagId.
- **serial**(int) – Block serial number. For the first record this value is zero (0).
- **rec_type**(*il2_rest.enumerations.RecordType*) – Block type. Most records are of the type ‘Data’. Corresponds to the ‘type’ field in the JSON.
- **version**(int) – Version of this record structure.
- **network**(str) – Network name this chain is part.
- **reference**(str) – Universal reference of this record.

applicationId

Application id this record is associated with.

Type int

chainId

Chain id that owns this record.

Type str

createdAt

Time of record creation.

Type datetime.datetime

hash

Hash of the full encoded bytes of the record.

Type str

payloadTagId

The payload’s TagId.

Type int

serial

Block serial number. For the first record this value is zero (0).

Type int

type

Block type. Most records are of the type ‘Data’. Corresponds to the ‘type’ field in the JSON.

Type *il2_rest.enumerations.RecordType*

version

Version of this record structure.

Type int

network

Network name this chain is part.

Type str

reference

Universal reference of this record.

Type str

__str__()

(str): JSON representation of the record as string.

1.3.2.24 RecordModel

```
class il2_rest.models.RecordModel (applicationId=None, chainId=None, createdAt=None,
                                     rec_hash=None, payloadTagId=None, serial=None,
                                     rec_type=None, version=None, reference=None, net-
                                     work=None, payloadBytes=None, **kwargs)
```

Bases: `il2_rest.models.RecordModelBase`

Generic opaque record.

Parameters **payloadBytes** (bytes/str) – The payload’s bytes. If loaded from JSON, can be input as a base64 string which will be decoded to bytes.

payloadBytes

The payload’s bytes.

Type bytes

1.3.2.25 RecordModelAsJson

```
class il2_rest.models.RecordModelAsJson (applicationId=None, chainId=None, create-
                                             dAt=None, rec_hash=None, payloadTagId=None,
                                             serial=None, rec_type=None, version=None,
                                             reference=None, network=None, payload=None,
                                             **kwargs)
```

Bases: `il2_rest.models.RecordModelBase`

Record model as JSON.

payload

Payload bytes.

1.3.2.26 InterlockingRecordModel

```
class il2_rest.models.InterlockingRecordModel (applicationId=None, chainId=None,
                                                  createdAt=None, rec_hash=None,
                                                  payloadTagId=None, serial=None,
                                                  rec_type=None, version=None, refer-
                                                  ence=None, network=None, payload-
                                                  Bytes=None, interlockedChainId=None,
                                                  interlockedRecordHash=None, inter-
                                                  lockedRecordOffset=None, interlocke-
                                                  dRecordSerial=None, **kwargs)
```

Bases: `il2_rest.models.RecordModel`

Interlocking details.

interlockedChainId

Interlocked Chain.

Type str

interlockedRecordHash

Interlock Record Hash.

Type str

interlockedRecordOffset

Interlocked Record Offset.

Type `int`

interlockedRecordSerial
Interlocked Record Serial.

Type `int`

__str__()
(`str`): String representation.

1.3.2.27 JsonDocumentRecordModel

class `il2_rest.models.JsonDocumentRecordModel` (`applicationId=None`, `chainId=None`,
`createdAt=None`, `rec_hash=None`,
`payloadTagId=None`, `serial=None`,
`rec_type=None`, `version=None`, `reference=None`, `network=None`, `json-Text=None`, `encryptedJson=None`,
`**kwargs`)

Bases: `il2_rest.models.RecordModelBase`

Record to store JSON documents.

jsonText
JSON document as string.

Type `str`

encryptedJson
JSON Documents encrypted text.

Type `EncryptedTextModel`

1.3.2.28 EncryptedTextModel

class `il2_rest.models.EncryptedTextModel` (`cipher=None`, `cipherText=None`, `readingKeys=None`, `**kwargs`)

Bases: `il2_rest.models.BaseModel`

JSON Documents encrypted text.

cipher
Cipher algorithm used to cipher the text.

Type `il2_rest.enumerations.CipherAlgorithms`

cipherText
Encrypted text.

Type `str`

readingKeys
List of keys able to read this encrypted text.

Type `list of ReadableReadingKeyModel`

decode_with (`certificate`)
Decode the encrypted JSON Document text using the keys inside the certificate.

Parameters **certificate** (`il2_rest.util.PKCS12Certificate`) – PKCS12 certificate with the keys to decode the text.

Returns Decoded JSON.

Return type dict

Example

```
>>> node = RestNode(cert_file=cert_path, cert_pass=cert_pass, address=address,
↳port=port_number)
>>> chain = node.chains[0]
>>> json_body = {"attribute_1": "value_1", "number_1": 1}
>>> response = chain.store_json_document(json_body)
>>> pkcs12_cert = PKCS12Certificate(path=cert_path, password=cert_pass)
>>> response_json = response.encryptedJson.decode_with(pkcs12_cert)
>>> print(response_json)
{"attribute_1": "value_1", "number_1": 1}
```

1.3.2.29 ReadingKeyModel

class `il2_rest.models.ReadingKeyModel` (*encryptedIV=None, encryptedKey=None, publicKey-Hash=None, readerId=None, **kwargs*)

Bases: `il2_rest.models.BaseModel`

Keys able to read an encrypted JSON Document record.

encryptedIV

Encrypted AES256 IV.

Type str

encryptedKey

Encrypted AES256 key.

Type str

publicKeyHash

Public key hash in IL2 text representation.

Type str

readerId

Id of the key.

Type str

1.3.2.30 Versions

class `il2_rest.models.Versions` (*coreLibs=None, main=None, peer2peer=None, tags=None, **kwargs*)

Bases: `il2_rest.models.BaseModel`

Versions for parts of the software.

coreLibs

Core libraries and il2apps version.

Type str

main

Interlockledger node daemon version.

Type `str`

peer2peer
Peer2Peer connectivity library version.

Type `str`

tags
Tag-Length-Value library version.

Type `str`

1.3.2.31 PageOfModel

class `il2_rest.models.PageOfModel` (*items=None, page=None, pageSize=None, totalNumberOfPages=None, itemClass=None, **kwargs*)
Bases: `il2_rest.models.BaseModel`

1.3.3 Enumerations module

Enumerations used in the InterlockLedger REST API.

1.3.3.1 Algorithms

class `il2_rest.enumerations.Algorithms` (*value*)
Bases: `il2_rest.enumerations.AutoName`
Enumeration of the digital signature algorithms available in IL2.

DSA = 'DSA'
EcDSA = 'EcDSA'
EdDSA = 'EdDSA'
ElGamal = 'ElGamal'
RSA = 'RSA'
RSA15 = 'RSA15'

1.3.3.2 AutoName

class `il2_rest.enumerations.AutoName` (*value*)
Bases: `enum.Enum`
Base Enum class to automatically generate the enumerations values based on the enumeration name.

1.3.3.3 DataFieldCast

```
class il2_rest.enumerations.DataFieldCast (value)
    Bases: il2_rest.enumerations.AutoName

    Enumeration of casting options for DataField

    DateTime = 'DateTime'
    Integer = 'Integer'
    NONE = 'None'
    TimeSpan = 'TimeSpan'
```

1.3.3.4 CipherAlgorithms

```
class il2_rest.enumerations.CipherAlgorithms (value)
    Bases: il2_rest.enumerations.AutoName

    Enumeration of the cipher algorithms available in IL2.

    AES256 = 'AES256'
    NONE = 'None'
```

1.3.3.5 HashAlgorithms

```
class il2_rest.enumerations.HashAlgorithms (value)
    Bases: il2_rest.enumerations.AutoName

    Enumeration of the hash algorithms available in IL2.

    Copy = 'Copy'
    SHA1 = 'SHA1'
    SHA256 = 'SHA256'
    SHA3_256 = 'SHA3_256'
    SHA3_512 = 'SHA3_512'
    SHA512 = 'SHA512'
```

1.3.3.6 KeyPurpose

```
class il2_rest.enumerations.KeyPurpose (value)
    Bases: il2_rest.enumerations.AutoName

    Enumeration of the purpose of keys in IL2.

    Action = 'Action'
    ChainOperation = 'ChainOperation'
    ClaimSigner = 'ClaimSigner'
    Encryption = 'Encryption'
    ForceInterlock = 'ForceInterlock'
    InvalidKey = 'InvalidKey'
```

```
KeyManagement = 'KeyManagement'  
Protocol = 'Protocol'
```

1.3.3.7 KeyStrength

```
class il2_rest.enumerations.KeyStrength(value)  
    Bases: il2_rest.enumerations.AutoName  
    Enumeration of the strength of keys.  
  
    Normal = 'Normal'  
        RSA 2048  
  
    Strong = 'Strong'  
        RSA 3072  
  
    ExtraStrong = 'ExtraStrong'  
        RSA 4096  
  
    MegaStrong = 'MegaStrong'  
        RSA 5120  
  
    SuperStrong = 'SuperStrong'  
        RSA 6144  
  
    HyperStrong = 'HyperStrong'  
        RSA 7172  
  
    UltraStrong = 'UltraStrong'  
        RSA 8192
```

1.3.3.8 NetworkProtocol

```
class il2_rest.enumerations.NetworkProtocol(value)  
    Bases: il2_rest.enumerations.AutoName  
    Enumeration of the network protocols.  
  
    HTTPS_Proxied = 'HTTPS_Proxied'  
  
    Originator_Only = 'Originator_Only'  
  
    TCP_Direct = 'TCP_Direct'  
  
    TCP_Proxied = 'TCP_Proxied'
```

1.3.3.9 NetworkPredefinedPorts

```
class il2_rest.enumerations.NetworkPredefinedPorts(value)  
    Bases: enum.IntEnum  
    Enumeration of the default ports of the IL2 networks.  
  
    MainNet = 32032  
  
    MetaNet = 32036  
  
    TestNet_Apollo = 32020  
  
    TestNet_Janus = 32022
```



```
TestNet_Jupiter = 32030
TestNet_Liber = 32018
TestNet_Minerva = 32024
TestNet_Neptune = 32026
TestNet_Saturn = 32028
```

1.3.3.10 RecordType

```
class il2_rest.enumerations.RecordType(value)
    Bases: il2_rest.enumerations.AutoName
    Enumeration of the types of Records available in IL2.
    Closing = 'Closing'
    Corrupted = 'Corrupted'
    Data = 'Data'
    EmergencyClosing = 'EmergencyClosing'
    Root = 'Root'
```

1.3.3.11 DocumentsCompression

```
class il2_rest.enumerations.DocumentsCompression(value)
    Bases: il2_rest.enumerations.AutoName
    Enumeration of the compression algorithm.
    BROTLI = 'BROTLI'
    GZIP = 'GZIP'
    NONE = 'NONE'
    ZSTD = 'ZSTD'
```

1.3.4 Util module

Utility classes and functions for the InterlockLedger REST API.

1.3.4.1 LimitedRange

```
class il2_rest.util.LimitedRange(start, count=1, end=None)
    Bases: object
```

A closed interval of integers represented by the notation '[start-end]'. If the range has only one value, the range is represented by '[start]'.

Parameters

- **start** (int) – Initial value of the interval
- **count** (int, optional) – How many elements are in the range
- **end** (int, optional) – If defined, define the end value of the interval

Raises **ValueError** – If ‘count’ is 0

start
Initial value of the interval

Type `int`

end
End value of the interval

Type `int`

__contains__ (*item*)
Check if item is in self.

Parameters **item** (`int`/*LimitedRange*) – Item to check if is in self.

Returns Return item in self.

Return type `bool`

__eq__ (*other*)
`bool`: Return self == other.

__hash__ ()
`int`: Hash representation of self.

__str__ ()
`str`: String representation of self.

property count
Number of elements in the interval.

Type `int`

overlaps_with (*other*)
Check if there is an overlap between the intervals of self and other.

Returns Return True if there is an overlap.

Return type `bool`

classmethod resolve (*text*)
Parses a string into a *LimitedRange*.

Parameters **text** (`str`) – String representing the range in the format of ‘[start]’ or ‘[start-end]’.

Returns An instance of the *LimitedRange* represented by the *text*.

Return type *LimitedRange*

1.3.4.2 PKCS12Certificate

class `il2_rest.util.PKCS12Certificate` (*path, password*)
Bases: `object`
A PKCS12 certificate interface.

Parameters

- **path** (`str`) – Path to the .pfx certificate.
- **password** (`str`) – Password of the .pfx certificate.

decrypt (*cypher_text*)

Decode a encrypted message using RSA with SHA1.

Parameters **cypher_text** (*bytes*) – Encrypted message.

Returns Decrypted message.

Return type *bytes*

property friendly_name

Certificate friendly name (Not implemented).

Type *str*

has_pk ()

Check if the certificate has a primary key.

Returns True if the certificate has a primary key.

Return type *bool*

property key_id

Id of the key.

Type *str*

property private_key

Certificate private key.

Type *bytes*

property pub_key_hash

Public key hash in IL2 text representation.

Type *str*

property public_certificate

Certificate public certificate.

Type *bytes*

property public_exponent

Public exponent.

Type *int*

property public_modulus

Public modulus.

Type *int*

1.3.4.3 null_condition_attribute

il2_rest.util.null_condition_attribute (*obj, attribute*)

Return the value of the item with key equals to attribute.

Parameters

- **obj** (*dict*) – Dictionary object.
- **attribute** (*str*) – Attribute name of obj.

Returns The value of the item. If obj is None, return None.

1.3.4.4 filter_none

`il2_rest.util.filter_none(d)`

Remove items of a dictionary with None values.

Parameters `d(dict)` – Dictionary object.

Returns Dictionary without None items.

Return type `dict`

1.3.4.5 string2datetime

`il2_rest.util.string2datetime(time_string)`

Convert a string to datetime object. The format of the string is as follows: 'yyyy-mm-ddTHH:MM:SS+HH:MM'.

Parameters `time_string(str)` – string with date and time.

Returns date time object.

Return type `datetime.datetime`

1.3.4.6 to_bytes

`il2_rest.util.to_bytes(value)`

Decodes value to bytes.

Parameters `value` – Value to decode to bytes

Returns

Return the value as bytes:

- if `type(value)` is `bytes`, return `value`;
- if `type(value)` is `str`, return the string encoded with UTF-8;
- otherwise, returns `bytes(value)`.

Return type `bytes`

1.3.4.7 build_query

`il2_rest.util.build_query(args_names, args_values)`

Transform a list of names and values in a HTTP query string.

Parameters

- **args_names** (`list of str`) – List of names.
- **args_values** (`list`) – List of values, must have same length of `args_names`.

Returns Query string.

Return type `str`

ABOUT THIS DOCUMENTATION

This reference manual was partially created using Sphinx and Google style docstrings. If you need/want to create this manual in another format (HTML, man, etc), you will need to install Sphinx and Sphinx-Napoleon extension:

```
$ pip3 install --user sphinx sphinxcontrib-napoleon2
```

To create an HTML version you can use the following instructions:

```
$ cd docs/  
$ make html
```

To create the PDF version you can use the following instructions:

```
$ cd docs/  
$ make latexpdf
```

Note: To create the PDF version, you must have a LaTeX builder (default is `pdflatex`) installed.

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