Hyperledger Avalon 0.5.0.dev1

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Hyperledger Avalon Documentation

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 - Glossary
 - Videos
- Avalon Proposal. Avalon Proposal, initial members, motivation, and proposed solutions (2019)
- "Ecosystem Support for EEA Trusted Compute Specification v1.0 Improves Blockchain Privacy and Scalability". Introductory blog by Michael Reed (2019)
- Introduction to Hyperledger Avalon video (20:24)

Community

- Project Wiki
- RocketChat
- Email list
- JIRA feature & bug tracking

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- Workload Application Tutorial
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- Avalon source code repository, https://github.com/hyperledger/avalon
- Building source code
- Example Avalon applications
- Contributing source code

SDK Reference Manual

The Avalon SDK Reference Manual is generated with Doxygen. To generate the Reference Manual, type the following:

```
cd $TCF_HOME/docs # this directory
sudo apt-get update
sudo apt-get install -y make doxygen texlive-full graphviz
make
```

Documentation generated will be here:

- \$TCF_HOME/docs/refman/html/HTML documentation
- \$TCF_HOME/docs/refman/man/man3man page documentation
- \$TCF_HOME/docs/refman/latexLaTeX documentation
- \$TCF_HOME/docs/refman/refman.pdfPDF documentation (generated from LaTex)

Reference

- Hyperledger Avalon Architecture Overview. Overview of Avalon architecture by Eugene Yarmosh (2020)
- Off-Chain Trusted Compute Specification defined by Enterprise Ethereum Alliance (EEA) Task Force
- · Cryptography. Cryptographic primitives used, libraries used, and implementation

BUILD

Building the common libraries

Make sure you have environment variables SGX_SDK and SGX_SSL defined (see ../../../BUILD.md "BUILD.md") and then run

```
mkdir build
cd build
cmake .. -G "Unix Makefiles" && make
```

\$ BUILD

README

Common Crypto library documentation

This common/cpp/crypto/ directory contains cryptographic code used by untrusted and trusted (Intel SGX Enclave) code.

This code is written in C++, but a Python wrapper is also available (see ../README.md").

Avalon applications are free to use third-party cryptographic implementations (such as what a programming language binding may provide) or the cryptographic interfaces provided here.

Software Components Required

OpenSSL 1.1 library and Intel SGX OpenSSL library built from OpenSSL 1.1:

- https://www.openssl.org/
- https://github.com/intel/intel-sgx-ssl

Cryptographic Primitives Used

| Primitive | Algorithm | Keysize | Comments |
|--------------------------|-----------------|---------|------------------------|
| Digital signature | ECDSA-SECP256K1 | 256 | (1) (2) |
| Asymmetric encryption | RSA-OAEP | 3072 | (1) |
| Authenticated encryption | AES-GCM | 256 | 96b IV, 128b tag |
| Digest | SHA-256 | 256 | (2) |
| Digest | KECCACK | 256 | (2) Differs from SHA-3 |

- (1) Not PQ resistant
- (2) Blockchain legacy algorithm

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Cryptographic Primitive Usage

- SHA-256 Computing digests of the work order request and response
- **KECCAK-256** Computing digests of the work order request and response or Ethereum raw transactions Packet bytes
- AES-GCM-256 Encrypts data items within work order request and response. It also used to encrypt a request digest and custom data encryption keys
- RSA-OAEP-3072 Encrypt symmetric data encryption keys
- ECSDA-SECP256K1 Signs work order response digest and worker's encryption RSA-OAEP public key

Implementation of Cryptographic Elements

Cryptographic elements include cryptographic keys, signature, ciphertexts, plaintexts, hashes, and random bit-strings.

| Element | Implementation | Representation | Serialize/Deserialize function? |
|------------------------|----------------|----------------|---------------------------------------|
| ECDSA public key | C++ class | Custom object | Yes, PEM encoding and 65-byte Bitcoin |
| | | | Hex format |
| ECDSA private key | C++ class | Custom object | Yes, PEM encoding |
| ECDSA signature | C++ string | DER binary | No, user defined |
| RSA public key | C++ class | Custom object | Yes, PEM encoding |
| RSA private key | C++ class | Custom object | Yes, PEM encoding |
| RSA ciphertext | C++ string | raw binary | No, user defined |
| RSA plaintext | C++ string | raw binary | No, user defined |
| AES-GCM key | C++ string | raw binary | No, user defined |
| AES-GCM iv | C++ string | raw binary | No, user defined |
| AES-GCM ciphertext+tag | C++ string | raw binary | No, user defined |
| AES-GCM plaintext | C++ string | raw binary | No, user defined |
| SHA-256 digest | C++ string | raw binary | No, user defined |
| Random bitstring | C++ string | raw binary | No, user defined |

Security notes

AES-GCM When using of AES-GCM inside Intel SGX enclaves to preserve confidentiality and integrity of
data to be stored outside of the Intel SGX enclaves a different unique or random 12-byte IV must be used
for each encrypted message. At most 2³² distinct IVs can be used until the key needs to be regenerated
for security. This limitation can possibly be mitigated in the future by using alternatives to AES-GCM like
AES-GCM SIV.

README

Purpose of Common

The common directory contains source code shared by untrusted and trusted (Intel SGX Enclave) code.

Dependencies:

- 1. OpenSSL 1.1 https://www.openssl.org/
- 2. Intel SGX OpenSSL library built from OpenSSL 1.1 https://github.com/intel/intel-sgx-ssl
- 3. Intel SGX SDK https://software.intel.com/en-us/sgx-sdk/download

Source Directories

Dir Content

crypto/*.cpp,*.h for OpenSSL based crypto functions. For more information, see crypto/README.md

. *.cpp,*.h error handling and common types

packages/base64/*.cpp,*.h of Renee Nyffinger base64 encoding/decoding

packages/parson/*.cpp,*.h of Parson JSON encoding/decoding

Python Wrapper

The Python SWIG wrapper exports the functions and classes defined in crypto.h, tcf_error.h and types.h. Several classes and functions are renamed. Check common/python/crypto_utils/crypto/crypto.i for details.

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README

Purpose of Common

The common directory contains source code shared by trusted (Intel SGX Enclave) code and different workloads(← Example workloads).

Dependencies:

- 1. SGX SDK https://software.intel.com/en-us/sgx-sdk/download
- 2. SGX OpenSSL library built from OpenSSL 1.1 https://github.com/intel/intel-sgx-ssl

Source Directories

Dir Content

sgx/iohandler/*.cpp,*.h files are custom iohandlers which help workloads to execute IO operations from the Intel SGX enclave

sgx/workload/ work_order_data.cpp,work_order_data.h files are wrapper files for work order data workload — _processor.cpp, workload_processor.h are workload processor which overrides function exposed by work order interface and also facilitates auto registration of workloads

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Solidity Connector Test Process

- 1. You have two choices for building Avalon: Docker-based build (recommended) or standalone build.
 - For standalone builds, follow instructions in the "Standalone based Build" section of the build document. Then continue with the next step, step 2.
 - For Docker-based builds, follow instructions in the "Docker-based Build and Execution" section of the the build document through step 4 (Docker container shell). Then continue with step 8, below.
- 2. (Standalone builds only) If needed, update the Ethereum account and direct registry contract information in sdk/avalon_sdk/tcf_connector.toml
- 3. (Standalone builds only) Install Python 3.6.8 if not currently installed. Determine your Python version with python3 --version. If it is not installed, install it as follows:
 - "bash wget https://www.python.org/ftp/python/3.6.8/Python-3.6.8.tgz tar -xvf Python-3.6.8.tgz cd Python-3.6.8./configure make sudo make install make sure "
- 4. (Standalone builds only) Install the Solidity compiler to compile Solidity contracts from Python: "bash pip3 install –upgrade py-solc-x python3 -m solcx.install v0.5.15 "
- 5. (Standalone builds only) To run smart contracts using a Ropsten network account, first install the MetaMask Chrome plugin to your Chrome web browser and create an account in the Ropsten network
- 6. (Standalone builds only) After creating an account, make sure to add fake ether to the account using:
 - https://faucet.metamask.io/
 - https://blog.bankex.org/how-to-buy-ethereum-using-metamask-ccea0703daec
- 7. Install web3.py, which is an Ethereum Python client that interacts with the Ethereum network. For more information about web3.py, see https://web3py.readthedocs.io/en/stable/quickstart.← html
 - "bash pip install web3 "
- 8. Run cd \$TCF_HOME/examples/common/python/connectors/ethereum
- 9. Fill in your Ropsten testnet address in eth_account in sdk/avalon_sdk/tcf_connector.toml
- 10. Deploy solidity contracts to Ropsten network using eth_cli.py
 - "bash ./eth cli.py "
 - The above command will display the contract instance address for $direct_registry_contract_\leftrightarrow$ address and $worker_registry_contract_address$
- 11. Fill in your your contract addresses direct_registry_contract_address and worker_← registry_contract_address in sdk/avalon_sdk/tcf_connector.toml

- 12. Test the DirectRegistry and WorkerRegistry contracts with: "'bash cd \$TCF_HOME/examples/common/python/connectors/ether_tests python3 test_ethereum_worker_registry_impl.py python3 test_ethereum_worker_registry_list_impl.py
- 13. Test echo client with direct mode using Ropsten test network. "bash cd \$TCF_HOME/examples/apps/echo/client ./echo_client.py -m "Hello world" "

Namespace Index

| 7.1 | Namespace | List |
|-----|-------------|------|
| | Hailloopaoo | |

| Here is a list of all documented namespaces with brief descriptions: | |
|--|----|
| tcf::crypto::skenc | 21 |

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Hierarchical Index

8.1 Class Hierarchy

This inheritance list is sorted roughly, but not completely, alphabetically:

| avalon_sdk.connector.direct.avalon_direct_client.AvalonDirectClient |
|--|
| avalon_sdk.connector.blockchains.fabric.base.ClientBase |
| avalon_sdk.connector.blockchains.fabric.event_listener.EventListener |
| avalon sdk.connector.blockchains.ethereum.ethereum wrapper.EthereumWrapper |
| avalon sdk.connector.blockchains.ethereum.ethereum listener.EventProcessor |
| Exception |
| avalon_sdk.http_client.http_jrpc_client.MessageException |
| avalon_sdk.connector.blockchains.fabric.fabric_wrapper.FabricWrapper |
| FileIoExecutor |
| json_array_t |
| json_object_t |
| json_value_t |
| json_value_value |
| JsonValue |
| object |
| avalon_crypto_utils.keys.EnclaveKeys |
| avalon_crypto_utils.keys.TransactionKeys |
| avalon_crypto_utils.signature.ClientSignature |
| avalon_sdk.http_client.http_jrpc_client.HttpJrpcClient |
| tcf::crypto::pkenc::PrivateKey |
| tcf::crypto::sig::PrivateKey |
| tcf::crypto::sig::PublicKey |
| tcf::crypto::pkenc::PublicKey |
| runtime_error |
| tcf::error::Error |
| tcf::error::CryptoError |
| tcf::error::DivisionByZero |
| tcf::error::IndexError |
| tcf::error::IOError |
| tcf::error::MemoryError |
| tcf::error::OverflowError |
| tcf::error::RuntimeError |
| tcf::error::SystemBusvError |

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| tcf::error::SystemError |
|---|
| tcf::error::UnknownError |
| tcf::error::ValueError |
| tcf::error::WorkloadError |
| TestCase |
| test_ethereum_work_order_impl.TestEthereumWorkOrderProxyImpl |
| test_ethereum_worker_registry_impl.TestEthereumWorkerRegistryImpl |
| test_ethereum_worker_registry_list_impl.TestEthereumWorkerRegistryListImpl |
| test_fabric_worker_registry_impl.TestFabricWorkerRegistryImpl |
| test_fabric_worker_registry_list_impl.TestFabricWorkerRegistryListImpl |
| test_work_order_encryption_key_jrpc_impl.TestWorkOrderEncryptionKeyJRPCImpl |
| test_work_order_jrpc_impl.TestWorkOrderJRPCImpl |
| test_worker_registry_jrpc_impl.TestWorkerRegistryJRPCImpl |
| tcf::utility::Timer |
| vector |
| StringArray |
| avalon_sdk.worker.worker_details.WorkerDetails |
| avalon_sdk.worker.worker_details.SGXWorkerDetails |
| WorkloadProcessor |
| tcf::WorkOrderData |
| avalon_sdk.work_order.work_order_params.WorkOrderParams |
| avalon sdk.work order receipt.work order receipt.WorkOrderReceiptRequest |
| avalon_sdk.work_order.work_order_request_validator.WorkOrderRequestValidator |
| ABC |
| avalon_sdk.connector.interfaces.work_order.WorkOrder |
| avalon_sdk.connector.direct.jrpc.jrpc_work_order.JRPCWorkOrderImpl |
| avalon_sdk.connector.interfaces.work_order_proxy.WorkOrderProxy |
| avalon sdk.connector.interfaces.work order receipt.WorkOrderReceipt |
| avalon_sdk.connector.interfaces.worker_registry.WorkerRegistry |
| avalon_sdk.connector.interfaces.worker_registry_list.WorkerRegistryList |
| Enum |
| avalon_sdk.connector.blockchains.common.contract_response.ContractResponse |
| avalon_sdk.registry.registry_status.RegistryStatus |
| avalon_sdk.work_order_receipt.work_order_receipt.ReceiptCreateStatus |
| avalon_sdk.worker.worker_details.WorkerStatus |
| avalon_sdk.worker.worker_details.WorkerType |
| IntEnum |
| avalon_sdk.connector.direct.jrpc.jrpc_util.JsonRpcErrorCode |
| WorkerRegistry |
| avalon_sdk.connector.blockchains.ethereum.ethereum_worker_registry.EthereumWorkerRegistryImpl . 36 |
| avalon_sdk.connector.blockchains.fabric.fabric_worker_registry.FabricWorkerRegistryImpl 58 |
| avalon_sdk.connector.direct.jrpc.jrpc_worker_registry.JRPCWorkerRegistryImpl |
| WorkerRegistryList |
| avalon_sdk.connector.blockchains.ethereum.ethereum_worker_registry_list.EthereumWorker↔ |
| RegistryListImpl |
| avalon_sdk.connector.blockchains.fabric.fabric_worker_registry_list.FabricWorkerRegistryListImpl 63 |
| WorkOrderProxy |
| avalon_sdk.connector.blockchains.ethereum.ethereum_work_order.EthereumWorkOrderProxyImpl 45 |
| avalon_sdk.connector.blockchains.fabric.fabric_work_order.FabricWorkOrderImpl 67 |
| WorkOrderReceipt |
| avalon_sdk.connector.blockchains.fabric.fabric_work_order_receipt.FabricWorkOrderReceiptImpl 72 |
| avalon sdk.connector.direct.jrpc.jrpc work order receipt.JRPCWorkOrderReceiptImpl 93 |

Class Index

9.1 Class List

Here are the classes, structs, unions and interfaces with brief descriptions:

| avalon_sdk.connector.direct.avalon_direct_client.AvalonDirectClient | 23 |
|--|-----|
| avalon_sdk.connector.blockchains.ethereum.ethereum_listener.BlockchainInterface | 25 |
| avalon_sdk.connector.blockchains.fabric.base.ClientBase | 25 |
| avalon_crypto_utils.signature.ClientSignature | 26 |
| avalon_sdk.connector.blockchains.common.contract_response.ContractResponse | 30 |
| tcf::error::CryptoError | 31 |
| tcf::error::DivisionByZero | 32 |
| avalon_crypto_utils.keys.EnclaveKeys | 33 |
| tcf::error::Error | 35 |
| avalon_sdk.connector.blockchains.ethereum.ethereum_worker_registry.EthereumWorkerRegistryImpl . | 36 |
| $avalon_sdk.connector.blockchains.ethereum_ethereum_worker_registry_list.EthereumWorkerRegistry \leftarrow$ | |
| ListImpl | 41 |
| avalon_sdk.connector.blockchains.ethereum.ethereum_work_order.EthereumWorkOrderProxyImpl | 45 |
| avalon_sdk.connector.blockchains.ethereum.ethereum_wrapper.EthereumWrapper | 49 |
| avalon_sdk.connector.blockchains.fabric.event_listener.EventListener | 53 |
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| avalon_sdk.connector.blockchains.fabric.fabric_work_order.FabricWorkOrderImpl | 67 |
| avalon_sdk.connector.blockchains.fabric.fabric_work_order_receipt.FabricWorkOrderReceiptImpl | 72 |
| avalon_sdk.connector.blockchains.fabric.fabric_wrapper.FabricWrapper | 77 |
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| tcf::error::IndexError | 84 |
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| json_object_t | 99 |
| json_value_t | 100 |
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| avalon_sdk.connector.direct.jrpc.jrpc_util.JsonRpcErrorCode | 101 |
| JsonValue | 103 |
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| avalon_sdk.http_client.http_jrpc_client.MessageException |
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| tcf::error::OverflowError |
| tcf::crypto::pkenc::PrivateKey |
| tcf::crypto::sig::PrivateKey |
| tcf::crypto::sig::PublicKey |
| tcf::crypto::pkenc::PublicKey |
| avalon_sdk.work_order_receipt.work_order_receipt.ReceiptCreateStatus |
| avalon_sdk.registry_status.RegistryStatus |
| tcf::error::RuntimeError |
| avalon_sdk.worker_details.SGXWorkerDetails |
| StringArray |
| tcf::error::SystemBusyError |
| tcf::error::SystemError |
| $test_ethereum_worker_registry_impl. TestEthereumWorkerRegistryImpl \\ \dots $ |
| $test_ethereum_worker_registry_list_impl. TestEthereumWorkerRegistryListImpl \\ \ldots \ldots \\ 117$ |
| $test_ethereum_work_order_impl. Test \\ EthereumWorkOrder \\ ProxyImpl \\ \dots \\ $ |
| $test_fabric_worker_registry_impl. TestFabricWorkerRegistryImpl \ . \ . \ . \ . \ . \ . \ . \ . \ . \ $ |
| $test_fabric_worker_registry_list_impl. TestFabricWorkerRegistryListImpl \ . \ . \ . \ . \ . \ . \ . \ . \ . \ $ |
| $test_worker_registry_jrpc_impl. TestWorkerRegistry JRPCImpl \\ $ |
| $test_work_order_encryption_key_jrpc_impl. TestWorkOrderEncryptionKeyJRPCImpl \\ \\ 124$ |
| $test_work_order_irpc_impl. TestWorkOrderJRPCImpl \\ \dots \\ $ |
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| avalon_crypto_utils.keys.TransactionKeys |
| $avalon_sdk.connector.blockchains.fabric.tx_committer.TxCommitter \\ \ \ \dots \\ \ \ 127$ |
| tcf::error::UnknownError |
| tcf::error::ValueError |
| avalon_sdk.worker.worker_details.WorkerDetails |
| avalon_sdk.connector.interfaces.worker_registry.WorkerRegistry |
| avalon_sdk.connector.interfaces.worker_registry_list.WorkerRegistryList |
| avalon_sdk.worker.worker_details.WorkerStatus |
| avalon_sdk.worker.worker_details.WorkerType |
| tcf::error::WorkloadError |
| WorkloadProcessor |
| avalon_sdk.connector.interfaces.work_order.WorkOrder |
| tcf::WorkOrderData |
| $avalon_sdk.work_order_params.WorkOrderParams \ . \ . \ . \ . \ . \ . \ . \ . \ . \ $ |
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Chapter 10

File Index

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| /home/dano/git/avalon/common/cpp/c11_support.h |
|---|
| /home/dano/git/avalon/common/cpp/error.h |
| /home/dano/git/avalon/common/cpp/hex_string.h |
| /home/dano/git/avalon/common/cpp/json_utils.h |
| /home/dano/git/avalon/common/cpp/jsonvalue.h |
| /home/dano/git/avalon/common/cpp/tcf_error.h |
| /home/dano/git/avalon/common/cpp/timer.h |
| /home/dano/git/avalon/common/cpp/types.cpp |
| /home/dano/git/avalon/common/cpp/types.h |
| $/home/dano/git/avalon/common/cpp/utils.h \\ \ . \ . \ . \ . \ . \ . \ . \ . \ . \ . \ . \ . \ . \ . \ . \ . \ . \ . \ . \ . \ . \ . \ . \ . \ . \ . \ . \ . \ . \ . \ . \ . \ . \ . \ . \ . \ . \ . \ . \ . \ . \ . \ . \ . \ . \ . \ . \ . \ . \ . \ . \ . \ . \ . \ . \ . \ . \ . \ . \ . \ . \ . \ . \ . \ . \ . \ . \ . \ . \ . \ . \ . \ . \ . \ . \ . \ . \ . \ . \ . \ . \ . \ . \ $ |
| /home/dano/git/avalon/common/cpp/zero.h |
| /home/dano/git/avalon/common/cpp/crypto/ crypto.h |
| /home/dano/git/avalon/common/cpp/crypto/ crypto_shared.h |
| /home/dano/git/avalon/common/cpp/crypto/crypto_utils.h |
| /home/dano/git/avalon/common/cpp/crypto/ pkenc.h |
| /home/dano/git/avalon/common/cpp/crypto/ pkenc_private_key.h |
| /home/dano/git/avalon/common/cpp/crypto/ pkenc_public_key.h |
| /home/dano/git/avalon/common/cpp/crypto/ sig.h |
| /home/dano/git/avalon/common/cpp/crypto/ sig_private_key.h |
| /home/dano/git/avalon/common/cpp/crypto/ sig_public_key.h |
| /home/dano/git/avalon/common/cpp/crypto/skenc.h |
| /home/dano/git/avalon/common/cpp/crypto/verify_certificate.h |
| /home/dano/git/avalon/common/cpp/crypto/verify_signature.h |
| /home/dano/git/avalon/common/cpp/packages/base64/base64.h |
| /home/dano/git/avalon/common/cpp/packages/parson/ parson.h |
| /home/dano/git/avalon/common/cpp/verify_ias_report/ias-certificates.h |
| /home/dano/git/avalon/common/cpp/verify_ias_report/ias_attestation_util.h |
| /home/dano/git/avalon/common/cpp/verify_ias_report/verify-report.h |
| /home/dano/git/avalon/common/sgx_workload/iohandler/file_io.cpp |
| /home/dano/git/avalon/common/sgx_workload/iohandler/file_io.h |
| /home/dano/git/avalon/common/sgx_workload/iohandler/file_io_wrapper.cpp |
| /home/dano/git/avalon/common/sgx_workload/iohandler/file_io_wrapper.h |
| /home/dano/git/avalon/common/sgx_workload/workload/work_order_data.h |
| /home/dano/git/avalon/common/sgx_workload/workload/workload_processor.cpp |
| /home/dano/git/avalon/common/sgx_workload/workload_processor.h |

20 File Index

Chapter 11

Namespace Documentation

11.1 tcf::crypto::skenc Namespace Reference

Functions

- ByteArray GenerateKey ()
- ByteArray GenerateIV (const std::string &IVstring=std::string(""))
- ByteArray EncryptMessage (const ByteArray &key, const ByteArray &iv, const ByteArray &message)
- ByteArray EncryptMessage (const ByteArray &key, const ByteArray &message)
- ByteArray DecryptMessage (const ByteArray &key, const ByteArray &iv, const ByteArray &message)
- ByteArray DecryptMessage (const ByteArray &key, const ByteArray &message)

11.1.1 Detailed Description

Authenticated encryption.

11.1.2 Function Documentation

11.1.2.1 DecryptMessage() [1/2]

Throws RuntimeError, ValueError, CryptoError (message authentication failure).

11.1.2.2 DecryptMessage() [2/2]

Throws RuntimeError, ValueError, CryptoError (message authentication failure). Expects IV prepended to message ciphertext.

11.1.2.3 EncryptMessage() [1/2]

```
ByteArray tcf::crypto::skenc::EncryptMessage ( const ByteArray & key, const ByteArray & iv, const ByteArray & message)
```

Throws RuntimeError, ValueError.

11.1.2.4 EncryptMessage() [2/2]

```
ByteArray tcf::crypto::skenc::EncryptMessage ( const ByteArray & key, const ByteArray & message)
```

Uses random IV prepended the returned ciphertext. Throws RuntimeError, ValueError.

11.1.2.5 GenerateIV()

Throws RuntimeError.

11.1.2.6 GenerateKey()

```
ByteArray tcf::crypto::skenc::GenerateKey ( )
```

ByteArray here is used to encapsulate raw binary data and does not apply/assume any encoding. Throws Runtime ← Error.

Chapter 12

Class Documentation

12.1 avalon_sdk.connector.direct.avalon_direct_client.AvalonDirectClient Class Reference

Public Member Functions

- def __init__ (self, config_file=None, config=None)
- def get_worker_registry_list_instance (self)
- def get_worker_registry_instance (self)
- · def get work order instance (self)
- def get_work_order_receipt_instance (self)

12.1.1 Detailed Description

```
This is class for the direct JSON RPC API client.
It is used in the direct model.

1. Worker registry list interacts with the blockchain; it is optional.

2. Worker registry interacts with the JSON RPC listener.

3. Work order interacts with the JSON RPC listener.

4. Work order receipt interacts with the JSON RPC listener.
```

12.1.2 Constructor & Destructor Documentation

12.1.3 Member Function Documentation

12.1.3.1 get_work_order_instance()

```
def avalon_sdk.connector.direct.avalon_direct_client.AvalonDirectClient.get_work_order_\leftrightarrow instance ( self~)
```

Return the worker's instance of the work order. The work order interacts with the JSON RPC listener.

12.1.3.2 get_work_order_receipt_instance()

```
def avalon_sdk.connector.direct.avalon_direct_client.AvalonDirectClient.get_work_order_\leftrightarrow receipt_instance ( self )
```

Return the worker's instance of the work order receipt. The work order receipt interacts with the JSON RPC listener.

12.1.3.3 get_worker_registry_instance()

```
\label{lem:def_avalon_sdk} $$ def avalon\_sdk.connector.direct.avalon\_direct\_client.AvalonDirectClient.get\_worker\_registry\_ \\ $$ instance ( $$ self ) $$
```

Return the worker's instance of the registry. The registry interacts with the JSON RPC listener.

12.1.3.4 get_worker_registry_list_instance()

```
def avalon_sdk.connector.direct.avalon_direct_client.AvalonDirectClient.get_worker_registry_ \leftrightarrow list_instance ( self )
```

Return the worker's instance of the registry list. This list is optional and interacts with the blockchain.

The documentation for this class was generated from the following file:

/home/dano/git/avalon/sdk/avalon_sdk/connector/direct/avalon_direct_client.py

12.2 avalon_sdk.connector.blockchains.ethereum.ethereum_listener.BlockchainInterface Class Reference

Public Member Functions

- def init (self, config)
- def newListener (self, contract, event, fromBlock='latest')

12.2.1 Detailed Description

Ethereum blockchain interface to event processor.

12.2.2 Member Function Documentation

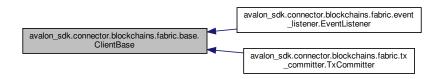
12.2.2.1 newListener()

The documentation for this class was generated from the following file:

• /home/dano/git/avalon/sdk/avalon sdk/connector/blockchains/ethereum/ethereum listener.py

12.3 avalon_sdk.connector.blockchains.fabric.base.ClientBase Class Reference

Inheritance diagram for avalon sdk.connector.blockchains.fabric.base.ClientBase:



Public Member Functions

- def __init__ (self, profile, channel_name, org_name, peer_name, user_name)
- def channel_name (self)
- def channel (self)
- def org_name (self)
- def peer_name (self)
- def user_name (self)
- def user (self)

Public Attributes

client

12.3.1 Detailed Description

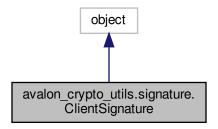
Base class for a Hyperledger Fabric client.

The documentation for this class was generated from the following file:

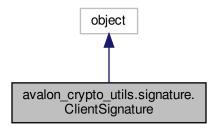
• /home/dano/git/avalon/sdk/avalon_sdk/connector/blockchains/fabric/base.py

12.4 avalon_crypto_utils.signature.ClientSignature Class Reference

Inheritance diagram for avalon_crypto_utils.signature.ClientSignature:



Collaboration diagram for avalon_crypto_utils.signature.ClientSignature:



Public Member Functions

- def __init__ (self)
- def calculate datahash (self, data objects)
- def generate_signature (self, hash, private_key)
- def generate_client_signature (self, input_json_str, worker, private_key, session_key, session_iv, encrypted
 _session_key, data_key=None, data_iv=None)
- def verify_signature (self, input_json, verification_key)
- def verify_update_receipt_signature (self, input_json)
- def verify_create_receipt_signature (self, input_json)
- def calculate_request_hash (self, input_json)

Public Attributes

- private_key
- public_key
- · param_pool
- tcs_worker

12.4.1 Detailed Description

Class to perform hash calculation, signature generation and verification $% \left(1\right) =\left(1\right) \left(1\right) \left$

12.4.2 Member Function Documentation

12.4.2.1 calculate_datahash()

```
def avalon_crypto_utils.signature.ClientSignature.calculate_datahash (
              self,
              data_objects )
Function to calculate a hash value of the array concatenating dataHash,
data, encryptedDataEncryptionKey, iv for each item in the
inData/outData array
Parameters:
    - data_objects is each item in inData or outData part of workorder
      request as per Trusted Compute EEA API 6.1.7
      Work Order Data Formats
12.4.2.2 calculate_request_hash()
def avalon_crypto_utils.signature.ClientSignature.calculate_request_hash (
              self,
              input_json )
Function to create the work order reuest hash
as defined in EEA spec 6.1.8.1
Parameters:
    - input_json is dictionary contains work order request payload
     as define EEA spec 6.1.1
Returns hash of work order request as string
12.4.2.3 generate_client_signature()
def avalon_crypto_utils.signature.ClientSignature.generate_client_signature (
              self,
              input_json_str,
              worker,
              private_key,
              session kev,
              session_iv,
              encrypted_session_key,
              data_key = None,
              data_iv = None)
Function to generate client signature
Parameters:
    - input_json_str is requester Work Order Request payload in a
      JSON-RPC based format defined 6.1.1 Work Order Request Payload
    - worker is a worker object to store all the common details of
      worker as per Trusted Compute EEA API 8.1
     Common Data for All Worker Types
    - private_key is Client private key
    - session_key is one time session key generated by the participant
      submitting the work order.
    - session_iv is an initialization vector if required by the
      data encryption algorithm (encryptedSessionKey).
      The default is all zeros.
    - data_key is a one time key generated by participant used to
      encrypt work order indata
    - data_iv is an initialization vector used along with data_key.
     Default is all zeros.
    - encrypted_session_key is a encrypted version of session_key.
Returns a tuple containing signature and status
```

12.4.2.4 generate_signature()

12.4.2.5 verify_create_receipt_signature()

12.4.2.6 verify_signature()

Worker Service in response to successful workorder submit request as per Trusted Compute EEA API 6.1.2 Work Order Result Payload - verification_key is ECDSA/SECP256K1 public key used to verify

signatures created by the Enclave.

Returns enum type SignatureStatus

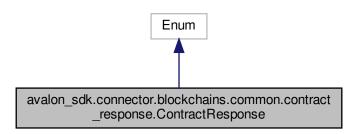
12.4.2.7 verify_update_receipt_signature()

The documentation for this class was generated from the following file:

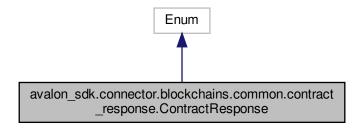
· /home/dano/git/avalon/common/crypto_utils/avalon_crypto_utils/signature.py

12.5 avalon_sdk.connector.blockchains.common.contract_response.ContractResponse Class Reference

Inheritance diagram for avalon_sdk.connector.blockchains.common.contract_response.ContractResponse:



 $Collaboration\ diagram\ for\ avalon_sdk. connector. block chains. common. contract_response. Contract Response:$



Static Public Attributes

- int SUCCESS = 0
- int **ERROR** = -1

12.5.1 Detailed Description

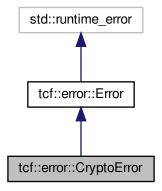
Contract response values.

The documentation for this class was generated from the following file:

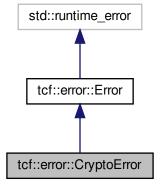
• /home/dano/git/avalon/sdk/avalon_sdk/connector/blockchains/common/contract_response.py

12.6 tcf::error::CryptoError Class Reference

Inheritance diagram for tcf::error::CryptoError:



Collaboration diagram for tcf::error::CryptoError:



Public Member Functions

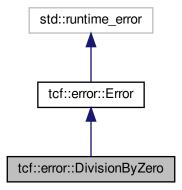
• CryptoError (const std::string &msg)

The documentation for this class was generated from the following file:

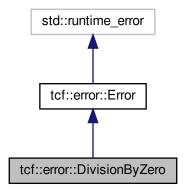
• /home/dano/git/avalon/common/cpp/error.h

12.7 tcf::error::DivisionByZero Class Reference

Inheritance diagram for tcf::error::DivisionByZero:



Collaboration diagram for tcf::error::DivisionByZero:



Public Member Functions

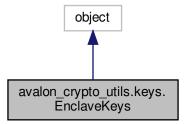
• DivisionByZero (const std::string &msg)

The documentation for this class was generated from the following file:

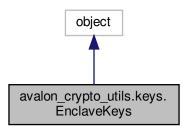
· /home/dano/git/avalon/common/cpp/error.h

12.8 avalon_crypto_utils.keys.EnclaveKeys Class Reference

Inheritance diagram for avalon_crypto_utils.keys.EnclaveKeys:



Collaboration diagram for avalon_crypto_utils.keys.EnclaveKeys:



Public Member Functions

- def __init__ (self, verifying_key, encryption_key)
- def identity (self)
- def hashed_identity (self)

12.8.1 Detailed Description

Wrapper for managing the enclave's keys, the verifying_key is an ECDSA public key used to verify enclave signatures, the encryption_key is an RSA public key for encrypting message to the enclave.

12.8.2 Constructor & Destructor Documentation

```
12.8.2.1 __init__()
```

```
Initialize the object
```

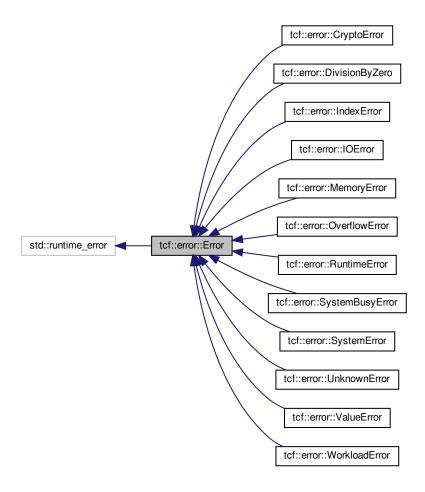
```
:param verifying_key: PEM encoded ECDSA verifying key
:param encryption_key: PEM encoded RSA encryption key
```

The documentation for this class was generated from the following file:

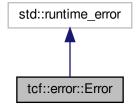
/home/dano/git/avalon/common/crypto_utils/avalon_crypto_utils/keys.py

12.9 tcf::error::Error Class Reference

Inheritance diagram for tcf::error::Error:



Collaboration diagram for tcf::error::Error:



Public Member Functions

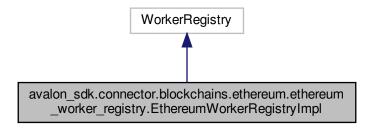
- Error (tcf_err_t in_error, const std::string &msg)
- tcf_err_t error_code ()

The documentation for this class was generated from the following file:

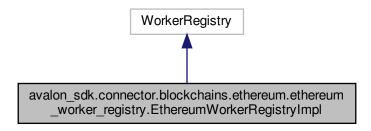
· /home/dano/git/avalon/common/cpp/error.h

12.10 avalon_sdk.connector.blockchains.ethereum.ethereum_worker_registry.Ethereum WorkerRegistryImpl Class Reference

Inheritance diagram for avalon_sdk.connector.blockchains.ethereum.ethereum_worker_registry.EthereumWorker \leftarrow RegistryImpl:



Collaboration diagram for avalon_sdk.connector.blockchains.ethereum.ethereum_worker_registry.Ethereum ← WorkerRegistryImpl:



Public Member Functions

- def init (self, config)
- def worker_lookup (self, worker_type, org_id, application_id, id=None)
- def worker_retrieve (self, worker_id, id=None)
- def worker_lookup_next (self, worker_type, org_id, application_id, lookup_tag)
- def worker_register (self, worker_id, worker_type, organization_id, application_type_ids, details)
- def worker_update (self, worker_id, details)
- def worker_set_status (self, worker_id, status)

12.10.1 Detailed Description

```
This class is sets and gets worker-related information to and from the Ethereum blockchain.

Detailed method descriptions are available in the WorkerRegistry interfaces.
```

12.10.2 Constructor & Destructor Documentation

```
12.10.2.1 __init__()
```

12.10.3 Member Function Documentation

```
12.10.3.1 worker_lookup()
```

```
Lookup a worker identified by worker_type, org_id, and application_id.
All fields are optional and, if present, condition should match for
all fields. If none are passed it should return all workers.
If the list is too large to fit into a single response (the \mbox{maximum}
number of entries in a single response is implementation specific),
the smart contract should return the first batch of the results
and provide a lookupTag that can be used by the caller to
retrieve the next batch by calling worker_lookup_next.
Parameters:
worker_type
                           Optional characteristic of workers for which you may
             wish to search
org_id
                            Optional organization ID that can be used to search
             for one or more workers that belong to this
             organization
application_id Optional application type ID that is supported by
             the worker
id
                            Optional JSON RPC request ID
Returns:
Tuple containing workers count, lookup tag, and list of
worker IDs:
total_count Total number of entries matching a specified
        lookup criteria. If this number is larger than the
        size of the IDs array, the caller should use
        lookupTag to call worker_lookup_next to retrieve
       the rest of the IDs
lookup_tag Optional parameter. If it is returned, it means
        that there are more matching worker IDs, which can then
        be retrieved by calling function worker_lookup_next
        with this tag as an input parameter
                      Array of the worker IDs that match the input parameters
On error returns None.
12.10.3.2 worker_lookup_next()
\tt def\ avalon\_sdk.connector.blockchains.ethereum.ethereum\_worker\_registry. Ethereum WorkerRegistry \hookleftarrow the avalon\_sdk.connector.blockchains.ethereum.ethereum\_worker\_registry. Ethereum WorkerRegistry \hookleftarrow the avalon\_sdk.connector.blockchains.ethereum.ethereum\_worker\_registry. Ethereum WorkerRegistry ↩ the avalon\_sdk.connector.blockchains.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.
Impl.worker_lookup_next (
                          self,
                           worker_type,
                           org_id,
                           application_id,
                           lookup_tag )
Retrieve additional worker lookup results after calling worker_lookup.
Parameters:
worker_type
                                      Characteristic of Workers for which you may wish
                      to search
                                      Organization ID to which a Worker belongs
ora id
application_id
                                      Optional application type ID that is
                       supported by the worker
lookup_tag
                                     is returned by a previous call to either this
                       function or to worker_lookup
                                     Optional Optional JSON RPC request ID
id
Returns:
Tuple containing the following:
total_count Total number of entries matching this lookup
             criteria. If this number is larger than the number
             of IDs returned so far, the caller should use
```

```
Class Reference
                                                                                                                                                                                                                                                 39
                   lookupTag to call worker_lookup_next to retrieve
                  the rest of the IDs
new_lookup_tag Optional parameter. If it is returned, it
                  means that there are more matching worker IDs that
                  can be retrieved by calling this function again with
                  this tag as an input parameter
ids
                                      Array of the worker IDs that match the input parameters
On error returns None.
12.10.3.3 worker_register()
def avalon_sdk.connector.blockchains.ethereum.ethereum_worker_registry.EthereumWorkerRegistry↔
Impl.worker_register (
                                   self.
                                    worker_id,
                                    worker_type,
                                    organization_id,
                                    application_type_ids,
                                    details )
Register a new worker with details of the worker.
Parameters:
                                        Worker ID value. E.g., an Ethereum address or
worker_id
                     a value derived from the worker's DID
\star "TEE-SGX": an Intel SGX Trusted Execution
                        Environment
                     * "MPC": Multi-Party Compute
                     * "ZK": Zero-Knowledge
organization_id Optional parameter representing the
                    organization that hosts the Worker,
                     e.g. a bank in the consortium or
                    anonymous entity
application_ids Optional parameter that defines
                   application types supported by the Worker
details
                                       Detailed information about the worker in
                    {\tt JSON} RPC format as defined in
https://entethalliance.github.io/trusted-computing/spec.html
#common-data-for-all-worker-types
Returns:
Transaction receipt if registration succeeds.
None if registration does not succeed.
12.10.3.4 worker_retrieve()
\tt def avalon\_sdk.connector.blockchains.ethereum\_worker\_registry. Ethereum WorkerRegistry \leftarrow \tt connector.blockchains.ethereum\_worker\_registry \leftarrow \tt connector.blo
Impl.worker_retrieve (
                                    self.
```

worker_id, id = None)

```
Retrieve the worker identified by worker ID.
Parameters:
worker_id Worker ID of the registry whose details are requested
                              Optional JSON RPC request ID
Returns:
Tuple containing worker status (defined in worker_set_status),
worker type, organization ID, list of application IDs, and worker
details (JSON RPC string).
On error returns None.
12.10.3.5 worker_set_status()
\tt def \ avalon\_sdk.connector.blockchains.ethereum\_worker\_registry. EthereumWorkerRegistry \leftarrow \tt connector.blockchains.ethereum\_worker\_registry \leftarrow \tt connector.bl
Impl.worker_set_status (
                                        self.
                                        worker_id,
                                        status )
Set the worker status identified by worker ID.
Parameters:
worker_id Worker ID value. E.g., an Ethereum address or
     a value derived from the worker's {\tt DID}
                           Worker status. The currently defined values are:
     1 - worker is active
     2 - worker is temporarily "off-line"
      3 - worker is decommissioned
      4 - worker is compromised
Returns:
Transaction receipt if registration succeeds.
None if registration does not succeed.
12.10.3.6 worker_update()
\verb|def| a valon\_sdk.connector.blockchains.ethereum.ethereum\_worker\_registry.\\ EthereumWorkerRegistry \leftarrow |
Impl.worker_update (
                                        self,
                                        worker id,
                                        details )
Update a worker with details data.
Parameters:
worker_id Worker ID value. E.g., an Ethereum address or
        a value derived from the worker's DID
                         Detailed information about the worker in JSON format
details
Returns:
Transaction receipt if registration succeeds.
None if registration does not succeed.
```

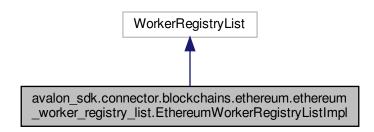
The documentation for this class was generated from the following file:

 $\bullet \ / home/dano/git/avalon/sdk/avalon_sdk/connector/blockchains/ethereum/ethereum_worker_registry.py$

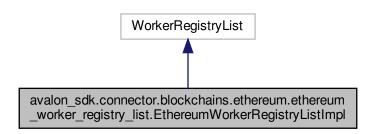
Reference 12.11 avalon_sdk.connector.blockchains.ethereum.ethereum_worker_registry_list.

EthereumWorkerRegistryListImpl Class Reference

Inheritance diagram for avalon_sdk.connector.blockchains.ethereum.ethereum_worker_registry_list.Ethereum WorkerRegistryListImpl:



Collaboration diagram for avalon_sdk.connector.blockchains.ethereum.ethereum_worker_registry_list.Ethereum WorkerRegistryListImpl:



Public Member Functions

- def __init__ (self, config)
- def registry_lookup (self, app_type_id=None)
- def registry_retrieve (self, org_id)
- def registry_lookup_next (self, app_type_id, lookup_tag)
- def registry_add (self, org_id, uri, sc_addr, app_type_ids)
- def registry_update (self, org_id, uri, sc_addr, app_type_ids)
- def registry_set_status (self, org_id, status)

12.11.1 Detailed Description

This class provide APIs to read/write registry entries of workers, which is stored in the Ethereum blockchain.

12.11.2 Member Function Documentation

```
12.11.2.1 registry_add()
```

Returns None on error.

```
RegistryListImpl.registry_add (
            self,
            org_id,
            uri,
            sc_addr,
            app_type_ids )
Add a new registry.
Parameters:
           bytes[] identifies organization that hosts the
org_id
    registry, e.g. a bank in the consortium or an
    anonymous entity
           String defines a URI for this registry that
    supports the Off-Chain Worker Registry
    JSON RPC API.
sc addr
           bytes[] defines an Ethereum address that
    runs the Worker Registry Smart Contract API
    smart contract for this registry
app_type_ids []bytes[] is an optional parameter that defines
    application types supported by the worker
    managed by the registry
Returns:
Transaction receipt on success or None on error.
12.11.2.2 registry_lookup()
```

```
\tt def \ avalon\_sdk.connector.blockchains.ethereum.ethereum\_worker\_registry\_list.EthereumWorker \leftrightarrow \tt connector.blockchains.ethereum.ethereum\_worker\_registry\_list.EthereumWorker \leftrightarrow \tt connector.blockchains.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereu
RegistryListImpl.registry_lookup (
                                               self.
                                               app_type_id = None )
Registry Lookup identified by application type ID.
Parameters:
app_type_id Application type ID to lookup in the registry
Returns:
Returns tuple containing totalCount, lookupTag, ids on success:
totalCount Total number of entries matching a specified
          lookup criteria. If this number is larger than the size
          of the IDs array, the caller should use the lookupTag to
          call workerLookUpNext to retrieve the rest of the IDs
 lookupTag Optional parameter. If it is returned, it means that
          there are more matching registry IDs that can be retrieved
          by calling the function registry_lookup_next with this tag
          as an input parameter
                                     Array of the registry organization IDs that match the
           input parameters
```

Reference 43

12.11.2.3 registry_lookup_next()

```
def avalon_sdk.connector.blockchains.ethereum.ethereum_worker_registry_list.EthereumWorker↔
RegistryListImpl.registry_lookup_next (
              self,
              app_type_id,
              lookup_tag )
Get additional registry lookup results.
This function is called to retrieve additional results of the
Registry lookup initiated by the registry_lookUp call.
Parameters:
app_type_id
               Application type that has to be
      supported by the workers retrieved
lookup_tag Returned by a previous call to either this
       function or to registry_lookup
Returns:
Outputs tuple on success containing the following:
total_count Total number of entries matching the lookup
       criteria. If this number is larger than the number
       of IDs returned so far, the caller should use
       lookup_tag to call registry_lookup_next to
       the rest of the ids
new_lookup_tag Optional parameter. If it is returned, it means
       that there are more matching registry {\tt IDs} that
       can be retrieved by calling this function again
       with this tag as an input parameter
ids
               Array of the registry IDs that match the input
       parameters
Returns None on error.
12.11.2.4 registry retrieve()
```

```
\verb|def| avalon\_sdk.connector.blockchains.ethereum.ethereum\_worker\_registry\_list.EthereumWorker \leftarrow |
RegistryListImpl.registry_retrieve (
              self,
              org_id )
Retrieving Registry Information identified by organization ID.
Parameters:
org_id
           Organization ID to lookup
Tuple containing following on success:
uri
                     string defining a URI for this registry that
             supports the Off-Chain Worker Registry JSON
             RPC API. It will be None for the proxy model
sc addr
                     Ethereum address for worker registry
             smart contract address
application_type_ids List of application ids(array of byte[])
                     Status of the registry
```

Returns None on error.

12.11.2.5 registry_set_status()

```
\tt def\ avalon\_sdk.connector.blockchains.ethereum\_ethereum\_worker\_registry\_list.EthereumWorker \leftrightarrow the avalon\_sdk.connector.blockchains.ethereum.ethereum\_worker\_registry\_list.EthereumWorker \leftrightarrow the avalon\_sdk.connector.blockchains.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.
{\tt RegistryListImpl.registry\_set\_status} \ \ (
                                                                                              self,
                                                                                              org_id,
                                                                                               status )
Set registry status.
Parameters:
org_id bytes[] identifies organization that hosts
 the registry
 status Defines registry status to set.
 The currently defined values are:
 {\bf 1} - the registry is active
 2 - the registry is temporarily "off-line"
 3 - the registry is decommissioned
Returns:
Transaction receipt on success or None on error.
12.11.2.6 registry_update()
 \tt def\ avalon\_sdk.connector.blockchains.ethereum\_ethereum\_worker\_registry\_list.EthereumWorker \leftrightarrow the avalon\_sdk.connector.blockchains.ethereum.ethereum\_worker\_registry\_list.EthereumWorker \leftrightarrow the avalon\_sdk.connector.blockchains.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.
 RegistryListImpl.registry_update (
                                                                                             self,
                                                                                              org_id,
                                                                                              uri,
                                                                                               sc_addr,
                                                                                               app_type_ids )
Update a registry.
 Parameters:
```

bytes[] identifies organization that hosts the

[]bytes[] is an optional parameter that defines

string defines a URI for this registry that

bytes[] defines an Ethereum address that

registry, e.g. a bank in the consortium or

supports the Off-Chain Worker Registry

runs a Worker Registry Smart Contract API

application types supported by the worker

```
Returns:
Transaction receipt on success or None on error.
```

managed by the registry

an anonymous entity

JSON RPC API

org_id

sc_addr

app_type_ids

uri

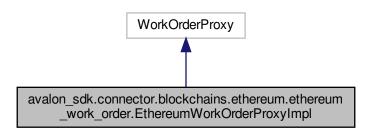
The documentation for this class was generated from the following file:

smart contract for this registry

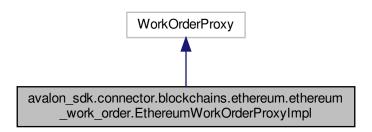
• /home/dano/git/avalon/sdk/avalon_sdk/connector/blockchains/ethereum/ethereum_worker_registry_list.py

12.12 avalon_sdk.connector.blockchains.ethereum.ethereum_work_order.Ethereum ← WorkOrderProxyImpl Class Reference

 $Inheritance\ diagram\ for\ avalon_sdk.connector.blockchains.ethereum.ethereum_work_order. EthereumWorkOrder \hookleftarrow ProxyImpl:$



Collaboration diagram for avalon_sdk.connector.blockchains.ethereum.ethereum_work_order.EthereumWork OrderProxyImpl:



Public Member Functions

- def __init__ (self, config)
- def work_order_submit (self, work_order_id, worker_id, requester_id, work_order_request, id=None)
- def work_order_complete (self, work_order_id, work_order_response)
- def work order get result (self, work order id, id=None)
- def encryption_key_retrieve (self, worker_id, last_used_key_nonce, tag, requester_id, signature_
 —
 nonce=None, signature=None, id=None)
- def encryption key start (self, tag, id=None)
- def encryption key set (self, worker id, encryption key, encryption nonce, tag, signature, id=None)
- def encryption_key_get (self, worker_id, requester_id, last_used_key_nonce=None, tag=None, signature_
 nonce=None, signature=None, id=None)

12.12.1 Detailed Description

This class is meant to write work order-related data to the Ethereum blockchain.

Detailed method descriptions are available in the interfaces.

12.12.2 Member Function Documentation

12.12.2.1 encryption_key_get()

12.12.2.2 encryption_key_retrieve()

Not supported for Ethereum.

12.12.2.3 encryption_key_set()

12.12.2.4 encryption_key_start()

12.12.2.5 work_order_complete()

12.12.2.6 work_order_get_result()

```
def avalon_sdk.connector.blockchains.ethereum.ethereum_work_order.EthereumWorkOrderProxy↔
Impl.work_order_get_result (
              self,
              work_order_id,
              id = None)
Query blockchain to get a work order result.
This function starts an event handler for handling the
\verb|workOrderCompleted| event from the Ethereum blockchain.
Parameters:
work_order_id Work Order ID that was sent in the
      corresponding work_order_submit request
             Optional JSON RPC request ID
id
Returns:
Tuple containing work order status, worker id, work order request,
work order response, and error code.
None on error.
```

12.12.2.7 work_order_submit()

```
\tt def\ avalon\_sdk.connector.blockchains.ethereum.ethereum\_work\_order.EthereumWorkOrderProxy \hookleftarrow the avalon\_sdk.connector.blockchains.ethereum.ethereum\_work\_order.EthereumWorkOrderProxy \longleftrightarrow the avalon\_sdk.connector.blockchains.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethereum.ethe
Impl.work_order_submit (
                                                            self,
                                                             work_order_id,
                                                              worker_id,
                                                             requester_id,
                                                              work_order_request,
                                                              id = None )
Submit work order request to the Ethereum block chain.
Parameters:
work_order_id
                                                                                 Unique ID of the work order request
                                                                              Identifier for the worker
worker id
                                                                            Unique id to identify the requester
work_order_request JSON RPC string work order request.
                                                 Complete definition at work_order.py and
                                                defined in EEA specification 6.1.1.
id
                                                                                   Optional JSON RPC request ID
Returns:
0 on success and non-zero on error.
```

The documentation for this class was generated from the following file:

/home/dano/git/avalon/sdk/avalon_sdk/connector/blockchains/ethereum/ethereum_work_order.py

12.13 avalon_sdk.connector.blockchains.ethereum.ethereum_wrapper.EthereumWrapper Class Reference

Public Member Functions

- def __init__ (self, config)
- def compile source file (self, file path)
- def deploy_contract (self, contract_interface)
- def sign_execute_raw_transaction (self, tx_dict)
- def execute unsigned transaction (self, tx dict)
- def execute transaction (self, tx dict)
- def get_chain_id (self)
- def get_gas_limit (self)
- def get_gas_price (self)
- · def get account address (self)
- def get_contract_instance (self, contract_file_name, contract_address)
- def get_contract_instance_from_json (self, json_file_name, contract_address)
- def get txn nonce (self)
- def get transaction params (self)
- def get_bytes_from_hex (self, hex_str)

12.13.1 Detailed Description

Ethereum wrapper class to interact with the Ethereum blockchain to deploy compile contract code, deploy contract code, and execute contract code.

12.13.2 Member Function Documentation

12.13.2.1 compile_source_file()

12.13.2.2 deploy_contract()

Parameters: tx_dict

Returns:

Unsigned transaction to execute

Transaction receipt on success or None on error.

```
\verb|def| a valon\_sdk.connector.blockchains.ethereum\_wrapper.EthereumWrapper.deploy\_contract| \\
              self,
              contract_interface )
Deploys a Solidity contract to an Ethereum network identified by
chain_id.
Parameters:
contract_interace Solidity contract interface
Solidity contract address.
12.13.2.3 execute_transaction()
\verb|def| a valon\_sdk.connector.blockchains.ethereum.ethereum\_wrapper.EthereumWrapper.execute\_{\leftarrow} \\
transaction (
               self.
               tx_dict )
Wrapper function to choose appropriate function to execute a
transaction based on provider (Ropsten vs other).
Parameters:
           Transaction to execute
tx_dict
12.13.2.4 execute_unsigned_transaction()
\verb|def| avalon_sdk.connector.blockchains.ethereum.ethereum_wrapper.EthereumWrapper.execute\_{\leftarrow}|
unsigned_transaction (
              self,
               tx_dict )
Send a transaction to be executed only with the account address,
and wait for receipts.
```

12.13.2.5 get_account_address()

```
def avalon_sdk.connector.blockchains.ethereum.ethereum_wrapper.EthereumWrapper.get_account_ \leftrightarrow address ( self~)
```

Retrieve account address.

12.13.2.6 get_bytes_from_hex()

```
def avalon_sdk.connector.blockchains.ethereum.ethereum_wrapper.EthereumWrapper.get_bytes_\leftrightarrow from_hex ( self, \\ hex\_str )
```

Convert a hex string to bytes.

12.13.2.7 get_chain_id()

```
{\tt def avalon\_sdk.connector.blockchains.ethereum.ethereum\_wrapper.EthereumWrapper.get\_chain\_id \ ( self )
```

Retrieve chain ID.

12.13.2.8 get_contract_instance()

12.13.2.9 get_contract_instance_from_json()

```
\verb|def| a valon\_sdk.connector.blockchains.ethereum.ethereum\_wrapper.EthereumWrapper.get\_contract\_{\hookleftarrow} \\
instance_from_json (
                                        self,
                                         json_file_name,
                                         contract\_address )
Return two contract instances from a JSON file.
The first is meant for committing transactions or reading from
a blockchain.
The second one is specifically meant for event listening.
Parameters:
                                                     JSON filename
json_file_name
Returns:
Two contract instances as explained above.
12.13.2.10 get_gas_limit()
\tt def avalon\_sdk.connector.blockchains.ethereum\_wrapper.EthereumWrapper.get\_gas\_limit \ (\tt option 
Retrieve gas limit.
12.13.2.11 get_gas_price()
def avalon_sdk.connector.blockchains.ethereum.ethereum_wrapper.EthereumWrapper.qet_qas_price (
                                         self )
Retrieve gas price.
12.13.2.12 get_transaction_params()
\tt def \ avalon\_sdk.connector.blockchains.ethereum\_ethereum\_wrapper.EthereumWrapper.get\_transaction \leftarrow
_params (
                                         self )
Construct a dictionary with required parameters
to submit the transaction.
Return dict containing chain id, gas, gas limit, and nonce.
```

12.13.2.13 get_txn_nonce()

```
{\tt def avalon\_sdk.connector.blockchains.ethereum\_wrapper.EthereumWrapper.get\_txn\_nonce~(self~)}
```

Return a transaction nonce. Derived from the transaction address.

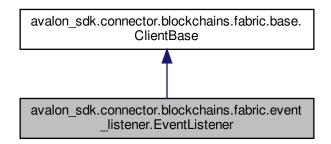
12.13.2.14 sign_execute_raw_transaction()

The documentation for this class was generated from the following file:

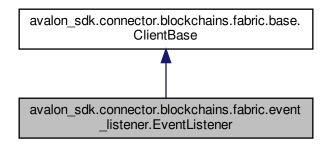
• /home/dano/git/avalon/sdk/avalon_sdk/connector/blockchains/ethereum/ethereum_wrapper.py

12.14 avalon_sdk.connector.blockchains.fabric.event_listener.EventListener Class Reference

Inheritance diagram for avalon_sdk.connector.blockchains.fabric.event_listener.EventListener:



Collaboration diagram for avalon_sdk.connector.blockchains.fabric.event_listener.EventListener:



Public Member Functions

- def __init__ (self, profile, channel_name, org_name, peer_name, user_name)
- def handler (self)
- def handler (self, handler)
- def chaincode (self)
- def chaincode (self, chaincode)
- def event (self)
- def event (self, event)
- def config (self)
- def config (self, config)
- def start_event_handling (self)
- def stop_event_handling (self, seconds=0)
- def get_single_event (self)

Additional Inherited Members

12.14.1 Detailed Description

Utility class to listen to Fabric block chain events.

12.14.2 Member Function Documentation

12.14.2.1 config()

Open configuration file named config.

12.14.2.2 get_single_event()

12.14.2.3 start_event_handling()

12.14.2.4 stop_event_handling()

```
def avalon_sdk.connector.blockchains.fabric.event_listener.EventListener.stop_event_handling ( self, \\ seconds = 0 \ ) Stop event listener.
```

The documentation for this class was generated from the following file:

• /home/dano/git/avalon/sdk/avalon sdk/connector/blockchains/fabric/event listener.py

12.15 avalon_sdk.connector.blockchains.ethereum.ethereum_listener.EventProcessor Class Reference

Public Member Functions

- def __init__ (self, config)
- def listener (self, event_filter)
- def handler (self, callback, kargs, kwargs)
- def sync handler (self, check event callback=None, kargs, kwargs)
- def start (self, event_filter, callback, kargs, kwargs)
- def get_event_synchronously (self, event_filter, callback, kargs, kwargs)
- def stop (self)

Public Attributes

- queue
- · listeners
- handlers

12.15.1 Detailed Description

```
This class provides an event processor to capture events then send these events to event listeners.
```

Returns an event received for the event_filter used.

12.15.2 Member Function Documentation

12.15.2.1 get_event_synchronously()

12.15.2.2 handler()

Start event handler to handle events.

```
12.15.2.3 listener()
```

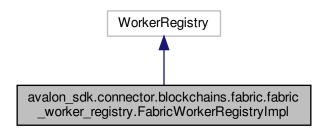
```
def avalon_sdk.connector.blockchains.ethereum_ethereum_listener.EventProcessor.listener (
            self.
             event_filter )
Listen to new events since the last poll on this filter.
Although this method uses events, it is not fully asynchronous.
12.15.2.4 start()
\verb|def avalon_sdk.connector.blockchains.ethereum.ethereum_listener.EventProcessor.start (\\
            self,
             event_filter,
             callback,
             kargs,
             kwargs )
Start event processor in an infinite loop.
12.15.2.5 stop()
self )
Stop the event processor that was started with start().
12.15.2.6 sync_handler()
\tt def\ avalon\_sdk.connector.blockchains.ethereum\_ethereum\_listener.EventProcessor.sync\_handler\ (
             self,
             check_event_callback = None,
            kargs,
             kwargs )
Start a synchronous event handler to handle an event.
```

The documentation for this class was generated from the following file:

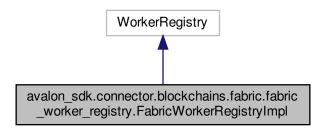
• /home/dano/git/avalon/sdk/avalon_sdk/connector/blockchains/ethereum/ethereum_listener.py

12.16 avalon_sdk.connector.blockchains.fabric.fabric_worker_registry.FabricWorker ← RegistryImpl Class Reference

Inheritance diagram for avalon_sdk.connector.blockchains.fabric.fabric_worker_registry.FabricWorkerRegistry ← Impl:



Collaboration diagram for avalon_sdk.connector.blockchains.fabric.fabric_worker_registry.FabricWorkerRegistry ← Impl:



Public Member Functions

- def __init__ (self, config)
- def worker lookup (self, worker type=None, org id=None, application id=None, id=None)
- def worker_retrieve (self, worker_id, id=None)
- def worker_lookup_next (self, worker_type, org_id, application_id, lookup_tag, id=None)
- def worker_register (self, worker_id, worker_type, org_id, application_ids, details, id=None)
- def worker_set_status (self, worker_id, status, id=None)
- def worker_update (self, worker_id, details, id=None)

Public Attributes

· CHAIN_CODE

12.16.1 Detailed Description

```
This class provide worker APIs which interact with the Hyperledger Fabric blockchain. Detailed method descriptions are available in the WorkerRegistry interface.
```

12.16.2 Constructor & Destructor Documentation

12.16.3 Member Function Documentation

```
12.16.3.1 worker_lookup()
\tt def\ avalon\_sdk.connector.blockchains.fabric\_worker\_registry.Fabric Worker Registry Impl. \leftrightarrow \tt connector.blockchains.fabric\_worker\_registry.Fabric Fabric Fabric
worker_lookup (
                                        self,
                                         worker_type = None,
                                         org_id = None,
                                          application_id = None,
                                          id = None )
Lookup a worker identified worker_type, org_id, and application_id.
All fields are optional and, if present, condition should match for
all fields. If none are passed it should return all workers.
If the list is too large to fit into a single response (the maximum
number of entries in a single response is implementation specific),
the smart contract should return the first batch of the results
and provide a lookup_tag that can be used by the caller to
retrieve the next batch by calling worker_lookup_next.
Parameters:
worker_type
                                                        Optional characteristic of workers for which
                               you may wish to search
                                                   Optional organization ID to which a worker belongs
application_id
                                                        Optional application type ID that is
                                   supported by the worker
                                                         Optional JSON RPC request ID
Returns:
```

```
Tuple containing workers count, lookup tag, and list of
worker TDs:
total_count Total number of entries matching a specified
    lookup criteria. If this number is larger than the
    size of the IDs array, the caller should use
    lookupTag to call worker_lookup_next to retrieve
    the rest of the IDs
lookup_tag Optional parameter. If it is returned, it means
    that there are more matching worker IDs, which can then
    be retrieved by calling function worker_lookup_next
    with this tag as an input parameter
            Array of the worker IDs that match the input parameters
On error returns None.
12.16.3.2 worker_lookup_next()
\tt def \ avalon\_sdk.connector.blockchains.fabric\_worker\_registry.FabricWorkerRegistryImpl. \leftarrow
worker_lookup_next (
              self,
              worker_type,
              org_id,
              application_id,
              lookup_tag,
              id = None )
Retrieve additional worker lookup results after calling worker_lookup.
Parameters:
worker_type
                    Characteristic of Workers for which you may wish
            to search.
org_id
                    Organization ID to which a worker belongs
                    Optional application type ID that is
application_id
            supported by the worker
                    is returned by a previous call to either this
lookup_tag
            function or to worker_lookup
                    Optional Optional JSON RPC request ID
id
Returns:
Tuple containing the following:
total_count Total number of entries matching this lookup
       criteria. If this number is larger than the number
       of IDs returned so far, the caller should use
       lookupTag to call worker_lookup_next to retrieve
       the rest of the IDs
new_lookup_tag Optional parameter. If it is returned, it
       means that there are more matching worker \operatorname{IDs} that
       can be retrieved by calling this function again with
       this tag as an input parameter
ids
               Array of the worker IDs that match the input parameters
```

On error returns None.

Generated by Doxygen

12.16.3.3 worker_register()

```
\tt def\ avalon\_sdk.connector.blockchains.fabric.fabric\_worker\_registry.FabricWorkerRegistryImpl. \leftarrow
worker_register (
              self.
              worker_id,
              worker_type,
              org_id,
              application_ids,
              details.
              id = None)
Register a new worker with details of the worker.
Parameters:
worker_id
                Worker ID value. E.g., a Fabric address
               Type of Worker. Currently defined types are:
worker type
        \star "TEE-SGX": an Intel SGX Trusted Execution
         Environment
        * "MPC": Multi-Party Compute
        * "ZK": Zero-Knowledge
               Optional parameter representing the
org_id
        organization that hosts the Worker,
        e.g. a bank in the consortium or
        anonymous entity
application_ids Optional parameter that defines
       application types supported by the Worker
               Detailed information about the worker in
details
        JSON RPC format as defined in
https://entethalliance.github.io/trusted-computing/spec.html
#common-data-for-all-worker-types
                Optional Optional JSON RPC request ID
Returns:
ContractResponse.SUCCESS on success or
ContractResponse.ERROR on error.
```

12.16.3.4 worker_retrieve()

12.16.3.5 worker_set_status()

```
\tt def\ avalon\_sdk.connector.blockchains.fabric\_worker\_registry.Fabric Worker Registry Impl. \leftrightarrow \tt connector.blockchains.fabric\_worker\_registry.Fabric Fabric Fabric
worker_set_status (
                                                                self,
                                                                worker_id,
                                                                 status,
                                                                 id = None )
Set the registry status identified by worker ID
Parameters:
worker_id Worker ID value. E.g., a Fabric address
                                     Worker status. The currently defined values are:
status
         1 - worker is active
         2 - worker is temporarily "off-line"
        3 - worker is decommissioned
        4 - worker is compromised
                                             Optional Optional JSON RPC request ID
Returns:
ContractResponse.SUCCESS on success
or ContractResponse.ERROR on error.
```

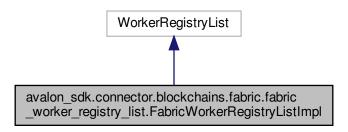
12.16.3.6 worker_update()

The documentation for this class was generated from the following file:

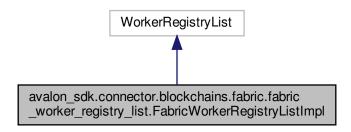
• /home/dano/git/avalon/sdk/avalon_sdk/connector/blockchains/fabric/fabric_worker_registry.py

12.17 avalon_sdk.connector.blockchains.fabric.fabric_worker_registry_list.Fabric← WorkerRegistryListImpl Class Reference

 $Inheritance \quad diagram \quad for \quad avalon_sdk.connector.blockchains.fabric.fabric_worker_registry_list.FabricWorker \\ \leftarrow \\ RegistryListImpl:$



 $\label{lockchains.fabric.fabric} Collaboration \quad diagram \quad for \quad avalon_sdk.connector.blockchains.fabric.fabric_worker_registry_list.FabricWorker \\ \leftarrow \\ RegistryListImpl:$



Public Member Functions

- def __init__ (self, config)
- def registry lookup (self, app type id=None)
- def registry retrieve (self, org id)
- def registry_lookup_next (self, app_type_id, lookup_tag)
- def registry_add (self, org_id, uri, sc_addr, app_type_ids)
- def registry_update (self, org_id, uri, sc_addr, app_type_ids)
- def registry_set_status (self, org_id, status)

Public Attributes

· CHAIN CODE

12.17.1 Detailed Description

This class provide APIs to read/write registry entries of workers, which is stored in the Hyperledger Fabric blockchain.

12.17.2 Constructor & Destructor Documentation

12.17.3 Member Function Documentation

Transaction receipt on success or None on error.

12.17.3.1 registry_add()

```
\tt def\ avalon\_sdk.connector.blockchains.fabric\_worker\_registry\_list.FabricWorkerRegistry \hookleftarrow \\
ListImpl.registry_add (
              self,
              org_id,
              uri,
              sc_addr,
              app_type_ids )
Add a new registry.
Parameters:
            bytes[] identifies organization that hosts the
org_id
     registry, e.g. a bank in the consortium or an \,
     anonymous entity
            String defining a URI for this registry that
     supports the Off-Chain Worker Registry
     JSON RPC API
sc addr
            bytes[] defines a Fabric chain code name that
     runs the Worker Registry Smart Contract API
     smart contract for this registry
app_type_ids []bytes[] is an optional parameter that defines
     application types supported by the worker
     managed by the registry
Returns:
```

12.17.3.2 registry_lookup()

```
def avalon_sdk.connector.blockchains.fabric_fabric_worker_registry_list.FabricWorkerRegistry↔
ListImpl.registry_lookup (
              self.
              app\_type\_id = None)
Registry Lookup identified by application type ID
Parameters:
app_type_id Application type ID to lookup in the registry
Tuple containing totalCount, lookupTag, and ids on success:
totalCount Total number of entries matching a specified lookup
   criteria. If this number is larger than the size of the
   ids array, the caller should use the lookupTag to call
   registry_lookup_next to retrieve the rest of the IDs
lookupTag Optional parameter. If it is returned, it means that
   there are more matching registry IDs that can be
   retrieved by calling the function registry_lookup_next
   with this tag as an input parameter.
          Array of the registry organization ids that match the
   input parameters.
Returns None on error.
```

12.17.3.3 registry_lookup_next()

```
\tt def\ avalon\_sdk.connector.blockchains.fabric\_worker\_registry\_list.FabricWorkerRegistry \leftarrow \tt connector.blockchains.fabric\_worker\_registry\_list.FabricWorkerRegistry \leftarrow \tt connector.blockchains.fabric\_worker\_registry\_list.Fabric\_worker\_registry\_list.Fabric\_worker\_registry\_list.Fabric\_worker\_registry\_list.Fabric\_worker\_registry\_list.Fabric\_worker\_registry\_list.Fabric\_worker\_registry\_list.Fabric\_worker\_registry\_list.Fabric\_worker\_registry\_list.Fabric\_worker\_registry\_list.Fabric\_worker\_registry\_list.Fabric\_worker\_registry\_list.Fabric\_worker\_registry\_list.Fabric\_worker\_registry\_list.Fabric\_worker\_registry\_list.Fabric\_worker\_registry\_list.Fabric\_worker\_registry\_list.Fabric\_worker\_registry\_list.Fabric\_worker\_registry\_list.Fabric\_worker\_registry\_list.Fabric\_worker\_registry\_list.Fabric\_worker\_registry\_list.Fabric\_worker\_registry\_list.Fabric\_worker\_registry\_list.Fabric\_worker\_registry\_list.Fabric\_worker\_registry\_list.Fabric\_worker\_registry\_list.Fabric\_worker\_registry\_list.Fabric\_worker\_registry\_list.Fabric\_worker\_registry\_list.Fabric\_worker\_registry\_list.Fabric\_worker\_registry\_list.Fabric\_worker\_registry\_list.Fabric\_worker\_registry\_list.Fabric\_worker\_registry\_list.Fabric\_worker\_registry\_list.Fabric\_worker\_registry\_list.Fabric\_worker\_registry\_list.Fabric\_worker\_registry\_list.Fabric\_worker\_registry\_list.Fabric\_worker\_registry\_list.Fabric\_worker\_registry\_list.Fabric\_worker\_registry\_list.Fabric\_worker\_registry\_list.Fabric\_worker\_registry\_list.Fabric\_worker\_registry\_list.Fabric\_worker\_registry\_list.Fabric\_worker\_registry\_list.Fabric\_worker\_registry\_list.Fabric\_worker\_registry\_list.Fabric\_worker\_registry\_list.Fabric\_worker\_registry\_list.Fabric\_worker\_registry\_
ListImpl.registry_lookup_next (
                                             self,
                                             app_type_id,
                                             lookup_tag )
Get additional registry lookup results.
This function is called to retrieve additional results of the
Registry lookup initiated by the registry_lookup call.
Parameters:
app_type_id
                                               Application type ID that has to be
                     supported by the workers retrieved
                                              Returned by a previous call to either this function
lookup_tag
                      or to registry_lookup
Returns:
Outputs a tuple on success containing the following:
                                               Total number of entries matching the lookup
total_count
                     criteria. If this number is larger than the number
                      of IDs returned so far, the caller should use
                      lookup_tag to call registry_lookup_next to
                      retrieve the rest of the IDs
{\tt new\_lookup\_tag} \ {\tt is} \ {\tt an} \ {\tt optional} \ {\tt parameter.} \ {\tt If} \ {\tt it} \ {\tt is} \ {\tt returned,} \ {\tt it} \ {\tt means}
                     that there are more matching registry IDs that can be
                      retrieved by calling this function again with this tag
                      as an input parameter
                                               Array of the registry IDs that match the input
                      parameters
```

Returns None on error.

12.17.3.4 registry_retrieve()

```
\tt def \ avalon\_sdk.connector.blockchains.fabric\_worker\_registry\_list.FabricWorkerRegistry \leftrightarrow \tt connector.blockchains.fabric\_worker\_registry\_list.FabricWorkerRegistry \leftrightarrow \tt connector.blockchains.fabric\_worker\_registry \to \tt connector.blockchains.fabri
ListImpl.registry_retrieve (
                                                    self,
                                                      org_id )
Retrieve registry information identified by the organization ID.
Parameters:
                                                                                     Organization ID to lookup
org_id
Returns:
Tuple containing following on success:
                                                                               String defines a URI for this registry that
                                                   supports the Off-Chain Worker Registry JSON RPC
                                                  API. It will be None for the proxy model
                                                                              Fabric address for worker registry
sc addr
                                                 smart contract address
application_type_ids List of application ids (array of byte[])
                                                                               Status of the registry
status
Returns None on error.
12.17.3.5 registry_set_status()
def avalon_sdk.connector.blockchains.fabric.fabric_worker_registry_list.FabricWorkerRegistry↔
ListImpl.registry_set_status (
                                                    self,
                                                      org_id,
                                                      status )
Set registry status.
```

Parameters:
org_id bytes[] identifies organization that hosts the registry, e.g. a bank in the consortium or an anonymous entity status Defines the registry status to set.
The currently defined values are:
1 - the registry is active
2 - the registry is temporarily "off-line"
3 - the registry is decommissioned

Returns:

Transaction receipt on success or None on error.

12.17.3.6 registry_update()

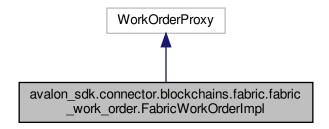
```
\tt def\ avalon\_sdk.connector.blockchains.fabric\_worker\_registry\_list.FabricWorkerRegistry \leftarrow \tt connector.blockchains.fabric\_worker\_registry\_list.FabricWorkerRegistry \leftarrow \tt connector.blockchains.fabric\_worker\_registry\_list.Fabric\_worker\_registry\_list.Fabric\_worker\_registry\_list.Fabric\_worker\_registry\_list.Fabric\_worker\_registry\_list.Fabric\_worker\_registry\_list.Fabric\_worker\_registry\_list.Fabric\_worker\_registry\_list.Fabric\_worker\_registry\_list.Fabric\_worker\_registry\_list.Fabric\_worker\_registry\_list.Fabric\_worker\_registry\_list.Fabric\_worker\_registry\_list.Fabric\_worker\_registry\_list.Fabric\_worker\_registry\_list.Fabric\_worker\_registry\_list.Fabric\_worker\_registry\_list.Fabric\_worker\_registry\_list.Fabric\_worker\_registry\_list.Fabric\_worker\_registry\_list.Fabric\_worker\_registry\_list.Fabric\_worker\_registry\_list.Fabric\_worker\_registry\_list.Fabric\_worker\_registry\_list.Fabric\_worker\_registry\_list.Fabric\_worker\_registry\_list.Fabric\_worker\_registry\_list.Fabric\_worker\_registry\_list.Fabric\_worker\_registry\_list.Fabric\_worker\_registry\_list.Fabric\_worker\_registry\_list.Fabric\_worker\_registry\_list.Fabric\_worker\_registry\_list.Fabric\_worker\_registry\_list.Fabric\_worker\_registry\_list.Fabric\_worker\_registry\_list.Fabric\_worker\_registry\_list.Fabric\_worker\_registry\_list.Fabric\_worker\_registry\_list.Fabric\_worker\_registry\_list.Fabric\_worker\_registry\_list.Fabric\_worker\_registry\_list.Fabric\_worker\_registry\_list.Fabric\_worker\_registry\_list.Fabric\_worker\_registry\_list.Fabric\_worker\_registry\_list.Fabric\_worker\_registry\_list.Fabric\_worker\_registry\_list.Fabric\_worker\_registry\_list.Fabric\_worker\_registry\_list.Fabric\_worker\_registry\_list.Fabric\_worker\_registry\_list.Fabric\_worker\_registry\_
ListImpl.registry_update (
                                                         self,
                                                         org_id,
                                                        uri,
                                                         sc_addr,
                                                         app_type_ids )
Update a registry.
Parameters:
                                               bytes[] identifies organization that hosts the
org_id
                    registry, e.g. a bank in the consortium or an \,
                    anonymous entity
                                              string that defines a URI for this registry that
                    supports the Off-Chain Worker Registry
                   JSON RPC API
 sc_addr
                                                   bytes[] defines a Fabric chain code name that
                     runs the Worker Registry Smart Contract API
                    smart contract for this registry
 app_type_ids []bytes[] is an optional parameter that defines
                    application types supported by the worker
                    managed by the registry
Transaction receipt on success or None on error.
```

The documentation for this class was generated from the following file:

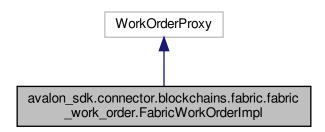
/home/dano/git/avalon/sdk/avalon_sdk/connector/blockchains/fabric/fabric_worker_registry_list.py

12.18 avalon_sdk.connector.blockchains.fabric.fabric_work_order.FabricWorkOrderImpl Class Reference

Inheritance diagram for avalon sdk.connector.blockchains.fabric.fabric work order.FabricWorkOrderImpl:



Collaboration diagram for avalon_sdk.connector.blockchains.fabric_work_order.FabricWorkOrderImpl:



Public Member Functions

- def __init__ (self, config)
- def work_order_submit (self, work_order_id, worker_id, requester_id, work_order_request, id=None)
- def work_order_get_result (self, work_order_id, id=None)
- def work_order_complete (self, work_order_id, work_order_response)
- def encryption_key_start (self, tag)
- def encryption_key_get (self, worker_id, requester_id, last_used_key_nonce=None, tag=None, signature_
 nonce=None, signature=None)
- def encryption key set (self, worker id, encryption key, encryption nonce, tag, signature)
- def get_work_order_submitted_event_handler (self, handler_func)
- def get_work_order_completed_event_handler (self, handler_func)

Public Attributes

- CHAIN_CODE
- WORK_ORDER_SUBMITTED_EVENT_NAME
- WORK_ORDER_COMPLETED_EVENT_NAME

12.18.1 Detailed Description

This class provides work order management APIs which interact with the Fabric blockchain. Detail method descriptions are available in WorkOrder interface.

12.18.2 Constructor & Destructor Documentation

```
12.18.2.1 __init__()
\tt def \ avalon\_sdk.connector.blockchains.fabric\_work\_order.FabricWorkOrderImpl.\_\_init\_\_ \ (
                                                                                                   self,
                                                                                                       config )
Parameters:
                                                              Dictionary containing Fabric-specific parameters
12.18.3 Member Function Documentation
12.18.3.1 encryption_key_get()
\tt def \ avalon\_sdk.connector.blockchains.fabric\_work\_order.Fabric\_WorkOrderImpl.encryption \leftarrow \tt connector.blockchains.fabric\_work\_order.Fabric\_workOrderImpl.encryption \leftarrow \tt connector.blockchains.fabric\_work\_order.Fabric\_workOrderImpl.encryption \leftarrow \tt connector.blockchains.fabric\_work\_order.Fabric\_workOrderImpl.encryption \leftarrow \tt connector.blockchains.fabric\_workOrderImpl.encryption \leftarrow \tt connector.blockchains.fabric\_workOrderI
 _key_get (
                                                                                                      self,
                                                                                                     worker_id,
                                                                                                     requester_id,
                                                                                                      last_used_key_nonce = None,
                                                                                                       tag = None,
                                                                                                        signature_nonce = None,
                                                                                                        signature = None )
Get worker's key from Fabric blockchain.
Not supported for Fabric.
12.18.3.2 encryption_key_set()
\tt def \ avalon\_sdk.connector.blockchains.fabric\_work\_order.Fabric\_WorkOrderImpl.encryption \leftarrow \tt connector.blockchains.fabric\_work\_order.Fabric\_workOrderImpl.encryption \leftarrow \tt connector.blockchains.fabric\_work\_order.Fabric\_workOrderImpl.encryption \leftarrow \tt connector.blockchains.fabric\_work\_order.Fabric\_workOrderImpl.encryption \leftarrow \tt connector.blockchains.fabric\_work\_order.Fabric\_workOrderImpl.encryption \leftarrow \tt connector.blockchains.fabric\_workOrderImpl.encryption \leftarrow \tt connector.blockchains
 _key_set (
                                                                                                      self,
                                                                                                     worker_id,
                                                                                                       encryption_key,
                                                                                                        encryption_nonce,
                                                                                                        tag,
                                                                                                        signature )
```

Set worker's encryption key. Not supported for Fabric.

12.18.3.3 encryption_key_start()

```
\tt def \ avalon\_sdk.connector.blockchains.fabric\_work\_order.Fabric\_WorkOrderImpl.encryption \leftarrow \tt connector.blockchains.fabric\_work\_order.Fabric\_workOrderImpl.encryption \leftarrow \tt connector.blockchains.fabric\_work\_order.Fabric\_workOrderImpl.encryption \leftarrow \tt connector.blockchains.fabric\_work\_order.Fabric\_workOrderImpl.encryption \leftarrow \tt connector.blockchains.fabric\_work\_order.Fabric\_workOrderImpl.encryption \leftarrow \tt connector.blockchains.fabric\_workOrderImpl.encryption \leftarrow \tt connector.blockchains
 _key_start (
                                                                                                                             self,
                                                                                                                             tag )
 Initiate setting the encryption key of the worker.
Not supported for Fabric.
12.18.3.4 get_work_order_completed_event_handler()
\tt def \ avalon\_sdk.connector.blockchains.fabric\_fabric\_work\_order.FabricWorkOrderImpl.get\_work\_connector.blockchains.fabric\_work\_order.FabricWorkOrderImpl.get\_work\_connector.blockchains.fabric\_work\_order.FabricWorkOrderImpl.get\_work\_connector.blockchains.fabric\_work\_order.FabricWorkOrderImpl.get\_work\_connector.blockchains.fabric\_work\_connector.blockchains.fabric\_work\_connector.blockchains.fabric\_work\_connector.blockchains.fabric\_work\_connector.blockchains.fabric\_work\_connector.blockchains.fabric\_work\_connector.blockchains.fabric\_work\_connector.blockchains.fabric\_work\_connector.blockchains.fabric\_work\_connector.blockchains.fabric\_work\_connector.blockchains.fabric\_work\_connector.blockchains.fabric\_work\_connector.blockchains.fabric\_work\_connector.blockchains.fabric\_work\_connector.blockchains.fabric\_work\_connector.blockchains.fabric\_work\_connector.blockchains.fabric\_work\_connector.blockchains.fabric\_work\_connector.blockchains.fabric\_work\_connector.blockchains.fabric\_work\_connector.blockchains.fabric\_work\_connector.blockchains.fabric\_work\_connector.blockchains.fabric\_work\_connector.blockchains.fabric\_work\_connector.blockchains.fabric\_work\_connector.blockchains.fabric\_work\_connector.blockchains.fabric\_work\_connector.blockchains.fabric\_work\_connector.blockchains.fabric\_work\_connector.blockchains.fabric\_work\_connector.blockchains.fabric\_work\_connector.blockchains.fabric\_work\_connector.blockchains.fabric\_work\_connector.blockchains.fabric\_work\_connector.blockchains.fabric\_work\_connector.blockchains.fabric\_work\_connector.blockchains.fabric\_work\_connector.blockchains.fabric\_work\_connector.blockchains.fabric\_work\_connector.blockchains.fabric\_work\_connector.blockchains.fabric\_work\_connector.blockchains.fabric\_work\_connector.blockchains.fabric\_work\_connector.blockchains.fabric\_work\_connector.blockchains.fabric\_work\_connector.blockchains.fabric\_work\_connector.blockchains.fabric\_work\_connector.blockchains.fabric\_work\_connector.blockchains.fabric\_work\_connector.blockchains.fabric\_work\_connector.blockchains.fabric\_work\_connecto
order_completed_event_handler (
                                                                                                                       self,
                                                                                                                          handler_func )
Start event handler loop for a workOrderCompleted event.
Parameters:
handler_func Callback function name as a string
12.18.3.5 get_work_order_submitted_event_handler()
\tt def \ avalon\_sdk.connector.blockchains.fabric\_fabric\_work\_order.FabricWorkOrderImpl.get\_work\_connector.blockchains.fabric\_work\_order.FabricWorkOrderImpl.get\_work\_connector.blockchains.fabric\_work\_order.FabricWorkOrderImpl.get\_work\_connector.blockchains.fabric\_work\_order.FabricWorkOrderImpl.get\_work\_connector.blockchains.fabric\_work\_connector.blockchains.fabric\_work\_connector.blockchains.fabric\_work\_connector.blockchains.fabric\_work\_connector.blockchains.fabric\_work\_connector.blockchains.fabric\_work\_connector.blockchains.fabric\_work\_connector.blockchains.fabric\_work\_connector.blockchains.fabric\_work\_connector.blockchains.fabric\_work\_connector.blockchains.fabric\_work\_connector.blockchains.fabric\_work\_connector.blockchains.fabric\_work\_connector.blockchains.fabric\_work\_connector.blockchains.fabric\_work\_connector.blockchains.fabric\_work\_connector.blockchains.fabric\_work\_connector.blockchains.fabric\_work\_connector.blockchains.fabric\_work\_connector.blockchains.fabric\_work\_connector.blockchains.fabric\_work\_connector.blockchains.fabric\_work\_connector.blockchains.fabric\_work\_connector.blockchains.fabric\_work\_connector.blockchains.fabric\_work\_connector.blockchains.fabric\_work\_connector.blockchains.fabric\_work\_connector.blockchains.fabric\_work\_connector.blockchains.fabric\_work\_connector.blockchains.fabric\_work\_connector.blockchains.fabric\_work\_connector.blockchains.fabric\_work\_connector.blockchains.fabric\_work\_connector.blockchains.fabric\_work\_connector.blockchains.fabric\_work\_connector.blockchains.fabric\_work\_connector.blockchains.fabric\_work\_connector.blockchains.fabric\_work\_connector.blockchains.fabric\_work\_connector.blockchains.fabric\_work\_connector.blockchains.fabric\_work\_connector.blockchains.fabric\_work\_connector.blockchains.fabric\_work\_connector.blockchains.fabric\_work\_connector.blockchains.fabric\_work\_connector.blockchains.fabric\_work\_connector.blockchains.fabric\_work\_connector.blockchains.fabric\_work\_connector.blockchains.fabric\_work\_connector.blockchains.fabric\_work\_connector.blockchains.fabric\_work\_connecto
 order_submitted_event_handler (
                                                                                                                          self,
                                                                                                                          handler_func )
Start event handler loop for a workOrderSubmitted event.
Parameters:
handler_func Callback function name as a string
Returns:
Event handler object.
```

12.18.3.6 work_order_complete()

12.18.3.7 work_order_get_result()

12.18.3.8 work_order_submit()

```
Submit work order request to the Fabric block chain.

Parameters:
work_order_id Unique ID of the work order request worker_id Identifier for the worker requester_id Unique id to identify the requester work_order_request JSON RPC string work order request.

Complete definition at work_order.py and defined in EEA specification 6.1.1 id Optional JSON RPC request ID

Returns:

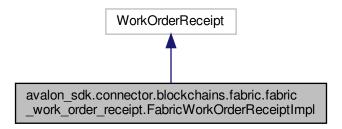
0 on success and non-zero on error.
```

The documentation for this class was generated from the following file:

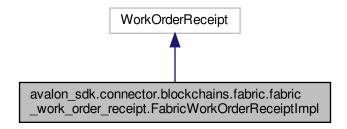
/home/dano/git/avalon/sdk/avalon_sdk/connector/blockchains/fabric/fabric_work_order.py

12.19 avalon_sdk.connector.blockchains.fabric.fabric_work_order_receipt.FabricWork OrderReceiptImpl Class Reference

 $Inheritance \ diagram \ for \ avalon_sdk.connector.blockchains.fabric.fabric_work_order_receipt.FabricWorkOrder \\ \leftarrow ReceiptImpl:$



Collaboration diagram for avalon_sdk.connector.blockchains.fabric.fabric_work_order_receipt.FabricWorkOrder ← ReceiptImpl:



Public Member Functions

- def __init__ (self, config)
- def work_order_receipt_create (self, work_order_id, worker_id, worker_service_id, requester_id, receipt_
 create_status, work_order_request_hash)
- def work_order_receipt_update (self, work_order_id, update_id, update_type, update_data, update_
 signature=None, signature rules=None)
- · def work order receipt retrieve (self, work order id)
- def work_order_receipt_update_retrieve (self, work_order_id, updater_id, update_index)
- def work_order_receipt_lookup (self, worker_service_id, worker_id, requester_id, receipt_status)
- def work_order_receipt_lookup_next (self, worker_service_id, worker_id, requester_id, receipt_status, last
 — lookup_tag)

Public Attributes

· CHAIN CODE

12.19.1 Detailed Description

This class provides work order receipt management APIs which interact with the Fabric blockchain. Detailed method descriptions are available in the WorkOrderReceipt interface.

12.19.2 Constructor & Destructor Documentation

```
12.19.2.1 __init__()

def avalon_sdk.connector.blockchains.fabric.fabric_work_order_receipt.FabricWorkOrderReceipt↔
   Impl.__init__ (
```

```
self,
config )
Parameters:
```

config Dict containing Fabric-specific parameters.

12.19.3 Member Function Documentation

12.19.3.1 work_order_receipt_create()

On error, returns -1.

```
\tt def\ avalon\_sdk.connector.blockchains.fabric\_fabric\_work\_order\_receipt.FabricWorkOrderReceipt \leftarrow \tt connector.blockchains.fabric\_fabric\_work\_order\_receipt.FabricWorkOrderReceipt \leftarrow \tt connector.blockchains.fabric\_fabric\_work\_order\_receipt.FabricWorkOrderReceipt \leftarrow \tt connector.blockchains.fabric\_fabric\_fabric\_work\_order\_receipt.FabricWorkOrderReceipt \leftarrow \tt connector.blockchains.fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fab
 Impl.work_order_receipt_create (
                                                    self,
                                                    work_order_id,
                                                    worker_id,
                                                    worker_service_id,
                                                    requester_id,
                                                    receipt_create_status,
                                                    work_order_request_hash )
Create work order receipt in the Fabric block chain.
Parameters:
                                                                                     ID of the Work Order
work_order_id
 worker_id
                                                                                  Worker id that should execute the Work Order
worker_service_id
                                                                                       ID of the Worker Service that
                                                         hosts the Worker
 requester_id
                                                                                      ID of the requester
 receipt_create_status
                                                                                    Initial receipt status defined
                                                          in EEA spec 7.1.1
 work_order_request_hash Hash value of the work order request as
                                                          defined in EEA spec 6.7
Returns:
{\tt 0} on success and {\tt -1} on error.
12.19.3.2 work_order_receipt_lookup()
\tt def\ avalon\_sdk.connector.blockchains.fabric\_fabric\_work\_order\_receipt.FabricWorkOrderReceipt \leftrightarrow the connector.blockchains.fabric\_fabric\_work\_order\_receipt.FabricWorkOrderReceipt \leftrightarrow the connector.blockchains.fabric\_fabric\_fabric\_work\_order\_receipt.FabricWorkOrderReceipt \leftrightarrow the connector.blockchains.fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fa
Impl.work_order_receipt_lookup (
                                                    self.
                                                    worker_service_id,
                                                    worker_id,
                                                    requester_id,
                                                   receipt_status )
Lookup a work order receipt.
Parameters:
 worker_service_id Worker Service ID whose receipts will be
                                   retrieved
                                                      Worker Id whose receipts are requested
worker id
 requester_id
                                                               ID of the entity requesting receipts
 receipt_status
                                                                Defines the status of the receipts retrieve
id
                                                                 Optional JSON RPC request ID
Returns:
Tuple containing total count, last_lookup_tag, and
list of work order IDs, on success:
total_count
                                                          Total number of receipts matching the lookup criteria.
                              If this number is bigger than the size of the ids
                              array, the caller should use a lookup_tag to call
                              work_order_receipt_lookup_next() to retrieve the rest
                              of the receipt IDs.
last_lookup_tag Optional lookup_tag when the receipts exceed the ids
                                                           Array of work order receipt ids that match the input
```

12.19.3.3 work_order_receipt_lookup_next()

```
\tt def\ avalon\_sdk.connector.blockchains.fabric\_fabric\_work\_order\_receipt.FabricWorkOrderReceipt \leftrightarrow the connector.blockchains.fabric\_fabric\_work\_order\_receipt.FabricWorkOrderReceipt \leftrightarrow the connector.blockchains.fabric\_fabric\_fabric\_work\_order\_receipt.FabricWorkOrderReceipt \leftrightarrow the connector.blockchains.fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fa
 Impl.work_order_receipt_lookup_next (
                                            self,
                                            worker_service_id,
                                             worker_id,
                                             requester_id,
                                             receipt_status,
                                             last_lookup_tag )
Retrieve subsequent work order receipts after calling
work_order_receipt_lookup().
Parameters:
worker_id Worker ID value derived from the worker's DID requester_id Requester ID
worker_id
work_order_receipt_lookup()
 id
                                                        Optional JSON RPC request ID
Returns:
On success, return a tuple containing total count, look up tag, and
list of work order IDs:
total_count
                                                       Total number of receipts matching the lookup
                              criteria
                                                      Optional parameter. If it is returned, it means
lookup_tag
                                that there are more matching receipts that can be
                                retrieved by calling this function again and with
                                this tag as an input parameter.
                                                        Array of the Work Order receipt IDs that match the
                                input criteria from the corresponding call to
                                work_order_receipt_lookup().
Return -1 on error.
```

12.19.3.4 work_order_receipt_retrieve()

12.19.3.5 work_order_receipt_update()

```
def avalon_sdk.connector.blockchains.fabric_fabric_work_order_receipt.FabricWorkOrderReceipt←
 Impl.work_order_receipt_update (
                                                                                         self,
                                                                                         work_order_id,
                                                                                         updater_id,
                                                                                         update_type,
                                                                                         update_data,
                                                                                         update_signature = None,
                                                                                         signature_rules = None )
Update a Work Order Receipt.
Parameters:
                                                                                                     Work Order ID that was sent in the
work_order_id
                                                         corresponding work_order_submit request
                                                                                                 ID of the updating entity. It is optional if it
 updater_id
                                                        is the same as the transaction sender address % \left( 1\right) =\left( 1\right) \left( 1\right) 
 update_type
                                                                                                     Type of the Work Order update that defines
                                                        how the update should be handled
                                                                                            Update-specific data that depends on the
                                                      updater type defined in EEA spec 7.1.2
 update_signature Optional signature of concatenated
                                                       work_order_id, update_type, and update_data
 signature_rules Defines hashing and signing algorithms,
                                                         that are separated by forward slash '/'
Returns:
 0 on success, -1 on error.
```

12.19.3.6 work_order_receipt_update_retrieve()

```
\tt def\ avalon\_sdk.connector.blockchains.fabric\_fabric\_work\_order\_receipt.FabricWorkOrderReceipt \leftrightarrow \tt connector.blockchains.fabric\_fabric\_work\_order\_receipt.FabricWorkOrderReceipt \leftrightarrow \tt connector.blockchains.fabric\_fabric\_work\_order\_receipt.FabricWorkOrderReceipt \leftrightarrow \tt connector.blockchains.fabric\_fabric\_work\_order\_receipt.FabricWorkOrderReceipt \leftrightarrow \tt connector.blockchains.fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fabric\_fab
 Impl.work_order_receipt_update_retrieve (
                                                                 self,
                                                                 work_order_id,
                                                                 updater id.
                                                                 update_index )
Retrieve an update to a work order receipt.
Parameters:
 work_order_id Work Order ID that was sent in the
                          corresponding work_order_submit request
Value "0xFFFFFFF" is reserved to retrieve the
                           last received update
On success, return updater_id, update_type, update_data,
update_signature, signature_rules, as defined in
{\tt work\_order\_receipt\_update(), and update\_count.}
On error, return -1.
```

The documentation for this class was generated from the following file:

• /home/dano/git/avalon/sdk/avalon_sdk/connector/blockchains/fabric/fabric_work_order_receipt.py

12.20 avalon_sdk.connector.blockchains.fabric.fabric_wrapper.FabricWrapper Class Reference

Public Member Functions

- def init (self, config)
- def invoke chaincode (self, chaincode name, method name, params)
- def get_event_handler (self, event_name, chain_code, handler_func)

12.20.1 Detailed Description

```
Fabric wrapper class to interact with Fabric blockchain. It provides wrapper functions to invoke and query chain code.
```

12.20.2 Constructor & Destructor Documentation

12.20.3 Member Function Documentation

12.20.3.1 get_event_handler()

12.20.3.2 invoke_chaincode()

```
def avalon_sdk.connector.blockchains.fabric.fabric_wrapper.FabricWrapper.invoke_chaincode (
              self,
              chaincode_name,
             method_name,
             params )
This is wrapper method to invoke chain code.
Parameters:
chaincode_name Name of the chain code
method_name Chain code method name
params
             List of arguments to method
Returns:
If the call to chain code query, then it
returns the payload of the chain code response
on success or None on error.
If the call is invoking chain code, then it
returns ContractResponse.SUCCESS on success
and ContractResponse.ERROR on failure.
```

The documentation for this class was generated from the following file:

/home/dano/git/avalon/sdk/avalon sdk/connector/blockchains/fabric/fabric wrapper.py

12.21 FileloExecutor Class Reference

Public Member Functions

- void SetIoHandlerId (uint32_t handler_id)
- void **SetFileName** (std::string file_name)
- uint32 t GetloHandlerId (const char *handlerName)
- size_t GetMaxFileSize ()
- size_t GetMaxIoResultSize ()
- uint32 t FileOpen (uint8 t *result, size t result size)
- uint32_t FileClose (uint8_t *result, size_t result_size)
- uint32 t FileRead (uint8 t *result, size t result size, uint8 t *out buf, size t out buf size)
- uint32_t FileWrite (uint8_t *result, size_t result_size, const uint8_t *in_buf, size_t in_buf_size)
- uint32 t FileTell (uint8 t *result, size t result size, uint8 t *out buf, size t out buf size)
- uint32_t FileSeek (size_t position, uint8_t *result, size_t result_size)
- uint32 t FileDelete (uint8 t *result, size t result size)

12.21.1 Member Function Documentation

12.21.1.1 FileClose()

Closes given file and updates status in the result buffer.

Parameters

| result | Status of file close operation (0 is success, non-0 is failure) |
|-------------|---|
| result_size | Maximum size of the result buffer in bytes |

Returns

Status of operation (0 on success, non-0 on failure)

12.21.1.2 FileDelete()

Deletes the file whose name is stored in the FileloExecutor instance.

Parameters

| result | Status of file delete operation (0 is success, non-0 is failure) |
|-------------|--|
| result_size | Maximum size of the result buffer in bytes |

Returns

Status of operation (0 on success, non-0 on failure)

12.21.1.3 FileOpen()

Opens given file and updates status in the result buffer.

Parameters

| result | Status of file open operation (0 is success, non-0 is failure) |
|-------------|--|
| result_size | Maximum size of the result buffer in bytes |

Returns

Status of operation (0 on success, non-0 on failure)

12.21.1.4 FileRead()

Reads given file, stores content in out buffer and updates status in result buffer.

Parameters

| result | Status of file read operation (0 is success, non-0 is failure) |
|--------------|--|
| result_size | Maximum size of the result buffer in bytes |
| out_buf | Buffer to hold file content |
| out_buf_size | Maximum size of out_buf to contain the file contents in bytes |

Returns

Status of operation (0 on success, non-0 on failure)

12.21.1.5 FileSeek()

Moves the file position the file to the given position and updates the status in result buffer.

Parameters

| position | Byte offset of new file position |
|-------------|--|
| result | Status of file seek operation (0 is success, non-0 is failure) |
| result_size | Maximum size of the result buffer in bytes |

Returns

Status of operation (0 on success, non-0 on failure)

12.21.1.6 FileTell()

```
size_t result_size,
uint8_t * out_buf,
size_t out_buf_size )
```

Gets the current position of the file, stores it in buffer out_buf, and updates status in result buffer.

Parameters

| result | status of file tell operation (0 is success, non-0 is failure) |
|--------------|--|
| result_size | Maximum size of the result buffer in bytes |
| out_buf | Buffer to hold file position |
| out_buf_size | Maximum size of out_buf to contain the file position in bytes |

Returns

Status of operation (0 on success, non-0 on failure)

12.21.1.7 FileWrite()

Writes given file with content in input buffer and updates status in result buffer.

Parameters

| result | Status of file write operation (0 is success, non-0 is failure) |
|-------------|---|
| result_size | Maximum size of the result buffer in bytes |
| in_buf | Buffer with content to be written to the file |
| in_buf_size | Maximum size of in_buf to write to the file in bytes |

Returns

Status of operation (0 on success, non-0 on failure)

12.21.1.8 GetloHandlerId()

Get the I/O handler ID corresponding to IoHandler handler_name.

Parameters

Returns

I/O handler ID. That is, 1 for handler "tcf-base-file-io" 0 on error

12.21.1.9 GetMaxFileSize()

```
size_t FileIoExecutor::GetMaxFileSize ( )
```

Get the maximum size of the buffer used for file I/O.

Returns

Maximum buffer size in bytes

12.21.1.10 GetMaxIoResultSize()

```
size_t FileIoExecutor::GetMaxIoResultSize ( )
```

Get the maximum size of the result buffer used to store the I/O status.

Returns

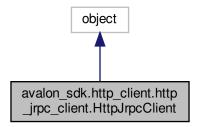
Maximum result buffer size in bytes

The documentation for this class was generated from the following files:

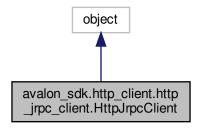
- /home/dano/git/avalon/common/sgx_workload/iohandler/file_io.h
- /home/dano/git/avalon/common/sgx_workload/iohandler/file_io.cpp

12.22 avalon_sdk.http_client.http_jrpc_client.HttpJrpcClient Class Reference

Inheritance diagram for avalon_sdk.http_client.http_jrpc_client.HttpJrpcClient:



Collaboration diagram for avalon_sdk.http_client.http_jrpc_client.HttpJrpcClient:



Public Member Functions

• def __init__ (self, url)

Public Attributes

- ServiceURL
- ProxyHandler

12.22.1 Detailed Description

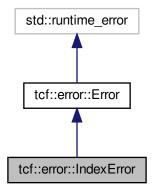
Class to handle HTTP JSON RPC communication by the client.

The documentation for this class was generated from the following file:

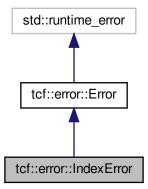
/home/dano/git/avalon/sdk/avalon_sdk/http_client/http_jrpc_client.py

12.23 tcf::error::IndexError Class Reference

Inheritance diagram for tcf::error::IndexError:



Collaboration diagram for tcf::error::IndexError:



Public Member Functions

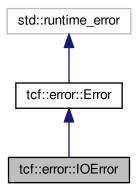
• IndexError (const std::string &msg)

The documentation for this class was generated from the following file:

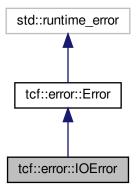
• /home/dano/git/avalon/common/cpp/error.h

12.24 tcf::error::IOError Class Reference

Inheritance diagram for tcf::error::IOError:



Collaboration diagram for tcf::error::IOError:



Public Member Functions

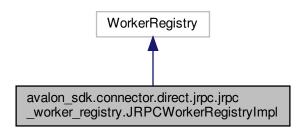
• IOError (const std::string &msg)

The documentation for this class was generated from the following file:

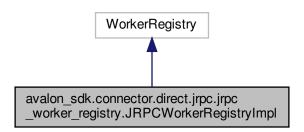
• /home/dano/git/avalon/common/cpp/error.h

12.25 avalon_sdk.connector.direct.jrpc.jrpc_worker_registry.JRPCWorkerRegistryImpl Class Reference

Inheritance diagram for avalon sdk.connector.direct.jrpc.jrpc worker registry.JRPCWorkerRegistryImpl:



Collaboration diagram for avalon_sdk.connector.direct.jrpc.jrpc_worker_registry.JRPCWorkerRegistryImpl:



Public Member Functions

- def __init__ (self, config)
- def worker_retrieve (self, worker_id, id=None)
- def worker_lookup (self, worker_type=None, organization_id=None, application_type_id=None, id=None)
- def worker_lookup_next (self, lookup_tag, worker_type=None, organization_id=None, application_type_
 id=None, id=None)
- def worker_register (self, worker_id, worker_type, org_id, application_type_ids, details, id=None)
- def worker_update (self, worker_id, details, id=None)
- def worker_set_status (self, worker_id, status, id=None)

12.25.1 Detailed Description

This class is to read the worker registry to get the more details of worker.

12.25.2 Member Function Documentation

12.25.2.1 worker_lookup()

```
def avalon_sdk.connector.direct.jrpc.jrpc_worker_registry.JRPCWorkerRegistryImpl.worker_lookup
             self,
             worker_type = None,
              organization_id = None,
              application_type_id = None,
              id = None)
Worker lookup based on worker type, organization ID,
and application ID.
All fields are optional and, if present, condition should match for
all fields. If none are passed it should return all workers.
Parameters:
                   Optional characteristic of Workers for which you
worker_type
            may wish to search. Currently defined types are:
            * "TEE-SGX": an Intel SGX Trusted Execution
             Environment
            * "MPC": Multi-Party Compute
            * "ZK": Zero-Knowledge
organization_id
                   Optional parameter representing the
            organization that hosts the Worker,
            \ensuremath{\text{e.g.}} a bank in the consortium or
            anonymous entity
application_type_id Optional application type that has to be supported
           by the worker
id
                    Optional Optional JSON RPC request ID
Returns:
JRPC response containing number of workers,
lookup tag, and list of worker IDs.
```

12.25.2.2 worker_lookup_next()

```
worker_lookup
                    Optional characteristic of Workers for which you
worker_type
            may wish to search. Currently defined types are:
            * "TEE-SGX": an Intel SGX Trusted Execution
              Environment
             * "MPC": Multi-Party Compute
            \star "ZK": Zero-Knowledge
organization_id
                    Optional parameter representing the
            organization that hosts the Worker,
            e.g. a bank in the consortium or
            anonymous entity
application_type_id Optional application type that has to be supported
            by the worker
id
                    Optional Optional JSON RPC request ID
Returns:
JRPC response containing number of workers,
lookup tag, and list of worker IDs.
12.25.2.3 worker_register()
\tt def \ avalon\_sdk.connector.direct.jrpc\_worker\_registry.JRPCWorkerRegistryImpl.worker\_{\leftarrow} \\
register (
              self,
              worker_id,
              worker_type,
              org_id,
              application_type_ids,
              details.
              id = None )
Adds worker details to registry
Parameters:
worker_id
                     Worker ID value derived from the worker's DID \,
worker_type
                      Type of Worker. Currently defined types are:
              * "TEE-SGX": an Intel SGX Trusted Execution
               Environment
              * "MPC": Multi-Party Compute
              * "ZK": Zero-Knowledge
org_id
                     Organization that hosts the Worker,
              e.g. a bank in the consortium or
              anonymous entity
application_type_ids Application types supported by the worker
                     Optional JSON RPC request ID
id
Returns:
JRPC response with worker registry status.
12.25.2.4 worker_retrieve()
\tt def \ avalon\_sdk.connector.direct.jrpc\_worker\_registry.JRPCWorkerRegistryImpl.worker\_{\leftarrow} \\
retrieve (
              self,
              worker_id,
              id = None)
```

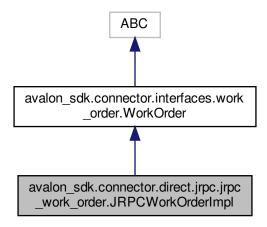
```
Retrieve the worker identified by worker ID.
Parameters:
worker_id Worker ID value derived from the worker's DID
          Optional Optional JSON RPC request ID
Returns:
JRPC response containing:
organization ID, application ID, worker status,
and worker details.
12.25.2.5 worker_set_status()
\tt def \ avalon\_sdk.connector.direct.jrpc\_worker\_registry.JRPCWorkerRegistryImpl.worker\_set\_{\leftarrow} \\
status (
                self,
               worker id,
               status,
                id = None)
Set the worker status to active, offline,
decommissioned, or compromised state.
Parameters:
{\tt worker\_id} \quad {\tt Worker} \; {\tt ID} \; {\tt value} \; {\tt derived} \; {\tt from} \; {\tt the} \; {\tt worker's} \; {\tt DID}
status Worker status value to set id Optional JSON RPC request ID
Returns:
JRPC response with status.
12.25.2.6 worker_update()
def avalon_sdk.connector.direct.jrpc.jrpc_worker_registry.JRPCWorkerRegistryImpl.worker_update
               self,
               worker_id,
                details,
                id = None)
Update worker with new information.
Parameters:
worker_id Worker ID value derived from the worker's DID
details Detailed information about the worker in
  JSON RPC format as defined in
          Optional JSON RPC request ID
Returns:
JRPC response with update status.
```

The documentation for this class was generated from the following file:

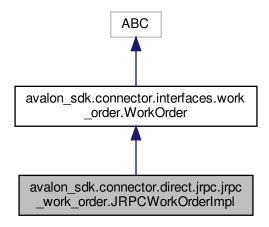
/home/dano/git/avalon/sdk/avalon_sdk/connector/direct/jrpc/jrpc_worker_registry.py

12.26 avalon_sdk.connector.direct.jrpc.jrpc_work_order.JRPCWorkOrderImpl Class Reference

Inheritance diagram for avalon_sdk.connector.direct.jrpc.jrpc_work_order.JRPCWorkOrderImpl:



Collaboration diagram for avalon_sdk.connector.direct.jrpc.jrpc_work_order.JRPCWorkOrderImpl:



Public Member Functions

- def __init__ (self, config)
- def work_order_submit (self, work_order_id, worker_id, requester_id, work_order_request, id=None)

- def work_order_get_result_nonblocking (self, work_order_id, id=None)
- def work_order_get_result (self, work_order_id, id=None)
- def encryption_key_get (self, worker_id, requester_id, last_used_key_nonce=None, tag=None, signature_←
 nonce=None, signature=None, id=None)
- def encryption_key_set (self, worker_id, encryption_key, encryption_nonce, tag, signature_nonce, signature, id=None)

12.26.1 Detailed Description

This class is for to manage to the work orders from client side.

12.26.2 Member Function Documentation

12.26.2.1 encryption_key_get()

```
def avalon_sdk.connector.direct.jrpc.jrpc_work_order.JRPCWorkOrderImpl.encryption_key_get (
              self,
              worker_id,
              requester_id,
              last_used_key_nonce = None,
              tag = None,
              signature_nonce = None,
              signature = None,
              id = None )
API to receive a worker's key.
Parameters:
worker_id
                    Worker ID of the worker whose encryption key
            is requested
{\tt last\_used\_key\_nonce}~{\tt Optional}~{\tt nonce}~{\tt associated}~{\tt with}~{\tt the}~{\tt last}~{\tt retrieved}
            key. If it is provided, the key retrieved should
            be newer than this one.
            Otherwise any key can be retrieved
                     Tag that should be associated with the returned
            key, e.g. the requester ID. This is an optional
            parameter. If it is not provided, requester_id is
            used as a key
                    ID of the requester that plans to use
requester_id
            the returned key to submit one or more work orders
            using this key
signature_nonce
                    Optional nonce associated with the signature and
            is used only if signature below is also provided
                   Optional signature of worker_id,
signature
            last_used_key_nonce, tag, and signature_nonce.
                    Optional JSON RPC request ID
```

12.26.2.2 encryption_key_set()

```
def avalon_sdk.connector.direct.jrpc.jrpc_work_order.JRPCWorkOrderImpl.encryption_key_set (
                                       self,
                                        worker_id,
                                        encryption_key,
                                        encryption_nonce,
                                       tag,
                                       signature_nonce,
                                       signature,
                                       id = None )
API called by a Worker or Worker Service to receive a Worker's key.
Parameters:
                                                ID of the worker to set an encryption key
worker_id
encryption_key Encryption key to set
encryption_nonce Nonce associated with the key
                                                Tag that should be associated with the returned key,
                         e.g. requester ID.
signature_nonce Nonce associated with the signature
                                             Signature generated by the worker on the worker_id,
                        tag and encryption_nonce
                                                Optional JSON RPC request ID
id
Returns:
JRPC response with the result of the operation.
12.26.2.3 work_order_get_result()
\tt def \ avalon\_sdk.connector.direct.jrpc\_work\_order.JRPCWorkOrderImpl.work\_order\_get\_result \ (in the context of the context
                                       self,
                                        work_order_id,
                                        id = None )
Get the work order result in a blocking way until it gets a
result or error.
Parameters:
                                                  Work order ID
work_order_id
                                                   Optional JSON RPC request ID
id
Returns:
JSON RPC response of dictionary type
```

12.26.2.4 work_order_get_result_nonblocking()

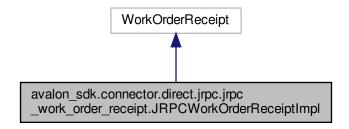
12.26.2.5 work_order_submit()

The documentation for this class was generated from the following file:

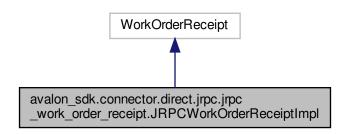
/home/dano/git/avalon/sdk/avalon sdk/connector/direct/jrpc/jrpc work order.py

12.27 avalon_sdk.connector.direct.jrpc.jrpc_work_order_receipt.JRPCWorkOrder ← ReceiptImpl Class Reference

Inheritance diagram for avalon_sdk.connector.direct.jrpc.jrpc_work_order_receipt.JRPCWorkOrderReceiptImpl:



Collaboration diagram for avalon_sdk.connector.direct.jrpc.jrpc_work_order_receipt.JRPCWorkOrderReceipt ← lmpl:



Public Member Functions

- def __init__ (self, config)
- def work_order_receipt_create (self, work_order_id, worker_service_id, worker_id, requester_id, receipt_
 create_status, work_order_request_hash, requester_nonce, requester_signature, signature_rules, receipt
 verification_key, id=None)
- def work_order_receipt_update (self, work_order_id, update_id, update_type, update_data, update_
 signature, signature_rules, id=None)
- def work_order_receipt_retrieve (self, work_order_id, id=None)
- · def work order receipt update retrieve (self, work order id, update index, id=None)
- def work_order_receipt_lookup (self, worker_service_id=None, worker_id=None, requester_id=None, receipt_status=None, id=None)
- def work_order_receipt_lookup_next (self, last_lookup_tag, worker_service_id=None, worker_id=None, requester_id=None, receipt_status=None, id=None)

12.27.1 Detailed Description

This class is an implementation of WorkOrderReceiptInterface to manage work order receipts from the client side.

12.27.2 Member Function Documentation

12.27.2.1 work_order_receipt_create()

```
requester_id,
                 receipt_create_status,
                 work_order_request_hash,
                 requester_nonce,
                 requester_signature,
                 signature_rules,
                 receipt_verification_key,
                 id = None)
Create a Work Order Receipt JSON RPC request and submit to an
Avalon listener.
Parameters:
work_order_id Work order ID
worker_service_id Worker service ID
worker_id Worker ID value derived from the worker's DID
                  WOIKEL 12
Requester ID
requester_id
receipt_create_status Receipt creation status
work_order_request_hash Work order request hash value
                        Requester generated nonce
requester_nonce
requester_signature Signature generated by the requester signature_rules Defines hashing and signing algorithms;
                  separated by forward slash ^{\prime}/^{\prime}
receipt_verification_key Receipt verification key
                               Optional JSON RPC request ID
```

12.27.2.2 work_order_receipt_lookup()

```
def avalon_sdk.connector.direct.jrpc_jrpc_work_order_receipt.JRPCWorkOrderReceiptImpl.work_←
order_receipt_lookup (
             self,
             worker_service_id = None,
             worker_id = None,
             requester_id = None,
             receipt_status = None,
             id = None)
Work Order Receipt Lookup
All fields are optional and, if present, condition should match for
all fields. If none are passed it should return all
work order receipts.
Parameters:
worker_service_id Optional worker service ID to lookup
worker_id
                        Optional worker ID value derived from
               the worker's DID
requester_id
                     Optional requester ID to lookup
receipt_status
                        Optional receipt status
                        Optional JSON RPC request ID
id
```

12.27.2.3 work_order_receipt_lookup_next()

```
\tt def \ avalon\_sdk.connector.direct.jrpc.jrpc\_work\_order\_receipt.JRPCWorkOrderReceiptImpl.work\_torder\_receipt.order\_receipt.order\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_torder\_tor
order_receipt_lookup_next (
                                                           self,
                                                            last_lookup_tag,
                                                             worker_service_id = None,
                                                             worker_id = None,
                                                             requester_id = None,
                                                             receipt_status = None,
                                                            id = None )
Work Order Receipt Lookup Next.
Call to retrieve subsequent results after calling
work_order_receipt_lookup or
Parameters:
last_lookup_tag
                                                                                                        Last lookup tag returned by
                                                                         work_order_receipt_lookup
worker_service_id
                                                                                                           Optional worker service ID to lookup
worker_id
                                                                                                            Optional worker ID value derived from
                                                                        the worker's DID
requester_id
                                                                                                          Optional requester ID to lookup
                                                                                                            Optional receipt status
receipt_status
id
                                                                                                            Optional JSON RPC request ID
```

12.27.2.4 work_order_receipt_retrieve()

12.27.2.5 work_order_receipt_update()

```
def avalon_sdk.connector.direct.jrpc.jrpc_work_order_receipt.JRPCWorkOrderReceiptImpl.work_←
    order_receipt_update (
        self,
        work_order_id,
        updater_id,
        update_type,
        update_data,
        update_signature,
        signature_rules,
        id = None )
```

```
Update a Work Order Receipt JSON RPC request and submit an Avalon listener.

Parameters:
work_order_id Work Order ID
updater_id Updater ID
update_type Updater type
update_data Receipt update data
update_signature Signature of the update
signature_rules Defines hashing and signing algorithms;
separated by forward slash '/'
id Optional JSON RPC request ID
```

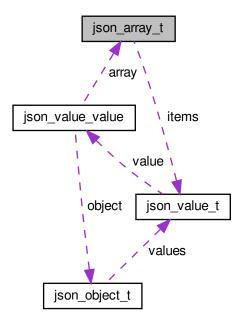
12.27.2.6 work_order_receipt_update_retrieve()

The documentation for this class was generated from the following file:

/home/dano/git/avalon/sdk/avalon_sdk/connector/direct/jrpc/jrpc_work_order_receipt.py

12.28 json_array_t Struct Reference

Collaboration diagram for json_array_t:



Public Attributes

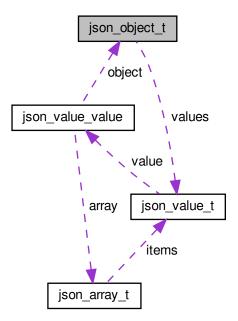
- JSON_Value ** items
- size_t count
- size_t capacity

The documentation for this struct was generated from the following file:

• /home/dano/git/avalon/common/cpp/packages/parson/parson.cpp

12.29 json_object_t Struct Reference

Collaboration diagram for json_object_t:



Public Attributes

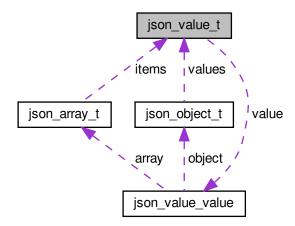
- char ** names
- JSON_Value ** values
- · size_t count
- size_t capacity

The documentation for this struct was generated from the following file:

• /home/dano/git/avalon/common/cpp/packages/parson/parson.cpp

12.30 json_value_t Struct Reference

Collaboration diagram for json_value_t:



Public Attributes

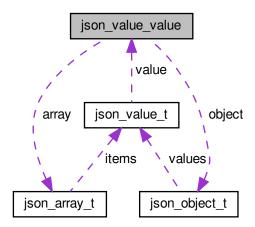
- JSON_Value_Type type
- JSON_Value_Value value

The documentation for this struct was generated from the following file:

• /home/dano/git/avalon/common/cpp/packages/parson/parson.cpp

12.31 json_value_value Union Reference

Collaboration diagram for json_value_value:



Public Attributes

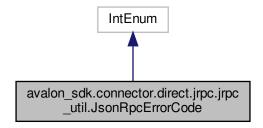
- char * string
- double number
- JSON_Object * object
- JSON_Array * array
- · int boolean
- int null

The documentation for this union was generated from the following file:

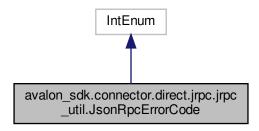
/home/dano/git/avalon/common/cpp/packages/parson/parson.cpp

12.32 avalon_sdk.connector.direct.jrpc.jrpc_util.JsonRpcErrorCode Class Reference

 $Inheritance\ diagram\ for\ avalon_sdk.connector.direct.jrpc.jrpc_util.JsonRpcErrorCode:$



Collaboration diagram for avalon_sdk.connector.direct.jrpc.jrpc_util.JsonRpcErrorCode:



Static Public Attributes

- int SUCCESS = 0
- int UNKNOWN_ERROR = 1
- int INVALID_PARAMETER = 2
- int ACCESS_DENIED = 3
- int INVALID_SIGNATURE = 4
- int NO_LOOKUP_RESULTS = 5
- int UNSUPPORTED_MODE = 6

12.32.1 Detailed Description

```
JSON RPC error code values:

0 - SUCCESS

1 - UNKNOWN_ERROR

2 - INVALID_PARAMETER format or value

3 - ACCESS_DENIED

4 - INVALID_SIGNATURE

5 - NO_LOOKUP_RESULTS no more lookup results remaining

6 - UNSUPPORTED_MODE (e.g. synchronous, asynchronous, poll, or notification)

-32768 to -32000 - reserved for pre-defined errors in the JSON RPC spec.

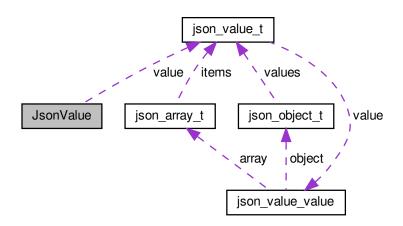
From EEA spec 4.1.1.
```

The documentation for this class was generated from the following file:

/home/dano/git/avalon/sdk/avalon_sdk/connector/direct/jrpc/jrpc_util.py

12.33 JsonValue Class Reference

Collaboration diagram for JsonValue:



Public Member Functions

- JsonValue (JSON_Value *value=nullptr)
- operator JSON_Value * ()
- operator const JSON_Value * () const

Public Attributes

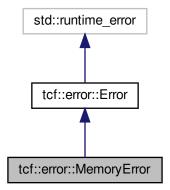
• JSON_Value * value

The documentation for this class was generated from the following file:

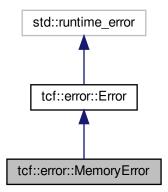
• /home/dano/git/avalon/common/cpp/jsonvalue.h

12.34 tcf::error::MemoryError Class Reference

Inheritance diagram for tcf::error::MemoryError:



Collaboration diagram for tcf::error::MemoryError:



Public Member Functions

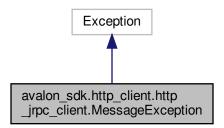
• MemoryError (const std::string &msg)

The documentation for this class was generated from the following file:

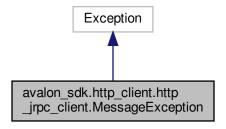
• /home/dano/git/avalon/common/cpp/error.h

12.35 avalon_sdk.http_client.http_jrpc_client.MessageException Class Reference

Inheritance diagram for avalon_sdk.http_client.http_jrpc_client.MessageException:



Collaboration diagram for avalon_sdk.http_client.http_jrpc_client.MessageException:



12.35.1 Detailed Description

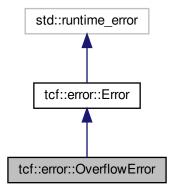
 $\ensuremath{\mathtt{A}}$ class to capture communication exceptions when communicating with services.

The documentation for this class was generated from the following file:

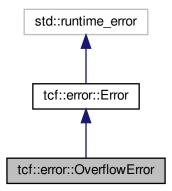
/home/dano/git/avalon/sdk/avalon_sdk/http_client/http_jrpc_client.py

12.36 tcf::error::OverflowError Class Reference

Inheritance diagram for tcf::error::OverflowError:



Collaboration diagram for tcf::error::OverflowError:



Public Member Functions

• OverflowError (const std::string &msg)

The documentation for this class was generated from the following file:

• /home/dano/git/avalon/common/cpp/error.h

12.37 tcf::crypto::pkenc::PrivateKey Class Reference

Public Member Functions

- PrivateKey (const PrivateKey &privateKey)
- **PrivateKey** (PrivateKey &&privateKey)
- **PrivateKey** (const std::string &encoded)
- PrivateKey & operator= (const PrivateKey &privateKey)
- void Deserialize (const std::string &encoded)
- void Generate ()
- PublicKey GetPublicKey () const
- · std::string Serialize () const
- ByteArray DecryptMessage (const ByteArray &ct) const

The documentation for this class was generated from the following files:

- /home/dano/git/avalon/common/cpp/crypto/pkenc_private_key.h
- /home/dano/git/avalon/common/cpp/crypto/pkenc_private_key.cpp

12.38 tcf::crypto::sig::PrivateKey Class Reference

Public Member Functions

- PrivateKey (const PrivateKey &privateKey)
- PrivateKey (PrivateKey &&privateKey)
- PrivateKey (const std::string &encoded)
- PrivateKey & operator= (const PrivateKey &privateKey)
- · void Deserialize (const std::string &encoded)
- · void Generate ()
- PublicKey GetPublicKey () const
- std::string Serialize () const
- ByteArray SignMessage (const ByteArray &hashMessage) const

The documentation for this class was generated from the following files:

- /home/dano/git/avalon/common/cpp/crypto/sig_private_key.h
- /home/dano/git/avalon/common/cpp/crypto/sig private key.cpp

12.39 tcf::crypto::sig::PublicKey Class Reference

Public Member Functions

- PublicKey (const PublicKey &publicKey)
- PublicKey (PublicKey &&publicKey)
- PublicKey (const PrivateKey &privateKey)
- PublicKey (const std::string &encoded)
- PublicKey & operator= (const PublicKey &publicKey)
- void Deserialize (const std::string &encoded)
- std::string Serialize () const
- · std::string SerializeXYToHex () const
- void DeserializeXYFromHex (const std::string &hexXY)
- int VerifySignature (const ByteArray &hashMessage, const ByteArray &signature) const

The documentation for this class was generated from the following files:

- /home/dano/git/avalon/common/cpp/crypto/sig_public_key.h
- /home/dano/git/avalon/common/cpp/crypto/sig_public_key.cpp

12.40 tcf::crypto::pkenc::PublicKey Class Reference

Public Member Functions

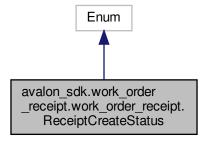
- PublicKey (const PublicKey &publicKey)
- PublicKey (PublicKey &&publicKey)
- PublicKey (const PrivateKey &privateKey)
- PublicKey (const std::string &encoded)
- PublicKey & operator= (const PublicKey &publicKey)
- · void Deserialize (const std::string &encoded)
- std::string Serialize () const
- ByteArray EncryptMessage (const ByteArray &message) const

The documentation for this class was generated from the following files:

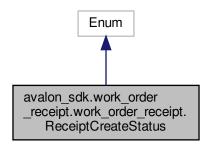
- /home/dano/git/avalon/common/cpp/crypto/pkenc public key.h
- /home/dano/git/avalon/common/cpp/crypto/pkenc_public_key.cpp

12.41 avalon_sdk.work_order_receipt.work_order_receipt.ReceiptCreateStatus Class Reference

Inheritance diagram for avalon_sdk.work_order_receipt.work_order_receipt.ReceiptCreateStatus:



Collaboration diagram for avalon_sdk.work_order_receipt.work_order_receipt.ReceiptCreateStatus:



Static Public Attributes

- int **PENDING** = 0
- int COMPLETED = 1
- int PROCESSED = 2
- int **FAILED** = 3
- int **REJECTED** = 4

12.41.1 Detailed Description

```
Receipt creation status values:

0 - PENDING. The work order is waiting to be processed by the worker

1 - COMPLETED. The worker processed the Work Order and no more worker updates are expected

2 - PROCESSED. The worker processed the Work Order, but additional worker updates are expected, e.g. oracle notifications

3 - FAILED. The Work Order processing failed, e.g. by the worker service because of an invalid workerId

4 - REJECTED. The Work Order is rejected by the smart contract, e.g. invalid workerServiceId

5 to 254 - reserved

255 - indicates any status

>255 - application-specific values

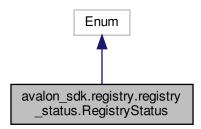
Defined in EEA spec 7.1.
```

The documentation for this class was generated from the following file:

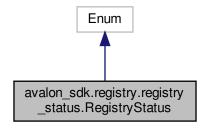
/home/dano/git/avalon/sdk/avalon_sdk/work_order_receipt/work_order_receipt.py

12.42 avalon_sdk.registry.registry_status.RegistryStatus Class Reference

Inheritance diagram for avalon_sdk.registry.registry_status.RegistryStatus:



Collaboration diagram for avalon_sdk.registry.registry_status.RegistryStatus:



Static Public Attributes

- int ACTIVE = 1
- int **OFF_LINE** = 2
- int **DECOMMISSIONED** = 3

12.42.1 Detailed Description

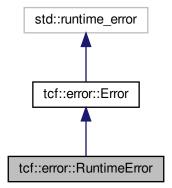
```
Worker registry status values:
1 - registry is ACTIVE
2 - registry is temporarily OFF_LINE
3 - registry is DECOMMISSIONED
From EEA spec 5.2.
```

The documentation for this class was generated from the following file:

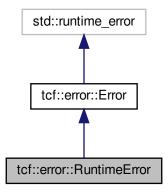
/home/dano/git/avalon/sdk/avalon_sdk/registry/registry_status.py

12.43 tcf::error::RuntimeError Class Reference

Inheritance diagram for tcf::error::RuntimeError:



Collaboration diagram for tcf::error::RuntimeError:



Public Member Functions

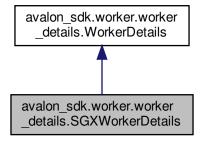
• RuntimeError (const std::string &msg)

The documentation for this class was generated from the following file:

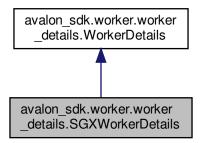
• /home/dano/git/avalon/common/cpp/error.h

12.44 avalon_sdk.worker.worker_details.SGXWorkerDetails Class Reference

Inheritance diagram for avalon_sdk.worker.worker_details.SGXWorkerDetails:



Collaboration diagram for avalon_sdk.worker.worker_details.SGXWorkerDetails:



Public Member Functions

- def __init__ (self)
- def load_worker (self, worker_data)

Public Attributes

- · verification_key
- · extended_measurements
- proof_data_type
- · proof_data
- · encryption_key
- encryption_key_nonce
- · encryption_key_signature

- · enclave_certificate
- · worker_id
- · hashing_algorithm
- · signing_algorithm
- · key_encryption_algorithm
- · data_encryption_algorithm

12.44.1 Detailed Description

```
Contains Intel SGX TEE worker type data.
```

12.44.2 Member Function Documentation

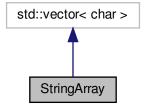
12.44.2.1 load_worker()

The documentation for this class was generated from the following file:

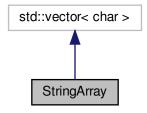
/home/dano/git/avalon/sdk/avalon_sdk/worker/worker_details.py

12.45 StringArray Class Reference

Inheritance diagram for StringArray:



Collaboration diagram for StringArray:



Public Member Functions

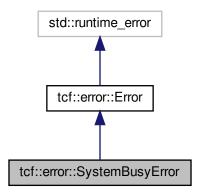
- StringArray (const std::string &value)
- StringArray (const size_t size)
- void assign (const std::string &value)
- std::string str ()

The documentation for this class was generated from the following file:

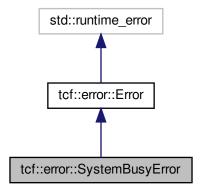
• /home/dano/git/avalon/common/cpp/types.h

12.46 tcf::error::SystemBusyError Class Reference

Inheritance diagram for tcf::error::SystemBusyError:



Collaboration diagram for tcf::error::SystemBusyError:



Public Member Functions

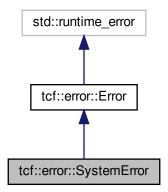
• SystemBusyError (const std::string &msg)

The documentation for this class was generated from the following file:

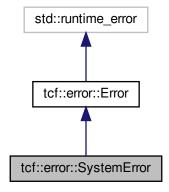
• /home/dano/git/avalon/common/cpp/error.h

12.47 tcf::error::SystemError Class Reference

Inheritance diagram for tcf::error::SystemError:



Collaboration diagram for tcf::error::SystemError:



Public Member Functions

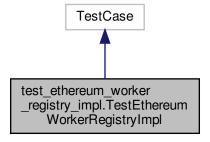
• SystemError (const std::string &msg)

The documentation for this class was generated from the following file:

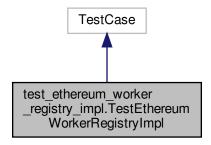
• /home/dano/git/avalon/common/cpp/error.h

12.48 test_ethereum_worker_registry_impl.TestEthereumWorkerRegistryImpl Class Reference

 $Inheritance\ diagram\ for\ test_ethereum_worker_registry_impl. TestEthereumWorkerRegistryImpl:$



Collaboration diagram for test_ethereum_worker_registry_impl.TestEthereumWorkerRegistryImpl:



Public Member Functions

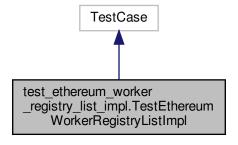
- def __init__ (self, config_file)
- def test_worker_register (self)
- def test_worker_set_status (self)
- def test_worker_update (self)
- def test_worker_lookup (self)
- def test_worker_retrieve (self)
- def test_worker_lookup_next (self)

The documentation for this class was generated from the following file:

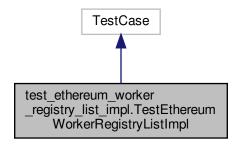
/home/dano/git/avalon/sdk/avalon_sdk/connector/blockchains/ethereum/unit_tests/test_ethereum_worker
 —registry_impl.py

12.49 test_ethereum_worker_registry_list_impl.TestEthereumWorkerRegistryListImpl Class Reference

Inheritance diagram for test ethereum worker registry list impl.TestEthereumWorkerRegistryListImpl:



Collaboration diagram for test_ethereum_worker_registry_list_impl.TestEthereumWorkerRegistryListImpl:



Public Member Functions

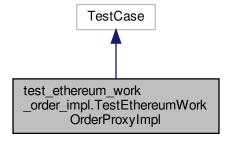
- def __init__ (self, config_file)
- def test_registry_add (self)
- def test_registry_update (self)
- def test_registry_set_status (self)
- def test_registry_lookup (self)
- def test_registry_retrieve (self)
- def test_registry_lookup_next (self)

The documentation for this class was generated from the following file:

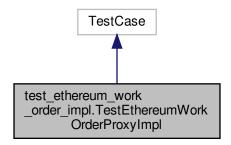
/home/dano/git/avalon/sdk/avalon_sdk/connector/blockchains/ethereum/unit_tests/test_ethereum_worker
 —registry_list_impl.py

12.50 test_ethereum_work_order_impl.TestEthereumWorkOrderProxyImpl Class Reference

Inheritance diagram for test ethereum work order impl.TestEthereumWorkOrderProxyImpl:



Collaboration diagram for test_ethereum_work_order_impl.TestEthereumWorkOrderProxyImpl:



Public Member Functions

- def __init__ (self, config_file)
- def test_work_order_submit_positive (self)
- def test_work_order_submit_mismatch (self)
- def test_work_order_get_result (self)
- def test_work_order_complete (self)
- def test_work_order_complete_error (self)
- def test_is_wo_id_in_event_positive (self)
- def test_is_wo_id_in_event_wo_id_not_matched (self)
- def test_is_wo_id_in_event_error_result (self)
- def test_is_wo_id_in_event_no_wo_id (self)
- def test_is_valid_work_order_json (self)

12.50.1 Member Function Documentation

12.50.1.1 test_is_wo_id_in_event_error_result()

```
\label{lem:condition} $\operatorname{def test\_ethereum_work\_order\_impl.TestEthereumWorkOrderProxyImpl.test\_is\_wo\_id\_in\_event\_} \leftrightarrow $\operatorname{error\_result} \ ($\operatorname{\it self} \ )$
```

This case mocks an event and verifies the wo_id_in_event function for a positive result. The event has an error response from work order execution.

12.50.1.2 test_is_wo_id_in_event_positive()

12.50.1.3 test_is_wo_id_in_event_wo_id_not_matched()

for a negative result. The wo_id does not match.

```
\label{lem:condition} $\operatorname{def test\_ethereum\_work\_order\_impl.TestEthereumWorkOrderProxyImpl.test\_is\_wo\_id\_in\_event\_wo\_\leftrightarrow id\_not\_matched ( $\operatorname{\it self}$ ) $$ This case mocks an event and verifies the wo\_id\_in\_event function $$ \operatorname{\it self}$ is $\operatorname{\it self}$ and $\operatorname{\it verifies}$ is $\operatorname{\it self}$ is $\operatorname{\it
```

12.50.1.4 test_work_order_complete()

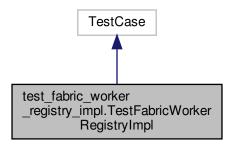
```
\label{lem:complete} $$ \  \  \, def test\_ethereum\_work\_order\_impl.TestEthereumWorkOrderProxyImpl.test\_work\_order\_complete ( $self )$$ $$ \  \  \, self )$$ This function verifies if work order complete function succeeds when the in work order execution is done.
```

12.50.1.5 test work order complete error()

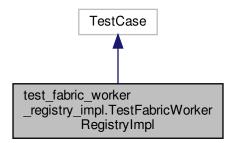
The documentation for this class was generated from the following file:

12.51 test_fabric_worker_registry_impl.TestFabricWorkerRegistryImpl Class Reference

Inheritance diagram for test_fabric_worker_registry_impl.TestFabricWorkerRegistryImpl:



Collaboration diagram for test_fabric_worker_registry_impl.TestFabricWorkerRegistryImpl:



Public Member Functions

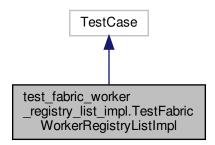
- def __init__ (self, config_file)
- def test_worker_register (self)
- def test_worker_set_status (self)
- def test worker update (self)
- def test_worker_lookup (self)
- def test_worker_retrieve (self)
- def test_worker_lookup_next (self)

The documentation for this class was generated from the following file:

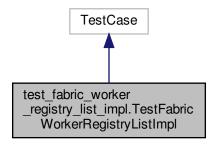
/home/dano/git/avalon/sdk/avalon_sdk/connector/blockchains/fabric/unit_tests/test_fabric_worker_registry
 — impl.py

12.52 test_fabric_worker_registry_list_impl.TestFabricWorkerRegistryListImpl Class Reference

Inheritance diagram for test_fabric_worker_registry_list_impl.TestFabricWorkerRegistryListImpl:



Collaboration diagram for test_fabric_worker_registry_list_impl.TestFabricWorkerRegistryListImpl:



Public Member Functions

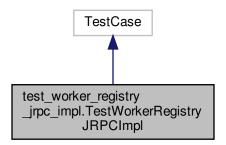
- def __init__ (self, config_file)
- def test_registry_add (self)
- def test_registry_update (self)
- def test_registry_set_status (self)
- def test_registry_lookup (self)
- def test_registry_retrieve (self)
- def test_registry_lookup_next (self)

The documentation for this class was generated from the following file:

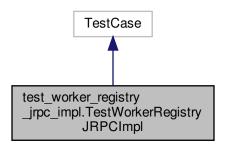
/home/dano/git/avalon/sdk/avalon_sdk/connector/blockchains/fabric/unit_tests/test_fabric_worker_registry
 — list_impl.py

12.53 test_worker_registry_irpc_impl.TestWorkerRegistryJRPCImpl Class Reference

 $Inheritance\ diagram\ for\ test_worker_registry_jrpc_impl. TestWorkerRegistryJRPCImpl:$



Collaboration diagram for test_worker_registry_jrpc_impl.TestWorkerRegistryJRPCImpl:



Public Member Functions

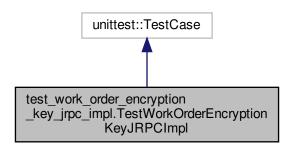
- def __init__ (self, config_file)
- def test_worker_register (self)
- def test_worker_update (self)
- def test_worker_set_status (self)
- def test_worker_retrieve (self)
- def test_worker_lookup (self)
- def test_worker_lookup_next (self)

The documentation for this class was generated from the following file:

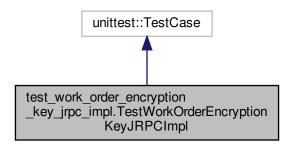
• /home/dano/git/avalon/sdk/avalon_sdk/connector/direct/jrpc/unit_tests/test_worker_registry_jrpc_impl.py

12.54 test_work_order_encryption_key_jrpc_impl.TestWorkOrderEncryptionKeyJRPC Impl Class Reference

Inheritance diagram for test_work_order_encryption_key_jrpc_impl.TestWorkOrderEncryptionKeyJRPCImpl:



Collaboration diagram for test_work_order_encryption_key_jrpc_impl.TestWorkOrderEncryptionKeyJRPCImpl:



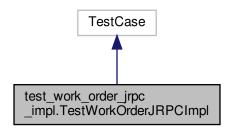
Public Member Functions

- def __init__ (self, config_file)
- def test_encryption_key_get (self)
- def test_encryption_key_set (self)

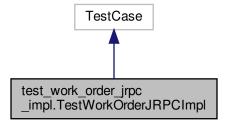
The documentation for this class was generated from the following file:

12.55 test_work_order_irpc_impl.TestWorkOrderJRPCImpl Class Reference

Inheritance diagram for test_work_order_jrpc_impl.TestWorkOrderJRPCImpl:



Collaboration diagram for test_work_order_jrpc_impl.TestWorkOrderJRPCImpl:



Public Member Functions

- def __init__ (self, config_file)
- def test_work_order_submit (self)
- def test_work_order_get_result (self)

The documentation for this class was generated from the following file:

/home/dano/git/avalon/sdk/avalon_sdk/connector/direct/jrpc/unit_tests/test_work_order_jrpc_impl.py

12.56 tcf::utility::Timer Class Reference

Public Member Functions

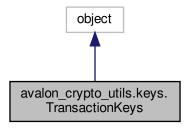
• Timer (const std::string &key)

The documentation for this class was generated from the following file:

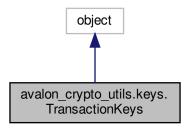
/home/dano/git/avalon/common/cpp/timer.h

12.57 avalon_crypto_utils.keys.TransactionKeys Class Reference

Inheritance diagram for avalon_crypto_utils.keys.TransactionKeys:



Collaboration diagram for avalon_crypto_utils.keys.TransactionKeys:



Public Member Functions

- def __init__ (self)
- def hashed_identity (self)
- def txn_private (self)
- def txn_public (self)

Public Attributes

- · private_key
- public_key

12.57.1 Detailed Description

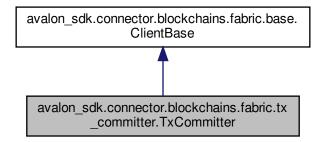
Wrapper for managing Avalon transaction keys

The documentation for this class was generated from the following file:

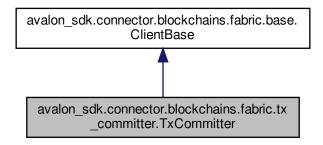
/home/dano/git/avalon/common/crypto_utils/avalon_crypto_utils/keys.py

12.58 avalon_sdk.connector.blockchains.fabric.tx_committer.TxCommitter Class Reference

Inheritance diagram for avalon_sdk.connector.blockchains.fabric.tx_committer.TxCommitter:



 $Collaboration\ diagram\ for\ avalon_sdk.connector.blockchains.fabric.tx_committer.TxCommitter:$



Public Member Functions

- def cc_invoke (self, args, cc_name, fcn, cc_version, queryonly=False)
- def cc_query (self, args, cc_name, fcn)

Additional Inherited Members

12.58.1 Detailed Description

```
Utility class to invoke Fabric chain code and query chain code. % \left( 1\right) =\left( 1\right) \left( 1\right)
```

12.58.2 Member Function Documentation

```
12.58.2.1 cc_invoke()
```

```
def avalon_sdk.connector.blockchains.fabric.tx_committer.TxCommitter.cc_invoke (
             self,
             args,
             cc_name,
             fcn.
             cc_version,
              queryonly = False)
Invoke a chaincode method.
Parameters:
       JSON RPC serialized data used as the
  sole parameter to invoke the chaincode
cc_name chaincode name
          chaincode function name to be invoked
cc_version chaincode version to be used
queryonly If the invocation does not result in ledger change,
  queryonly should be set to True.
   If the invocation does result in ledger change, it should
  be set to False.
```

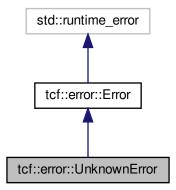
12.58.2.2 cc_query()

The documentation for this class was generated from the following file:

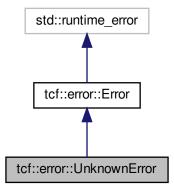
/home/dano/git/avalon/sdk/avalon_sdk/connector/blockchains/fabric/tx_committer.py

12.59 tcf::error::UnknownError Class Reference

Inheritance diagram for tcf::error::UnknownError:



Collaboration diagram for tcf::error::UnknownError:



Public Member Functions

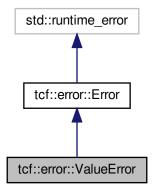
• UnknownError (const std::string &msg)

The documentation for this class was generated from the following file:

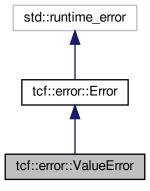
• /home/dano/git/avalon/common/cpp/error.h

12.60 tcf::error::ValueError Class Reference

Inheritance diagram for tcf::error::ValueError:



Collaboration diagram for tcf::error::ValueError:



Public Member Functions

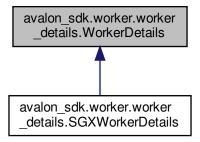
• ValueError (const std::string &msg)

The documentation for this class was generated from the following file:

• /home/dano/git/avalon/common/cpp/error.h

12.61 avalon_sdk.worker.worker_details.WorkerDetails Class Reference

Inheritance diagram for avalon_sdk.worker.worker_details.WorkerDetails:



Public Member Functions

- def __init__ (self)
- def validate_worker_details (self, details)

Public Attributes

- work_order_sync_uri
- · work_order_async_uri
- · work order pull uri
- work_order_notify_ri
- receipt_invocation_uri
- · work_oder_invocation_address
- · receipt_invocation_address
- · from address
- hashing_algorithm
- signing_algorithm
- · key_encryption_algorithm
- · data_encryption_algorithm
- work_order_payload_formats

12.61.1 Detailed Description

Class to store the worker details

12.61.2 Constructor & Destructor Documentation

12.61.3 Member Function Documentation

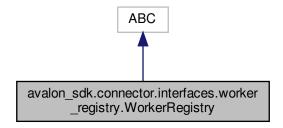
12.61.3.1 validate_worker_details()

The documentation for this class was generated from the following file:

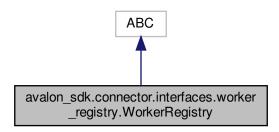
/home/dano/git/avalon/sdk/avalon_sdk/worker/worker_details.py

12.62 avalon_sdk.connector.interfaces.worker_registry.WorkerRegistry Class Reference

Inheritance diagram for avalon_sdk.connector.interfaces.worker_registry.WorkerRegistry:



Collaboration diagram for avalon_sdk.connector.interfaces.worker_registry.WorkerRegistry:



Public Member Functions

- def __init__ (self)
- def worker_retrieve (self, worker_id, id=None)
- def worker_lookup (self, worker_type, organization_id, application_type_id, id=None)
- def worker_lookup_next (self, worker_type, organization_id, application_type_id, lookup_tag, id=None)
- def worker_register (self, worker_id, worker_type, organization_id, application_type_ids, details, id=None)
- def worker_update (self, worker_id, details, id=None)
- def worker_set_status (self, worker_id, status, id=None)

12.62.1 Detailed Description

This class is an abstract base class containing abstract APIs which can be called from client to manage workers.

12.62.2 Member Function Documentation

12.62.2.1 worker_lookup()

Lookup a worker identified worker_type, organization, and

All fields are optional and, if present, condition should match for

application id.

```
all fields. If none are passed it should return all workers.
If the list is too large to fit into a single response (the \max
number of entries in a single response is implementation specific),
the smart contract should return the first batch of the results
and provide a lookupTag that can be used by the caller to
retrieve the next batch by calling worker_lookup_next.
Parameters:
               Optional characteristic of workers for which you may
worker_type
        wish to search
organization_id Optional organization ID that can be used to search
        for one or more workers that belong to this
        organization
application_id Optional application type ID that is supported by
        the worker
               Optional JSON RPC request ID
Returns:
Tuple containing workers count, lookup tag, and list of
worker IDs:
total_count Total number of entries matching a specified
    lookup criteria. If this number is larger than the
    size of the IDs array, the caller should use
    lookupTag to call worker_lookup_next to retrieve
    the rest of the IDs
lookup_tag Optional parameter. If it is returned, it means
    that there are more matching worker IDs, which can then
    be retrieved by calling function worker_lookup_next
    with this tag as an input parameter
           Array of the worker IDs that match the input parameters
On error returns None.
12.62.2.2 worker_lookup_next()
def avalon_sdk.connector.interfaces.worker_registry.WorkerRegistry.worker_lookup_next (
              self.
              worker_type,
              organization_id,
              application_type_id,
              lookup_tag,
              id = None)
Retrieve additional worker lookup results after calling worker_lookup.
Parameters:
                   Characteristic of Workers for which you may wish
worker_type
           to search.
organization_id
                   Organization ID to which a Worker belongs
application_id
                   Optional application type ID that is
            supported by the worker
lookup_tag
                   is returned by a previous call to either this
            function or to worker_lookup
id
                    Optional Optional JSON RPC request ID
Tuple containing the following:
total_count Total number of entries matching this lookup
      criteria. If this number is larger than the number
```

```
of IDs returned so far, the caller should use
      lookupTag to call worker_lookup_next to retrieve
      the rest of the IDs
new_lookup_tag Optional parameter. If it is returned, it
      means that there are more matching worker IDs that
      can be retrieved by calling this function again with
      this tag as an input parameter
ids
              Array of the worker IDs that match the input parameters
On error returns None.
12.62.2.3 worker_register()
def avalon_sdk.connector.interfaces.worker_registry.WorkerRegistry.worker_register (
             self,
             worker_id,
             worker_type,
             organization_id,
             application_type_ids,
             details,
             id = None)
Register a new worker with details of the worker.
Parameters:
              Worker ID value. E.g., a Fabric address
worker_id
       or Ethereum DID
* "TEE-SGX": an Intel SGX Trusted Execution
         Environment
        * "MPC": Multi-Party Compute
        * "ZK": Zero-Knowledge
organization_id Optional parameter representing the
       organization that hosts the Worker,
        e.g. a bank in the consortium or
       anonymous entity
application_ids Optional parameter that defines
       application types supported by the Worker
details
               Detailed information about the worker in
       {\tt JSON} RPC format as defined in
https://entethalliance.github.io/trusted-computing/spec.html
#common-data-for-all-worker-types
id
               Optional Optional JSON RPC request ID
Returns:
ContractResponse.SUCCESS on success or
ContractResponse.ERROR on error.
12.62.2.4 worker_retrieve()
def avalon_sdk.connector.interfaces.worker_registry.WorkerRegistry.worker_retrieve (
             self.
             worker_id,
             id = None)
```

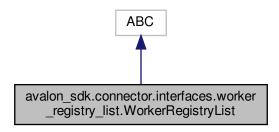
```
Retrieve worker identified by worker ID.
Parameters:
worker_id Worker ID of the registry whose details are requested
           Optional JSON RPC request ID
Returns:
Tuple containing worker status (defined in worker_set_status),
worker type, organization ID, list of application IDs, and worker
details (JSON RPC string).
On error returns None.
12.62.2.5 worker_set_status()
def avalon_sdk.connector.interfaces.worker_registry.WorkerRegistry.worker_set_status (
              self,
              worker_id,
              status,
              id = None)
Set the registry status identified by worker ID
Parameters:
worker_id Worker ID value. E.g., a Fabric address
 or Ethereum DID
status
         Worker status. The currently defined values are:
  1 - worker is active
  2 - worker is temporarily "off-line"
  3 - worker is decommissioned
  4 - worker is compromised
         Optional Optional JSON RPC request ID
id
Returns:
ContractResponse.SUCCESS on success
or ContractResponse.ERROR on error.
12.62.2.6 worker update()
def avalon_sdk.connector.interfaces.worker_registry.WorkerRegistry.worker_update (
              self,
              worker_id,
              details.
              id = None)
Update a worker with details data.
Parameters:
worker_id Worker ID
details Detailed information about the worker in JSON format
          Optional Optional JSON RPC request ID
Returns:
ContractResponse.SUCCESS on success
or ContractResponse.ERROR on error.
```

The documentation for this class was generated from the following file:

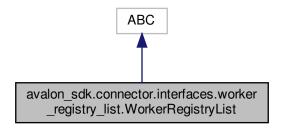
/home/dano/git/avalon/sdk/avalon_sdk/connector/interfaces/worker_registry.py

12.63 avalon_sdk.connector.interfaces.worker_registry_list.WorkerRegistryList Class Reference

Inheritance diagram for avalon_sdk.connector.interfaces.worker_registry_list.WorkerRegistryList:



Collaboration diagram for avalon sdk.connector.interfaces.worker registry list.WorkerRegistryList:



Public Member Functions

- def __init__ (self)
- def registry_retrieve (self, organization_id)
- def registry_lookup (self, application_type_id)
- def registry_lookup_next (self, application_type_id, lookup_tag)
- def registry_add (self, organization_id, uri, sc_addr, application_type_ids)
- def registry_update (self, organization_id, uri, sc_addr, application_type_ids)
- def registry_set_status (self, organization_id, status)

12.63.1 Detailed Description

This is an abstract base class to read/write the worker registries, which can be called by client.

12.63.2 Member Function Documentation

```
12.63.2.1 registry_add()
def avalon_sdk.connector.interfaces.worker_registry_list.WorkerRegistryList.registry_add (
              self,
              organization_id,
              uri,
              sc_addr,
              application_type_ids )
Add a new registry.
Parameters:
organization_id
                    bytes[] identifies organization that hosts the
             registry, e.g. a bank in the consortium or an
             anonymous entity
uri
                    String defines a URI for this registry that
             supports the Off-Chain Worker Registry
             JSON RPC API.
sc_addr
                    bytes[] defines an smart contract address that
             runs the Worker Registry Smart Contract API
             smart contract for this registry
application_type_ids []bytes[] is an optional parameter that defines
             application types supported by the worker
             managed by the registry
Returns:
Transaction receipt on success or None on error.
12.63.2.2 registry_lookup()
def avalon_sdk.connector.interfaces.worker_registry_list.WorkerRegistryList.registry_lookup (
              self.
              application_type_id )
Registry Lookup identified by application type ID
Parameters:
application_type_id Application type ID to lookup in the registry
Tuple containing totalCount, lookupTag, and ids on success:
totalCount Total number of entries matching a specified lookup
   criteria. If this number is larger than the size of the
   ids array, the caller should use the lookupTag to call
   registry_lookup_next to retrieve the rest of the IDs
lookupTag Optional parameter. If it is returned, it means that
  there are more matching registry IDs that can be
   retrieved by calling the function registry_lookup_next
   with this tag as an input parameter.
          Array of the registry organization ids that match the
   input parameters.
Returns None on error.
```

12.63.2.3 registry_lookup_next()

```
\tt def \ avalon\_sdk.connector.interfaces.worker\_registry\_list.WorkerRegistryList.registry\_lookup\_{\leftarrow}
             self,
             application_type_id,
             lookup_tag )
This function is called to retrieve additional results of the
Registry lookup initiated by the registry_lookUp call.
Parameters:
                    Application type that has to be
application_type_id
             supported by the workers retrieved
                    Returned by a previous call to either this
lookup_tag
              function or to registry_lookup
Returns:
Outputs tuple on success containing the following:
criteria. If this number is larger than the number
      of IDs returned so far, the caller should use
       lookup_tag to call registry_lookup_next to
      retrieve the rest of the IDs
new_lookup_tag Optional parameter. If it is returned, it means
      that there are more matching registry IDs that
      can be retrieved by calling this function again
      with this tag as an input parameter
ids
              Array of the registry IDs that match the input
      parameters
Returns None on error.
12.63.2.4 registry_retrieve()
def avalon_sdk.connector.interfaces.worker_registry_list.WorkerRegistryList.registry_retrieve
```

```
self,
              organization_id )
Retrieve registry information identified by the organization ID.
Parameters:
organization_id
                   Organization ID to lookup
Returns:
Tuple containing following on success:
                    String defines a URI for this registry that
            supports the Off-Chain Worker Registry JSON RPC
            API. It will be None for the proxy model
sc_addr
                    smart contract address for worker registry
            smart contract address
application_type_ids List of application ids (array of byte[])
status
                    Status of the registry
```

Returns None on error.

12.63.2.5 registry_set_status()

```
\tt def\ avalon\_sdk.connector.interfaces.worker\_registry\_list.WorkerRegistryList.registry\_set\_{\leftarrow} \\
status (
              self,
              organization_id,
               status )
Set registry status.
Parameters:
organization_id bytes[] identifies organization that hosts the
        registry, e.g. a bank in the consortium or an \,
        anonymous entity
                Defines the registry status to set.
status
        The currently defined values are:
        1 - the registry is active
        2 - the registry is temporarily "off-line"
        3 - the registry is decommissioned
Returns:
Transaction receipt on success or None on error.
```

12.63.2.6 registry_update()

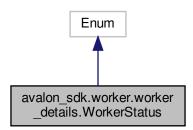
```
def avalon_sdk.connector.interfaces.worker_registry_list.WorkerRegistryList.registry_update (
              self,
              organization_id,
              uri,
              sc_addr,
              application_type_ids )
Update a registry.
Parameters:
organization_id
                    bytes[] identifies organization that hosts the
             registry, e.g. a bank in the consortium or an
             anonymous entity
                     string defines a URI for this registry that
uri
             supports the Off-Chain Worker Registry
             JSON RPC API
                     bytes[] defines an smart contract address that
sc addr
             runs a Worker Registry Smart Contract API
             smart contract for this registry
{\tt application\_type\_ids~[]bytes[]} \  \, {\tt is~an~optional~parameter~that~defines}
             application types supported by the worker
             managed by the registry
Transaction receipt on success or None on error.
```

The documentation for this class was generated from the following file:

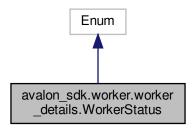
• /home/dano/git/avalon/sdk/avalon_sdk/connector/interfaces/worker_registry_list.py

12.64 avalon_sdk.worker.worker_details.WorkerStatus Class Reference

Inheritance diagram for avalon_sdk.worker.worker_details.WorkerStatus:



Collaboration diagram for avalon sdk.worker.worker details.WorkerStatus:



Static Public Attributes

- int ACTIVE = 1
- int **OFF_LINE** = 2
- int **DECOMMISSIONED** = 3
- int **COMPROMISED** = 4

12.64.1 Detailed Description

```
Worker status values:
1 - worker is ACTIVE
2 - worker is temporarily OFF_LINE
3 - worker is DECOMMISSIONED
4 - worker is COMPROMISED
```

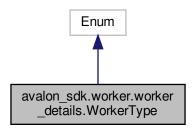
The documentation for this class was generated from the following file:

/home/dano/git/avalon/sdk/avalon_sdk/worker/worker_details.py

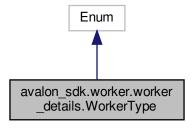
From EEA spec 5.2.

12.65 avalon_sdk.worker.worker_details.WorkerType Class Reference

Inheritance diagram for avalon_sdk.worker.worker_details.WorkerType:



Collaboration diagram for avalon_sdk.worker.worker_details.WorkerType:



Static Public Attributes

- int TEE_SGX = 1
- int **MPC** = 2
- int **ZK** = 3

12.65.1 Detailed Description

```
Worker types are:

1 = TEE-SGX: Intel SGX Trusted Execution Environment (hardware based)

2 = MPC: Trusted Multi-Party Compute (software/hardware based)

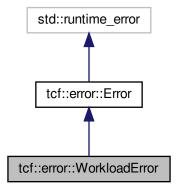
3 = ZK: Zero-knowledge proofs (software based)
```

The documentation for this class was generated from the following file:

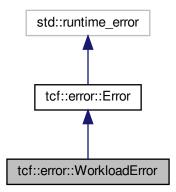
/home/dano/git/avalon/sdk/avalon_sdk/worker/worker_details.py

12.66 tcf::error::WorkloadError Class Reference

Inheritance diagram for tcf::error::WorkloadError:



Collaboration diagram for tcf::error::WorkloadError:



Public Member Functions

• WorkloadError (const std::string &msg)

The documentation for this class was generated from the following file:

• /home/dano/git/avalon/common/cpp/error.h

12.67 WorkloadProcessor Class Reference

```
#include <workload_processor.h>
```

Public Member Functions

- virtual WorkloadProcessor * Clone () const =0
- virtual void ProcessWorkOrder (std::string workload_id, const ByteArray &requester_id, const ByteArray &worker_id, const ByteArray &work_order_id, const std::vector< tcf::WorkOrderData > &in_work_order← _data, std::vector< tcf::WorkOrderData > &out_work_order_data)=0

Static Public Member Functions

- static WorkloadProcessor * CreateWorkloadProcessor (std::string workload_id)
- static WorkloadProcessor * RegisterWorkloadProcessor (std::string workload_id, WorkloadProcessor *processor)

Static Public Attributes

static std::map< std::string, WorkloadProcessor * > workload_processor_table

12.67.1 Detailed Description

Class to register, create, and process a workload.

12.67.2 Member Function Documentation

```
12.67.2.1 Clone()

virtual WorkloadProcessor* WorkloadProcessor::Clone ( ) const [pure virtual]

Clone a WorkloadProcessor

12.67.2.2 CreateWorkloadProcessor()
```

Create a WorkloadProcessor

Parameters

| workload⊷ | Workload identifier |
|-----------|---------------------|
| _id | |

Returns

Pointer to WorkloadProcessor

12.67.2.3 ProcessWorkOrder()

```
virtual void WorkloadProcessor::ProcessWorkOrder (
    std::string workload_id,
    const ByteArray & requester_id,
    const ByteArray & worker_id,
    const ByteArray & work_order_id,
    const std::vector< tcf::WorkOrderData > & in_work_order_data,
    std::vector< tcf::WorkOrderData > & out_work_order_data ) [pure virtual]
```

Process the workload.

Parameters

| workload_id | Workload identifier string |
|---------------------|--|
| requester_id | Requester ID to identify who submitted work order |
| worker_id | Worker ID, a unique string identifying this type of work order processor |
| work_order_id | Unique work order ID for this type of work order processor |
| in_work_order_data | Work order data input submitted to the work order processor |
| out_work_order_data | Work order data returned by the work order processor |

12.67.2.4 RegisterWorkloadProcessor()

Register a Workload Processor. Used by the workloads to register themselves

Parameters

| workload↔ | Workload identifier |
|-----------|---------------------|
| _id | |

Returns

Pointer to WorkloadProcessor

12.67.3 Member Data Documentation

12.67.3.1 workload_processor_table

std::map< std::string, WorkloadProcessor * > WorkloadProcessor::workload_processor_table [static]

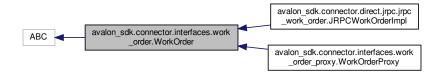
Mapping between workload id and WorkloadProcessor.

The documentation for this class was generated from the following files:

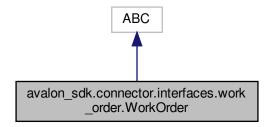
- /home/dano/git/avalon/common/sgx_workload/workload/workload_processor.h
- /home/dano/git/avalon/common/sgx_workload/workload/workload_processor.cpp

12.68 avalon sdk.connector.interfaces.work order.WorkOrder Class Reference

Inheritance diagram for avalon_sdk.connector.interfaces.work_order.WorkOrder:



 $Collaboration\ diagram\ for\ avalon_sdk. connector. interfaces. work_order. Work Order:$



Public Member Functions

- · def __init__ (self)
- def work_order_submit (self, work_order_id, worker_id, requester_id, work_order_request, id=None)
- def work_order_get_result (self, work_order_id, id=None)
- def encryption_key_get (self, worker_id, requester_id, last_used_key_nonce=None, tag=None, signature_←
 nonce=None, signature=None, id=None)
- def encryption_key_set (self, worker_id, encryption_key, encryption_nonce, tag, signature, id=None)

12.68.1 Detailed Description

```
This class is an abstract base class that contains abstract APIs to manage work orders.
```

12.68.2 Member Function Documentation

12.68.2.1 encryption_key_get()

```
{\tt def avalon\_sdk.connector.interfaces.work\_order.WorkOrder.encryption\_key\_get \ (}
              worker_id,
              requester_id,
              last_used_key_nonce = None,
              tag = None,
              signature nonce = None,
              signature = None,
              id = None)
Get Encryption Key Request Payload.
1. worker_id is an id of the worker to retrieve an encryption key for.
2. last_used_key_nonce is an optional nonce associated with the
last key retrieved.
If it is provided, the key retrieved should be newer than this one.
Otherwise any key can be retrieved.
3. tag is tag that should be associated with the returned key,
e.g. requester id. This is an optional parameter. If it is not
provided, requesterId below is used as a key.
4. requester_id is an id of the requester that plans to use the
returned key to submit one or more work orders using this key.
5. signature_nonce is an optional parameter and is used only
if signature below is also provided.
6. signature is an optional signature of workerId,
lastUsedKeyNonce, tag, and signatureNonce.
7. id is json rpc request id, it is optional
Output
1. errorCode is the result of the operation.
   1 - generic error
   2 - operation is not supported
   3 - invalid parameter
   4 - access denied
   5 - not ready, retry later. This is a recoverable error that may
   happen if the requester makes its first request for keys,
   or the requester retrieves keys, faster than the worker
```

```
The requester should retry later.
2. worker_id is an id of the worker that created the encryption key.
3. encryptionKey is an encryption key.
4. encryptionKeyNonce is a nonce associated with the key.
5. tag is tag associated with the key.
6. signature is a signature generated by the worker.
12.68.2.2 encryption_key_set()
{\tt def avalon\_sdk.connector.interfaces.work\_order.WorkOrder.encryption\_key\_set} \ \ (
              self.
              worker_id,
              encryption_key,
              encryption_nonce,
              tag,
              signature,
              id = None)
Set encryption key request payload
Parameters:
worker_id
                 ID of the worker to retrieve an encryption key
encryption_key Encryption key
encryption_nonce Nonce associated with the key
                 Tag that should be associated with the returned key,
         e.g. requester id. This is an optional parameter.
         If it is not provided, requesterId below is used
signature
                 Signature generated by the worker on the worker_id,
         tag, and encryption_nonce
                 Optional Optional JSON RPC request ID
id
Returns:
Error code is the result of the operation.
12.68.2.3 work_order_get_result()
def avalon_sdk.connector.interfaces.work_order.WorkOrder.work_order_get_result (
              self.
              work_order_id,
              id = None)
Query blockchain to get a work order result.
If a Requester receives a response stating that its work order state
is "scheduled" or "processing", it should poll the Worker Service
later to get the result:
1. Poll the Worker Service periodically until the Work Order is
completed successfully or in error
2. Wait for the Work Order Receipt complete event and retrieve a final
result.
Parameters:
work_order_id Work Order ID that was sent in the
      corresponding work_order_submit request
              Optional JSON RPC request ID
id
Returns:
Tuple containing work order status, worker id, work order request,
work order response, and error code.
None on error.
```

12.68.2.4 work_order_submit()

```
def avalon_sdk.connector.interfaces.work_order.WorkOrder.work_order_submit (
              work order id.
              worker_id,
              requester_id,
              work_order_request,
              id = None )
Submit a work order request.
Parameters:
work_order_id
                  Unique ID of the work order request
                   Identifier for the worker
worker_id
requester_id
                  Unique id to identify the requester
work_order_request JSON RPC string work order request.
          Defined in EEA specification 6.1.1.
                   Optional JSON RPC request ID
Returns:
errorCode
                   0 on success and non-zero on error.
work_order_request is a JSON string containing following parameters:
    "responseTimeoutMSecs": <integer>,
    "payloadFormat": <string>
    "resultUri": <string>,
    "notifyUri": <string>,
    "workOrderId": <hex string>,
    "workerId": <hex string or DID>,
    "workloadId": <hex string>,
    "requesterId": <hex string>,
    "workerEncryptionKey": <hex string>,
    "dataEncryptionAlgorithm": <string>,
    "encryptedSessionKey": <hex string>,
    "sessionKeyIv": <hex string>,
    "requesterNonce": <hex string>,
    "encryptedRequestHash": <hex string>,
    "requesterSignature": <BASE64 string>,
},
1. responseTimeoutMSecs - is a maximum timeout in milliseconds that
the caller will wait for the response. Setting this timeout to zero
means that the work order is submitted in the asynchronous (resultUri
is present), notify (notifyUri is present), or poll mode (neither
resultUri nor notifyUri is present). In this case, the TCS should
schedule the request for execution and immediately return an error
response with error code set to "scheduled". If the timeout is not
zero, the work order is in synchronous mode. The TCS should wait for
the work order completion before returning the response to the
participant. If the request cannot be completed within the allocated
interval, the work order should be cancelled and a corresponding error
should be returned to the participant.
2. payloadFormat defines how signatures and data items are formatted in
this work order request and corresponding response.
3. resultUri is an optional parameter. If it is specified, the
WorkerService should submit the Work Order result to this URI.
See section Work Order Asynchronous Result.
4. notifyUri is an optional parameter. If it is specified, the
WorkerService should send an event to this URI upon the Work Order
completion.
5. workOrderId is an id assigned to the Work Order by the Requester
and can be registered using the Work Order Receipts API.
6. workerId is a worker id to process the work order,
e.g. an Ethereum address or its DID.
7. workloadId is an id of the workload to be executed by the worker.
It is an optional value if the worker includes a single workload.
8. requesterId is either the Requester's Ethereum address or its DID.
9. workerEncryptionKey is an optional parameter containing the worker
```

```
encryption key used for this Work Order. It is useful if a Worker
frequently updates its encryption key in the registry and allows some
time overlap in utilizing multiple keys.
We assume here that the 'details' submitted during the registration of
a worker contain one or more public keys associated with the worker.
10. dataEncryptionAlgorithm is an optional parameter that defines an
algorithm for encrypting the data in this work order. The default is
the first value in the corresponding parameter for the worker
(defined by workerId). See section Common Data for All Worker Types.
11. encryptedSessionKey is a one-time encryption key generated by the
participant submitting the work order. It is sent encrypted with the
worker's public encryption key. It is used to encrypt
encryptedRequestHash and data item specific data encryption keys.
For the latter see Work Order Data Formats.
12. sessionKeyIv is an initialization vector if required by the data
encryption algorithm (encryptedSessionKey). The default is all zeros.
13. requesterNonce is a random string generated by the participant.
It is used to calculate a hash of this work order request.
14. encryptedRequestHash is a hash of the work order request encrypted
with the key provided in encryptedSessionKey.
15.\ {\rm requesterSignature} is an optional parameter. See section
Work Order Signing for the details.
16. inData contains either a JWT of the specified data or an array of
one or more Work Order inputs, e.g. state, message containing input
parameters.
    "index": <number>,
    "dataHash": <hex string>,
    "data": <BASE64 string>,
    "encryptedDataEncryptionKey": <hex string>,
    "iv": <hex string>
i. index is an index that determines order of the data items for the
hash generation. It also can be used by the worker to identify
different inputs and outputs.
ii. dataHash is an optional hash value of the data. It is only
applicable to inData in the work order request and outData in the
response.
iii. data contains either data inline within the JSON document or a
reference (e.g. URI) to the data. It is up to the worker to determine
how to interpret the data content. This parameter is applicable to
    -> inData in the work order request
    -> outData in the request if it contains a reference for the output
    -> outData in the response
{\tt iv.} encryptedDataEncryptionKey defines if data are encrypted and what
key to use. It is included only in the work order request as one of the
options below.
If this key is not provided or set to "null" or to "", the data is
encrypted using encryptedSessionKey from the work order request.
If the key value is set to "-", the data item is not encrypted, a.k.a.
sent as clear text.
Otherwise, the data item is sent encrypted with a one-time encryption
key generated by a 3rd party that owns this data item (it may be
different from the work order requester).
encryptedDataEncryptionKey contains this encryption key in double
encrypted format.
First, it is encrypted with the worker's public encryption key (e.g. by
a 3rd party that owns the data so the requester cannot see the data).
Then the result of the previous encryption above is encrypted with the
key from encryptedSessionKey (by the requester to enforce the work
order integrity).
v. iv is an initialization vector if required by the data encryption
algorithm. The default is all zeros. If the same encryption key is
used to encrypt more than one data item or the hash value of the
work order request, the iv must be a unique random number for every
encryption operation. It is included only in the work order request.
17. outData contains information about what and how the work order
execution results should be delivered. Same as inData
18. id is used for json rpc request
```

The documentation for this class was generated from the following file:

/home/dano/git/avalon/sdk/avalon_sdk/connector/interfaces/work_order.py

12.69 tcf::WorkOrderData Class Reference

#include <work_order_data.h>

Public Member Functions

WorkOrderData (int in_index, ByteArray data)

Public Attributes

- · int index
- ByteArray decrypted_data = {}

12.69.1 Detailed Description

Wrapper class for work order data submitted to workload processors.

The documentation for this class was generated from the following files:

- /home/dano/git/avalon/common/sgx_workload/workload/work_order_data.h
- /home/dano/git/avalon/common/sgx_workload/workload/work_order_data.cpp

12.70 avalon_sdk.work_order.work_order_params.WorkOrderParams Class Reference

Public Member Functions

- def __init__ (self, work_order_id, worker_id, workload_id, requester_id, session_key, session_civ, requester_nonce, verifying_key=None, payload_format="JSON-RPC", response_timeout_msecs=6000, result_uri=None, notify_uri=None, worker_encryption_key=None, data_encryption_algorithm=None)
- def set_response_timeout_msecs (self, response_timeout_msecs)
- def set payload format (self, payload format)
- def set_result_uri (self, result_uri)
- def set_notify_uri (self, notify_uri)
- def set_worker_id (self, worker_id)
- def set_work_order_id (self, work_order_id)
- def set_workload_id (self, workload_id)
- def set_requester_id (self, requester_id)
- def set_worker_encryption_key (self, worker_encryption_key)
- def set data encryption algorithm (self, data encryption algorithm)
- def set encrypted session key (self, encrypted session key)
- def set_session_key_iv (self, session_iv)
- def set_requester_nonce (self, requester_nonce)
- def add_encrypted_request_hash (self)
- def add_requester_signature (self, private_key)
- def set_verifying_key (self, verifying_key)
- def add_in_data (self, data, data_hash=None, encrypted_data_encryption_key=None, data_iv=None)
- def add out data (self, data, data hash=None, encrypted data encryption key=None, data iv=None)
- def get_params (self)

```
• def get_in_data (self)
```

- def get_out_data (self)
- def get_requester_nonce (self)
- def get_worker_id (self)
- def get_workload_id (self)
- def get_requester_id (self)
- def get_session_key_iv (self)
- def get_work_order_id (self)
- def to_jrpc_string (self, id)
- def to_string (self)

Public Attributes

- · params obj
- · session iv
- · session_key
- final_hash

12.70.1 Member Function Documentation

12.70.1.1 add_encrypted_request_hash()

```
\label{lem:conder_params.WorkOrderParams.add_encrypted_request_hash ( self )
```

Calculates request hash based on EEA trusted-computing spec 6.1.8.1 and set encryptedRequestHash parameter in the request.

12.70.1.2 add_in_data()

 $\label{eq:Add_inData} \mbox{ Add inData work order parameter.}$

12.70.1.3 add_out_data()

```
\verb|def avalon_sdk.work_order_params.WorkOrderParams.add_out_data| (
              self,
              data,
              data_hash = None,
              encrypted_data_encryption_key = None,
              data_iv = None )
Add outData work order parameter.
12.70.1.4 add_requester_signature()
\tt def \ avalon\_sdk.work\_order\_work\_order\_params.WorkOrderParams.add\_requester\_signature \ (
              self,
              private_key )
Calculate the signature of the request
as defined in Off-Chain Trusted Compute EEA spec 6.1.8.3
and set the requester
Signature parameter in the request.
12.70.1.5 get_in_data()
def avalon_sdk.work_order.work_order_params.WorkOrderParams.get_in_data (
              self )
Return inData work order parameter.
12.70.1.6 get_out_data()
\verb|def| avalon\_sdk.work\_order\_work\_order\_params.WorkOrderParams.get\_out\_data (
              self )
Return outData work order parameter.
```

12.70.1.7 get_params() def avalon_sdk.work_order.work_order_params.WorkOrderParams.get_params (self) Return a copy of work order parameters. 12.70.1.8 get_requester_id() def avalon_sdk.work_order.work_order_params.WorkOrderParams.get_requester_id (self) Return requesterId work order parameter. 12.70.1.9 get_requester_nonce() def avalon_sdk.work_order.work_order_params.WorkOrderParams.get_requester_nonce (self) Return requesterNonce work order parameter. 12.70.1.10 get_session_key_iv() def avalon_sdk.work_order.work_order_params.WorkOrderParams.get_session_key_iv (self) Return sessionKeyIv work order parameter. 12.70.1.11 get_work_order_id()

Return workOrderId work order parameter.

```
12.70.1.12 get_worker_id()
```

```
\label{lem:conder_params.WorkOrderParams.get_worker_id (} self ) Return workerId work order parameter.
```

12.70.1.13 get_workload_id()

```
\label{lem:conder_params.WorkOrderParams.get_workload_id (} self \ )
```

Return workloadId work order parameter.

12.70.1.14 set_data_encryption_algorithm()

```
\label{lem:defavalon_sdk.work_order_params.WorkOrderParams.set_data_encryption_algorithm ( self, \\ data_encryption_algorithm )
```

Set dataEncryptionAlgorithm work order parameter.

12.70.1.15 set_encrypted_session_key()

```
\label{lem:conder_def} $\operatorname{def avalon\_sdk.work\_order\_params.WorkOrderParams.set\_encrypted\_session\_key (} \\ self, \\ encrypted\_session\_key )
```

Set encryptedSessionKey work order parameter.

12.70.1.16 set_notify_uri()

Set notifyUri work order parameter.

```
12.70.1.17 set_payload_format()
```

```
def avalon_sdk.work_order.work_order_params.WorkOrderParams.set_payload_format (
              self,
              payload_format )
Set payloadFormat work order parameter.
12.70.1.18 set_requester_id()
def avalon_sdk.work_order.work_order_params.WorkOrderParams.set_requester_id (
              self,
              requester_id )
Set requesterId work order parameter.
12.70.1.19 set_requester_nonce()
\tt def avalon\_sdk.work\_order\_work\_order\_params.WorkOrderParams.set\_requester\_nonce \ (
              requester_nonce )
Set requesterNonce work order parameter.
12.70.1.20 set_response_timeout_msecs()
def avalon_sdk.work_order.work_order_params.WorkOrderParams.set_response_timeout_msecs (
              self,
              response_timeout_msecs )
Set responseTimeoutMSecs work order parameter.
12.70.1.21 set_result_uri()
def avalon_sdk.work_order.work_order_params.WorkOrderParams.set_result_uri (
              self,
              result_uri )
Set resultUri work order parameter.
```

```
12.70.1.22 set_session_key_iv()
def avalon_sdk.work_order.work_order_params.WorkOrderParams.set_session_key_iv (
             self,
             session_iv )
Set sessionKeyIv work order parameter.
12.70.1.23 set_verifying_key()
def avalon_sdk.work_order.work_order_params.WorkOrderParams.set_verifying_key (
             self,
             verifying_key )
Set verifyingKey work order parameter.
12.70.1.24 set_work_order_id()
work_order_id )
Set workOrderId work order parameter.
12.70.1.25 set_worker_encryption_key()
def avalon_sdk.work_order.work_order_params.WorkOrderParams.set_worker_encryption_key (
             self,
             worker_encryption_key )
Set workerEncryptionKey work order parameter.
12.70.1.26 set_worker_id()
def avalon_sdk.work_order.work_order_params.WorkOrderParams.set_worker_id (
             self,
             worker_id )
Set workerId work order parameter.
```

12.70.1.27 set_workload_id()

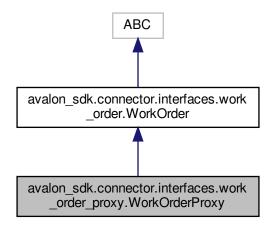
```
\tt def avalon\_sdk.work\_order\_work\_order\_params.WorkOrderParams.set\_workload\_id \ (
              self,
              workload_id )
Set workloadId work order parameter.
12.70.1.28 to_jrpc_string()
\tt def \ avalon\_sdk.work\_order.work\_order\_params.WorkOrderParams.to\_jrpc\_string \ (
              self,
              id)
Create a JRPC request in string format using
the work order params_obj.
Parameters:
          JRPC request ID
id
Returns:
Work order JRPC request as a string.
12.70.1.29 to_string()
def avalon_sdk.work_order.work_order_params.WorkOrderParams.to_string (
              self )
Create work order request string.
It is used to submit a work order.
Returns:
Work order request as a string
```

The documentation for this class was generated from the following file:

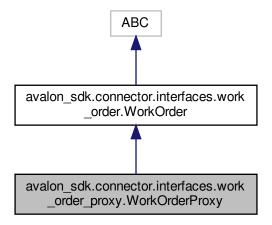
/home/dano/git/avalon/sdk/avalon_sdk/work_order/work_order_params.py

12.71 avalon_sdk.connector.interfaces.work_order_proxy.WorkOrderProxy Class Reference

Inheritance diagram for avalon_sdk.connector.interfaces.work_order_proxy.WorkOrderProxy:



Collaboration diagram for avalon_sdk.connector.interfaces.work_order_proxy.WorkOrderProxy:



Public Member Functions

- def __init__ (self)
- def encryption_key_start (self, tag, id=None)
- def work_order_complete (self, work_order_id, work_order_response)

12.71.1 Detailed Description

```
This class is an abstract base class that contains abstract APIs to manage work orders. This interface is going to be used by proxy model.
```

12.71.2 Member Function Documentation

```
12.71.2.1 encryption_key_start()
```

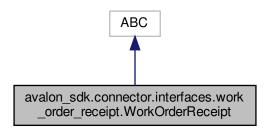
12.71.2.2 work_order_complete()

The documentation for this class was generated from the following file:

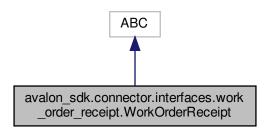
/home/dano/git/avalon/sdk/avalon_sdk/connector/interfaces/work_order_proxy.py

12.72 avalon_sdk.connector.interfaces.work_order_receipt.WorkOrderReceipt Class Reference

Inheritance diagram for avalon_sdk.connector.interfaces.work_order_receipt.WorkOrderReceipt:



Collaboration diagram for avalon_sdk.connector.interfaces.work_order_receipt.WorkOrderReceipt:



Public Member Functions

- def __init__ (self)
- def work_order_receipt_create (self, work_order_id, worker_id, worker_service_id, requester_id, receipt_
 create_status, work_order_request_hash, id=None)
- def work_order_receipt_update (self, work_order_id, update_id, update_type, update_data, update_
 signature, signature_rules, id=None)
- def work_order_receipt_retrieve (self, work_order_id, id=None)
- def work_order_receipt_update_retrieve (self, work_order_id, update_index, id=None)
- def work_order_receipt_lookup (self, worker_service_id, worker_id, requester_id, receipt_status, id=None)
- def work_order_receipt_lookup_next (self, worker_service_id, worker_id, requester_id, receipt_status, last
 — lookup_tag, id=None)
- def work_order_receipt_update (self, work_order_id, update_id, update_type, update_data, update_
 signature, signature_rules, id=None)

12.72.1 Detailed Description

This class is an abstract base class that contains abstract APIs to manage work order receipts.

12.72.2 Member Function Documentation

12.72.2.1 work_order_receipt_create()

```
\tt def \ avalon\_sdk.connector.interfaces.work\_order\_receipt.WorkOrderReceipt.work\_order\_receipt\_ \\ \longleftrightarrow \\ \tt connector.interfaces.work\_order\_receipt.workOrderReceipt.work\_order\_receipt\_ \\ \longleftrightarrow \\ \tt connector.interfaces.work\_order\_receipt.workOrderReceipt.work\_order\_receipt\_ \\ \longleftrightarrow \\ \tt connector.interfaces.work\_order\_receipt.workOrderReceipt.work\_order\_receipt\_ \\ \longleftrightarrow \\ \tt connector.interfaces.work\_order\_receipt.workOrderReceipt.work\_order\_receipt. \\ \end{split}
create (
                    self,
                    work_order_id,
                    worker_id,
                    worker_service_id,
                    requester_id,
                    receipt_create_status,
                    work_order_request_hash,
                    id = None )
Create a work order receipt.
Parameters:
worker_id Worker id that should execute the Work Order worker_service_id ID of the Worker Service the Worker Service
                     hosts the Worker
                                 ID of the requester
requester_id
receipt_create_status
                                  Initial receipt status defined
                      in EEA spec 7.1.1
work\_order\_request\_hash\ Hash\ value\ of\ the\ work\ order\ request\ as
                      defined in EEA spec 6.7.
                                  Optional JSON RPC request ID
Returns:
0 on success, otherwise an error code.
receipt_create_status values are:
{\tt 0} - "pending". The work order is waiting to be processed by the
     worker
{\bf 1} - "completed". The worker processed the Work Order and no more
     worker updates are expected
2 - "processed". The worker processed the Work Order, but
     additional worker updates are expected,
     e.g. oracle notifications
3 - "failed". The Work Order processing failed,
     e.g. by the worker service because of invalid workerId
4 - "rejected". The Work Order is rejected by the smart contract,
     e.g. invalid workerServiceId
5 to 254 - are reserved
          - indicates any status
            - application-specific values
>255
```

12.72.2.2 work_order_receipt_lookup()

```
def avalon_sdk.connector.interfaces.work_order_receipt.WorkOrderReceipt.work_order_receipt_←
lookup (
               self,
               worker_service_id,
               worker id,
               requester_id,
               receipt_status,
               id = None )
Lookup a work order receipt.
Parameters:
worker_service_id Worker Service ID whose receipts will be
worker_id Worker Id whose receipts are requested requester_id ID of the entity...
          retrieved
requester_id ID of the entity requesting receipts
receipt_status Defines the status of the receipts retrieved
id Optional JSON RPC request ID
Returns:
On success, return tuple containing matching count, lookup tag,
and list of work order receipt ids:
total_count   Total number of receipts matching the lookup
      criteria. If this number is bigger than the size
      of the ids array, the caller should use a lookup_tag
      to call work_order_receipt_lookup_next() to retrieve
      the remainder of the receipt IDs
lookup_tag Optional parameter. If returned, it means that
      there are more matching receipts. They can be retrieved
      by calling work_order_receipt_lookup_next() with
      this tag as input
ids
               Array of the Work Order receipt IDs that match the input
```

12.72.2.3 work_order_receipt_lookup_next()

```
\tt def \ avalon\_sdk.connector.interfaces.work\_order\_receipt.WorkOrderReceipt.work\_order\_receipt\_torder\_receipt.work\_order\_receipt\_torder\_receipt\_torder\_receipt\_torder\_receipt\_torder\_receipt\_torder\_receipt\_torder\_receipt\_torder\_receipt\_torder\_receipt\_torder\_receipt\_torder\_receipt\_torder\_receipt\_torder\_receipt\_torder\_receipt\_torder\_receipt\_torder\_receipt\_torder\_receipt\_torder\_receipt\_torder\_receipt\_torder\_receipt\_torder\_receipt\_torder\_receipt\_torder\_receipt\_torder\_receipt\_torder\_receipt\_torder\_receipt\_torder\_receipt\_torder\_receipt\_torder\_receipt\_torder\_receipt\_torder\_receipt\_torder\_receipt\_torder\_receipt\_torder\_receipt\_torder\_receipt\_torder\_receipt\_torder\_receipt\_torder\_receipt\_torder\_receipt\_torder\_receipt\_torder\_receipt\_torder\_receipt\_torder\_receipt\_torder\_receipt\_torder\_receipt\_torder\_receipt\_torder\_receipt\_torder\_receipt\_torder\_receipt\_torder\_receipt\_torder\_receipt\_torder\_receipt\_torder\_receipt\_torder\_receipt\_torder\_receipt\_torder\_receipt\_torder\_receipt\_torder\_receipt\_torder\_receipt\_torder\_receipt\_torder\_receipt\_torder\_receipt\_torder\_receipt\_torder\_receipt\_torder\_receipt\_torder\_receipt\_torder\_receipt\_torder\_receipt\_torder\_receipt\_torder\_receipt\_torder\_receipt\_torder\_receipt\_torder\_receipt\_torder\_receipt\_torder\_receipt\_torder\_receipt\_torder\_receipt\_torder\_receipt\_torder\_receipt\_torder\_receipt\_torder\_receipt\_torder\_receipt\_torder\_receipt\_torder\_receipt\_torder\_receipt\_torder\_receipt\_torder\_receipt\_torder\_receipt\_torder\_receipt\_torder\_receipt\_torder\_receipt\_torder\_receipt\_torder\_receipt\_torder\_receipt\_torder\_receipt\_torder\_receipt\_torder\_receipt\_torder\_receipt\_torder\_receipt\_torder\_receipt\_torder\_receipt\_torder\_receipt\_torder\_receipt\_torder\_receipt\_torder\_receipt\_torder\_receipt\_torder\_receipt\_torder\_receipt\_torder\_receipt\_torder\_receipt\_torder\_receipt\_torder\_receipt\_torder\_receipt\_torder\_receipt\_torder\_receipt\_torder\_receipt\_torder\_receipt\_torder\_receipt\_torder\_receipt\_torder\_receipt\_torder\_receipt\_torder\_receipt\_torder\_receipt\_torder\_receipt\_torder\_receipt\_torder\_receipt\_torder\_receipt\_torder\_receipt\_torder\_rec
lookup_next (
                                                                         self,
                                                                        worker_service_id,
                                                                         worker_id,
                                                                        requester_id,
                                                                        receipt_status,
                                                                        last_lookup_tag,
                                                                         id = None )
Retrieve subsequent work order receipts after calling
work_order_receipt_lookup().
Parameters:
worker_service_id Worker Service ID
{\tt last\_lookup\_tag} \quad {\tt One \ of \ the \ output \ parameters \ for \ function}
                                                  work_order_receipt_lookup()
                                                                                           Optional JSON RPC request ID
Returns:
```

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12.72.2.4 work_order_receipt_retrieve()

```
def avalon_sdk.connector.interfaces.work_order_receipt.WorkOrderReceipt.work_order_receipt_←
retrieve (
             self,
             work_order_id,
             id = None)
Retrieve a work order receipt.
Parameters:
Optional JSON RPC request ID
id
Outputs:
On success, return worker_service_id, requester_id, work_order_id,
receipt_create_status, and work_order_request_hash, as defined in
work_order_receipt_create().
receipt_create_status matches the status at the time of the
receipt creation if there has not been any receipt updates
changing its status. Otherwise it matches the status set by
the latest receipt update.
```

12.72.2.5 work_order_receipt_update() [1/2]

```
Update a Work Order Receipt.
This API is implemented by a work order receipts smart contract and it
can be called by one of the following participants:
  - By or on the behalf of the Worker identified during the receipt
     creation, e.g. to notify about the work order completion
- By or on the behalf of other Workers, e.g. to submit an oracle
    notification
 - By the Work Order Receipt creator (requester)
- By other participants, e.g. to acknowledge the Work Order results
     in case of multi-party Work Order processing
Parameters::
                                             Work Order ID that was sent in the
work_order_id
                          corresponding work_order_submit request
is the same as the transaction sender address % \left( 1\right) =\left( 1\right) \left( 1\right) 
update_type
                                             Type of the Work Order update that defines
                          how the update should be handled.
                          If update_type is from 0 to 255, the update sets
                          the receipt status to update_type value. Refer to
                          Creating a Work Order Receipt. For other values,
                          the processing is application-specific
                                              Update-specific data that depends on the
update data
                          updater type defined in EEA spec 7.1.2.
                          If the update sets the Work Order Receipt status
                          to completed or processed, it is a hash value of
                          the Work Order Response. In all other
                         cases, update_data are application-specific
update_signature Optional signature of concatenated
                          work_order_id, update_type, and update_data.
                          It is required only if the updater_id is not the
                          same as the transaction sender address. Hashing and
                          signing algorithms are defined by signature_rules
signature_rules Defines hashing and signing algorithms,
                          that are separated by forward slash '/' .
                          E.g. "SHA-256/RSA-OAEP-4096". Optional parameter
                          but required if signing algorithms are different
                          from the algorithms defined for the Worker defined
                          during receipt creation
                                                Optional JSON RPC request ID
id
Returns:
Zero on success, otherwise an error code.
12.72.2.6 work_order_receipt_update() [2/2]
\tt def \ avalon\_sdk.connector.interfaces.work\_order\_receipt.WorkOrderReceipt.work\_order\_receipt\_{\leftarrow}
update (
                                        self,
                                        work_order_id,
                                        updater_id,
                                        update_type,
                                        update_data,
                                        update_signature,
                                        signature_rules,
                                        id = None)
Update a Work Order Receipt.
This API is implemented by a Work Order Receipts smart contract and
it can be called by one of the following participants:
 - By or on the behalf of the Worker identified during the receipt
creation, e.g. to notify about the work order completion
 - By or on the behalf of other Workers, e.g. to submit an oracle
```

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```
notification
- By the Work Order Receipt creator (requester)
- By other participants, e.g. to acknowledge the Work Order results
in case of multi-party Work Order processing
Parameters:
work order id
                Work Order ID that was sent in the
        corresponding work_order_submit request
               ID of the updating entity. It is optional if it
        is the same as the transaction sender address
update_type
               Type of the Work Order update that defines
         how the update should be handled.
         If update_type is from 0 to 255, the update sets
         the receipt status to update_type value. Refer to
         Creating a Work Order Receipt. For other values,
         the processing is application-specific
update_data
                Update-specific data that depends on the
         updater type defined in EEA spec 7.1.2.
         If the update sets the Work Order Receipt status
         to completed or processed, it is a hash value of
         the Work Order Response. In all other
         cases, update_data are application-specific
update_signature Optional signature of concatenated
         work_order_id, update_type, and update_data.
         It is required only if the updater_id is not the
         same as the transaction sender address. Hashing and
         signing algorithms are defined by signature_rules
signature_rules Defines hashing and signing algorithms,
         that are separated by forward slash ^{\prime}\,/^{\prime}\,.
         E.g. "SHA-256/RSA-OAEP-4096". Optional parameter
         but required if signing algorithms are different
         from the algorithms defined for the Worker defined
         during receipt creation
                 Optional JSON RPC request ID
id
```

12.72.2.7 work_order_receipt_update_retrieve()

```
\tt def\ avalon\_sdk.connector.interfaces.work\_order\_receipt.WorkOrderReceipt.work\_order\_receipt\_{\leftarrow}
update_retrieve (
             self.
             work_order_id,
             updater_id,
             update_index,
             id = None)
Retrieving an update to a work order receipt.
Parameters:
work_order_id Work Order ID that was sent in the
     corresponding work_order_submit request
updater_id ID of the updating entity. Ignored if null
Value "OxFFFFFFFF" is reserved to retrieve the
      last received update
id
             Optional JSON RPC request ID
Returns:
On success, return updater_id, update_type, update_data,
update_signature, signature_rules as defined
work_order_receipt_update(), and update_count.
If updater_id is null, update_count is the total number of
updates for this receipt, otherwise it is the total number
of updates made by updater_id.
```

The documentation for this class was generated from the following file:

• /home/dano/git/avalon/sdk/avalon_sdk/connector/interfaces/work_order_receipt.py

12.73 avalon_sdk.work_order_receipt.work_order_receipt.WorkOrderReceiptRequest Class Reference

Public Member Functions

- def __init__ (self)
- def create_receipt (self, wo_request, receipt_create_status, signing_key, nonce=None)
- def update_receipt (self, work_order_id, update_type, update_data, signing_key)

Public Attributes

- · sig_obj
- SIGNING ALGORITHM
- · HASHING ALGORITHM

12.73.1 Detailed Description

```
Class to create work order receipt APIs such as create, update, retrieve, and lookup.
```

12.73.2 Member Function Documentation

12.73.2.1 create_receipt()

```
\tt def \ avalon\_sdk.work\_order\_receipt.work\_order\_receipt.WorkOrderReceiptRequest.create\_receipt \ (order\_receipt.work\_order\_receipt.work\_order\_receipt.work\_order\_receipt.work\_order\_receipt.work\_order\_receipt.work\_order\_receipt.work\_order\_receipt.work\_order\_receipt.work\_order\_receipt.work\_order\_receipt.work\_order\_receipt.work\_order\_receipt.work\_order\_receipt.work\_order\_receipt.work\_order\_receipt.work\_order\_receipt.work\_order\_receipt.work\_order\_receipt.work\_order\_receipt.work\_order\_receipt.work\_order\_receipt.work\_order\_receipt.work\_order\_receipt.work\_order\_receipt.work\_order\_receipt.work\_order\_receipt.work\_order\_receipt.work\_order\_receipt.work\_order\_receipt.work\_order\_receipt.work\_order\_receipt.work\_order\_receipt.work\_order\_receipt.work\_order\_receipt.work\_order\_receipt.work\_order\_receipt.work\_order\_receipt.work\_order\_receipt.work\_order\_receipt.work\_order\_receipt.work\_order\_receipt.work\_order\_receipt.work\_order\_receipt.work\_order\_receipt.work\_order\_receipt.work\_order\_receipt.work\_order\_receipt.work\_order\_receipt.work\_order\_receipt.work\_order\_receipt.work\_order\_receipt.work\_order\_receipt.work\_order\_receipt.work\_order\_receipt.work\_order\_receipt.work\_order\_receipt.work\_order\_receipt.work\_order\_receipt.work\_order\_receipt.work\_order\_receipt.work\_order\_receipt.work\_order\_receipt.work\_order\_receipt.work\_order\_receipt.work\_order\_receipt.work\_order\_receipt.work\_order\_receipt.work\_order\_receipt.work\_order\_receipt.work\_order\_receipt.work\_order\_receipt.work\_order\_receipt.work\_order\_receipt.work\_order\_receipt.work\_order\_receipt.work\_order\_receipt.work\_order\_receipt.work\_order\_receipt.work\_order\_receipt.work\_order\_receipt.work\_order\_receipt.work\_order\_receipt.work\_order\_receipt.work\_order\_receipt.work\_order\_receipt.work\_order\_receipt.work\_order\_receipt.work\_order\_receipt.worder\_receipt.work\_order\_receipt.work\_order\_receipt.work\_order\_receipt.work\_order\_receipt.work\_order\_receipt.work\_order\_receipt.work\_order\_receipt.work\_order\_receipt.work\_order\_receipt.work\_order\_receipt.work\_order\_receipt.work\_order\_receipt.work\_order\_recei
                                                                      wo_request,
                                                                       receipt_create_status,
                                                                        signing_key,
                                                                        nonce = None )
Create a work order receipt corresponding to a workorder ID.
Parameters:
                                                                                                                JSON RPC work order request used to create the
                                                                    work order request as defined in EEA spec 6.1.1
receipt_create_status Receipt creation status
signing_key
                                                                                                Private key of the signer
                                                                                                              Optional random number or monotonic counter
nonce
Returns:
JSON RPC request of type dictionary
```

168 Class Documentation

12.73.2.2 update_receipt()

```
def avalon_sdk.work_order_receipt.work_order_receipt.WorkOrderReceiptRequest.update_receipt (
              self.
              work_order_id,
              update_type,
              update_data,
              signing_key )
Update the existing work order receipt with
update_type and update_data.
Parameters:
work_order_id Work order ID whose receipt
      needs to be updated
update_type Update type. These values correspond to
      receipt status as defined in EEA Spec 7.1.1
update_data
             Update-specific data that depends on
     the workOrderStatus
JSON RPC work order update receipt request of type dictionary
```

The documentation for this class was generated from the following file:

/home/dano/git/avalon/sdk/avalon_sdk/work_order_receipt/work_order_receipt.py

12.74 avalon_sdk.work_order.work_order_request_validator.WorkOrderRequestValidator Class Reference

Public Member Functions

- def __init__ (self)
- def validate_parameters (self, params)
- def validate_data_format (self, data)

12.74.1 Detailed Description

 $\label{thm:workOrderRequestValidator} WorkOrderRequest Validator\ validates\ work\ order\ requests$ for proper parameter fields and valid data formats.

12.74.2 Constructor & Destructor Documentation

12.74.3 Member Function Documentation

12.74.3.1 validate_data_format()

12.74.3.2 validate_parameters()

The documentation for this class was generated from the following file:

/home/dano/git/avalon/sdk/avalon_sdk/work_order/work_order_request_validator.py

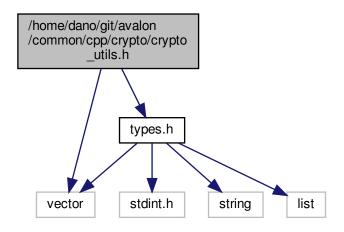
170 Class Documentation

Chapter 13

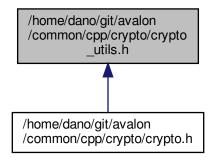
File Documentation

13.1 /home/dano/git/avalon/common/cpp/crypto/crypto_utils.h File Reference

#include <vector>
#include "types.h"
Include dependency graph for crypto_utils.h:



This graph shows which files directly or indirectly include this file:



Functions

- ByteArray tcf::crypto::ComputeMessageHash (const ByteArray &message)
- ByteArray tcf::crypto::RandomBitString (size_t length)
- int tcf::crypto::EVP_DecodeBlock_wrapper (unsigned char *out, int out_len, const unsigned char *in, int in
 _len)
- int tcf::crypto::decode_base64_block (unsigned char *decoded_data, const unsigned char *base64_data, int num_of_blocks)
- std::string tcf::crypto::CreateHexEncodedEncryptionKey ()
- std::string tcf::crypto::DecryptData (std::string cipher, std::string key)
- std::string tcf::crypto::EncryptData (std::string msg, std::string key)

13.1.1 Detailed Description

Avalon Crypto Utilities: hashing, base 64 conversion, random number generation, key generation, encrypt, and decrypt.

13.1.2 Function Documentation

13.1.2.1 ComputeMessageHash()

SHA256 hashing.

Compute SHA256 hash of message.data(). Returns ByteArray containing raw binary data.

13.1.2.2 CreateHexEncodedEncryptionKey()

```
std::string tcf::crypto::CreateHexEncodedEncryptionKey ( )
```

Create symmetric encryption key and return hex encoded key string.

13.1.2.3 decode_base64_block()

```
int tcf::crypto::decode_base64_block (
          unsigned char * decoded_data,
          const unsigned char * base64_data,
          int num_of_blocks )
```

Decodes specified number of blocks of base64 encoded data.

13.1.2.4 DecryptData()

Decrypt cipher using given encryption key and return message.

13.1.2.5 EncryptData()

Encrypt the message using given encryption key and return cipher.

13.1.2.6 EVP_DecodeBlock_wrapper()

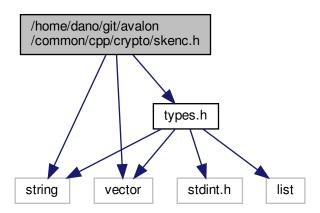
Wrapper function for EVP_DecodeBlock. EVP_DecodeBlock pads its output with \0 if the output length is not a multiple of 3. Check if the base64 string is padded at the end and adjust the output length.

13.1.2.7 RandomBitString()

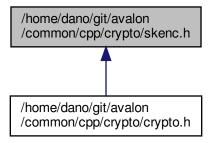
Generate a cryptographically strong random bitstring.

13.2 /home/dano/git/avalon/common/cpp/crypto/skenc.h File Reference

```
#include <string>
#include <vector>
#include "types.h"
Include dependency graph for skenc.h:
```



This graph shows which files directly or indirectly include this file:



Namespaces

· tcf::crypto::skenc

Functions

• ByteArray tcf::crypto::skenc::GenerateKey ()

- ByteArray tcf::crypto::skenc::GenerateIV (const std::string &IVstring=std::string(""))
- ByteArray tcf::crypto::skenc::EncryptMessage (const ByteArray &key, const ByteArray &iv, const ByteArray &message)
- ByteArray tcf::crypto::skenc::EncryptMessage (const ByteArray &key, const ByteArray &message)
- ByteArray tcf::crypto::skenc::DecryptMessage (const ByteArray &key, const ByteArray &iv, const ByteArray &message)
- ByteArray tcf::crypto::skenc::DecryptMessage (const ByteArray &key, const ByteArray &message)

Variables

- const int tcf::crypto::constants::IV_LEN = 12
- const int tcf::crypto::constants::SYM_KEY_LEN = 32
- const int tcf::crypto::constants::TAG_LEN = 16

13.2.1 Detailed Description

Avalon secret key encryption. Uses AES-GCM 256, which also includes authentication.

13.2.2 Variable Documentation

```
13.2.2.1 IV_LEN
```

```
const int tcf::crypto::constants::IV_LEN = 12
```

AES-GCM 256 for authenticated encryption.

13.3 /home/dano/git/avalon/common/cpp/crypto/verify_certificate.h File Reference

Functions

• bool verify_certificate_chain (const char *cert_pem, const char *ca_cert_pem)

13.3.1 Detailed Description

Avalon CA certification verification.

13.3.2 Function Documentation

13.3.2.1 verify_certificate_chain()

Verifies certificate against CA certificate.

13.4 /home/dano/git/avalon/common/cpp/crypto/verify_signature.h File Reference

Functions

• bool verify_signature (const char *cert_pem, const char *msg, unsigned int msg_len, char *signature, unsigned int signature_len)

13.4.1 Detailed Description

Avalon signature verification.

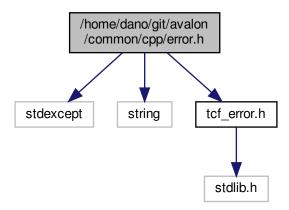
13.4.2 Function Documentation

13.4.2.1 verify_signature()

Verifies signature of the message by extracting public key from certificate.

13.5 /home/dano/git/avalon/common/cpp/error.h File Reference

```
#include <stdexcept>
#include <string>
#include "tcf_error.h"
Include dependency graph for error.h:
```



Classes

- class tcf::error::Error
- class tcf::error::CryptoError
- · class tcf::error::MemoryError
- · class tcf::error::IOError
- class tcf::error::RuntimeError
- class tcf::error::IndexError
- class tcf::error::DivisionByZero
- class tcf::error::OverflowError
- · class tcf::error::ValueError
- · class tcf::error::SystemError
- class tcf::error::SystemBusyError
- · class tcf::error::WorkloadError
- · class tcf::error::UnknownError

Functions

- template<typename PointerType >
 void tcf::error::ThrowlfNull (const PointerType ptr, const char *msg=nullptr)
- template<typename except >
 void tcf::error::Throwlf (bool condition, const char *msg)

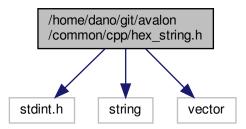
13.5.1 Detailed Description

Avalon error and exception handling functions.

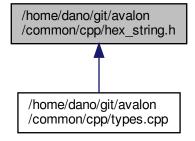
13.6 /home/dano/git/avalon/common/cpp/hex_string.h File Reference

```
#include <stdint.h>
#include <string>
#include <vector>
```

Include dependency graph for hex_string.h:



This graph shows which files directly or indirectly include this file:



Macros

#define HEX_STRING_SIZE(x) (static_cast<size_t>(((x) * 2)))

Functions

- std::vector< uint8_t > tcf::HexStringToBinary (const std::string &inHexString)
- void tcf::HexStringToBinary (uint8_t *outBinaryData, size_t inBinaryDataLength, const std::string &in←
 HexString)
- std::string tcf::BinaryToHexString (const std::vector< uint8_t > &inBinaryData)
- std::string tcf::BinaryToHexString (const uint8_t *inBinaryData, size_t inBinaryDataLength)

13.6.1 Detailed Description

Avalon hexadecimal string conversion functions.

13.6.2 Macro Definition Documentation

13.6.2.1 HEX_STRING_SIZE

This macro calculates the length of the actual data portion of the hex-string encoding of a buffer with x bytes PLUS the additional byte needed for the string terminator.

13.6.3 Function Documentation

13.6.3.1 BinaryToHexString()

Convert an array of bytes (represented as either a std::vector of bytes or a raw array) to a hex string.

13.6.3.2 HexStringToBinary()

Convert a hex string (i.e., a string of characters with values between '0'-'9', 'A'-'F') to an array of bytes.

13.7 /home/dano/git/avalon/common/cpp/json_utils.h File Reference

Functions

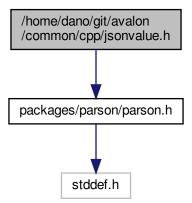
- const char * GetJsonStr (const JSON_Object *json_object, const char *name, const char *err_msg=NULL)
- void JsonSetStr (JSON_Object *json, const char *name, const char *value, const char *err)
- void GetByteArray (const JSON_Object *object, const char *name, const char *err_msg, ByteArray &dst)
- double **GetJsonNumber** (const JSON_Object *object, const char *name)
- void JsonSetNumber (JSON_Object *json, const char *name, double value, const char *err)

13.7.1 Detailed Description

Avalon JSON utilities.

13.8 /home/dano/git/avalon/common/cpp/jsonvalue.h File Reference

#include "packages/parson/parson.h"
Include dependency graph for jsonvalue.h:



Classes

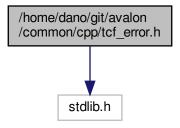
• class JsonValue

13.8.1 Detailed Description

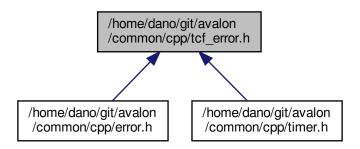
Avalon JSON object extraction utilities.

13.9 /home/dano/git/avalon/common/cpp/tcf_error.h File Reference

```
#include <stdlib.h>
Include dependency graph for tcf error.h:
```



This graph shows which files directly or indirectly include this file:



Typedefs

typedef void(* tcf_log_t) (tcf_log_level_t, const char *message)

Enumerations

```
    enum tcf_err_t {
        TCF_SUCCESS = 0, TCF_ERR_UNKNOWN = -1, TCF_ERR_MEMORY = -2, TCF_ERR_IO = -3,
        TCF_ERR_RUNTIME = -4, TCF_ERR_INDEX = -5, TCF_ERR_DIVIDE_BY_ZERO = -6, TCF_ERR_OVE
        RFLOW = -7,
        TCF_ERR_VALUE = -8, TCF_ERR_SYSTEM = -9, TCF_ERR_SYSTEM_BUSY = -10, TCF_ERR_CRYPTO = -11,
        TCF_ERR_INVALID_WORKLOAD = -12 }
        enum tcf_log_level_t {
        TCF_LOG_DEBUG = 0, TCF_LOG_INFO = 1, TCF_LOG_WARNING = 2, TCF_LOG_ERROR = 3,
        TCF_LOG_CRITICAL = 4 }
```

13.9.1 Detailed Description

Avalon logging levels and error codes.

13.9.2 Enumeration Type Documentation

```
13.9.2.1 tcf_err_t
```

```
enum tcf_err_t
```

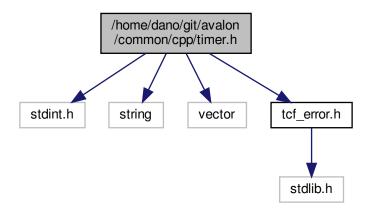
Enumerator

| TCF_ERR_SYSTEM_BUSY | Indicates that the system is busy and the operation may be retried again. If retries fail this should be converted to a TCF_ERR_SYSTEM for reporting. |
|--------------------------|---|
| TCF_ERR_INVALID_WORKLOAD | Invalid workload ID |

13.10 /home/dano/git/avalon/common/cpp/timer.h File Reference

```
#include <stdint.h>
#include <string>
#include <vector>
#include "tcf_error.h"
```

Include dependency graph for timer.h:



Classes

· class tcf::utility::Timer

Macros

• #define __TIMEIT__() {}

Functions

- uint64_t GetTimer (void)
- void Log (int level, const char *fmt,...)

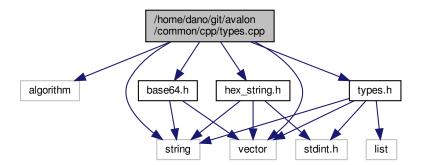
13.10.1 Detailed Description

Avalon timer utilities.

13.11 /home/dano/git/avalon/common/cpp/types.cpp File Reference

```
#include <algorithm>
#include <string>
#include <vector>
#include "types.h"
#include "base64.h"
#include "hex_string.h"
```

Include dependency graph for types.cpp:



Functions

- std::string ByteArrayToString (const ByteArray &inArray)
- StringArray ByteArrayToStringArray (const ByteArray &inArray)
- Base64EncodedString ByteArrayToBase64EncodedString (const ByteArray &buf)
- ByteArray Base64EncodedStringToByteArray (const Base64EncodedString &encoded)
- HexEncodedString ByteArrayToHexEncodedString (const ByteArray &buf)
- ByteArray HexEncodedStringToByteArray (const HexEncodedString &encoded)

13.11.1 Detailed Description

Avalon string utilities, including base 64, hex, and byte array conversion.

13.11.2 Function Documentation

13.11.2.1 Base64EncodedStringToByteArray()

```
ByteArray Base64EncodedStringToByteArray ( const\ Base64EncodedString\ \&\ encoded\ )
```

Simple conversion from Base64EncodedString to ByteArray.

13.11.2.2 ByteArrayToBase64EncodedString()

```
Base64EncodedString ByteArrayToBase64EncodedString ( {\tt const~ByteArray~\&~buf~)}
```

Simple conversion from ByteArray to Base64EncodedString.

13.11.2.3 ByteArrayToHexEncodedString()

Simple conversion from ByteArray to HexEncodedString.

13.11.2.4 ByteArrayToString()

Simple conversion from ByteArray to std::string

13.11.2.5 ByteArrayToStringArray()

Conversion from byte array to string array.

13.11.2.6 HexEncodedStringToByteArray()

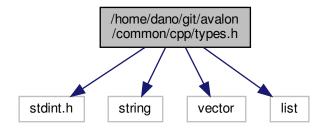
```
ByteArray HexEncodedStringToByteArray ( {\tt const~HexEncodedString~\&~encoded}~)
```

Simple conversion from HexEncodedString to ByteArray. Throws ValueError.

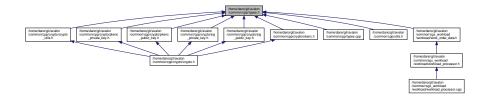
13.12 /home/dano/git/avalon/common/cpp/types.h File Reference

```
#include <stdint.h>
#include <string>
#include <vector>
#include <list>
```

Include dependency graph for types.h:



This graph shows which files directly or indirectly include this file:



Classes

· class StringArray

Typedefs

- typedef std::vector< uint8_t > ByteArray
- typedef std::string Base64EncodedString
- typedef std::string HexEncodedString

Functions

- std::string ByteArrayToString (const ByteArray &inArray)
- StringArray ByteArrayToStringArray (const ByteArray &inArray)
- Base64EncodedString ByteArrayToBase64EncodedString (const ByteArray &buf)
- ByteArray Base64EncodedStringToByteArray (const Base64EncodedString &encoded)
- HexEncodedString ByteArrayToHexEncodedString (const ByteArray &buf)
- ByteArray HexEncodedStringToByteArray (const HexEncodedString &encoded)

13.12.1 Detailed Description

Avalon string utilities, including base 64, hex, and byte array conversion.

13.12.2 Function Documentation

13.12.2.1 Base64EncodedStringToByteArray()

```
ByteArray Base64EncodedStringToByteArray ( {\tt const~Base64EncodedString~\&~encoded~)}
```

Simple conversion from Base64EncodedString to ByteArray.

13.12.2.2 ByteArrayToBase64EncodedString()

```
Base64EncodedString ByteArrayToBase64EncodedString ( {\tt const\ ByteArray\ \&\ \it buf\ )}
```

Simple conversion from ByteArray to Base64EncodedString.

13.12.2.3 ByteArrayToHexEncodedString()

Simple conversion from ByteArray to HexEncodedString.

13.12.2.4 ByteArrayToString()

Simple conversion from ByteArray to std::string

13.12.2.5 ByteArrayToStringArray()

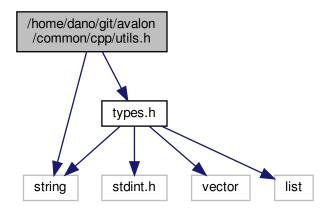
Conversion from byte array to string array.

13.12.2.6 HexEncodedStringToByteArray()

Simple conversion from HexEncodedString to ByteArray. Throws ValueError.

13.13 /home/dano/git/avalon/common/cpp/utils.h File Reference

```
#include <string>
#include "types.h"
Include dependency graph for utils.h:
```



Functions

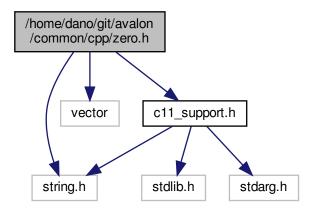
- ByteArray StrToByteArray (std::string str)
- std::string ByteArrayToStr (ByteArray ba)

13.13.1 Detailed Description

Avalon ByteArray and String conversion utilities.

13.14 /home/dano/git/avalon/common/cpp/zero.h File Reference

```
#include <string.h>
#include <vector>
#include "c11_support.h"
Include dependency graph for zero.h:
```



Functions

- template<typename T > void Zero (T &v)
- template<typename T > void ZeroV (std::vector< T > &v)
- void Zero (void *v, size_t length)

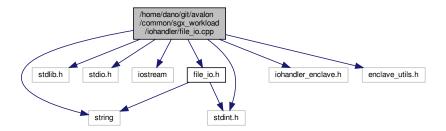
13.14.1 Detailed Description

Avalon zero initialization utilities.

13.15 /home/dano/git/avalon/common/sgx_workload/iohandler/file_io.cpp File Reference

```
#include <string>
#include <stdlib.h>
#include <stdio.h>
#include <iostream>
#include <stdint.h>
#include "file_io.h"
#include "iohandler_enclave.h"
```

#include "enclave_utils.h"
Include dependency graph for file_io.cpp:



Macros

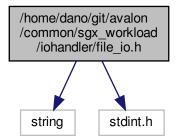
- #define MAX_FILE_SIZE 1024
- #define MAX_IO_RESULT_SIZE 128

13.15.1 Detailed Description

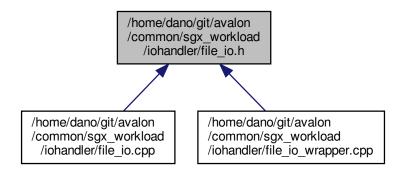
FileIoExecutor C++ class implementation for Avalon Inside-Out File I/O. To use, #include "file_io.h"

13.16 /home/dano/git/avalon/common/sgx_workload/iohandler/file_io.h File Reference

#include <string>
#include <stdint.h>
Include dependency graph for file_io.h:



This graph shows which files directly or indirectly include this file:



Classes

class FileIoExecutor

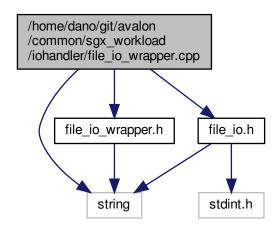
13.16.1 Detailed Description

FileIoExecutor C++ class definitions for Avalon Inside-Out File I/O. To use, #include "file_io.h"

13.17 /home/dano/git/avalon/common/sgx_workload/iohandler/file_io_wrapper.cpp File Reference

```
#include <string>
#include "file_io.h"
#include "file_io_wrapper.h"
```

Include dependency graph for file_io_wrapper.cpp:



Functions

- std::string Read (std::string file_name)
- uint32_t Write (std::string file_name, std::string data)
- uint32_t Delete (std::string file_name)

13.17.1 Detailed Description

C++ non-class wrapper implementation for Avalon Inside-Out File I/O. To use, #include "file_io_wrapper.h"

13.17.2 Function Documentation

13.17.2.1 Delete()

Delete a file named file_name. Return the integer status (0 is success, non-0 is failure).

Parameters

| file name | Name of the file to delete |
|-----------|----------------------------|

Returns

Status of operation (0 on success, non-0 on failure)

13.17.2.2 Read()

Read a file named file_name and return the contents in a string. Return an empty string ("") on failure.

Parameters

Returns

String containing file contents

13.17.2.3 Write()

Write the contents of string data to a file named file_name. Return the integer status (0 is success, non-0 is failure).

Parameters

| file_name | Name of the file to write |
|-----------|---------------------------|
| data | Contents of file to write |

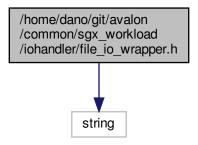
Returns

Status of operation (0 on success, non-0 on failure)

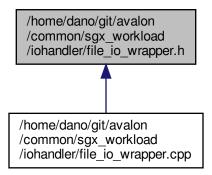
13.18 /home/dano/git/avalon/common/sgx_workload/iohandler/file_io_wrapper.h File Reference

```
#include <string>
```

Include dependency graph for file_io_wrapper.h:



This graph shows which files directly or indirectly include this file:



Functions

- std::string Read (std::string file_name)
- uint32_t Write (std::string file_name, std::string data)
- uint32_t Delete (std::string file_name)

13.18.1 Detailed Description

C++ non-class wrapper definitions for Avalon Inside-Out File I/O. To use, #include "file_io_wrapper.h"

13.18.2 Function Documentation

13.18.2.1 Delete()

Delete a file named file_name. Return the integer status (0 is success, non-0 is failure).

Parameters

Returns

Status of operation (0 on success, non-0 on failure)

13.18.2.2 Read()

Read a file named file_name and return the contents in a string. Return an empty string ("") on failure.

Parameters

| file_name | Name of the file to be read |
|-----------|-----------------------------|
|-----------|-----------------------------|

Returns

String containing file contents

13.18.2.3 Write()

Write the contents of string data to a file named file_name. Return the integer status (0 is success, non-0 is failure).

Parameters

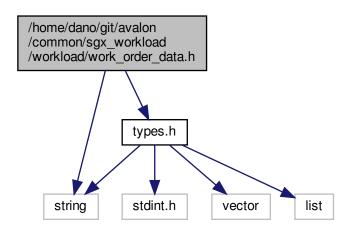
| file_name | Name of the file to write |
|-----------|---------------------------|
| data | Contents of file to write |

Returns

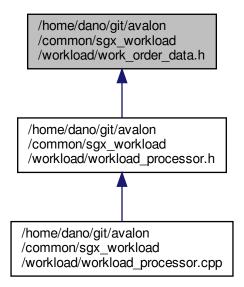
Status of operation (0 on success, non-0 on failure)

13.19 /home/dano/git/avalon/common/sgx_workload/workload/work_order_data.h File Reference

```
#include <string>
#include "types.h"
Include dependency graph for work_order_data.h:
```



This graph shows which files directly or indirectly include this file:



Classes

· class tcf::WorkOrderData

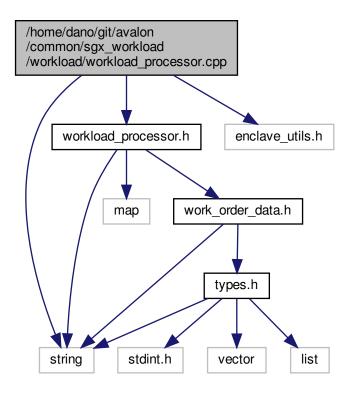
13.19.1 Detailed Description

Defines class tcf::WorkOrderData for work order data submitted to workload processors. To use, #include "work
_order_data.h"

13.20 /home/dano/git/avalon/common/sgx_workload/workload/workload_processor.cpp File Reference

```
#include <string>
#include "workload_processor.h"
```

```
#include "enclave_utils.h"
Include dependency graph for workload_processor.cpp:
```



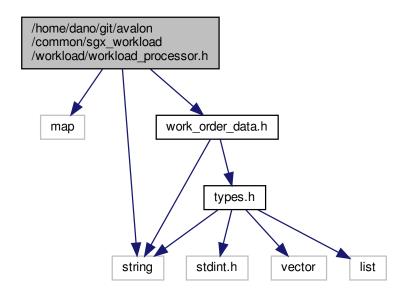
13.20.1 Detailed Description

Implements base class Workload Processor to create an Avalon workload processor.

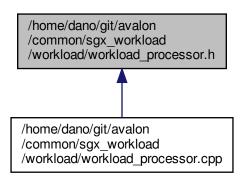
13.21 /home/dano/git/avalon/common/sgx_workload/workload/workload_processor.h File Reference

```
#include <map>
#include <string>
#include "work_order_data.h"
```

Include dependency graph for workload_processor.h:



This graph shows which files directly or indirectly include this file:



Classes

• class WorkloadProcessor

Macros

- #define IMPL_WORKLOAD_PROCESSOR_CLONE(TYPE) WorkloadProcessor* Clone() const { return new TYPE(*this); }
- #define REGISTER_WORKLOAD_PROCESSOR(WORKLOADID_STR, TYPE)

13.21.1 Detailed Description

Defines base class WorkloadProcessor and other definitions to create an Avalon workload processor. To use, #include "workload_processor.h"

13.21.2 Macro Definition Documentation

13.21.2.1 IMPL_WORKLOAD_PROCESSOR_CLONE

This macro clones an instance of class WorkloadProcessor for an Avalon worker. Example usage in a .h header file: IMPL_WORKLOAD_PROCESSOR_CLONE(Workload)

Parameters

13.21.2.2 REGISTER_WORKLOAD_PROCESSOR

Value:

```
WorkloadProcessor* TYPE##_myProcessor = \
    WorkloadProcessor::RegisterWorkloadProcessor(
    WORKLOADID_STR, new TYPE());
```

This macro registers a workload processor for a specific application. It associates a string with a workload. This is the same string that is passed in the work order request JSON payload. Example usage in a .cpp source file: REGISTER_WORKLOAD_PROCESSOR(workload_id_string, Workload)

Parameters

| WORKLOADID_STR | A string literal or variable identifying the workload type |
|----------------|--|
| TYPE | Name of the Workload class |

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