

# A Monero data model and API specification

*with implementations in Java, TypeScript, and C++  
using monero v0.18.3.4 'Flourine Fermi'*

Last updated August 28, 2024



Java implementation: <https://github.com/monero-ecosystem/monero-java>

TypeScript implementation: <https://github.com/monero-ecosystem/monero-ts>

C++ implementation: <https://github.com/monero-ecosystem/monero-cpp>

Document source: <https://github.com/monero-ecosystem/monero-java/blob/master/docs/monero-spec.drawio>

Document created and revisable using: <https://www.draw.io/>

## Monero Daemon Interface 1/2

setProxyUri(string proxyUri): void

isConnected(): bool

getVersion(): MoneroVersion

isTrusted(): bool

getHeight(): ulong

getBlockHash(ulong height): string

getBlockTemplate(string walletAddress, uint reserveSize=null): MoneroBlockTemplate

getLastBlockHeader(): MoneroBlockHeader

getBlockHeaderByHash(string blockHash): MoneroBlockHeader

getBlockHeaderByHeight(ulong height): MoneroBlockHeader

getBlockHeadersByRange(ulong startHeight=0, ulong endHeight=chainHeight): MoneroBlockHeader[]

getBlockByHash(string blockHash): MoneroBlock

getBlocksByHash(string[] blockHashes, ulong startHeight, bool prune=false): MoneroBlock[]

getBlockByHeight(ulong height): MoneroBlock

getBlocksByHeight(ulong[] heights): MoneroBlock[]

getBlocksByRange(ulong startHeight=0, ulong endHeight=chainHeight): MoneroBlock[]

getBlocksByRangeChunked(ulong startHeight=0, ulong endHeight=chainHeight, ulong maxChunkSize=3000000): MoneroBlock[]

getBlockHashes(string[] blockHashes, ulong startHeight): string[]

getTx(string txHash, bool prune=false): MoneroTx

getTxes(string[] txHashes, bool prune=false): MoneroTx[]

getTxHex(string txHash, bool prune=false): string

getTxHexes(string[] txHashes, bool prune=false): string[]

getMinerTxSum(ulong height, ulong numBlocks=chainHeight): MoneroMinerTxSum

getFeeEstimate(ulong graceBlocks=?): MoneroFeeEstimate

submitTxHex(string txHex, bool doNotRelay=false): MoneroSubmitTxResult

relayTxByHash(string txHash): void

relayTxesByHash(string[] txHashes): void

getTxPool(): MoneroTx[]

getTxPoolHashes(): string[]

getTxPoolBacklog(): MoneroTxBacklogEntry[]

getTxPoolStats(): MoneroTxPoolStats

flushTxPool(string[] txHashes=null): void

getKeyImageSpentStatus(string keyImage): MoneroKeyImageSpentStatus

getKeyImageSpentStatuses(string[] keyImages): MoneroKeyImageSpentStatus[]

getOutputs(MoneroOutput[] outputs): MoneroOutput[]

getInfo(): MoneroDaemonInfo

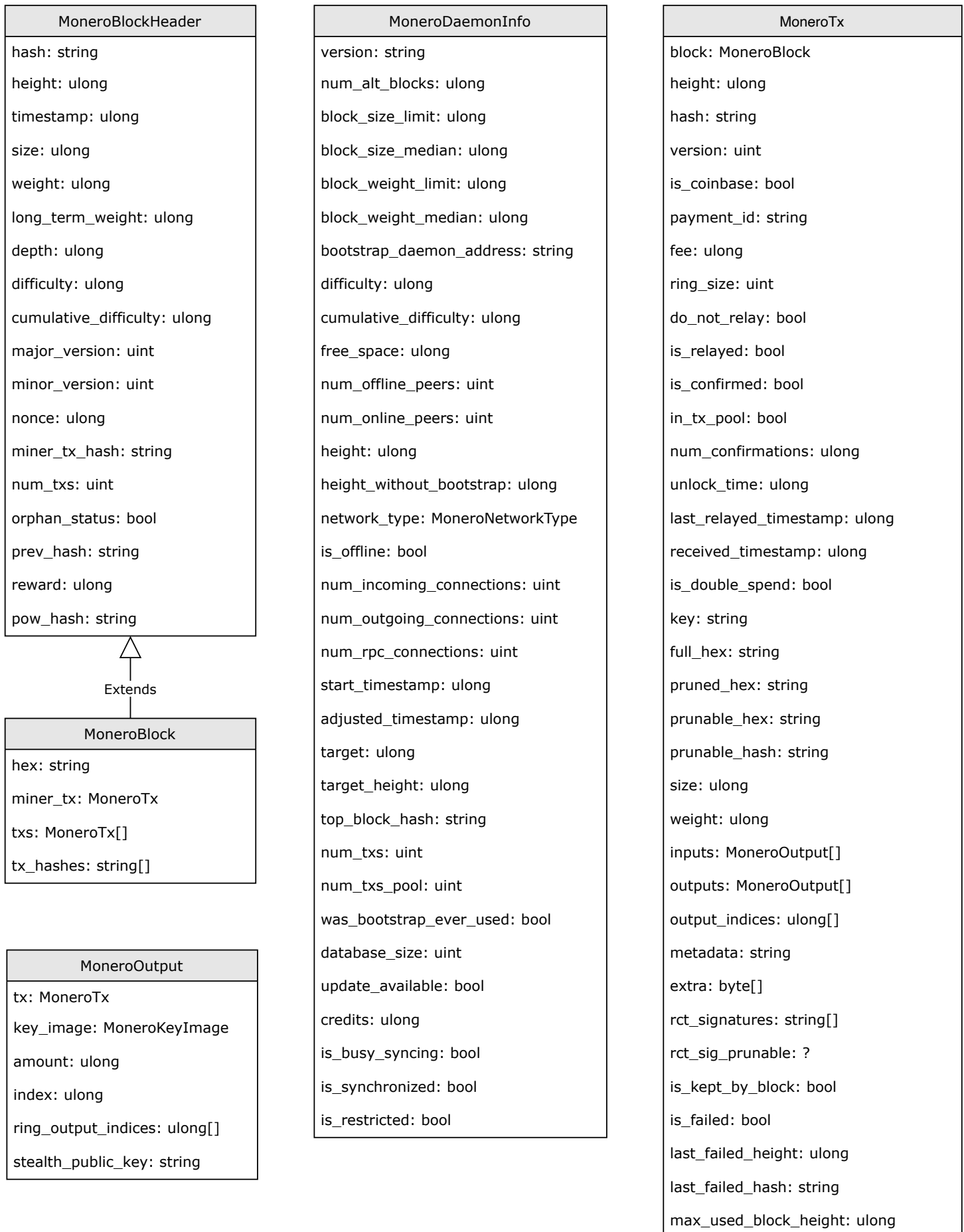
getSyncInfo(): MoneroDaemonSyncInfo

getHardForkInfo(): MoneroHardForkInfo

## Monero Daemon Interface 2/2

getAltChains(): MoneroAltChain[]  
getAltBlockHashes(): string[]  
getDownloadLimit(): uint  
setDownloadLimit(uint limit): uint  
resetDownloadLimit(): uint  
getUploadLimit(): uint  
setUploadLimit(uint): uint  
resetUploadLimit(): uint  
getPeers(): MoneroPeer[]  
getKnownPeers(): MoneroPeer[]  
setOutgoingPeerLimit(uint limit): void  
setIncomingPeerLimit(uint limit): void  
getPeerBans(): MoneroBan[]  
setPeerBan(MoneroBan ban): void  
setPeerBans(MoneroBan[] bans): void  
getOutputDistribution(ulong[] amounts, bool isCumulative, ulong startHeight=0, ulong endHeight=chainHeight):  
    MoneroOutputDistributionEntry[]  
getOutputHistogram(ulong[] amounts, ulong minCount, ulong maxCount, bool isUnlocked, ulong recentCutoff):  
    MoneroOutputHistogramEntry[]  
startMining(string address, ulong numThreads=null, bool isBackground=false, bool ignoreBattery=false): void  
stopMining(): void  
getMiningStatus(): MoneroMiningStatus  
submitBlock(string blockBlob): void  
submitBlocks(string[] blockBlobs): void  
checkForUpdate(): MoneroDaemonUpdateCheckResult  
downloadUpdate(string path): MoneroDaemonUpdateDownloadResult  
addListener(MoneroDaemonListener listener): void  
removeListener(MoneroDaemonListener listener): void  
waitForNextBlockHeader(): MoneroBlockHeader  
stop(): void  
pruneBlockchain(bool check): MoneroPruneResult

## Monero Daemon Types 1/3



max_used_block_hash: string
signatures: string[]

## Monero Daemon Types 2/3

### MoneroDaemonSyncInfo

height: ulong  
connections: MoneroDaemonConnection[]  
spans: MoneroDaemonConnectionSpan[]  
target\_height: ulong  
next\_needed\_pruning\_seed: uint  
overview: ?

### MoneroBan

host: string  
ip: string  
is\_banned: bool  
seconds: ulong

### MoneroBlockTemplate

block\_template\_blob: string  
block\_hashing\_blob: string  
difficulty: ulong  
expected\_reward: ulong  
height: ulong  
prev\_hash: string  
reserved\_offset: ulong  
seed\_height: ulong  
seed\_hash: string  
next\_seed\_hash: string

### MoneroDaemonConnectionSpan

connection\_id: string  
num\_blocks: ulong  
remote\_address: string  
rate: ulong  
speed: ulong  
size: ulong  
start\_block\_height: ulong

### MoneroDaemonListener

onBlockHeader(MoneroBlockHeader header): void

### <enumeration> MoneroNetworkType

mainnet: 0  
testnet: 1  
stagenet: 2

### MoneroKeyImage

hex: string  
signature: string

### <enumeration> MoneroKeyImageSpentStatus

not\_spent: 0  
confirmed: 1  
tx\_pool: 2

### MoneroSubmitTxResult

is\_good: bool  
is\_relayed: bool  
is\_double\_spend\_seen: bool  
is\_fee\_too\_low: bool  
is\_mixin\_too\_low: bool  
has\_invalid\_input: bool  
has\_invalid\_output: bool  
has\_too\_few\_outputs: bool  
is\_rct: bool  
is\_overspend: bool  
is\_too\_big: bool  
sanity\_check\_failed: bool  
reason: string  
credits: ulong  
top\_block\_hash: string  
is\_tx\_result\_too\_big: bool  
nonzero\_unlock\_time: bool

### MoneroPeer

id: string  
address: string  
host: string  
port: uint  
is\_online: boolean  
last\_seen\_timestamp: ulong  
pruning\_seed: uint  
rpc\_port: uint  
rpc\_credits\_per\_hash: ulong  
type: ConnectionType  
num\_support\_flags: uint  
state: string  
send\_idle\_time: ulong  
receive\_idle\_time: ulong  
num\_sends: uint  
num\_receives: uint  
is\_local\_host: bool  
is\_local\_ip: bool  
live\_time: ulong  
is\_incoming: bool  
height: ulong  
current\_upload: ulong  
current\_download: ulong  
avg\_upload: ulong  
avg\_download: ulong

## Monero Daemon Types 3/3

MoneroHardForkInfo
earliest_height: ulong
is_enabled: bool
state: uint
threshold: uint
version: string
num_votes: uint
window: uint
voting: uint
credits: ulong
top_block_hash: string

MoneroVersion
number: uint
is_release: bool

<enumeration> ConnectionType
invalid: 0
ipv4: 1
ipv6: 2
tor: 3
i2p: 4

MoneroFeeEstimate
fee: ulong
fees: ulong[]
quantizationMask: ulong

MoneroDaemonUpdateCheckResult
is_update_available: bool
version: string
hash: string
auto_uri: string
user_uri: string



MoneroDaemonUpdateDownloadResult
download_path: string

MoneroMinerTxSum
emission_sum: ulong
fee_sum: ulong

MoneroMiningStatus
is_active: bool
is_background: bool
address: string
speed: ulong
num_threads: uint

MoneroPruneResult
is_pruned: bool
pruning_seed: uint

MoneroOutputHistogramEntry
amount: ulong
num_instances: ulong
num_unlocked_instances: ulong
num_recent_instances: ulong

MoneroTxPoolStats
num_txs: uint
num_not_relayed: uint
num_failing: uint
num_double_spends: uint
num_10m: uint
fee_total: ulong
bytes_max: ulong
bytes_med: ulong
bytes_min: ulong
bytes_total: ulong
histo: ?
histo_98pc: ulong
oldest_timestamp: ulong

MoneroAltChain
block_hashes: string[]
difficulty: ulong
height: ulong
length: ulong
main_chain_parent_block_hash: string

## Monero Wallet Interface 1/3

```
addListener(MoneroWalletListener listener): void
removeListener(MoneroWalletListener): void
getListeners(): MoneroWalletListener[]
isViewOnly(): bool
setDaemonConnection(MoneroDaemonConnection connection): void
getDaemonConnection(): MoneroDaemonConnection
setProxyUri(string proxyUri): void
isConnectedToDaemon(): bool
getVersion(): MoneroVersion
getNetworkType(): MoneroNetworkType
getPath(): string
getSeed(): string
getSeedLanguage(): string
getSeedLanguages(): string[]
getPrivateSpendKey(): string
getPrivateViewKey(): string
getPublicSpendKey(): string
getPublicViewKey(): string
getPrimaryAddress(): string
getAddress(uint accountId, uint subaddressIdx): string
getAddressIndex(string address): MoneroSubaddress
getDaemonConnection(): MoneroRpcConnection
getDaemonHeight(): ulong
getDaemonMaxPeerHeight(): ulong
getApproximateChainHeight(): ulong
getHeight(): ulong
getHeightByDate(uint year, uint month, uint day): ulong
sync(ulong startHeight=null, MoneroSyncListener listener=null): MoneroSyncResult
startSyncing(): void
stopSyncing(): void
scanTxs(string[] txHashes): void
rescanSpent(): void
rescanBlockchain(): void
getBalance(uint accountId=null, uint subaddressIdx=null): ulong
getUnlockedBalance(uint accountId=null, uint subaddressIdx=null): ulong
getAccounts(bool includeSubaddresses=false, string tag=null): MoneroAccount[]
getAccount(uint accountId, bool includeSubaddresses=false): MoneroAccount
createAccount(string label=null): void
getSubaddresses(uint accountId, uint[] subaddressIndices): void
getSubaddress(uint accountId, uint subaddressIdx): MoneroSubaddress
```

## Monero Wallet Interface 2/3

```
createSubaddress(uint accountIdx, string label=null): MoneroSubaddress
setAccountLabel(uint accountIdx, string label): void
setSubaddressLabel(uint accountIdx, string subaddressIdx, string label): void
getTx(string txId): MoneroTxWallet
getTxs(MoneroTxQuery query=null): MoneroTxWallet[]
getTransfers(uint accountIdx=null, uint subaddressIdx=null): MoneroTransfer[]
getOutputs(MoneroOutputQuery query=null): MoneroOutputWallet[]
getOutgoingTransfers(MoneroTransferQuery query=null): MoneroOutgoingTransfer[]
getIncomingTransfers(MoneroTransferQuery query=null): MoneroIncomingTransfer[]
getTransfers(MoneroTransferQuery query=null): void
exportOutputs(bool all=false): string
importOutputs(string outputsHex): uint
exportKeyImages(bool all=false): MoneroKeyImage[]
importKeyImages(MoneroKeyImage[] keyImages): MoneroKeyImageImportResult
freezeOutput(String keyImage): void
thawOutput(String keyImage): void
isOutputFrozen(String keyImage): bool
getNewKeyImagesFromLastImport(): MoneroKeyImage[]
createTx(MoneroTxConfig config): MoneroTxWallet
createTxs(MoneroTxConfig config): MoneroTxWallet[]
sweepOutput(MoneroTxConfig config): MoneroTxWallet
sweepUnlocked(MoneroTxConfig config): MoneroTxWallet[]
sweepDust(bool relay=false): MoneroTxWallet[]
relayTx(string txMetadata): string
relayTx(MoneroTxWallet tx): string
relayTxs(string[] txMetadatas): string[]
relayTxs(MoneroTxWallet[] txs): string[]
describeTxSet(MoneroTxSet txSet): MoneroTxSet
signTxs(string unsignedTxHex): MoneroTxSet
submitTxs(string signedTxHex): string[]
signMessage(string message, MoneroMessageSignatureType type, int accountIdx, int subaddressIdx): string
verifyMessage(string message, string address, string signature): MoneroMessageSignatureResult
getTxKey(string txId): string
checkTxKey(string txId, string txKey, string address): MoneroCheckTx
getTxProof(String txId, string address, string message=null): string
checkTxProof(string txId, string address, string message, string signature): MoneroCheckTx
getSpendProof(string txId, string message=null): string
checkSpendProof(string txId, string message, string signature): bool
```



## Monero Wallet Interface 3/3

getReserveProofWallet(string message): string

getReserveProofAccount(uint accountId, ulong amount, string message): string

checkReserveProof(string address, string message, string signature): MoneroCheckReserve

setTxNotes(string[] txHashes, string[] notes): void

setTxNote(string txHash, string note): void

getTxNotes(string[] txHashes): string[]

getTxNote(string txHash): string

getAddressBookEntries(uint[] entryIndices=null): MoneroAddressBookEntry[]

addAddressBookEntry(string address, string description): uint

editAddressBookEntry(uint entryIdx, bool setAddress, string address, bool setDescription, string description): void

deleteAddressBookEntry(uint entryIdx): void

tagAccounts(string tag, uint[] accountIndices): void

untagAccounts(uint[] accountIndices): void

getAccountTags(): MoneroAccountTag[]

setAccountTagLabel(string tag, string label): void

getPaymentUri(MoneroTxConfig request): string

parsePaymentUri(string uri): MoneroSendRequest

getAttribute(string key): string

setAttribute(string key, string val): void

startMining(uint numThreads=null, bool backgroundMining=false, bool ignoreBattery=true): void

stopMining(): void

isMultisigImportNeeded(): bool

isMultisig(): bool

getMultisigInfo(): MoneroMultisigInfo

prepareMultisig(): string

makeMultisig(string[] multisigHexes, uint threshold, string password): string

exchangeMultisigKeys(string[] multisigHexes, string password): MoneroMultisigInitResult

exportMultisigHex(): string

importMultisigHex(string[] multisigHexes): uint

signMultisigTxHex(string multisigTxHex): MoneroMultisigSignResult

submitMultisig(string signedMultisigHex): string[]

moveTo(string path): void

changePassword(string oldPassword, string newPassword): void

save(): void

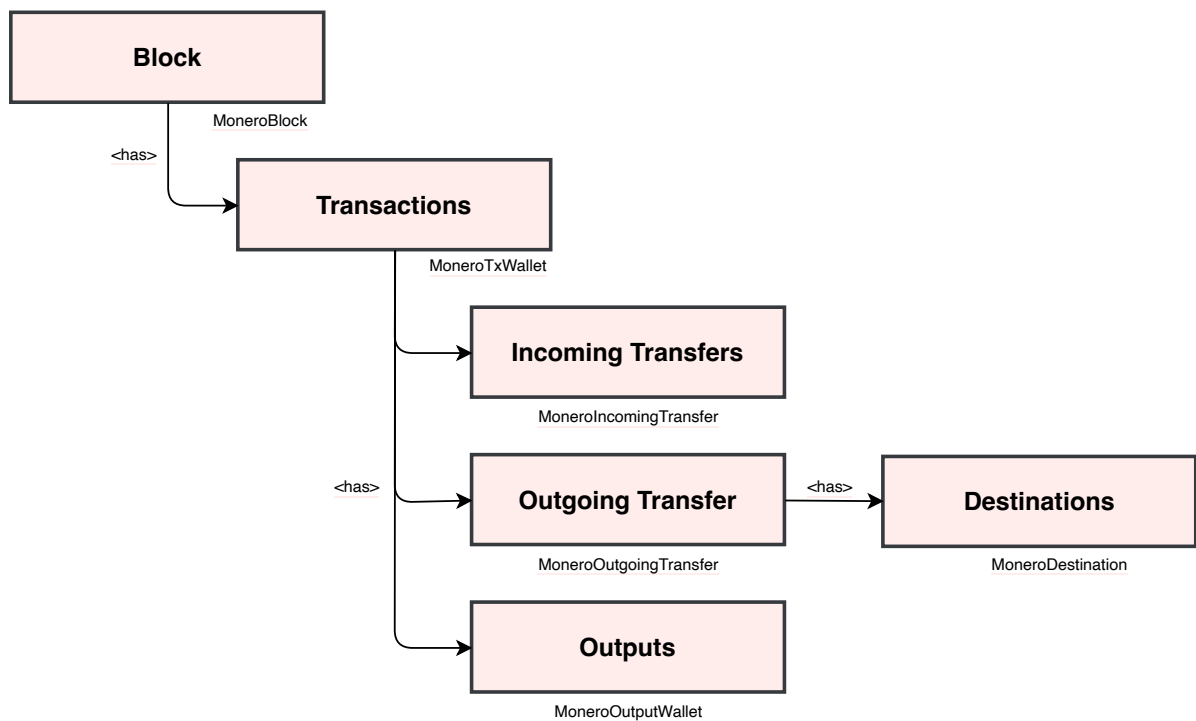
close(bool save=false): void

isClosed(): bool

getIntegratedAddress(string standardAddress=null, string paymentId=null): MoneroIntegratedAddress (deprecated)

decodeIntegratedAddress(string integratedAddress): MoneroIntegratedAddress (deprecated)

# Monero Wallet Types 1/4 - Transactions, Transfers, and Outputs



Transactions are part of a block and have incoming transfers and/or an outgoing transfer.

The outgoing transfer may have destination amounts and addresses which are saved locally with the wallet and are not recoverable from the blockchain.

Transactions may also have outputs received by the wallet when requested.

Monero Wallet Types 2/4 - Send Request and Queries for Transactions, Transfers, and Outputs

MoneroTxConfig
address: string
amount: ulong
destinations: MoneroDestination[]
subtract_fee_from: int[]
payment_id: string
priority: MoneroTxPriority
fee: ulong
account_index: uint
subaddress_index: uint
subaddress_indices: uint[]
can_split: bool
relay: bool
note: string
recipient_name: string
below_amount: ulong
sweep_each_subaddress: bool
key_image: string

Configures creating transactions to send funds.

MoneroOutputQuery extends MoneroOutputWallet
subaddress_indices: uint[]
tx_query: MoneroTxQuery
min_amount: ulong
max_amount: ulong

Configures a query to get wallet outputs.

MoneroTxQuery extends MoneroTxWallet
is_outgoing: bool
is_incoming: bool
hashes: string[]
has_payment_id: bool
payment_ids: string[]
height: ulong
min_height: ulong
max_height: ulong
include_outputs: bool
transfer_request: MoneroTransferQuery
output_request: MoneroOutputQuery

Configures a query to get wallet transactions.

MoneroTransferQuery extends MoneroTransfer
is_incoming: bool
address: string
addresses: string[]
subaddress_index: uint
subaddress_indices: uint[]
destinations: MoneroDestination[]
has_destinations: bool
tx_query: MoneroTxQuery

Configures a query to get wallet transfers.

## Monero Wallet Types 3/4

MoneroAccount
index: uint
primary_address: string
balance: ulong
unlocked_balance: ulong
subaddresses: MoneroSubaddress[]
tag: string

MoneroSubaddress
account_index: uint
index: uint
address: string
label: string
balance: ulong
unlocked_balance: ulong
is_used: bool
num_unspent_outputs: ulong
num_blocks_to_unlock: ulong

MoneroDestination
address: string
amount: ulong

MoneroOutputWallet extends MoneroOutput
account_index: uint
subaddress_index: uint
is_spent: bool
is_frozen: bool

MoneroTransfer
tx: MoneroTxWallet
is_incoming: bool
amount: ulong
account_index: uint

MoneroTxSet
txs: MoneroTxWallet[]
multisig_tx_hex: string
unsigned_tx_hex: string
signed_tx_hex: string

MoneroTxWallet extends MoneroTx
tx_set: MoneroTxSet
incoming_amount: ulong
outgoing_amount: ulong
incoming_transfers: MoneroTransfer[]
outgoing_transfer: MoneroTransfer
note: string
is_locked: bool
input_sum: ulong
output_sum: ulong
change_address: string
change_amount: ulong
num_dummy_outputs: uint
extra_hex: string

Extends

Extends

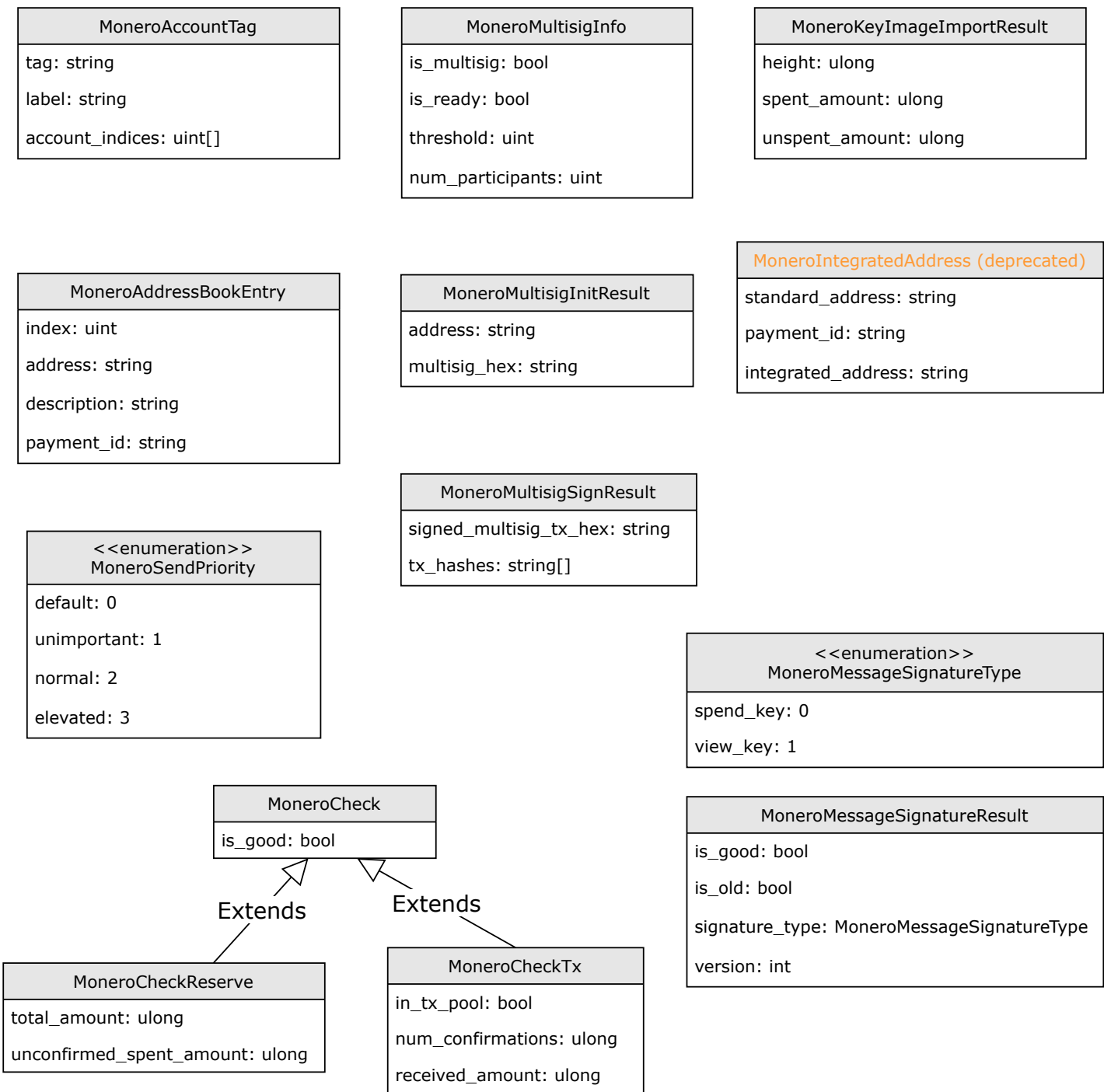
MoneroIncomingTransfer
subaddress_index: uint
address: string
num_suggested_confirmations: ulong

MoneroOutgoingTransfer
subaddress_indices: uint[]
addresses: string[]
destinations: MoneroDestination[]

MoneroSyncResult
num_blocks_fetched: ulong
received_money: bool

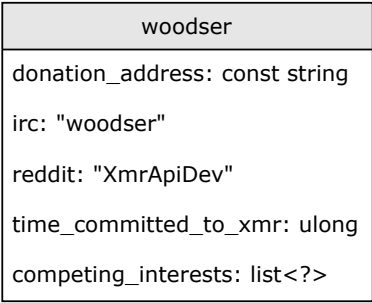
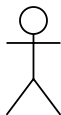
MoneroWalletListener
onSyncProgress(ulong height, ulong startHeight, ulong endHeight, double percentDone, string message): void
onNewBlock(ulong height): void
onOutputReceived(MoneroOutputWallet output): void
onOutputSpent(MoneroOutputWallet output): void

Monero Wallet Types 4/4





46FRlGKVqFNQnDiFkH7AuzbUBrGQwz2VdaXTDD4jcjRE8YkkoTYTmZ2Vohsz9gLSqkj5EM6ai9Q7sBoX4FPPYJdGKQQXPVz



Motivation tends to increase with support to donation address.