

# A Monero Data Model and API Specification

*with implementations in Java, JavaScript, and C++  
using monero v0.16.0.0 'Nitrogen Nebula'*

*Last revised June 04, 2020*



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

JavaScript implementation: <https://github.com/monero-ecosystem/monero-javascript>

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

This document's source: <https://github.com/monero-ecosystem/monero-java/blob/master/monero-spec.xml>

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

## Monero Daemon Interface 1/2

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

getTxs(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=?): ulong

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

relayTxByHash(string txHash): void

relayTxByHash(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  
getKnownPeers(): MoneroDaemonPeer[]  
getConnections(): MoneroDaemonConnection[]  
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  
getNextBlockHeader(): MoneroBlockHeader  
addListener(MoneroDaemonListener listener): void  
removeListener(MoneroDaemonListener listener): void  
stop(): void

Monero Daemon Types 1/3

MoneroBlockHeader
hash: string
height: ulong
timestamp: ulong
size: ulong
weight: ulong
long_term_weight: ulong
depth: ulong
difficulty: ulong
cumulative_difficulty: ulong
major_version: uint
minor_version: uint
nonce: uint
miner_tx_hash: string
num_txs: uint
orphan_status: bool
prev_hash: string
reward: ulong
pow_hash: string



MoneroBlock
hex: string
miner_tx: MoneroTx
txs: MoneroTx[]
tx_hashes: string[]

MoneroDaemonInfo
version: string
num_alt_blocks: ulong
block_size_limit: ulong
block_size_median: ulong
block_weight_limit: ulong
block_weight_median: ulong
bootstrap_daemon_address: string
difficulty: ulong
cumulative_difficulty: ulong
free_space: ulong
num_offline_peers: uint
num_online_peers: uint
height: ulong
height_without_bootstrap: ulong
network_type: MoneroNetworkType
is_offline: bool
num_incoming_connections: uint
num_outgoing_connections: uint
num_rpc_connections: uint
start_timestamp: ulong
target: ulong
target_height: ulong
top_block_hash: string
num_txs: uint
num_txs_pool: uint
was_bootstrap_ever_used: bool
database_size: uint
update_available: bool
credits: ulong

<enumeration> MoneroNetworkType
mainnet: 0
testnet: 1
stagenet: 2

MoneroTx
block: MoneroBlock
height: ulong
hash: string
version: uint
is_coinbase: bool
payment_id: string
fee: ulong
ring_size: uint
do_not_relay: bool
is_relayed: bool
is_confirmed: bool
in_tx_pool: bool
num_confirmations: ulong
unlock_time: ulong
last_relayed_timestamp: ulong
received_timestamp: ulong
is_double_spend: bool
key: string
full_hex: string
pruned_hex: string
prunable_hex: string
size: ulong
weight: ulong
inputs: MoneroOutput[]
outputs: MoneroOutput[]
output_indices: uint[]
metadata: string
extra: uint[]
rct_signatures: string[]
rct_sig_prunable: ?
is_kept_by_block: bool
is_failed: bool
last_failed_height: ulong
last_failed_hash: string
max_used_block_height: ulong

Monero Daemon Types 2/3

max_used_block_hash: string
signatures: string[]

MoneroDaemonSyncInfo
height: ulong
connections: MoneroDaemonConnection[]
spans: MoneroDaemonConnectionSpan[]
target_height: ulong
next_needed_pruning_seed: uint
overview: ?

MoneroDaemonConnection
peer: MoneroDaemonPeer
id: string
avg_download: ulong
avg_upload: ulong
current_download: ulong
current_upload: ulong
height: ulong
is_incoming: bool
live_time: ulong
is_local_ip: bool
is_local_host: bool
num_receives: uint
num_sends: uint
receive_idle_time: ulong
send_idle_time: ulong
state: string
num_support_flags: uint
type: ConnectionType

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

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

MoneroDaemonPeer
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

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

Monero Daemon Types 3/3

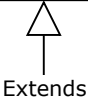
MoneroHardForkInfo
earliest_height: ulong
is_enabled: bool
state: uint
threshold: uint
version: string
num_votes: uint
window: uint
voting: uint
credits: ulong
top_block_hash: string

MoneroVersion
number: uint
is_release: bool

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

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

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

isViewOnly(): bool

setDaemonConnection(MoneroDaemonConnection connection): void

getDaemonConnection(): MoneroDaemonConnection

isConnected(): bool

getVersion(): MoneroVersion

getNetworkType(): MoneroNetworkType

getPath(): string

getMnemonic(): string

getMnemonicLanguage(): string

getMnemonicLanguages(): string[]

getPrivateSpendKey(): string

getPrivateViewKey(): string

getPublicSpendKey(): string

getPublicViewKey(): string

getPrimaryAddress(): string

getAddress(uint accountId, uint subaddressIdx): string

getAddressIndex(string address): MoneroSubaddress

getDaemonConnection(): MoneroRpcConnection

getHeight(): ulong

getDaemonHeight(): ulong

getDaemonMaxPeerHeight(): ulong

getApproximateChainHeight(): ulong

sync(ulong startHeight=null, MoneroSyncListener listener=null): MoneroSyncResult

startSyncing(): void

stopSyncing(): 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

createSubaddress(uint accountId, string label=null): MoneroSubaddress

getTx(string txId): MoneroTxWallet

getTxs(MoneroTxQuery query=null): MoneroTxWallet[]

getTransfers(uint accountId=null, uint subaddressIdx=null): MoneroTransfer[]

## Monero Wallet Interface 2/3

```
getOutputs(MoneroOutputQuery query=null): MoneroOutputWallet[]
getOutgoingTransfers(MoneroTransferQuery query=null): MoneroOutgoingTransfer[]
getIncomingTransfers(MoneroTransferQuery query=null): MoneroIncomingTransfer[]
getTransfers(MoneroTransferQuery query=null): void
getKeyImages(): MoneroKeyImage[]
importOutputsHex(string outputsHex): uint
getOutputsHex(): string
importKeyImages(MoneroKeyImage[] keyImages): MoneroKeyImageImportResult
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[]
parseTxSet(MoneroTxSet txSet): MoneroTxSet
signTxs(string unsignedTxHex): string
submitTxs(string signedTxHex): string[]
signMessage(string message): string
verifyMessage(string message, string address, string signature): bool
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 accountIdx, 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

createPaymentUri(MoneroSendRequest 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): MoneroMultisigInitResult

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

getMultisigHex(): string

importMultisigHex(string[] multisigHexes): uint

signMultisigTxHex(string multisigTxHex): MoneroMultisigSignResult

submitMultisig(string signedMultisigHex): string[]

moveTo(string path, string password): void

save(): void

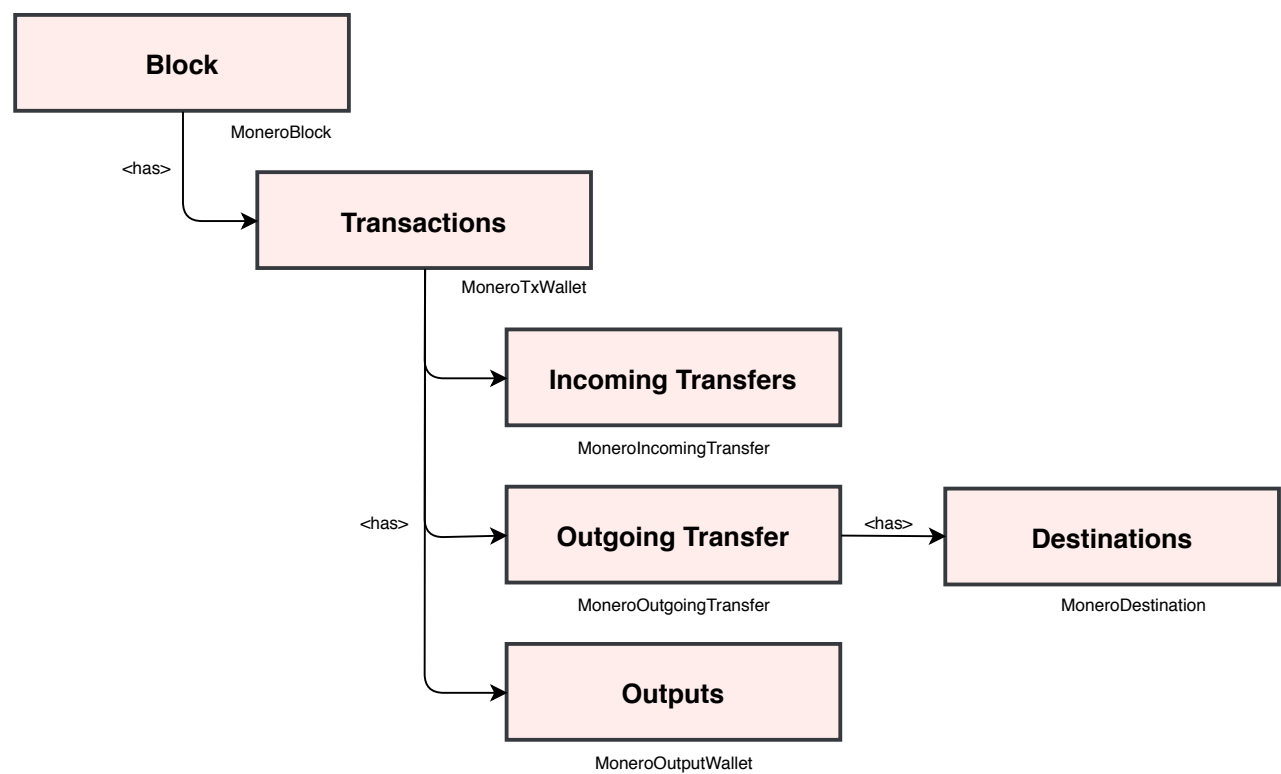
close(bool save=false): void

isClosed(): bool

getIntegratedAddress(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.

In the context of a wallet, transactions 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 can also have outputs received by the wallet.

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

MoneroTxConfig
address: string
amount: ulong
destinations: MoneroDestination[]
payment_id: string
priority: MoneroTxPriority
fee: ulong
account_index: uint
subaddress_index: uint
subaddress_indices: uint[]
unlock_time: ulong
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.

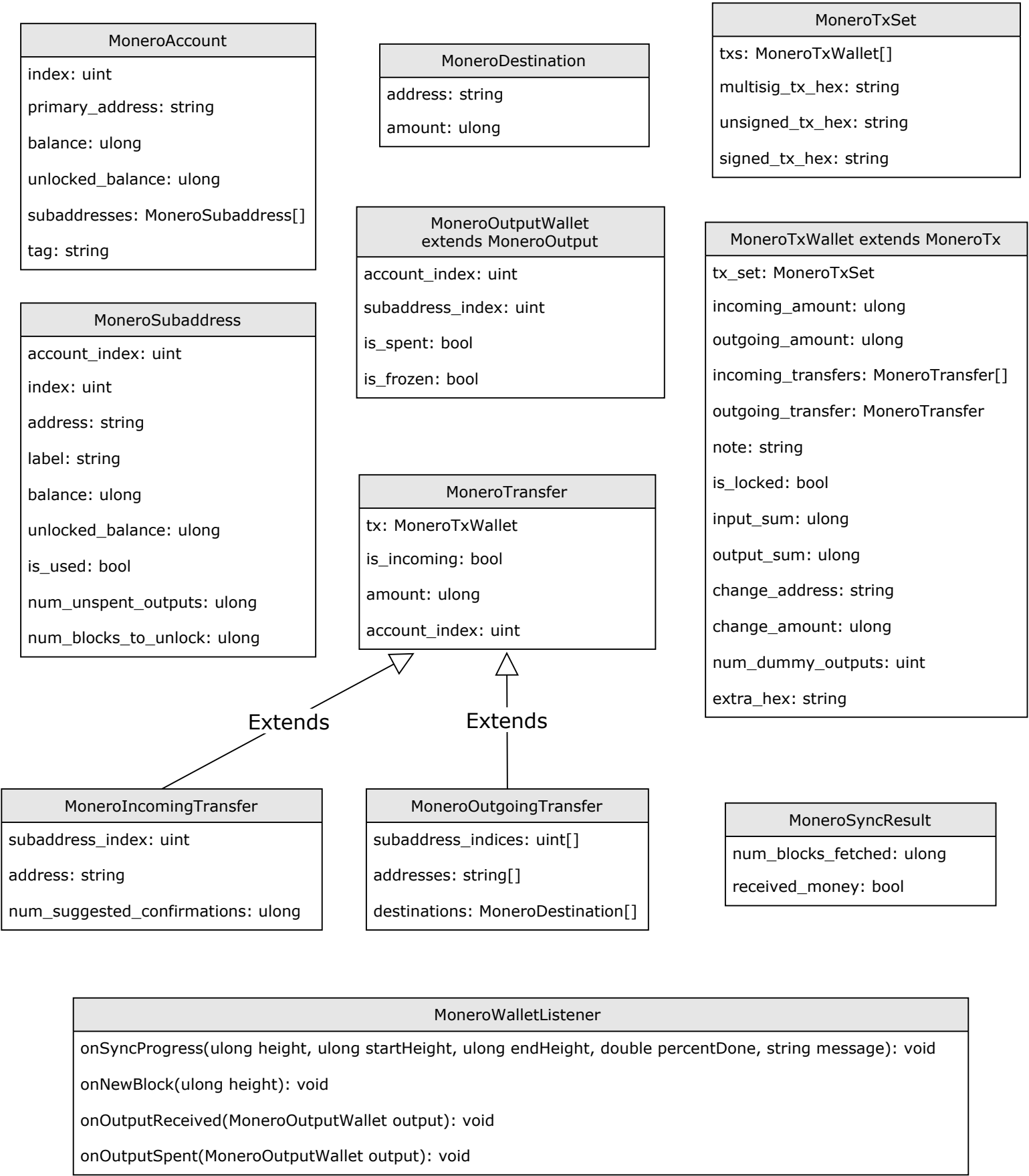
MoneroTxQuery extends MoneroTxWallet
is_outgoing: bool
is_incoming: bool
hashes: string[]
has_payment_id: bool
payment_ids: string[]
height: ulong
min_height: ulong
max_height: ulong
include_outputs: bool
transfer_request: MoneroTransferQuery
output_request: MoneroOutputQuery

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



Monero Wallet Types 4/4

MoneroAccountTag
tag: string
label: string
account_indices: uint[]

MoneroMultisigInfo
is_multisig: bool
is_ready: bool
threshold: uint
num_participants: uint

MoneroKeyImageImportResult
height: ulong
spent_amount: ulong
unspent_amount: ulong

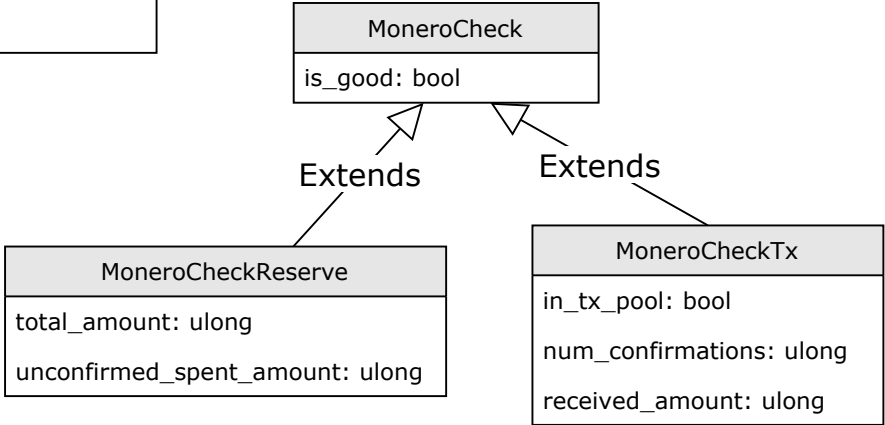
MoneroAddressBookEntry
index: uint
address: string
description: string
payment_id: string

MoneroMultisigInitResult
address: string
multisig_hex: string

MoneroIntegratedAddress (deprecated)
standard_address: string
payment_id: string
integrated_address: string

<<enumeration>> MoneroSendPriority
default: 0
unimportant: 1
normal: 2
elevated: 3

MoneroMultisigSignResult
signed_multisig_tx_hex: string
tx_hashes: string[]





46FR1GKVqFNQnDiFkH7AuzbUBrGQwz2VdaXTDD4jcjRE8YkkoTYTmZ2Vohsz9gLSqkj5EM6ai9Q7sBoX4FPPYJdGKQQXPVz



woodser

donation\_address: const string  
irc: "woodser"  
reddit: "XmrApiDev"  
time\_committed\_to\_xmr: ulong  
competing\_interests: list<?>

Motivation tends to increase with support shown to donation address.