Durable Transaction Nonces in the Solana CLI

Durable transaction nonces are a mechanism for getting around the typical short lifetime of a transaction's recent_blockhash . They are implemented as a Solana Program, the mechanics of which can be read about in the proposal .

Usage Examples

Full usage details for durable nonce CLI commands can be found in the CLI reference .

Nonce Authority

Authority over a nonce account can optionally be assigned to another account. In doing so the new authority inherits full control over the nonce account from the previous authority, including the account creator. This feature enables the creation of more complex account ownership arrangements and derived account addresses not associated with a keypair. The--nonce-authority argument is used to specify this account and is supported by the following commands

- create-nonce-account
- new-nonce
- withdraw-from-nonce-account
- authorize-nonce-account

Nonce Account Creation

The durable transaction nonce feature uses an account to store the next nonce value. Durable nonce accounts must be rent-exempt , so need to carry the minimum balance to achieve this.

A nonce account is created by first generating a new keypair, then create the account on chain

- Command

solana-keygen new -o nonce-keypair.json solana create-nonce-account nonce-keypair.json 1 * Output

2SymGjGV4ksPdpbaqWFiDoBz8okvtiik4KE9cnMQgRHrRLySSdZ6jrEcpPifW4xUpp4z66XM9d9wM48sA7peG2XL To keep the keypair entirely offline, use the Paper Wallet keypair generation instructions instead Full usage documentation

Querying the Stored Nonce Value

Creating a durable nonce transaction requires passing the stored nonce value as the value to the--blockhash argument upon signing and submission. Obtain the presently stored nonce value with

- Command

solana nonce nonce-keypair.json * Output

8GRipryfxcsxN8mAGjy8zbFo9ezaUsh47TsPzmZbuytU Full usage documentation

Advancing the Stored Nonce Value

While not typically needed outside a more useful transaction, the stored nonce value can be advanced by

- Command

solana new-nonce nonce-keypair.json * Output

44jYe1yPKrjuYDmoFTdgPjg8LFpYyh1PFKJqm5SC1PiSyAL8iw1bhadcAX1SL7KDmREEkmHpYvreKoNv6fZgfvUK Full usage documentation

Display Nonce Account

Inspect a nonce account in a more human friendly format with

- Command

solana nonce-account nonce-keypair.json * Output

balance: 0.5 SOL minimum balance required: 0.00136416 SOL nonce: DZar6t2EaCFQTbUP4DHKwZ1wT8gCPW2aRfkVWhydkBvS Full usage documentation

Withdraw Funds from a Nonce Account

Withdraw funds from a nonce account with

- Command

solana withdraw-from-nonce-account nonce-keypair.json ~/.config/solana/id.json 0.5 * Output

3foNy1SBqwXSsfSfTdmYKDuhnVheRnKXpoPySiUDBVeDEs6iMVokgqm7AqfTjbk7QBE8mqomvMUMNQhtdMvFLide Close a nonce account by withdrawing the full balance [Full usage documentation]

Assign a New Authority to a Nonce Account

Reassign the authority of a nonce account after creation with

- Command

solana authorize-nonce-account nonce-keypair.json nonce-authority.json * Output

3F9cg4zN9wHxLGx4c3cUKmqpej4oa67QbALmChsJbfxTgTffRiL3iUehVhR9wQmWgPua66jPuAYeL1K2pYYjbNoT [Full usage documentation]

Other Commands Supporting Durable Nonces

To make use of durable nonces with other CLI subcommands, two arguments must be supported.

- --nonce
- , specifies the account storing the nonce value
- --nonce-authority
- , specifies an optional[nonce authority]

The following subcommands have received this treatment so far

- [pay]
- [delegate-stake]
- [deactivate-stake]

Example Pay Using Durable Nonce

Here we demonstrate Alice paying Bob 1 SOL using a durable nonce. The procedure is the same for all subcommands supporting durable nonces

- Create accounts

First we need some accounts for Alice, Alice's nonce and Bob

solana-keygen new -o alice.json solana-keygen new -o nonce.json solana-keygen new -o bob.json

- Fund Alice's account

Alice will need some funds to create a nonce account and send to Bob. Airdrop her some SOL

solana airdrop -k alice.json 1 1 SOL

- Create Alice's nonce account

Now Alice needs a nonce account. Create one

Here, no separate[nonce authority] is employed, soalice.json has full authority over the nonce account solana create-nonce-account -k alice.json nonce.json 0.1
3KPZr96BTsL3hqera9up82KAU462Gz31xjqJ6eHUAjF935Yf8i1kmfEbo6SVbNaACKE5z6gySrNjVRvmS8DcPuwV

- A failed first attempt to pay Bob

Alice attempts to pay Bob, but takes too long to sign. The specified blockhash expires and the transaction fails

solana transfer -k alice.json --blockhash expiredDTaxfagttWjQweib42b6ZHADSx94Tw8gHx11 bob.json 0.01 [2020 -01-02T18:48:28.462911000Z ERROR solana_cli::cli] Io (Custom { kind: Other, error: "Transaction \"
33gQQaoPc9jWePMvDAeyJpcnSPiGUAdtVg8zREWv4GiKjkcGNufgpcbFyRKRrA25NkgjZySEeKue5rawyeH5TzsV \" failed:

None"

}) Error: Io (Custom { kind: Other, error: "Transaction \" 33gQQaoPc9jWePMvDAeyJpcnSPiGUAdtVg8zREWv4GiKjkcGNufgpcbFyRKRrA25NkgjZySEeKue5rawyeH5TzsV \" failed: None"

})

- Nonce to the rescue

Alice retries the transaction, this time specifying her nonce account and the blockhash stored there

Remember,alice.json is thenonce authority in this example solana nonce-account nonce.json balance: 0.1 SOL minimum balance required: 0.00136416 SOL nonce: F7vmkY3DTaxfagttWjQweib42b6ZHADSx94Tw8gHx3W7 solana transfer -k alice.json --blockhash F7vmkY3DTaxfagttWjQweib42b6ZHADSx94Tw8gHx3W7 --nonce nonce.json bob.json 0.01 HR1368UKHVZyenmH7yVz5sBAijV6XAPeWbEiXEGVYQorRMcoijeNAbzZqEZiH8cDB8tk65ckqeegFjK8dHwNFgQ

- Success

The transaction succeeds! Bob receives 0.01 SOL from Alice and Alice's stored nonce advances to a new value

solana balance -k bob.json 0.01 SOL solana nonce-account nonce.json balance: 0.1 SOL minimum balance required: 0.00136416 SOL nonce: 6bjroqDcZgTv6Vavhqf81oBHTv3aMnX19UTB51YhAZnN Previous Solana CLI: Deploy a Program Next Solana CLI: Offline Transaction Signing