How to use dfx to interact with NNS canisters instead of nns app

Contents

Background

现在所有和 ICP 以及神经元治理相关的操作都需要使用 NNS app。

在大多数情况下，NNS app 是能够满足需求。但是在以下情况下无法满足需求：

1. 当 Identity 组件无法使用时，因为 NNS app 依赖于 Identity 组件的认证，因此 NNS app 也将无法使用。
    1. 比如对应种子轮用户，他们被锁定的神经元被 2017 年生成的助记词控制，并且无法将控制权转移给 Identity 里面的账号。此时，他们要想操作神经元（比如投票，解锁等），则无法使用 NNS app。
    2. 用户管理的金额非常大，希望使用基于私钥文件的离线两步验证，这时就不能使用 NNS app 了。
    3. WebAuth 还是一个比较新的标准，浏览器支持并不完善。并且仍有很多终端设备（手机，电脑等）不支持安全芯片。
2. 当需要批量操作神经元时，比如需要操作 100 个神经元去投票，如果基于 NNS app，则需要点击几百次，并且等等投票结果等等，比较麻烦

How

dfx

使用 dfx + 足够的链上信息，原则上是可以完成和 IC 上所有的 canister 进行交互的所有操作。

现在假设 dfx 已经配置好一个账号，icp，里面有足量的 icp（至少 1.1 个 ICP，其中 1 个 ICP 用于质押在神经元里面，0.1 个 ICP 用于手续费）。

创建神经元

tools: subaccount

```
# 获取该账号在主网上的余额
dfx ledger --network=https://ic0.app balance
1.47200000 ICP

# 获取该账号的 principal id
dfx identity get-principal
yhy6j-huy54-mkzda-m26hc-yklb3-dzz4l-i2ykq-kr7tx-dhxyf-v2c2g-tae

# 获取该账号的 account id
dfx ledger account-id
073ca335431d6b6f6916068b5784a241730d2e3452ae650025b4bf7a975a81f0

# 设置 governance canister 地址
governance="principal \"rrkah-fqaaa-aaaaa-aaaaq-cai\""

# 调用 Ledger canister（ryjl3-tyaaa-aaaaa-aaaba-cai），发送 1 个 ICP 到 governance 地址下的某个子账号（to）。
# 其中 to 使用 [subaccount](subaccount/src/main.rs) 生成。等于 governance_canister_id + sub
# 可以看出，其中 sub 通过 caller（发送地址） 和 memo（这里是0），然后经过一系列变化得到。
# 交易发送完成后，得到这笔交易的块高 291747
# 交易地址在 https://dashboard.internetcomputer.org/transaction/d7eec9a3105857a94754838cb2dca9568836b3f441a89b498c5b729a02a7a9f3
dfx canister --network=https://ic0.app --no-wallet call ryjl3-tyaaa-aaaaa-aaaba-cai send_dfx "(record {memo=0:nat64;amount=record {e8s=100000000:nat64};fee=record {e8s=10000:nat64};from_subaccount=null;to=\"8ca2e53dd8b9f1924daf10cdf5879f6e4a5c3267ded5a7efb5e740b3e2f85ae3\";created_at_time=null})"
(291_747 : nat64)

# 接着调用 Ledger canister（ryjl3-tyaaa-aaaaa-aaaba-cai），给 governance canister 发送一个已经成功转账的通知
# 参数 block_height 为之前那笔交易的高度。to_canister 是 governance，
# to_subaccount 使用 [subaccount](subaccount/src/main.rs) 生成。和前一笔交易类似，通过 caller（发送地址） 和 memo（这里是0），然后经过一系列变化得到。
# 最后返回神经元 id（ic_nns_common::pb::v1::NeuronId）
dfx canister --network=https://ic0.app --no-wallet call ryjl3-tyaaa-aaaaa-aaaba-cai notify_dfx "(record {block_height=291747:nat64;max_fee=record{e8s=10000:nat64};from_subaccount=null;to_canister=$governance;to_subaccount=vec {151:nat8;153:nat8;127:nat8;225:nat8;241:nat8;148:nat8;194:nat8;208:nat8;107:nat8;96:nat8;196:nat8;180:nat8;189:nat8;234:nat8;210:nat8;114:nat8;65:nat8;81:nat8;192:nat8;46:nat8;165:nat8;142:nat8;58:nat8;137:nat8;118:nat8;125:nat8;47:nat8;181:nat8;92:nat8;181:nat8;165:nat8;94:nat8}})"
(record { 23_515 = 2_524_431_329_219_902_182 : nat64 })

# 查询余额，少了 1 ICP 和部分手续费
dfx ledger --network=https://ic0.app balance
0.47180000 ICP
```

查询神经元信息

查询并对比 governance 的 candid 文件，添加注释

```
dfx canister --network=https://ic0.app --no-wallet call rrkah-fqaaa-aaaaa-
aaaaq-cai get_full_neuron "(2_524_431_329_219_902_182 : nat64)"
(
  variant { # Result_1
    17_724 = record { # Neuron
      23_515 = opt record { 23_515 = 2_524_431_329_219_902_182 : nat64 };
# id : opt NeuronId;
      79_599_772 = opt principal "yhy6j-huy54-mkzda-m26hc-yklb3-dzz4l-
i2ykq-kr7tx-dhxyf-v2c2g-tae"; # controller : opt principal;
      349_671_467 = vec {}; # recent_ballots : vec BallotInfo;
      456_924_626 = true; # kyc_verified : bool;
      852_549_734 = false; # not_for_profit : bool;
      1_029_637_143 = 0 : nat64; # maturity_e8s_equivalent : nat64;
      1_257_408_332 = 100_000_000 : nat64; # cached_neuron_stake_e8s :
nat64;
      1_392_680_831 = 1_626_759_699 : nat64; # created_timestamp_seconds :
nat64;
      2_399_567_118 = 1_626_759_699 : nat64; #
aging_since_timestamp_seconds : nat64;
      2_680_861_478 = vec {}; # hot_keys : vec principal;
      2_707_029_165 = blob
"\97\99\7f\e1\f1\94\c2\d0k\60\c4\b4\bd\ea\d2rAQ\c0.\a5\8e:\89v}/\b5\5c\b5\
a5^"; # account : vec nat8;
      3_084_775_299 = opt variant { 1_620_537_965 = 0 : nat64 }; #
dissolve_state : opt DissolveState;
      3_407_357_762 = vec { # followees : vec record { int32; Followees };
        record {
          0 : int32;
          record { 3_407_357_762 = vec { record { 23_515 = 28 : nat64 } }
};
        };
      };
      3_439_871_066 = 0 : nat64; # neuron_fees_e8s : nat64;
      3_664_621_355 = opt record { # transfer : opt NeuronStakeTransfer;
        1_077_262_001 = blob
"\97\99\7f\e1\f1\94\c2\d0k\60\c4\b4\bd\ea\d2rAQ\c0.\a5\8e:\89v}/\b5\5c\b5\
a5^"; #   to_subaccount : vec nat8;
        1_103_886_095 = 100_000_000 : nat64; # neuron_stake_e8s : nat64;
        1_136_829_802 = opt principal "yhy6j-huy54-mkzda-m26hc-yklb3-
dzz4l-i2ykq-kr7tx-dhxyf-v2c2g-tae"; # from : opt principal;
        1_213_809_850 = 0 : nat64; # memo : nat64;
        1_835_347_746 = vec {}; # from_subaccount : vec nat8;
        3_066_807_170 = 1_626_759_699 : nat64; # transfer_timestamp :
nat64;
        3_583_743_961 = 291_747 : nat64; # block_height : nat64;
      };
```

```
    }
  },
)

# 返回该账号控制的神经元id，这里就刚刚创建的那个
dfx canister --network=https://ic0.app --no-wallet call rrkah-fqaaa-aaaaa-
aaaaq-cai get_neuron_ids
(vec { 2_524_431_329_219_902_182 : nat64 })

# 获取该神经元的基本信息
dfx canister --network=https://ic0.app --no-wallet call rrkah-fqaaa-aaaaa-
aaaaq-cai get_neuron_info "(2_524_431_329_219_902_182 : nat64)"
(
  variant { # Result_2
    17_724 = record { # NeuronInfo
      303_619_573 = 0 : nat64; # dissolve_delay_seconds : nat64;
      349_671_467 = vec {}; # recent_ballots : vec BallotInfo;
      1_392_680_831 = 1_626_759_699 : nat64; # created_timestamp_seconds :
nat64;
      2_215_343_633 = 3 : int32; # state : int32;
      3_433_024_449 = 1_626_762_752 : nat64; #
retrieved_at_timestamp_seconds : nat64;
      3_871_395_629 = 100_000_604 : nat64; # voting_power : nat64;
      4_290_862_015 = 3_053 : nat64; # age_seconds : nat64;
    }
  },
)

# 获取当前 Pending 的提案
dfx canister --network=https://ic0.app --no-wallet call rrkah-fqaaa-aaaaa-
aaaaq-cai get_pending_proposals
(
  vec {
    record { # ProposalInfo
      23_515 = opt record { 23_515 = 11_078 : nat64 }; # id : opt
NeuronId;
      100_394_802 = 1 : int32; # status : int32;
      338_645_423 = 7 : int32; # topic : int32;
      568_110_681 = null; # ballots : vec record { nat64; Ballot };
      718_522_127 = vec {};
      1_120_297_033 = 1_626_700_972 : nat64; # proposal_timestamp_seconds
: nat64;
      1_138_543_385 = 0 : nat64; # reward_event_round : nat64;
      1_453_869_204 = 0 : nat64; # failed_timestamp_seconds : nat64;
      1_659_864_270 = 100_000_000 : nat64; # reject_cost_e8s : nat64;
      2_084_260_468 = opt record { # latest_tally : opt Tally;
        24_641 = 16_425_617_043 : nat64; # no : nat64;
        6_039_847 = 2_806_966_682_423 : nat64; # yes : nat64;
        338_842_564 = 31_775_041_633_396_566 : nat64; # total : nat64;
        4_174_818_006 = 1_626_760_638 : nat64; # timestamp_seconds :
nat64;
      };
      2_139_208_002 = 1 : int32; # reward_status : int32;
      2_756_235_859 = 0 : nat64; # decided_timestamp_seconds : nat64;
```

```
      3_000_310_834 = opt record { # proposal : opt Proposal;
        5_843_823 = "https://github.com/ic-association/nns-
proposals/blob/main/proposals/subnet_management/20210719T1320Z.md"; # url
: text
        373_701_558 = opt variant { # action : opt Action
          2_746_863_190 = record { # ExecuteNnsFunction :
ExecuteNnsFunction;
            1_563_405_284 = 6 : int32; # nns_function : int32;
            3_979_722_638 = blob
"DIDL\06l\06\e7\8f\b0\12x\c4\c1\81D\01\bd\86\9d\8b\04h\8c\c9\9c\ae\06\03\f
c\ef\cc\a6\0d\05\f7\e0\ab\c7\0dxn\02mhn\04l\03\00q\01q\02xm{\01\00\f8&T\00
\00\00\00\00\01\00\01\1dE\17\8bf\a4\07\a4\d5\9c\0aMg3\bd\a2\ce?
7\c1\11\b4%~\c4\19\08\f4\f8\02\00
\1d\dc\eb\c4<_\00\efp\ee\9d5Zc}\f5ZA\e8\9f\8d\bda\ab d\10K\dc\c0\c1
\b0J\8a\a5\e83\93\16"; # payload : vec nat8
          }
        };
        2_162_756_390 = "recover subnet 5kdm2-62fc6-fwnja-hutkz-ycsnm-
4z33i-woh43-4cenu-ev7mi-gii6t-4ae"; # summary : text
      };
      3_000_311_732 = opt record { 23_515 = 48 : nat64 }; # proposer : opt
NeuronId;
      4_133_454_822 = 0 : nat64; # executed_timestamp_seconds : nat64;
    };
  },
)
```

提案 Action 类型，即有哪几种提案：

```
type Action = variant {
  ManageNeuron : ManageNeuron;
  ExecuteNnsFunction : ExecuteNnsFunction;
  RewardNodeProvider : RewardNodeProvider;
  SetDefaultFollowees : SetDefaultFollowees;
  ManageNetworkEconomics : NetworkEconomics;
  ApproveGenesisKyc : ApproveGenesisKyc;
  AddOrRemoveNodeProvider : AddOrRemoveNodeProvider;
  Motion : Motion;
};
```

获取某个指定的神经元信息

```
dfx canister --network=https://ic0.app --no-wallet call rrkah-fqaaa-aaaaa-
aaaaq-cai get_proposal_info "(11_077:nat64)"
(
  opt record { # ProposalInfo
    23_515 = opt record { 23_515 = 11_077 : nat64 }; # id : opt NeuronId;
    100_394_802 = 4 : int32;  # status : int32;
    338_645_423 = 2 : int32;  # topic : int32;
```

```
    568_110_681 = null;  # ballots : vec record { nat64; Ballot };
    718_522_127 = vec {};
    1_120_297_033 = 1_626_700_814 : nat64;  # proposal_timestamp_seconds :
nat64;
    1_138_543_385 = 0 : nat64; # reward_event_round : nat64;
    1_453_869_204 = 0 : nat64; # failed_timestamp_seconds : nat64;
    1_659_864_270 = 100_000_000 : nat64; # reject_cost_e8s : nat64;
    2_084_260_468 = opt record { # latest_tally : opt Tally;
      24_641 = 0 : nat64; # no : nat64;
      6_039_847 = 31_765_476_162_104_117 : nat64;  # yes : nat64;
      338_842_564 = 31_775_041_889_086_177 : nat64;  # total : nat64;
      4_174_818_006 = 1_626_700_819 : nat64; # timestamp_seconds : nat64;
    };
    2_139_208_002 = 2 : int32; # reward_status : int32;
    2_756_235_859 = 1_626_700_819 : nat64;  # decided_timestamp_seconds :
nat64;
    3_000_310_834 = opt record { # proposal : opt Proposal;
      5_843_823 = ""; # url : text
      373_701_558 = opt variant {  # action : opt Action
        2_746_863_190 = record { # # ExecuteNnsFunction :
ExecuteNnsFunction;
          1_563_405_284 = 10 : int32;  # nns_function : int32;
          3_979_722_638 = blob
"DIDL\01l\03\90\cb\8b\aa\01q\df\f5\81\a0\08x\d6\d5\da\c6\0fx\01\00
{\22icp\22:
[\22Huobi\22],\22sdr\22:\22xe.com\22}\ccC\03\00\00\00\00\00|\f5\60\00\0
0\00\00"; # payload : vec nat8
        }
      };
      2_162_756_390 = "The ICP/XDR conversion rate is set to 21.3964."; #
summary : text
    };
    3_000_311_732 = opt record { 23_515 = 25 : nat64 }; # proposer : opt
NeuronId;
    4_133_454_822 = 1_626_700_819 : nat64; # executed_timestamp_seconds :
nat64;
  },
)
```

```
dfx canister --network=https://ic0.app --no-wallet call rrkah-fqaaa-aaaaa-
aaaaq-cai list_neurons "(record{neuron_ids=vec
{2_524_431_329_219_902_182:nat64;};include_neurons_readable_by_caller=true
;})"
(
  record { # type ListNeuronsResponse = record {
    1_319_168_057 = vec { #   neuron_infos : vec record { nat64;
NeuronInfo };
      record { #
        2_524_431_329_219_902_182 : nat64; # nat64
        record {  # NeuronInfo
          303_619_573 = 0 : nat64;  #   dissolve_delay_seconds : nat64;
```

```
          349_671_467 = vec {}; #   recent_ballots : vec BallotInfo;
          1_392_680_831 = 1_626_759_699 : nat64; #
created_timestamp_seconds : nat64;
          2_215_343_633 = 3 : int32; #   state : int32;
          3_433_024_449 = 1_626_769_938 : nat64; #
retrieved_at_timestamp_seconds : nat64;
          3_871_395_629 = 100_002_027 : nat64; #   voting_power : nat64;
          4_290_862_015 = 10_239 : nat64; #   age_seconds : nat64;
        };
      };
    };
    1_488_793_264 = vec { #   full_neurons : vec Neuron;
      record {  # type Neuron = record {
        23_515 = opt record { 23_515 = 2_524_431_329_219_902_182 : nat64
}; #   id : opt NeuronId;
        79_599_772 = opt principal "yhy6j-huy54-mkzda-m26hc-yklb3-dzz4l-
i2ykq-kr7tx-dhxyf-v2c2g-tae"; #   controller : opt principal;
        349_671_467 = vec {}; #   recent_ballots : vec BallotInfo;
        456_924_626 = true; #   kyc_verified : bool;
        852_549_734 = false;  #   not_for_profit : bool;
        1_029_637_143 = 0 : nat64; #   maturity_e8s_equivalent : nat64;
        1_257_408_332 = 100_000_000 : nat64; #   cached_neuron_stake_e8s :
nat64;
        1_392_680_831 = 1_626_759_699 : nat64; #
created_timestamp_seconds : nat64;
        2_399_567_118 = 1_626_759_699 : nat64; #
aging_since_timestamp_seconds : nat64;
        2_680_861_478 = vec {}; #   hot_keys : vec principal;
        2_707_029_165 = blob
"\97\99\7f\e1\f1\94\c2\d0k\60\c4\b4\bd\ea\d2rAQ\c0.\a5\8e:\89v}/\b5\5c\b5\
a5^"; #   account : vec nat8;
        3_084_775_299 = opt variant { 1_620_537_965 = 0 : nat64 }; #
dissolve_state : opt DissolveState;
        3_407_357_762 = vec { #   followees : vec record { int32;
Followees };
          record {
            0 : int32;
            record { 3_407_357_762 = vec { record { 23_515 = 28 : nat64 }
} }; # type Followees = record { followees : vec NeuronId };
          };
        };
        3_439_871_066 = 0 : nat64; #   neuron_fees_e8s : nat64;
        3_664_621_355 = opt record { #   transfer : opt
NeuronStakeTransfer;
          1_077_262_001 = blob
"\97\99\7f\e1\f1\94\c2\d0k\60\c4\b4\bd\ea\d2rAQ\c0.\a5\8e:\89v}/\b5\5c\b5\
a5^";
          1_103_886_095 = 100_000_000 : nat64;
          1_136_829_802 = opt principal "yhy6j-huy54-mkzda-m26hc-yklb3-
dzz4l-i2ykq-kr7tx-dhxyf-v2c2g-tae";
          1_213_809_850 = 0 : nat64;
          1_835_347_746 = vec {};
          3_066_807_170 = 1_626_759_699 : nat64;
          3_583_743_961 = 291_747 : nat64;
```

```
        };
      };
      record {
        23_515 = opt record { 23_515 = 2_524_431_329_219_902_182 : nat64
};
        79_599_772 = opt principal "yhy6j-huy54-mkzda-m26hc-yklb3-dzz4l-
i2ykq-kr7tx-dhxyf-v2c2g-tae";
        349_671_467 = vec {};
        456_924_626 = true;
        852_549_734 = false;
        1_029_637_143 = 0 : nat64;
        1_257_408_332 = 100_000_000 : nat64;
        1_392_680_831 = 1_626_759_699 : nat64;
        2_399_567_118 = 1_626_759_699 : nat64;
        2_680_861_478 = vec {};
        2_707_029_165 = blob
"\97\99\7f\e1\f1\94\c2\d0k\60\c4\b4\bd\ea\d2rAQ\c0.\a5\8e:\89v}/\b5\5c\b5\
a5^";
        3_084_775_299 = opt variant { 1_620_537_965 = 0 : nat64 };
        3_407_357_762 = vec {
          record {
            0 : int32;
            record { 3_407_357_762 = vec { record { 23_515 = 28 : nat64 }
} };
          };
        };
        3_439_871_066 = 0 : nat64;
        3_664_621_355 = opt record {
          1_077_262_001 = blob
"\97\99\7f\e1\f1\94\c2\d0k\60\c4\b4\bd\ea\d2rAQ\c0.\a5\8e:\89v}/\b5\5c\b5\
a5^";
          1_103_886_095 = 100_000_000 : nat64;
          1_136_829_802 = opt principal "yhy6j-huy54-mkzda-m26hc-yklb3-
dzz4l-i2ykq-kr7tx-dhxyf-v2c2g-tae";
          1_213_809_850 = 0 : nat64;
          1_835_347_746 = vec {};
          3_066_807_170 = 1_626_759_699 : nat64;
          3_583_743_961 = 291_747 : nat64;
        };
      };
    };
  },
)

dfx canister --network=https://ic0.app --no-wallet call rrkah-fqaaa-aaaaa-
aaaaq-cai list_neurons "(record{neuron_ids=vec
{2_524_431_329_219_902_182:nat64;};include_neurons_readable_by_caller=fals
e;})"
(
  record {
    1_319_168_057 = vec {
      record {
        2_524_431_329_219_902_182 : nat64;
        record {
```

```
            303_619_573 = 0 : nat64;
            349_671_467 = vec {};
            1_392_680_831 = 1_626_759_699 : nat64;
            2_215_343_633 = 3 : int32;
            3_433_024_449 = 1_626_770_001 : nat64;
            3_871_395_629 = 100_002_040 : nat64;
            4_290_862_015 = 10_302 : nat64;
          };
        };
      };
      1_488_793_264 = vec {
        record {
          23_515 = opt record { 23_515 = 2_524_431_329_219_902_182 : nat64
};
          79_599_772 = opt principal "yhy6j-huy54-mkzda-m26hc-yklb3-dzz4l-
i2ykq-kr7tx-dhxyf-v2c2g-tae";
          349_671_467 = vec {};
          456_924_626 = true;
          852_549_734 = false;
          1_029_637_143 = 0 : nat64;
          1_257_408_332 = 100_000_000 : nat64;
          1_392_680_831 = 1_626_759_699 : nat64;
          2_399_567_118 = 1_626_759_699 : nat64;
          2_680_861_478 = vec {};
          2_707_029_165 = blob
"\97\99\7f\e1\f1\94\c2\d0k\60\c4\b4\bd\ea\d2rAQ\c0.\a5\8e:\89v}/\b5\5c\b5\
a5^";
          3_084_775_299 = opt variant { 1_620_537_965 = 0 : nat64 };
          3_407_357_762 = vec {
            record {
              0 : int32;
              record { 3_407_357_762 = vec { record { 23_515 = 28 : nat64 }
} };
            };
          };
          3_439_871_066 = 0 : nat64;
          3_664_621_355 = opt record {
            1_077_262_001 = blob
"\97\99\7f\e1\f1\94\c2\d0k\60\c4\b4\bd\ea\d2rAQ\c0.\a5\8e:\89v}/\b5\5c\b5\
a5^";
            1_103_886_095 = 100_000_000 : nat64;
            1_136_829_802 = opt principal "yhy6j-huy54-mkzda-m26hc-yklb3-
dzz4l-i2ykq-kr7tx-dhxyf-v2c2g-tae";
            1_213_809_850 = 0 : nat64;
            1_835_347_746 = vec {};
            3_066_807_170 = 1_626_759_699 : nat64;
            3_583_743_961 = 291_747 : nat64;
          };
        };
      };
    },
)
```

可以看成，好几个接口返回的信息基本差不多。当然，现在账号下面神经元少，就会出现这种情况。

操作神经元

针对神经元操作类型：

```
type Command = variant {
  Spawn : Spawn;
  Split : Split;
  Follow : Follow;
  Configure : Configure;
  RegisterVote : RegisterVote;
  DisburseToNeuron : DisburseToNeuron;
  MakeProposal : Proposal;
  Disburse : Disburse;
};
```

1. Spawn，下蛋，即神经元成熟了可以增发出新的小神经元，里面包含锁定 7 天的 ICP。
2. Split，分叉，可以将一个神经元分叉成两个神经元
3. Follow，跟随其他神经元去投票
4. Configure，配置神经元
5. RegisterVote，主动向某个提案投票
6. DisburseToNeuron，
7. MakeProposal，发起一个提案
8. Disburse，将已经溶解了的神经元里面的 ICP 拿出来。

设置溶解延迟

只有当神经元的溶解延迟大于 6 个月时，才能投票。

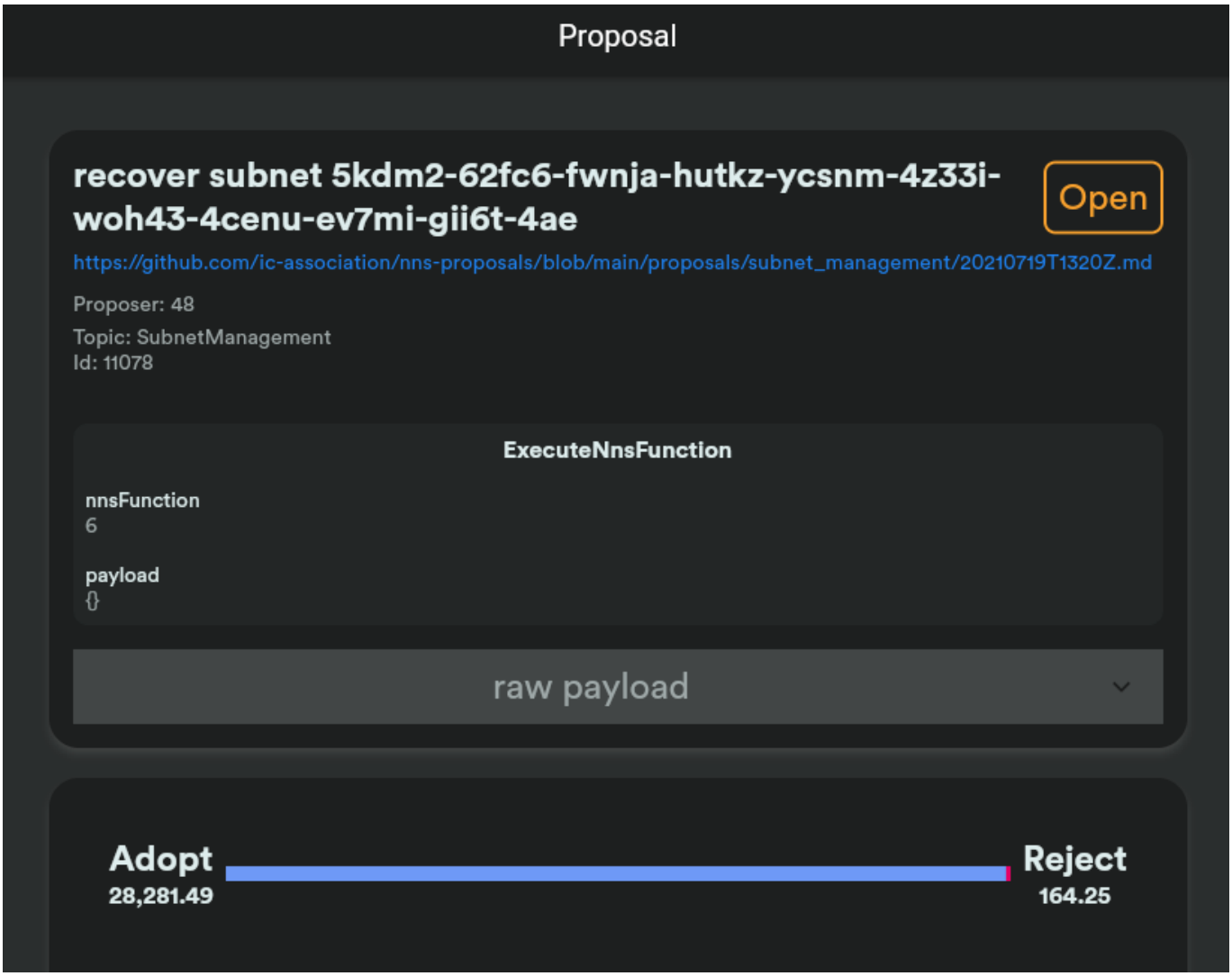
给前面的创建的神经元设置溶解延迟，7个月：`7*30*24*3600=18144000 秒`

```
dfx canister --network=https://ic0.app --no-wallet call rrkah-fqaaa-aaaaa-
aaaaq-cai manage_neuron "(record {id=opt
record{id=2_524_431_329_219_902_182:nat64};command=opt
variant{Configure=record {operation=opt variant {IncreaseDissolveDelay=
record{additional_dissolve_delay_seconds=18144000:nat32}}}})"
(record { 2_171_433_291 = opt variant { 1_647_237_574 = record {} } })
```

神经元投票

没有设置溶解延迟直接投票（失败） 使用前面生成的神经元 id 投票： 2_524_431_329_219_902_182；

我们找一个还可以投票的提案：11078 提案：




```
dfx canister --network=https://ic0.app --no-wallet call rrkah-fqaaa-aaaaa-
aaaaq-cai get_proposal_info "(11078:nat64)"
(
  opt record { # ProposalInfo
    23_515 = opt record { 23_515 = 11_078 : nat64 }; # id : opt NeuronId;
    100_394_802 = 1 : int32;  # status : int32;
    338_645_423 = 7 : int32;  # topic : int32;
    568_110_681 = null;  # ballots : vec record { nat64; Ballot };
    718_522_127 = vec {};
    1_120_297_033 = 1_626_700_972 : nat64;# proposal_timestamp_seconds :
nat64;
    1_138_543_385 = 0 : nat64; # reward_event_round : nat64;
    1_453_869_204 = 0 : nat64; # failed_timestamp_seconds : nat64;
    1_659_864_270 = 100_000_000 : nat64; # reject_cost_e8s : nat64;
    2_084_260_468 = opt record { # latest_tally : opt Tally;
      24_641 = 16_425_617_043 : nat64;  # no : nat64;
      6_039_847 = 5_371_532_431_420 : nat64;   # yes : nat64;
      338_842_564 = 31_775_041_633_396_566 : nat64;  # total : nat64;
      4_174_818_006 = 1_626_770_088 : nat64; # timestamp_seconds : nat64;
    };
    2_139_208_002 = 1 : int32; # reward_status : int32;
    2_756_235_859 = 0 : nat64;  # decided_timestamp_seconds : nat64;
    3_000_310_834 = opt record { # proposal : opt Proposal;
```

```
      5_843_823 = "https://github.com/ic-association/nns-
proposals/blob/main/proposals/subnet_management/20210719T1320Z.md";  # url
: text
      373_701_558 = opt variant { # action : opt Action
        2_746_863_190 = record { # ExecuteNnsFunction :
ExecuteNnsFunction;
          1_563_405_284 = 6 : int32; # nns_function : int32;
          3_979_722_638 = blob
"DIDL\06l\06\e7\8f\b0\12x\c4\c1\81D\01\bd\86\9d\8b\04h\8c\c9\9c\ae\06\03\f
c\ef\cc\a6\0d\05\f7\e0\ab\c7\0dxn\02mhn\04l\03\00q\01q\02xm{\01\00\f8&T\00
\00\00\00\00\01\00\01\1dE\17\8bf\a4\07\a4\d5\9c\0aMg3\bd\a2\ce?
7\c1\11\b4%~\c4\19\08\f4\f8\02\00
\1d\dc\eb\c4<_\00\efp\ee\9d5Zc}\f5ZA\e8\9f\8d\bda\ab d\10K\dc\c0\c1
\b0J\8a\a5\e83\93\16";; # payload : vec nat8
        }
      };
      2_162_756_390 = "recover subnet 5kdm2-62fc6-fwnja-hutkz-ycsnm-4z33i-
woh43-4cenu-ev7mi-gii6t-4ae"; # summary : text
    };
    3_000_311_732 = opt record { 23_515 = 48 : nat64 }; # proposer : opt
NeuronId;
    4_133_454_822 = 0 : nat64;  # executed_timestamp_seconds : nat64;
  },
)
```

其中 vote = 1 表示支持，2 表示反对，我们支持

```
dfx canister --network=https://ic0.app --no-wallet call rrkah-fqaaa-aaaaa-
aaaaq-cai manage_neuron "(record {id=opt
record{id=2_524_431_329_219_902_182:nat64};command=opt
variant{RegisterVote=record {vote=1:int32;proposal=opt
record{id=11078:nat64}}}})"

(
  record {
    2_171_433_291 = opt variant {
      106_380_200 = record {
        1_389_388_560 = "Neuron not authorized to vote on proposal.";
        3_790_638_545 = 3 : int32;
      }
    };
  },
)
...
```

设置完溶解延迟再投票

```
dfx canister --network=https://ic0.app --no-wallet call rrkah-fqaaa-aaaaa-
aaaaq-cai manage_neuron "(record {id=opt
```

```
record{id=2_524_431_329_219_902_182:nat64};command=opt
variant{RegisterVote=record {vote=1:int32;proposal=opt
record{id=11078:nat64}}})"
(
  record {
    2_171_433_291 = opt variant {
      106_380_200 = record {
        1_389_388_560 = "Neuron not authorized to vote on proposal.";
        3_790_638_545 = 3 : int32;
      }
    };
  },
)
```

结果还是失败。应该是创建神经元之后需要等一段时间才能投票： 提了一个问题 https://forum.dfinity.org/t/how-long-does-it-take-to-start-voting-after-the-neuron-is-created/6011

原链接：source