Farming program

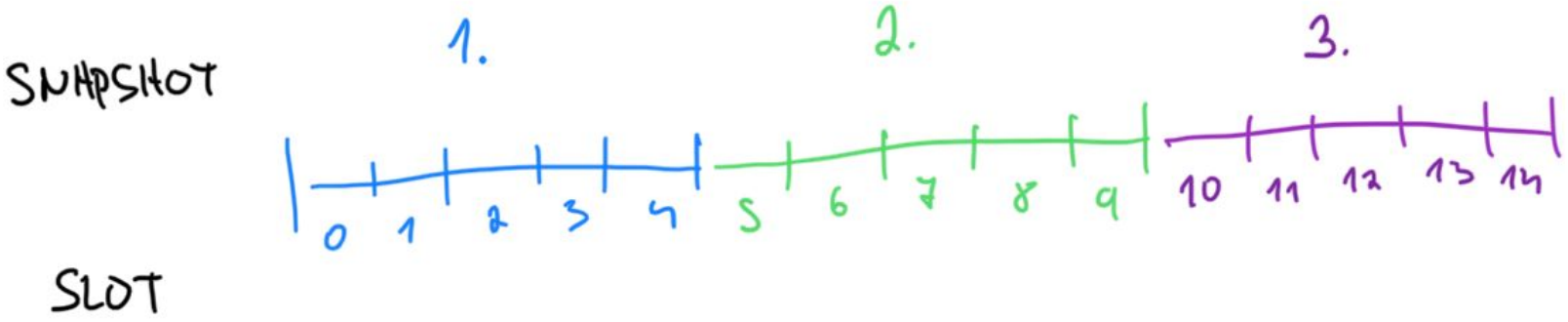
Concepts and comparison to the previous version

Accounts - Farm

- Iteration on prev version's **FarmingState** + **SnapshotQueue**
- Staking mint
- Staking vault
- Recorded history as snapshots ring buffer
- Harvests
  - Mint
  - Vault
  - Tokens per slot (ρ) : how many tokens to be divided between all farmers per slot
  - Harvest period start slot, end slot

Recorded history

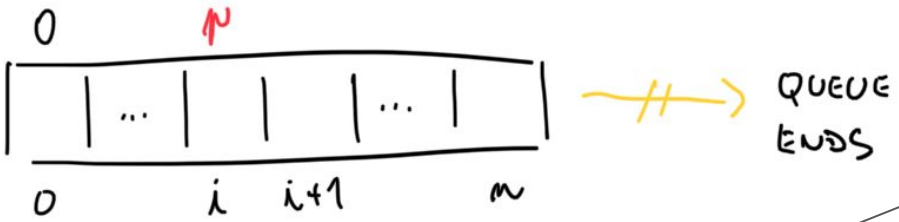
- Snapshots of ~ equal number of slots with constant emission rate and constant staked amount



Recorded history

p	latest snapshot

queue



ring buffer

Accounts - Farmer

- Iteration on prev version's **FarmingCalc** + **FarmingTicket**
- Staked tokens *(F_s)* *(number)*, vested tokens *(number)* and vested at slot
  - Σ of all farmers' (vested + staked) = farm's staking vault amount
- Harvests
  - Mint
  - Tokens farmed until *F_u*
- Calculate next harvest from slot (*F_u*)

Basic Farmer’s interaction with Farm

- *start_farming*(**Farm**, **Farmer**, amount)
  - Amount added to vested tokens counter
  - Earning harvest only from next snapshot
- *stop_farming*(**Farm**, **Farmer**, amount)
  - Amount removed from vested + staked tokens counters

Calculate user’s harvest

For every reward token …

Initialize_farming_calc(
FarmingCalc,
FarmingTicket,
FarmingState
)

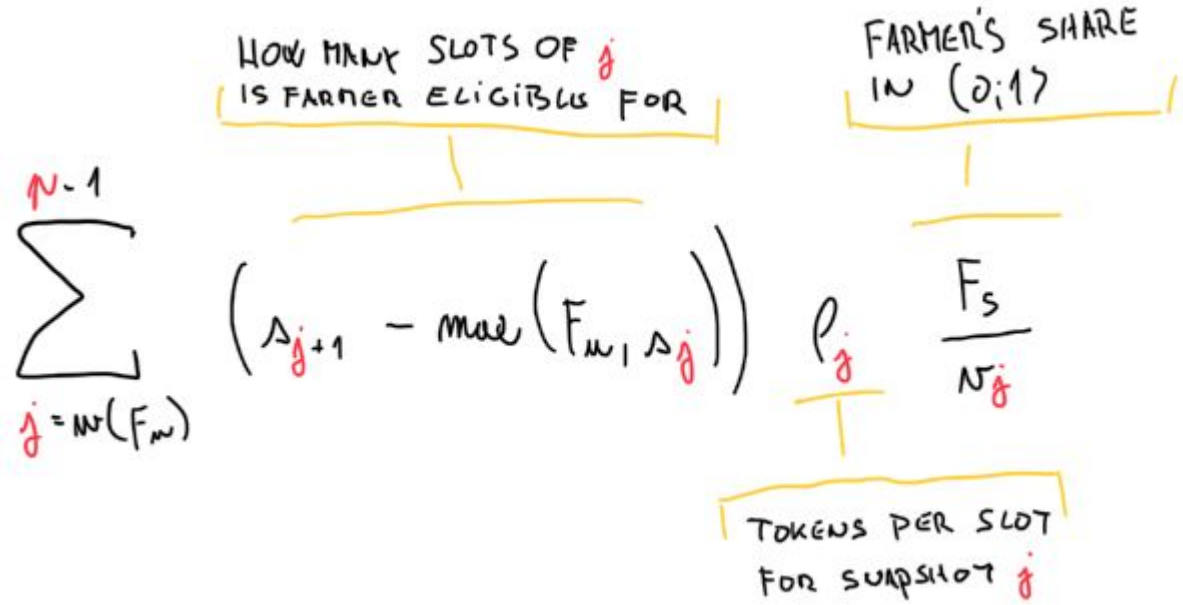
calculate_farmed(
Pool,
FarmingState,
SnapshotQueue,
FarmingCalc,
FarmingTicket
)

For all reward tokens at once …

update_eligible_harvest(
Farm,
Farmer
)

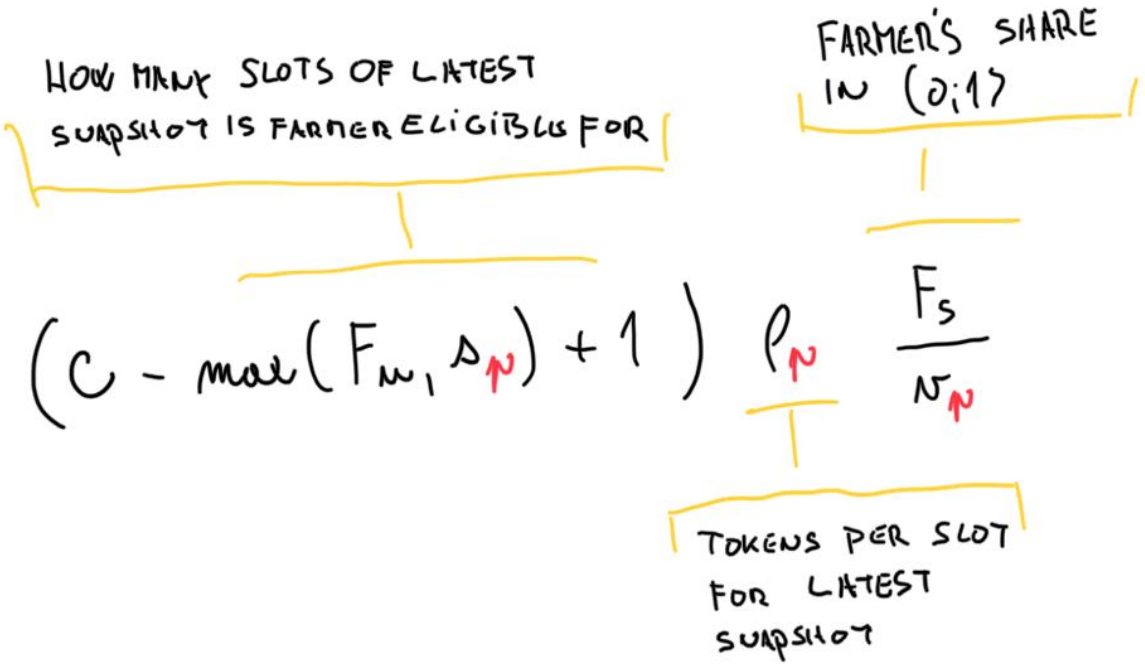
Calculating harvest from history

F_u	slot of farmer's last harvest
F_s	farmer's staked amount
$w(t)$	snapshot at slot t



Continuous harvest

c	current slot



Claim user’s harvest

For every reward token …

withdraw_farmed(
    Pool,
    FarmingState,
    FarmingCalc,
    vault: **TokenAccount**,
    wallet: **TokenAccount**
)

For multiple reward tokens at once …

claim_eligible_harvest(
    Farmer,
    remaining accounts: (
        vault: **TokenAccount**,
        wallet: **TokenAccount**
) []
)

Token emission history

- Changes to ρ must be kept until no snapshots refer that much back in time
- Limits update frequency
- Each emission rate is always bounded in time
  - *new_harvest_period*(**ρ**, **from_slot** = current slot, **length**)

PDAs

- *Staking vault*: [“stake_vault”, farm]
- *Harvest vault*: [“harvest_vault”, farm, harvestMint]
- *Vaults signer*: [“signer”, farm]
- *Farmer*: [“farmer”, farm, authority]
- *Whitelist Compounding*: [”whitelist_compounding”, sourceFarm, targetFarm]

Endpoints overview

Admin

create_farm
add_harvest
new_harvest_period
remove_harvest
set_farm_owner
set_min_snapshot_window
whitelist_farm_for_compounding
dewhitelist_farm_for_compounding

User

create_farmer
start_farming*
stop_farming
claim_eligible_harvest
close_farmer

Permission-less

take_snapshot
update_eligible_harvest
compound_across_farms
compound_same_farm

Automation

- Record history
  - *take_snapshot* for each **Farm**
  - In regular intervals
- Recorder history is limited
  - *update_eligible_harvest* for each **Farmer**
  - At least once per history length
- Compounding
  - Frequency depends on business use case
  - *compound_across_farms*
  - *compound_same_farm*