OST
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Blockchain (BlCh)

Solana

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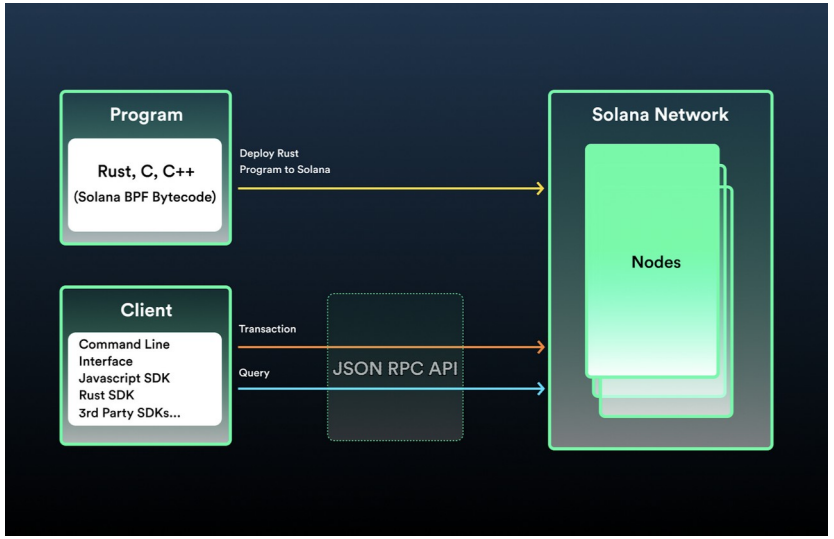
Solana

- Solana is a decentralized blockchain built to enable scalable, user-friendly apps for the world.
  - First block: 16.03.2020 [link]
  - 4’385 tx/s (Ethereum: 14, Bitcoin: 7)
  - Transaction cost: $0.00025
  - 2’085 Validators
    - 16/32 cores machine with AVX, 256GB RAM suggested, min. 2TB NVME SSD
    - “While you can run a validator on a cloud computing platform, it may not be cost-efficient over the long term” [link]
  - Many outages

- Ethereum: Solidity, Solana: Rust
  - Similar to Ethereum [link]



- Proof of History (PoH) with PoS
  - PoH is PoW that cannot be parallelized

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- PoH Example [link]
  - Cannot be parallelized

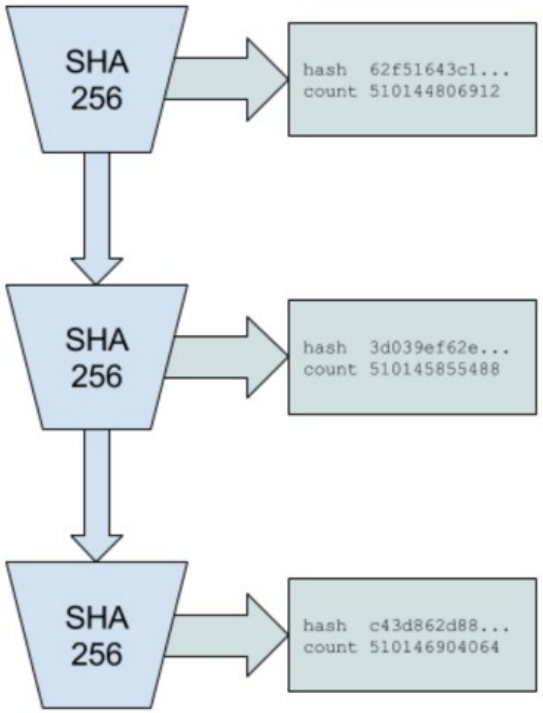

Figure 2: Proof of History sequence

- Add events
  - Proof that time elapsed

POH Sequence

Index	Operation	Output Hash
1	sha256("any random starting value")	hash1
200	sha256(hash199)	hash200
300	sha256(hash299)	hash300
336	sha256(append(hash335, photograph1_sha256))	hash336
400	sha256(hash399)	hash400
500	sha256(hash499)	hash500
600	sha256(append(hash599, photograph2_sha256))	hash600
700	sha256(hash699)	hash700

Table 1: PoH Sequence With 2 Events

- Verification
  - Can be parallelized

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- PoS – a node needs to bond coins
- Election on PoH generator (epoch)
- Slashing occurs when a validator votes two separate sequence
- Delegate coins to validators to 5-8% [link]
- PoRep - Proof of Replication [link]
  - Publish keys and re-encrypt
  - A proof that data was stored multiple times
  - Not part of consensus
- Metamask → Phantom [link]
- Etherscan → Solana Explorer [link]
- EVM → eBPF [link]

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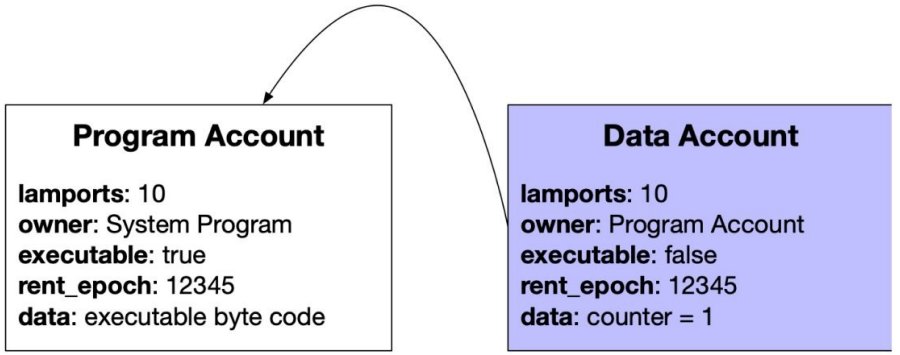
- Accounts [link]
  - Accounts are used to store data
  - Each account has a unique address
  - Accounts, max size of 10MB (10 Mega Bytes)
  - PDA accounts, max size of 10KB (10 Kilo Bytes)
  - PDA accounts used to sign on behalf of a program
  - Accounts size are fixed at creation time, can be adjusted
  - Rent for account data storage
- 1 lamport = 1000000000 SOL
- Owner change
  - Only owner of an account may modify its data
  - Owner of an account may assign a new owner if the account's data is zeroed out
- Program accounts do not store state, you need 2 accounts to store state



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- Rent
  - Storing data on accounts costs SOL to maintain – rent
  - If minimum balance equivalent to 2 years of rent payments in account - no rent
- Programs
  - Solana separates code from data
  - Tested against Localhost and Devnet before being deployed to Testnet or Mainnet
- Transactions
  - Invoke programs by submitting a transaction
  - Any part of an instruction fails, the entire transaction will fail
  - Limited to 1232 bytes
  - Specify a list of all accounts they intended to read from or write to
  - No concept of a fee market in which users can pay higher fees to increase their chances of being included in the next block

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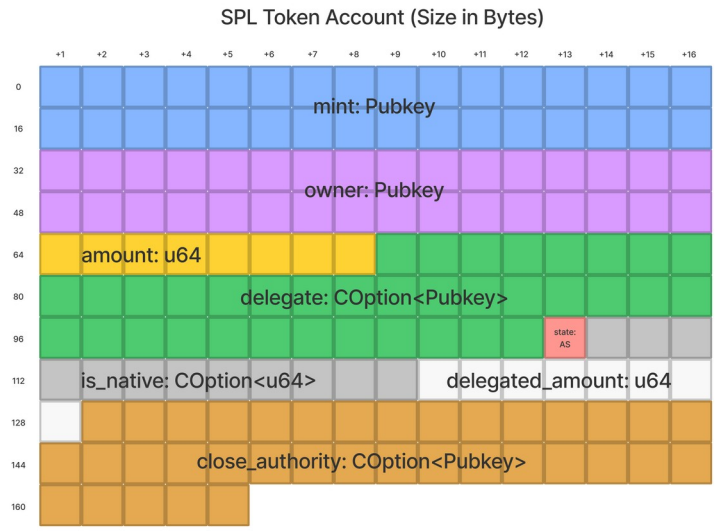
- Program Derived Addresses (PDAs)
  - Accounts controlled by a specific program without needing private key
- Efficient storage: token account (165 bytes)



- Example (similar to remix IDE) [link]
  - Redeploy to same address for rapid development, bug fixes, or upgrades

```rust
use solana_program::{
    account_info::AccountInfo,
    entrypoint,
    entrypoint::ProgramResult,
    pubkey::Pubkey,
    msg,
};

// declare and export the program's entrypoint
entrypoint!(process_instruction);

// program entrypoint's implementation
pub fn process_instruction(
    program_id: &Pubkey,
    accounts: &[AccountInfo],
    instruction_data: &[u8]
) -> ProgramResult {
    // log a message to the blockchain
    msg!("Hello, world!");

    // gracefully exit the program
    Ok(())
}
```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Solana References

- https://solana.com
- https://docs.solana.com/
- https://beta.solpg.io
- https://explorer.solana.com
- https://phantom.app/
- https://github.com/solana-labs
- https://soldev.app/
- https://solanacookbook.com
- https://solanacompass.com/
- https://en.wikipedia.org/wiki/Solana_(blockchain_platform)

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