

הגשת מטלה בלוקצ'ין

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התקנה והרצת הפרויקט

1. `git clone https://github.com/avichai504/blockchain_project`
2. `npm install`
3. `npm start`

הדגמת תהליך כריית בלוקים

- Load 30 transactions from mempool.json.
- Each block mines 4 transactions.
- Merkle Tree is generated for block transactions.
- Bloom Filter added.
- Mining difficulty: leading two zeros in block hash.
- Base fee of 2 coins burned per transaction.
- Priority fee of 3 coins per transaction added to miner's reward.
- 50 coin mining reward per block.

```
"chain": [
  {
    "timestamp": 1745779264291,
    "transactions": [],
    "previousHash": "0",
    "nonce": 0,
    "merkleRoot": "",
    "hash": "66bd986fbcacba6aabf0612aa9ede2bc20eea810ebcb6eee6fec59f3af5c3661"
  },
  {
    "timestamp": 1745779264356,
    "transactions": [
      {
        "fromAddress": "864c4fbfbf6e700bef7a8fce51c41a5523c87a75c56f7968c540ba28f24123d3",
        "toAddress": "WalletB",
        "amount": 10,
        "baseFee": 2,
        "priorityFee": 3,
        "timestamp": 1745779264318,
        "publicKey": "04cac362e47e060d453192e8fcc9a3d6a1ddf9fb36ff7b14a81365c748f3c330a98a38e99188e0a93003c5c8a5cd55043a21a79981edf9ae02fd6a4eef6cc77691",
        "signature": "3046022100f6c65dde5a02b6af7c654070ed31b0697f9900121e0301d20097a8cb22139bae022100fa82d0af6fc4507679657157245ac1e129a931c6a5de711c81de91145157bcb6"
      },
      {
        "fromAddress": "864c4fbfbf6e700bef7a8fce51c41a5523c87a75c56f7968c540ba28f24123d3",
        "toAddress": "WalletC",
        "amount": 5,
        "baseFee": 2,
        "priorityFee": 3,
        "timestamp": 1745779264339,
        "publicKey": "04cac362e47e060d453192e8fcc9a3d6a1ddf9fb36ff7b14a81365c748f3c330a98a38e99188e0a93003c5c8a5cd55043a21a79981edf9ae02fd6a4eef6cc77691",
        "signature": "3046022100ba27db4b11e62d5b0844c9c3d3c1b797a779b2762cf4d105cb7d56d60307ce5022100d9ead8dfc8e1808fa642e2d1f42b1f2b3c81a7a772adc2029234065356f08656"
      }
    ]
  },
  {
    "timestamp": 1745779264399,
    "transactions": [
      {
        "fromAddress": "864c4fbfbf6e700bef7a8fce51c41a5523c87a75c56f7968c540ba28f24123d3",
        "toAddress": "WalletD",
        "amount": 10,
        "baseFee": 2,
        "priorityFee": 3,
        "timestamp": 1745779264361,
        "publicKey": "04cac362e47e060d453192e8fcc9a3d6a1ddf9fb36ff7b14a81365c748f3c330a98a38e99188e0a93003c5c8a5cd55043a21a79981edf9ae02fd6a4eef6cc77691",
        "signature": "3046022100ba27db4b11e62d5b0844c9c3d3c1b797a779b2762cf4d105cb7d56d60307ce5022100d9ead8dfc8e1808fa642e2d1f42b1f2b3c81a7a772adc2029234065356f08656"
      }
    ]
  }
],
```

חישוב שורש מרקל

Merkle root is calculated for every block using the included transactions.

Merkle Root of last block:

eeff4b5d39134f4e27e142996373f2ee2b340e6156387a6d569715d127295172

הדגמת אימות בארנק קל

- Light wallets receive only relevant transactions.
- Validate transaction signature using the public key.

```
Light Wallet 1 Verification of First Transaction: false
```

הצגת יתרות בארנקים

Each wallet's balance is updated based on incoming and outgoing transactions.

```
Balances:  
Full Wallet: 27  
Light Wallet 1 (WalletB): 97  
Light Wallet 2 (WalletC): 71
```

סיכום רשת

- Total Coins = WalletA + WalletB + WalletC
- Burned Coins = baseFee sum
- Rewards = Mining rewards + Priority Fees

```
--- Network Summary ---  
Total Coins in network (calculated): 195  
Total Burned Coins (fees): 60  
Total Rewarded Coins (miner rewards + priority fees): 490
```