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Dynamic Data Replication for Higher Availability and Security

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ABSTRACT: The paradigm and domain of data security is the key point as per the current era in which the data is getting transmitted to multiple channels from multiple sources. The data leakage and security loopholes are enormous and there is need to enforce the higher levels of security, privacy and integrity. Such sections incorporate e-administration, long range interpersonal communication, internet business, transportation, coordinations, proficient correspondences and numerous others. The work on security and trustworthiness is very conspicuous in the systems based situations and the private based condition. This examination original copy is exhibiting the efficacious use of security based methodology towards the execution with blockchain programming utilizing robustness and different devices. The blockchain based mix is currently days utilized for e-administrations and military applications for the noticeable security based applications. To work with the high performance approaches and algorithms, the blockchain technology is quite prominent and used in huge performance aware patterns whereby the need to enforce the security is there. The work integrates the usage patterns of blockchain technologies so that the overall security and integrity can be improved in which there is immutability and strength based algorithms for enforce the security measures.

Keywords: Blockchain Security, Data Replication, Data Security, High Availability Data, Secured Databases

1. INTRODUCTION

The work on security and integrity is quite cavernous and widely integrated so that the gadgets and the enormous devices in the network environment can be made secure [1, 2]. These blockchain based digital currencies don't have any halfway bank or installment door to record the log of the exchanges [3–5]. That is the principle reason as a result of which numerous nations are not permitting the digital forms of money as legitimate cash exchange [6–8]. All things considered, these blockchain based digital currencies are celebrated and utilized as a result of immense security highlights [9–11]. The blockchain organize is having a square of records in which every single record is related with the dynamic cryptography so every one of the exchanges can be encoded with no likelihood of sniffing or hacking endeavors [12–14].

Figure 1 is depicting the taxonomy of Blockchain Technology with the security aspects with the integration of replication.Using blockchian technology, the servers of government for enormous apps [15–17].

1.1 KEY INTEGRATIONS OF BLOCKCHAINS

- Digital Identity of Government Documents
- Asset and Land Registry
- Incorporation Services

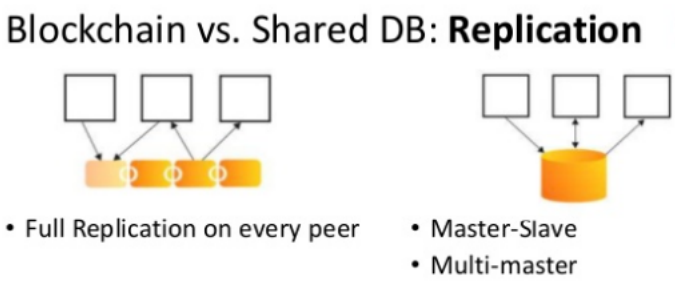

FIGURE 1. Blockchain Platform for Database Security with Replication

- Birth Certificate
- Death Certificate
- Polling / Voting / Assembly Elections
- Personalized Government Services
- Taxation
- Marriage Certificate
- Notarized Documents
- Social Welfare and Benefits

1.2 SOME EXAMPLES OF BLOCKCHAIN IMPLEMENTATIONS

- Entertainment
  - KickCity
  - B2Expand
  - Spotify
  - Guts
  - Veredictum
- Social Networks
  - Matchpool
  - Minds
  - MeWe
  - Steepshot
  - DTube
  - Mastodon
  - Sola
- Cryptocurrency
  - Namecoin
  - Bitcoin
  - Dogecoin
  - Primecoin
  - Nxt

  - Ripple
  - Litecoin
  - Ethereum
- Retail
  - Warranteer
  - Blockpoint
  - Loyyal
  - Fluz Fluz
  - Shopin
  - Spl.yt
  - Opskins
  - Ecoinmerce.io
  - Every.Shop
  - Portion
  - Buying.com

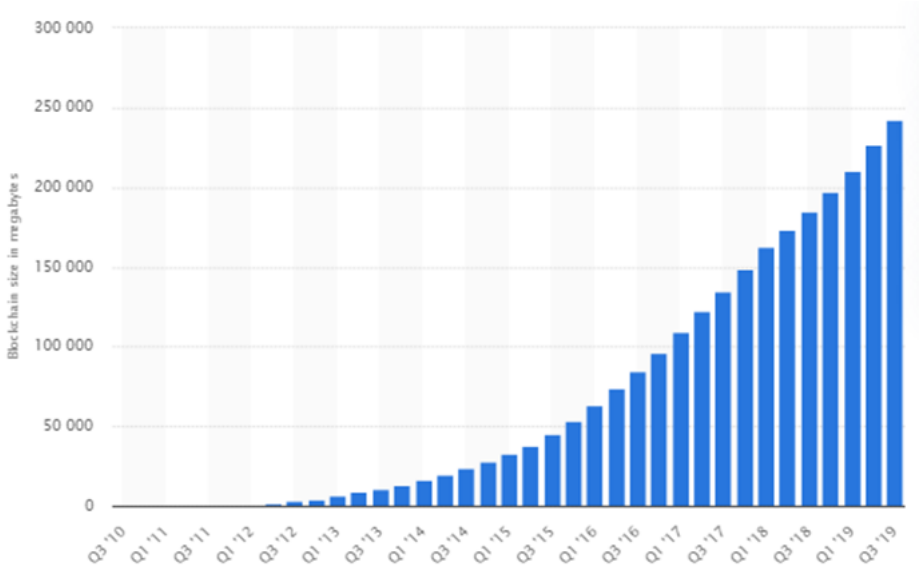

FIGURE 2. Blockchain Size in MB Worldwide (2016-2019)

Figure 2 is showing the worldwide pattern of the blockchain size that is elevating from year 2010 and now it is getting huge values.

The blockchain network includes the immutable behavior whereby the assorted dimensions in the channel are non-breakable and thereby to have the higher degree of security and consistency [18, 19]. As per the blockchain based environment, there is strong security layer with the assorted phases [20, 21] and the overall outcomes are performance aware with higher level of integrity.

Figure 3 depicts the number of users worldwide with the elevation since year 2016 to year 2019 and the blockchain users are increasing very rapidly because of the performance.

Table 1 represents the conspicuous tools and the libraries which are used for the development of blockchains.

Solidity [22–24] is a widely used effectual programming platform for the development and deployment of blockchain for multiple applications. To start with Solidity Programming, there is need to work different aspects including Remix IDE or dedicated server based applications [25–27]. Following is the code snippet that is used for the implementation of currency and generation of new secured platform.

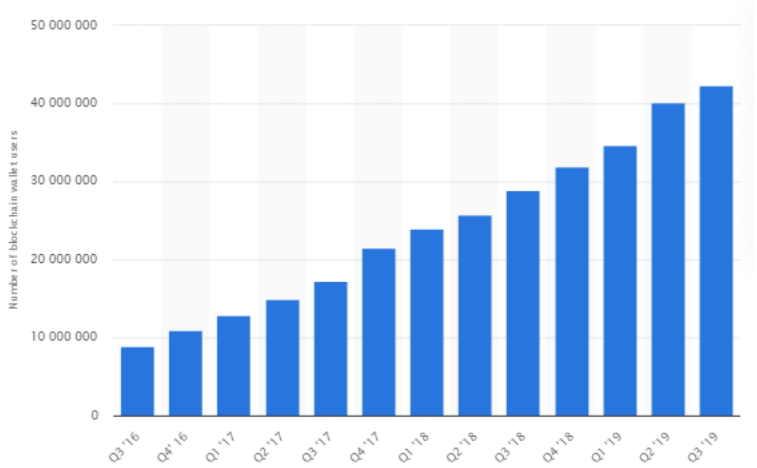

FIGURE 3. Blockchain Users and Elevation from 2016-2019

Table 1. Tools and Frameworks for Blockchain Development

Framework / Tool	URL
Remix IDE	http://remix.ethereum.org/
EthFiddle	https://ethfiddle.com/
Truffle	https://truffleframework.com/
Embark	https://embark.status.im/
Populus	http://populus.readthedocs.io/en/latest/
Go Ethereum / Geth	https://geth.ethereum.org/
Etherlime	https://etherlime.readthedocs.io/en/latest/
Dot-Abi-cli	https://github.com/cryppadotta/dotta-license/tree/master/dot-abi-cli
PyEthereum	https://github.com/ethereum/pyethereum
Nethereum	https://nethereum.com/
Cava	https://github.com/consensys/cava
Solidity	http://solidity.readthedocs.io/en/v0.4.24/
Liquidity	http://www.liquidity-lang.org/
Infura	https://infura.io/
Lamden	https://lamden.io/
MyThril	https://consensys.net/diligence/mythril.html
Coq	https://coq.inria.fr/

2. CODE

```
    pragma solidity ^0.4.18;
    event Send(addr _transmitter, addr _receiver, uint256
  _value);
    // Myname of the Effectual MonetaryValue
    my-contract MyMonetaryValue {
    char array public myname = 'GMonetaryValue';
    // Select MonetaryValue
    mapping (addr => uint) rems;
    char array public MonetaryValueMyname = 'Mone-
  taryValue1.0';
    // Key-Value Pair for Addr-Account
    // Log Recording
    constructor() public {
    rems[msg.transmitter] = 100000;
      new_MyBlock_timestamp = Curr_timestamp =
  date.datetime.now()
      last_MyBlock_hash = last_MyBlock.hash
      Curr_nodes_transactions[:] = []
      mined_MyBlock = MyBlock(
        new_MyBlock_idx,
        new_MyBlock_timestamp,
     class MyBlock:
      def __init__(self, idx, ts, mydata, backhash):
        self.idx = idx
        self.ts = ts
      self.mydata = mydata
      self.backhash = backhash
      self.hash = self.hashop()

    def hashop(self):
      shahash = hasher.sha256()
      shahash.update(str(self.idx) + str(self.ts) +
str(self.mydata) + str(self.backhash))
      return shahash.hexdigest()

  def genesis():
    return MyBlock(0, date.datetime.now(), "Genesis My-
Block", "0")

  def next_MyBlock(last_MyBlock):
    Curr_idx = last_MyBlock.idx + 1
    Curr_ts = date.datetime.now()
    Curr_mydata = "MyBlock" + str(Curr_idx)
    Curr_hash = last_MyBlock.hash
    return MyBlock(Curr_idx, Curr_ts, Curr_mydata,
Curr_hash)
  MyBlockchain = [genesis()]
  back_MyBlock = MyBlockchain[0]

  maxMyBlocks = 20000
    new_MyBlock_data,
      last_block_hash// Constructor on Creating the My-
contract
  // Rem Confirmation
  }
  if (rems[msg.transmitter] < _amount) return false;
  function sendAmount(addr _receiver, uint _amount) pub-
lic returns(bool sufficient) {
  // OAuth of the Send
  rems[msg.transmitter] -= _amount;
  emit Send(msg.transmitter, _receiver, _amount);
  rems[_receiver] += _amount;
  // Commit of Payment Send with Transaction Recording
  return true;
  }
  // Checking the Rem
  function getRem(addr _addr) public view returns(uint) {
  return rems[_addr];
  }
  }
```

The data analytics libraries and platforms can be used for the detailed logging and investigation of the logged datasets from the blockchains and further analytics for cavernous mining applications. The data analytics libraries and platforms are widely used in research based implementations so that the advanced simulations on the technologies can be done with

effectiveness.

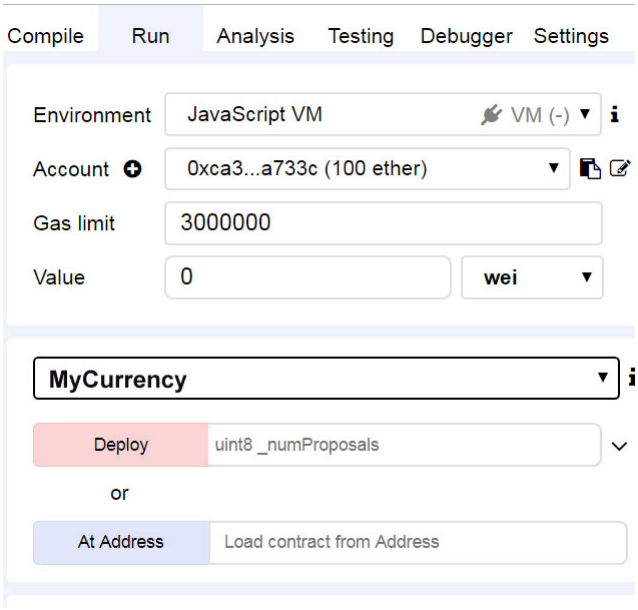

FIGURE 4. Compile and Run Code in Remix IDE

Figure 4 presents the process of compilation and running the code on Remix IDE with the integration of Solidity programming. It is used for the generation and deployment of binary for the blockchain development in the scenario for security and integrity.

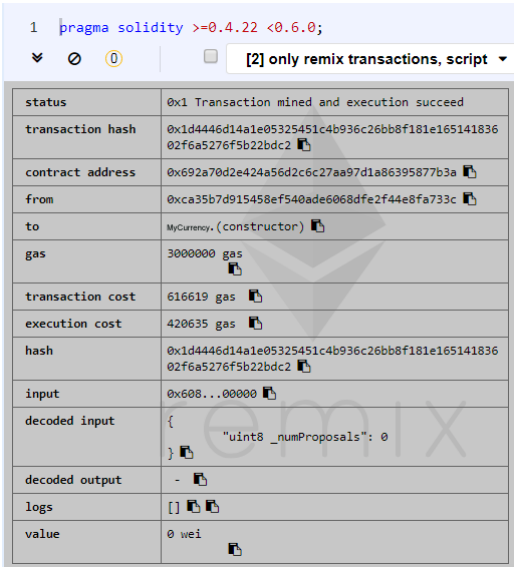

FIGURE 5. View Logs and Transaction Details

Figure 5 is presenting the log analysis and transaction evaluations whereby the detailed logs can be further analyzed using high performance plotting and visualization tools [28].

Figure 6 is having the cavernous analytics of the flow and modules in integration with the simulation patterns.

Table 2 is having the analysis of the blockchain based technology with the usage patterns in classical and proposedprojected approach.

The above plotted Figure 7 is depicting the results on the key base of effectiveness and the results are quite effectual in terms of the better outcomes towards the proposed approach. The presented outcomes can be integrated in the further usage patterns and analytics.

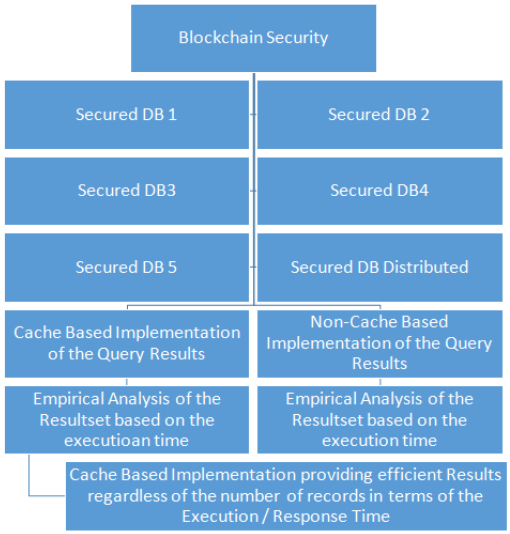

FIGURE 6. Flow Approach

Table 2. Evaluation of Results

Attempt ID	Product ID	Classical Approach	Proposed Approach with Replication based Blockchain
1	X001	1.01	0.20
2	X002	1.01	0.38
3	X002	1.00	0.08
4	X003	1.01	0.00
5	X003	1.47	0.05
6	X003	1.02	0.05
7	X001	1.10	0.03
8	X004	1.02	0.06
9	X004	1.08	0.05

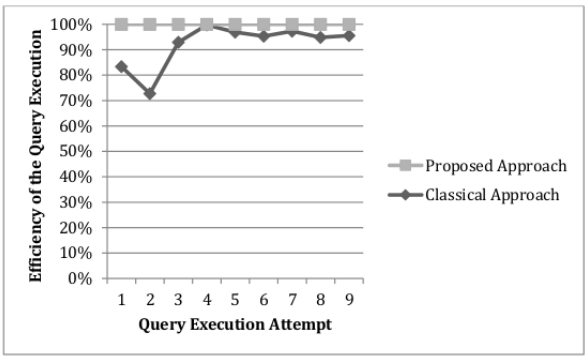

FIGURE 7. Outcome of Effectiveness

3. CONCLUSION

The work on security and integrity is quite prominent in the networks based scenarios and the private based environment. This research manuscript is presenting the effectual usage of security based approach towards the implementation with blockchain programming using solidity and other tools. The blockchain based integration is now days used for e-services and military applications for the prominent privacy based applications. The use of data replication with the security aspects based integrations are quite important and used in this work to enforce the security layers using blockchain technologies.

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CONFLICTS OF INTEREST

The author declares no conflict of interest.

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