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Proof of Authority Blockchain

Accurate Human Action Recognition

Highlights

Efficient 3D CNNs with Doppler

CPU Scheduling for Critical Processes

Discovering Thoughts, Inventing Future

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Utilise 5G Mobile Handset as DAO and Node in Layer 1 Proof of Authority Blockchain

By Frode van der Laak

Abstract- As the demand for real-time, secure, and scalable transactions continues to rise, the intersection of 5G mobile connectivity and blockchain technology presents a promising solution. This paper proposes a novel approach to leverage the high-speed and low-latency capabilities of 5G mobile networks, integrating them as nodes in a Layer 1 Proof of Authority (PoA) blockchain architecture for microtransactions. Several advantages are achieved by utilising 5G mobile connections as nodes in the blockchain network. Firstly, the ultra-fast data transmission speeds and low network latency of 5G networks enhance the efficiency of blockchain transactions, enabling near-instantaneous settlement of microtransactions. Secondly, the distributed nature of the blockchain, combined with the security features provided by 5G networks, ensures a robust and tamper-proof transactional environment.

Keywords: 5G, mobile, connection, node, PoA, blockchain, microtransaction.

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I. Introduction

The rapid growth of mobile connectivity has revolutionised the way we interact with technology and each other. [1] Introducing 5G networks has brought unparalleled speed and efficiency, unlocking various possibilities across various industries. Simultaneously, blockchain technology has garnered significant attention for its potential to revolutionise digital transactions and create trustless, decentralised systems. By combining the power of 5G mobile connections and blockchain technology, we can build a robust and scalable infrastructure for microtransactions, overcoming the limitations of traditional payment systems.

Traditional Proof of Work (PoW) algorithms [2] requires extensive computational power and results in high energy consumption. While these networks have demonstrated their resilience and security, their scalability and transaction processing capabilities remain limited. Moreover, the increasing demand for real-time and low-latency transactions in today's digital landscape necessitates the exploration of alternative consensus mechanisms that can operate efficiently at scale.

In this paper, we propose the utilisation of 5G mobile connections as a layer 1 PoA blockchain node to facilitate microtransactions. [3] The PoA consensus mechanism, known for its low energy consumption and scalability, relies on known validators who take turns proposing and validating blocks. By leveraging the robust connectivity and low latency of 5G networks, we can establish a distributed and secure network of mobile devices acting as blockchain nodes. This approach could revolutionise microtransactions by offering near-instantaneous settlement times, increased throughput, and improved scalability.

We aim to address several key research questions in this study, including designing and implementing a PoA blockchain network utilising 5G mobile connections, evaluating its scalability and latency performance, and analysing its suitability for microtransactions. We will explore the integration of smart contracts, enabling the execution of automated and self-executing transactions, and assess the security implications of utilising 5G mobile connections as blockchain nodes.

The outcomes of this research have significant implications for various domains, including finance, supply chain management, the Internet of Things (IoT), and digital identity systems. We can unlock new possibilities for peer-to-peer transactions, micro-payments, and decentralised applications by providing a scalable and efficient platform for microtransactions.

In the subsequent sections of this paper, we will delve into the technical details of our proposed solution, present experimental results, discuss potential challenges, and provide insights into the prospects of utilising 5G mobile connections as a Layer 1 PoA blockchain node for microtransactions is a type of crash fault tolerance consensus algorithms, which improves the efficiency of private and consortium blockchains. Unlike PoW, it does not have the longest chain or confirmation rule. New blocks are directly added to the chain with the unanimous approval of a group of trustworthy validators. Cryptographic puzzle solving is not a sport of the validators. As a result, executing this algorithm only requires a small amount of computing power. PoA relies on a set of *N* dependable nodes known as an authority, each identified by a unique ID or public key.

The exchanges that are put away are confirmed by the partners afterwards. Certain qualities of the blockchain result in the good thing about distinctive spaces such as cryptocurrency, monetary segments,

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the Web of Things, etc. The different properties are decentralisation, straightforwardness, audibility, and cryptographic security. The information is put away safely in a Blockchain. This report investigates the potential of utilising 5G versatile systems as a hub in the Verification of Specialist (PoA) blockchains utilised for microtransactions. PoA employs an agreement calculation that gives specific hubs, called specialists, the control to approve and include pieces in the chain [3]. The organisation must authorise hubs in a PoA blockchain to take part in approval. This makes PoA blockchains more adaptable than open blockchains, which anybody can connect. Microtransactions are little budgetary exchanges that happen online, regularly utilising cryptocurrency. They are utilised to buy advanced products and administrations or create small instalments instead of conventional cash. Moreover, 5G is the fifth era of versatile systems and is anticipated to be rolled out worldwide for a long time. 5G is much quicker than past eras of versatile systems, up to 100 times quicker than 4G. This expanded speed and capacity will permit more data-intensive applications, such as gushing video and virtual reality, to be utilised on versatile gadgets.

II. State of the ART in POA Blockchain

In recent years, blockchain technology has gained significant attention and widely adopted across various industries. One of the critical challenges in blockchain networks is achieving consensus among the participants. The Proof of Authority (PoA) consensus algorithm is famous for its scalability and energy efficiency. This section presents state of the art in PoA blockchain networks and explores the utilisation of 5G mobile connections as nodes in Layer 1 PoA blockchains for microtransactions.

PoA, or Proof of Authority, is an algorithm used with blockchains and is responsible for delivering fast transactions through a consensus mechanism based on identity as a stake. [5] VeChain, Reltime and Xodex are the most notable platforms of PoA. The approved accounts in PoA-based networks corroborate the transactions and blocks. These are known as validators. The validators run the software and allow them to put the transactions in blocks. This process is automated, and there is no requirement for the validators to monitor the computers. [6] Proof of Authority (PoA) is a consensus algorithm that relies on a set of trusted authorities or validators to validate transactions and create new blocks. Unlike Proof of Work (PoW) and Proof of Stake (PoS) algorithms, where participants compete or stake their tokens, PoA requires validators to be identified and authorised by the network.

In PoA, block validators are known entities with known addresses and public keys, making it easier to identify bad actors. Validators are typically selected based on their reputation, expertise, or stake in the network. Once authorised, a validator can participate in block creation and transaction validation. The consensus is achieved when most validators agree on the validity of transactions and the order of blocks. [7] PoA consensus offers several advantages over other consensus algorithms. It eliminates the need for resource-intensive mining or staking, resulting in lower energy consumption and increased scalability. PoA also provides faster block confirmation times, making it suitable for applications that require high transaction throughput. [8]

III. Problem Statement

Blockchain technology has revolutionised various industries by enabling secure and decentralised transactions. Within the realm of blockchain, micro-transactions have gained significant attention due to their potential to facilitate instantaneous and low-cost transactions. However, several challenges hinder blockchain microtransaction systems' widespread adoption and efficient implementation. This paper aims to identify and address these challenges while exploring the opportunities presented by blockchain microtransactions. [9]

Blockchain systems need scalability issues when processing many microtransactions, leading to slow confirmation times and high transaction fees. Solving this problem is crucial to enabling efficient and real-time blockchain microtransactions.

There is, moreover, a need for belief between users and specialists. Usually, no centralised specialist controls the arrangement [7]. The clients must depend on agreement components to guarantee that exchanges are substantial and adjusted. However, these instruments do not culminate and can sometimes fall flat. This will lead to twofold investing and other issues.

1. *Scalability:* Current blockchain systems face scalability issues when processing many micro-transactions, leading to slow confirmation times and high transaction fees. Solving this problem is crucial to enabling efficient and real-time blockchain microtransactions.
2. *Privacy and Security:* While blockchain provides immutability and transparency, preserving the privacy and security of microtransactions is vital. Ensuring the anonymity of users, protecting sensitive transaction details, and preventing unauthorised access or tampering are significant challenges that need to be addressed.
3. *Interoperability:* Interoperability among blockchain networks and platforms is essential for seamless microtransactions between users and applications. Developing standardised protocols and frameworks that enable cross-blockchain communication can

enhance the usability and utility of blockchain microtransaction systems.

4. *Energy Efficiency:* The resource-intensive nature of blockchain consensus algorithms, such as proof-of-work, raises concerns regarding the environmental impact and energy consumption associated with microtransaction processing. Exploring energy-efficient consensus mechanisms or optimising existing ones can help mitigate these concerns.
5. *User Experience and Adoption:* In order to foster widespread adoption of blockchain microtransaction systems, it is essential to prioritise an intuitive, user-friendly, and accessible user experience for individuals with diverse technical backgrounds. This entails recognising user requirements, creating intuitive interfaces, and tackling usability challenges. Enhancing the user experience can facilitate greater adoption of blockchain technology. For a visual representation of the transactions through blockchain, please refer to Figure 1, Transactions through Blockchain.

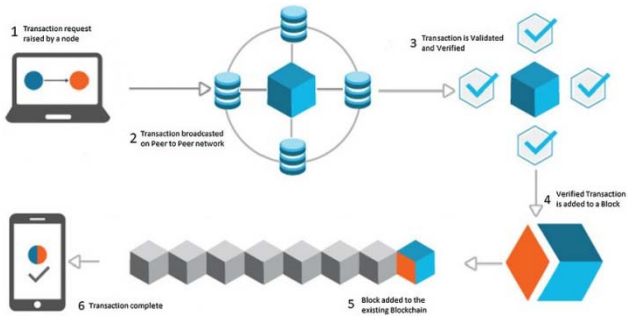

Figure 1: Transactions through blockchain

Using blockchain for small transactions is better than the usual method because it has more benefits.

Because blockchain transactions cannot be undone, there is no reason for someone else to handle or manage payments. This makes small payments cheaper because there is no middle person to pay.

People can get their stuff immediately after paying because blockchain payments happen quickly. This is much better than regular small payments that might take a long time to complete. [10]

Blockchain's small financial transactions can be expanded easily, so big service providers can use them without any issues caused by scaling the platform.

Nevertheless, doing small financial transactions using blockchain technology has some problems too.

When you make a payment with blockchain, it cannot be undone. So, the people who provide the service must believe you are trustworthy. This is a big problem because it is hard to know for sure who someone is on the blockchain. [11]

Small payments made through blockchain technology are still new, and there must be more ways to make or help people use them. Companies must spend time and money creating small payment systems that use blockchain technology.

Because small blockchain financial transactions do not have user names, companies must be cautious about keeping their users' personal information private.

We use a type of blockchain called a consortium to make small transactions safer and more private for our customers. Blockchain technology can make online services more trustworthy by using a secure system for saving information and transactions. The consortium blockchain is a type of many organisations managed together instead of just one. This kind of blockchain suits businesses that want to share information and deals but keep it private. Companies can improve their service by using a particular consortium blockchain system. They can use it to keep their information private while still having control over it. Consortium blockchains can protect data and secure information better than traditional centralised databases.

IV. The Integration

Integrating 5G mobile networks as nodes in a Layer 1 Proof of Authority (PoA) blockchain architecture for microtransactions represents a groundbreaking and forward-thinking solution to address pressing challenges in various business and industry sectors.

One of the primary motivations for integrating 5G networks into the blockchain infrastructure is the need for enhanced transaction speeds and reduced latency. The emergence of 5G networks, with their remarkable data transfer speeds and low-latency capabilities, presents an ideal opportunity to overcome this bottleneck.

Consider, for instance, the financial industry, which relies heavily on rapid and secure micro-transactions. Traditional banking systems need help attempting to quickly process a high volume of micro-transactions. This can result in delays and increased operational costs. By integrating 5G networks into the blockchain, financial institutions can significantly expedite microtransaction processing, reducing costs and enhancing overall efficiency.

Moreover, integrating 5G into the blockchain architecture holds immense promise for the Internet of Things (IoT) ecosystem. IoT devices, increasingly prevalent in various industries, require seamless and instantaneous communication for tasks such as sensor data reporting, automated decision-making, and remote control.

IoT devices can interact in real-time using 5G's low latency and high-speed capabilities within a blockchain framework, unlocking many new applications and possibilities.

Another compelling use case lies in supply chain management. The integration of 5G and blockchain can enable the real-time tracking of goods, ensuring transparency and traceability throughout the supply chain. This enhances logistics efficiency and strengthens trust among stakeholders, as they can access important records of product movements and transactions.

Integrating 5G with blockchain in the healthcare sector can have life-saving implications. Telemedicine and remote patient monitoring require rapid data transmission to ensure timely diagnoses and treatment.

With 5G connectivity within a secure blockchain framework, healthcare providers can securely transmit patient data while maintaining privacy and integrity. This innovation can revolutionize healthcare delivery, especially in remote or underserved areas.

Furthermore, integrating 5G into Layer 1 PoA blockchains enhances security and trust in micro-transactions. PoA blockchains rely on a network of trusted nodes to validate transactions, reducing the risk of fraudulent activity.

With this, it is possible to strengthen the security of the blockchain while also benefiting from the inherent security features of 5G, such as encryption and authentication.

Challenges are inherent in any technological integration, and this proposal acknowledges potential hurdles. One key challenge is ensuring the compatibility and interoperability of 5G networks with blockchain protocols.

Standardisation efforts and collaboration between telecom companies and blockchain developers will be critical in addressing this issue. Additionally, network reliability and uptime concerns must be carefully considered, as any disruption in 5G connectivity could impact the blockchain's performance.

V. Standalone Server Node to Mobile Node

Integrating 5G networks and blockchain technology presents unique opportunities for revolutionising various industries. Mobile devices have become indispensable daily, [12] possessing considerable computational power and connectivity. Harnessing these devices as autonomous servers within a 5G network empowers us to capitalise on their inherent capabilities. In turn, this dramatically bolsters blockchain systems' security, scalability, and efficiency. For a deeper understanding of how these elements interact, please refer to Figure 2: Mobile Node Ecosystem. The motivation behind this work is to explore the potential of mobile nodes in providing trustworthy and efficient validation services, leading to a more robust blockchain ecosystem. [13]

Figure 2: Mobile Nodes Ecosystem

We introduce a sophisticated three-tiered architecture that integrates mobile nodes, a dedicated 5G network, and the blockchain network to create a unified ecosystem. The mobile nodes, fortified with advanced hardware and software competencies, act as independent servers within the confines of the 5G network. These nodes interact with their counterparts in the blockchain network and perform the execution of consensus algorithms and partake in transaction verification procedures. Assuring fluid communication, the committed 5G network comes into play by offering substantial bandwidth, minimal latency, and unwavering reliability. It forms the crucial link that ensures flawless data exchange between the mobile nodes and the blockchain network. Figure 2 Mobile Nodes Ecosystem offers a comprehensive view of this landscape.

We introduce an enhanced PoA consensus algorithm tailored for mobile nodes in a 5G environment. The algorithm leverages the trustworthiness and integrity of the mobile node as a standalone server while considering the specific characteristics of the 5G network. It incorporates mechanisms to prevent

collusion, ensure fairness, and minimise the risk of malicious activity. The algorithm's efficiency is demonstrated through performance evaluation and comparison with existing consensus mechanisms.

With servers acting as intermediaries, user data requests often encounter delays due to the need to travel to and from the server. In contrast, 5G mobile devices can access data more directly, resulting in almost instantaneous responses. This low latency is particularly critical for applications that require real-time interactions, such as online gaming, telemedicine, and autonomous vehicles.

5G mobile networks offer unparalleled mobility compared to server-based solutions. Users can access the network from virtually anywhere, untethered from physical servers.

5G mobile networks are equipped with edge computing capabilities, allowing data processing and analysis to occur closer to the data source. This decentralization of computing resources reduces the load on centralized servers and enables quicker decision-making. Applications focused on real-time data analytics, such as smart cities and industrial automation, benefit immensely from this feature.

The adoption of 5G mobile devices has made it better, the access to high-speed internet. Unlike server-based solutions that need specialized infrastructure and equipment, 5G mobile networks are accessible to a broader user base. This inclusivity fosters innovation and economic growth by enabling a wider range of individuals and businesses to use better connectivity.

Managing servers connected to 5G networks can be costly in terms of hardware and operational costs. In contrast, 5G mobile devices are readily available in the market, and users typically bear the cost of their own devices and data plans. This cost-sharing model can be more financially sustainable for individuals and businesses alike.

5G mobile networks offer scalability and flexibility that are challenging to achieve with server-based solutions. As user demands grow, mobile network operators can expand their infrastructure to accommodate increasing traffic. This adaptability is particularly valuable in fluctuating data loads, such as major events or emergencies.

Mobile devices are designed with energy efficiency in mind, aiming to extend battery life while maintaining high performance. On the other hand, data centers and servers demand substantial energy resources for cooling and operation. Using 5G mobile devices can reduce overall energy consumption, aligning with sustainability goals.

5G mobile networks improve security features. It includes end-to-end encryption and authentication protocols. With mobile devices, users can have more control over their data and privacy. It furthers some of the concerns with centralized server systems.

5G mobile networks prioritize the user experience, offering personalized services and content delivery. The adaptability of mobile applications helps better experiences for individual preferences, enhancing user satisfaction.

There are many good things about using the PoA blockchain for making small payments in government. [14] The PoA blockchain works very quickly and can process many transactions at once. This is about small and fast payments called micropayments. It is essential. The PoA blockchain can handle lots of users and is easy to expand. Many people use public services, so this is very important. Thirdly, the PoA blockchain is very safe and has a vital way of ensuring everyone agrees on what is happening. This is crucial for government organisations that handle essential information that needs to be kept safe.

More and more people are using their phones to watch videos and play games, which uses much internet. [15] To ensure everyone can access everything quickly, a new way of sending internet wirelessly has been made called 5G. The advent of this novel wireless technology marks a significant step forward in terms of speed and data handling capacity. Its ability to process extensive information simultaneously and reduce communication delay to virtually nil propels us into a new era of advanced connectivity. See Figure 3, Mobile Phone Performance, for a more comprehensive depiction of these technological advancements and usage of time and battery life. To make progress, it is essential to use a broader range of frequencies, including millimetre wave frequencies. In the past, people rarely used high frequencies because they do not travel very far and can be easily blocked or disrupted.

A big thing that will make 5G better is called massive MIMO. Massive MIMO is a fancy tech that uses many antennas on the tower to make the internet go faster and stop things from getting mixed up.

5G will be beneficial, but there is a big problem with setting up the needed equipment. 5G uses high frequencies that cannot travel very far, so we need more small cells closer together to make it work. Moreover, using massive MIMO will need more base stations than before in older generations of wireless technology.

One way to solve this problem is by using something called blockchain technology. [16] Blockchain is a database that stores information in a way where no one person or group has complete control over it. This might be used to save details about where 5G stations are. If mobile operators save this information on a blockchain, they can quickly and easily set up 5G infrastructure.

Blockchain technology can also be used for smart contracts. [17] Smart contracts are software that performs transactions automatically when specific rules

are followed. This can be used to make it easier to rent land and buildings from people. [18]

5G needs new security measures because it uses faster data and different waves requiring special protection. One way to solve the problem is to use quantum cryptography. [19] Quantum cryptography uses the rules of how tiny particles behave to ensure that messages are safe when sent. This can protect the information sent between 5G stations and gadgets.

This advantage is even more pronounced in a federated learning setting, where data is distributed across a network of devices. Using blockchain, 5G networks can ensure that data remains private and secure, even when distributed across a network. This makes federated learning an attractive option for 5G networks, which are expected to be highly distributed.

In addition, blockchain can provide a way to ensure that data is not tampered with or lost. [20] When data is stored on a blockchain, it is immutable and can be easily verified. This means that data stored on a blockchain is more secure than data stored on a centralised server. [21]

VI. Proposed Solution

It would be easy to notice if someone tries to use the same money twice, and the payment will not go through. A blockchain can stop people from spending the same money twice. This plan uses one person or group to check and approve every transaction.

This group would write down everything bought or sold and ensure any new sales or purchases match what is already recorded. If the people in charge notice that someone tried to use the same money twice, they can say no to that transaction.

This way of doing things needs one main rule-maker, but it stops people from spending the same money twice and can work with other ways of staying safe, like secret codes. This authority would keep a record of all transactions that have taken place and check each new transaction against this record. If the authority sees that the same currency has been spent twice, it can reject the transaction. The advent of 5G technology brings with it a myriad of opportunities to revolutionise various industries. In this proposed solution, we explore using 5G mobile connections as a node in a Layer 1 Proof of Authority (PoA) blockchain designed explicitly for microtransactions. By combining the speed, low latency, and high bandwidth capabilities of 5G with the security and efficiency of PoA consensus, we can create a robust infrastructure for processing microtransactions in a scalable and decentralised manner.

To build a Layer 1 PoA blockchain suitable for microtransactions, the following components need to be considered.

1. *Consensus Mechanism:* Implement a Proof of Authority consensus algorithm that relies on trusted nodes to validate transactions. These nodes will be established using 5G mobile connections, ensuring fast and reliable communication between the blockchain network participants.
2. *Scalability:* Leverage the high bandwidth of 5G connections to enable a more significant number of transactions per second (TPS) compared to traditional blockchain networks. This will accommodate the high-volume nature of micro-transactions, enabling the system to handle a significant load.

The transformative capability of this technology comfortably meets the high-volume demands of micro-transactions, thus enabling the system to shoulder a substantial load without compromising efficiency. For a detailed representation of mobile phone performance during this robust operation re, Figure 4: Mobile Phone Performance During PoA.

1. *Security and Trust:* PoA consensus ensures a high level of security by relying on trusted nodes. Mobile operators and reputable organisations can act as validators, ensuring the integrity of the network and protecting it from malicious activities.
2. *Network Architecture:* Design an optimised network architecture that leverages the distributed nature of 5G mobile connections. This architecture should prioritise low-latency communication, enabling fast transaction confirmation and a seamless user experience for microtransaction participants and integrating the Layer 1 PoA blockchain with the existing 5G infrastructure.

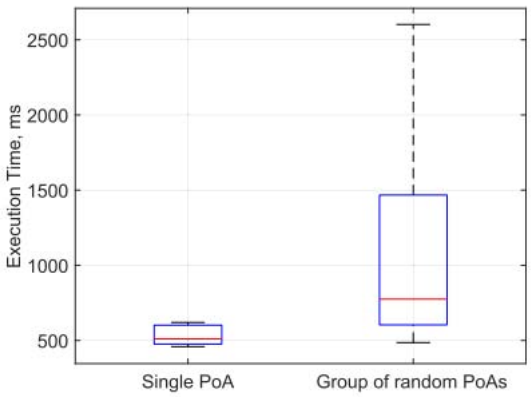

Figure 3: Execution of PoA

Execution of PoA provided in Figure 5 usually refers to implementing a Proof of Authority (PoA) consensus algorithm in a blockchain network. Proof of Authority is a method for validating transactions and creating new blocks in a blockchain.

Instead of relying on a decentralised network of miners or stakes (as in Proof of Work or Proof of Stake systems), PoA relies on a set of pre-approved authority nodes that are trusted to validate transactions.

In a PoA system, these trusted nodes, known as validators, propose and validate blocks. The validators' reputation secures the system. If a validator were to act maliciously, they could be easily identified and removed from the network, and their reputation would be ruined.

The "Execution of PoA" refers to the process by which these authority nodes perform their function within the blockchain network. This would include validating transactions, proposing new blocks, and maintaining the integrity of the blockchain. It is particularly useful in private and permissioned blockchain networks, where the participants are known and trusted entities.

1. *Mobile Network Compatibility:* Ensure the blockchain network is compatible with 5G mobile networks, enabling seamless integration and communication between the blockchain nodes and the broader network.
2. *Mobile Operator Collaboration:* Collaborate with mobile network operators to establish trusted nodes using their 5G connections. Mobile operators can act as validators, leveraging their infrastructure and expertise to maintain the blockchain network's integrity.
3. *Data Privacy and Security:* Implement robust encryption and privacy mechanisms to protect user data and transaction information transmitted over the 5G network. This will ensure compliance with data protection regulations and build trust among users.

The proposed solution for utilising 5G mobile connections as a Layer 1 PoA blockchain node opens up several microtransaction use cases, including the Internet of Things (IoT).

1. *Micropayments:* Enable seamless, secure, and low-cost micropayments between IoT devices, allowing for new business models and increased automation in various industries.
2. *In-App Purchases and Digital Content:* Facilitate frictionless microtransactions within mobile applications, allowing users to make small purchases or access digital content with ease and security.
3. *Mobile Payments and Digital Wallets:* Provide a fast and reliable platform for mobile payment services, enabling users to make instant micropayments using their smartphones while ensuring the security of their transactions.

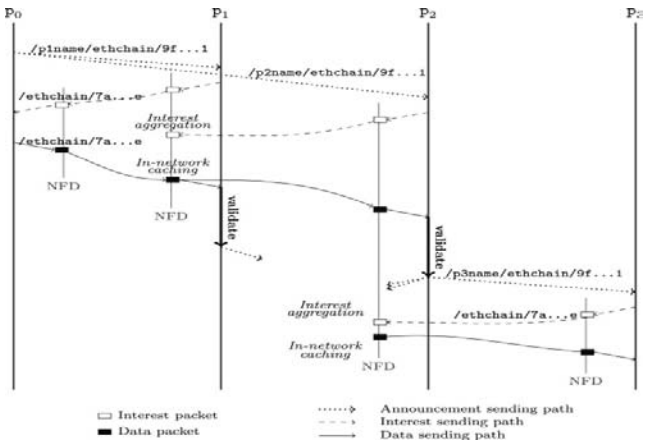

Figure 4: Designing a Layer 1 PoA Blockchain

Designing a Layer 1 Proof of Authority (PoA), described in Figure 4, involves creating the foundational layer of a blockchain system that uses the PoA consensus algorithm. Layer 1 in blockchain architecture refers to the base protocol level, including transaction validation and block creation.

In a PoA consensus model, the system relies on a limited number of trusted nodes, known as validators, to propose and validate new blocks. As such, the reputation of these validators is crucial to maintaining the integrity and security of the network.

The steps in designing a Layer 1 PoA Blockchain could include the following.

Validators are usually reputable entities known within the network whose role is to propose and validate new blocks. Identifying these validators' identities is a crucial step in designing a PoA blockchain.

The integrity of a PoA blockchain depends on the trust placed in the validators. This could involve setting up a system for validators to stake their reputation, ensuring they have a vested interest in maintaining the network's integrity.

The consensus algorithm is how validators agree on the state of the blockchain. A PoA model might involve validators taking turns proposing and validating blocks.

This includes determining how validators are added or removed, how upgrades to the protocol are handled, and how disputes are resolved.

Like any blockchain, a PoA chain needs robust security measures to protect against potential attacks. This could include security audits, intrusion detection systems, and protocols for handling suspected malicious activity.

Since one of the benefits of a PoA blockchain is increased speed and scalability, designing the Layer 1 protocol for optimal performance is crucial.

Validators in decentralised networks can disconnect for various reasons, including network instability, hardware failures, or malicious attacks. When a validator goes offline, it can disrupt the network's consensus mechanism, potentially leading to forks or vulnerabilities. In order to address these challenges, efficient validator replacement mechanisms are required.

One essential approach to replace validators is implementing real-time monitoring and alerting systems. Network operators should continuously monitor the status of validators to detect disconnections or other issues promptly. It is possible through various monitoring tools and metrics, such as ping latency, response time, or heartbeat signals.

Implementing redundancy in the validator set can help mitigate the impact of validator disconnections. Having backup validators ready to take over allows the network to operate smoothly even when a validator disconnects. Load balancing techniques can distribute the workload among validators, ensuring no single validator becomes a bottleneck.

Automated failover mechanisms are crucial for ensuring uninterrupted network operation. Automated scripts or algorithms can identify the issue and trigger the replacement process when a validator disconnects. It can involve selecting a backup validator or launching a new validator node to maintain network integrity.

In some decentralized networks, the validator set can be dynamically adjusted. It means that new validators can be added and removed as needed. When a validator disconnects, the network can quickly replace it with a standby validator without significant disruption.

To encourage validators to maintain reliable connections, networks can implement incentive mechanisms. Validators could receive rewards for maintaining uptime or penalties for frequent disconnections. These incentives can motivate validators to invest in stable network connections and robust hardware.

Decentralized networks can adopt governance mechanisms that allow token holders or network participants to vote on validator replacements. This approach ensures transparency and community involvement in the validator replacement process, reducing the risk of centralization.

Some decentralized networks, such as sharding or sidechains, explore advanced network topologies. These architectures can isolate the impact of validator disconnections to specific network segments, reducing the overall disruption.

Validator Reputation and Trust Building, a reputation and trust system for validators, can help network participants identify reliable validators. Validators with a track record of stable operation and timely replacements are more likely to gain trust and attract delegations.

In critical network disruptions, emergency recovery procedures should be in place. These procedures can involve network-wide snapshots, rollbacks, or other consensus mechanisms to stabilize the network and address any inconsistencies caused by validator disconnections.

The process of validator replacement should be continually improved and tested. Network operators should regularly conduct simulations and drills to ensure the replacement mechanisms work as intended. This proactive approach can help identify potential issues before they impact the live network.

Designing a Layer 1 PoA Blockchain is a complex task that requires thorough knowledge of blockchain technology and careful consideration of network needs and constraints.

The purpose of this Proof of Concept (POC) [22] document is to provide detailed instructions for setting up and running an EVM light node on an Android mobile device using Termux and Geth. This POC aims to demonstrate the feasibility of running a lightweight EVM node on a resource-constrained Android device.

System Specifications

Device: IQOO Z3

Operating System: Android 13

Processor: Snapdragon 768G 2.8 GHz Octa-Core

RAM: 8 GB

Storage: 256GB

Connectivity: WIFI (100Mbpsconnection)

Gethversion: 1.12.0 stable

Network: Mainnet

Before proceeding with the POC, ensure the following prerequisites are met.

1. *Install Termux:* Download and install Termux from the Google Play Store on your Android device.
2. *Stable Internet Connection:* Ensure a stable internet connection is available for downloading and syncing the blockchain.
3. *Geth:* Geth is an EVM client implementation written in the Go programming language. It is a command-line interface (CLI) tool and a full-node implement-tation that enables users to interact with the

blockchain network, deploy smart contracts, and execute transactions.

4. *Termux:* Termux is an Android terminal emulator and Linux environment app that provides a command-line interface on Android devices. It allows users to emulate a Linux environment, runs Linux packages and utilities, and perform software development, system administration, and running server applications.
5. *EVM Light Node:* An EVM light node is a type of client that requires fewer computational resources and storage space compared to a full node. It maintains a subset of the blockchain data necessary for specific operations by relying on other full nodes in the network to provide information on demand. Light nodes offer a resource-efficient way to interact with the Blockchain network while minimising storage requirements.

By combining Geth, Termux, and the EVM light node concept, this POC demonstrates the feasibility of running an EVM light node on an Android mobile device. This configuration enables users to utilise the Blockchain network, deploy smart contracts, and access blockchain data using Termux's Linux environment and Geth's lightweight implementation.

Installing Ubuntu 20.04 in Termux

Launch Termux and open the terminal.

Run the following command to update the package repositories: [23].

```
pkgupdate-y&&pkginstallwgetcurlproottar-y
wgethttps://raw.githubusercontent.com/AndronixApp/AndronixOrigin/master/Installer/Ubuntu20/ubuntu20.sh-Oubuntu20.sh
chmod+xubuntu20.sh
bashubuntu20.sh
```

Installing Required Packages

After Ubuntu 20.04 installation is complete, install the necessary packages by running the following command.

```
Aptinstallsoftware-properties-common
```

Installing Geth

Add the repository and install Geth by executing the following commands.

```
add-apt-repository-yppa:geth/geth
aptupdate
aptinstallgeth
```

Installing the 'screen' Application

Install the 'screen' application to run Geth in the background as a daemon process.

```
Apt-getupdate&&apt-getinstallscreen-y
```

Running Geth in Light Mode

Start Geth in light mode and run it in the background as follows.

```
screen-dmSgethgeth--syncmodelight--http--http.API"eth,debug."
```

Checking Sync Status

Attach to the Geth console to check the synchronisation status.

```
gethattach
```

In the Geth console, execute the command eth. I am syncing to view the sync progress.

Output:

```
currentBlock:2236992,
healedBytecodes:0,
healedTrienodeBytes:0,
healedTrienodes:0,
healingBytecode:0,
healingTrienodes:0,
highest block:17414379,
startingBlock:1806912,
syncedAccountBytes:0,
synced accounts:0,
syncedBytecodeBytes:0,
syncedBytecodes:0,
syncedStorage:0,
syncedStorageBytes:0
}
```

Managing the Geth Process

Access the Geth process or detach from it using the following commands:

To access the Geth process: screen -r

To detach from the Geth process: Press Ctrl + a, then d

Checking Synced Data Size

To determine the size of the synced data, navigate to the folder where the chain data is stored (usually .geth).

```
du-sh.geth
```

After successfully synchronising the EVM light node on the Android device using Termux and Geth, the following observations were made:

1. *Total Number of Block Headers Synced:* The light node successfully synchronised 17,414,852 block headers from the main net. This indicates that the node is up to date with the latest block headers of the blockchain.
2. *Average Bandwidth Consumption:* The average bandwidth consumption was approximately 25 Mbps during synchronisation. This indicates that the light node effectively utilises network resources while maintaining a relatively low bandwidth requirement.
3. *Blockchain Data Size:* The synced blockchain data on the Android device was approximately 11 GB.

This indicates that the light node efficiently stores a subset of the blockchain data, significantly reducing the storage requirements compared to a full node.

4. *Time for Sync Completion:* The synchronisation process took approximately 3 hours to complete, demonstrating the efficiency of the light node synchronisation process. This relatively short time frame allows users to quickly set up a synchronised Blockchain node on their Android device.

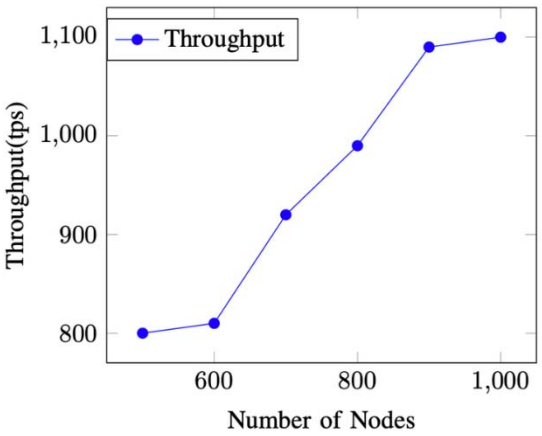

Figure 5: Throughput Value

VII. Requirements

The arrival of 5G technology means that we can use mobile phones to set up blockchain computers in a new way. 5G technology makes mobile devices work faster and with less delay. This is good for using a small computer on your phone. Also, 5G can connect to many blockchain networks at once. This means you can use your phone as a part of a particular computer system. [24]

A PoA blockchain is a way to make transactions that do not need trust or permission from anyone. This means it is good to use for small money transactions. In a PoA blockchain, every member has a share in the network that decides their power. When someone has more to gain, they have more power to control.

A mobile phone with 5G could connect to a PoA blockchain if it promises to keep the connection. The link can be used to check deals and put them in the chain of blocks. The node can also help send transactions to other nodes in the network. This means a network can work without one big boss in charge, and everyone can trust each other.

A 5G phone for a PoA blockchain network can suit people and companies. Users can take part in the blockchain without buying any equipment or technology. It would let people reach the blockchain from any place across the globe. It can help companies find new customers and enter new markets. Also, it would help companies not rely so much on a big boss.

Using 5G phones as part of blockchain networks has enormous potential to change how we use [25] these networks. Using a 5G phone as part of a blockchain can have a lot of good results. Initially, people can join the blockchain without buying equipment or computer programs. Next, it would let people get to the blockchain from any location worldwide. Thirdly, it would enable companies to connect with fresh customers and markets. Fourth, it would help businesses not rely so much on one leader. Using a 5G phone for PoA blockchain is not easy because people need to know a lot, the network might get too busy, and the phone could be stolen or lost.

Using a 5G phone as a part of blockchain technology can be helpful for people and companies. It has excellent potential to lead to many advantages. However, some difficulties must be overcome before this technology can be used entirely. To attach a 5G phone to a Proof of Authority blockchain as a point, there are some things you need to do and problems to overcome. The 5G network needs to be fast and not take a long time to do things in order to work well with blockchain. [26] The computer must always work and be online to ensure everything is clear and precise. Thirdly, the point where data is stored must be safe so no one can harm it. The node needs to quickly and smoothly deal with transactions to match with the network. To create a 5G-based node in a Proof of Authority blockchain, we need to solve some problems. However, if we succeed, it will have lots of advantages. First, it would make transactions happen very quickly. It would use less energy to run the network. Third, it would make the network more spread and less controlled from one central point. Connecting a 5G phone to a secure blockchain could make the network faster and safer.

VIII. Limitations

In implementing a Layer 1 Proof of Authority (PoA) blockchain architecture for microtransactions with 5G mobile networks as integral nodes, it is imperative to acknowledge and carefully scrutinize the limitations associated with this innovative approach. These limitations have profound implications for such a blockchain system's feasibility, security, and scalability.

One of the critical limitations of employing a PoA consensus mechanism is its inherent tendency toward centralization. Validators in a PoA network are selected based on their identity and reputation, which can lead to a concentration of power among a select few. This centralization aspect may conflict with the principles of decentralization that underlie many blockchain applications.

If decentralisation is a paramount consideration for your specific use case, the benefits of low latency and real-time processing offered by 5G must be

carefully weighed against the potential centralization of PoA.

Striking the right balance between these conflicting factors will be pivotal in determining the success and suitability of this integration.

While 5G networks undoubtedly present advantages in terms of speed and capacity, their security implications cannot be underestimated. Blockchain networks rely on robust security measures to ensure the integrity and immutability of transactions and data.

Any vulnerabilities or security lapses within the 5G network infrastructure could pose a significant threat to the overall security of the blockchain system. Thus, a comprehensive assessment and mitigation strategy for potential security risks associated with 5G integration should be integral to the implementation process.

It is also crucial to recognize that not all blockchain applications necessitate the high-speed and low-latency capabilities of 5G networks. In cases where real-time interactions or massive data transfer are not essential components of the use case, the benefits of combining 5G and PoA may be less pronounced.

Implementing such a combination without a genuine need for these features could result in unnecessary complexity and cost, potentially outweighing any perceived advantages. Therefore, careful consideration of the specific requirements and objectives of the blockchain application is imperative to determine whether the integration of 5G is justified.

Furthermore, the success of this integrated approach is contingent upon the availability and adoption of 5G networks in the target deployment areas. It is well-established that the rollout and accessibility of 5G networks vary significantly by region and may not yet be widespread in some areas.

Consequently, the feasibility and effectiveness of integrating 5G with PoA blockchain hinge on the existing infrastructure and adoption rates in the regions where the blockchain system is intended to be deployed. In regions where 5G infrastructure is lacking or underdeveloped, alternative solutions or a phased approach may need to be considered.

IX. Conclusion

The number of mobile devices is continuously growing; however, the computational power of those devices could be more widely used, mainly due to battery constraints. Numerous applications could use those FLOPs, and one of them is blockchain. The design of modern blockchain systems mainly relies on Proof-of-Work consent. This paper outlined the main applications of blockchain technology for smartphones and wearable devices, stepping aside from the conventional cryptocurrency perspective and comparing existing market-available systems. Next, a set of protocols coupling together Proof-of-Work, Proof-of-Stake, and Proof-of-Authority blockchain strategies was proposed aiming to involve mobile devices in the new block generation process.

The protocol is already implemented in a real-life distributed test network involving more than 2,500 mobile nodes around the globe. The system's evolution and the subsequent impact on node growth are demonstrated through the Throughput value, as illustrated in Figure 5.

We contrasted our developed system's operation with similar methodologies and concluded that it only incurs a minor impact, 5%, on user-experienced battery consumption. This impact is significantly less than the substantial battery drain, up to 40%, common with regular device operation and other systems. The comparative analysis proves the effectiveness of our design in maintaining a secure and privacy-focused system.

Furthermore, we delved into the primary challenges associated with blockchain adoption, highlighting significant obstacles from both user and regulatory standpoints. This exploration offers valuable insights to refine the system for improved adoption rates. The future directions and the primary mobile blockchain challenges related to the integration of blockchain-based solutions on smartphones conclude the paper.

References Références Referencias

1. AI and Machine Learning: A Glimpse into the Future -Web set net. https://websetnet.com/ai-and-machine-learning-a-glimpse-into-the-future/
2. What is Alogrand (ALGO) | CRIPTOMO. https://criptomo.com/what-is-alogrand-algo/
3. Programme – ONDM 2021. https://ondm2021.Chalm-ers.se/programme/
4. A Framework for Regulation of New and Existing PFAS by EPA. https://www.science-policyjournal.org/article_1038126_jspg_16_01_03.html.
5. Proof of authority - Wikipedia. https://en.wikipedia.org/wiki/Proof_of_authority.
6. AMP Release Schedule - amp. Dev. https://amp.dev/documentation/guides-and-tutorials/stories/learn/spec/release-schedule.
7. How is a Blockchain Secured?. https://www.cooramedia.com/blog/how-is-a-blockchain-secured
8. Answers to all your Hedera - hashgraph questions - BitQuestions. https://www.bitquestions.com/hedera-hashgraph.
9. Immortalising 20 Years of Epic Research | NCC Group Research Blog | Making the world safer and more secure. https://research.nccgroup.com/2020/08/21/immortalising-20-years-of-epic-research/
10. WF-XML - Workflow Management Coalition. https://wfmc.org/wf-xml/.

11. Relationship Stereotypes in Europe — How to Overcome Relationship Stereotypes in Europe | Riad Karmela a Marrakech. https://www.riadkarmela.com/relationship-stereotypes-in-europe-how-to-overcome-relationship-stereotypes-in-europe/
12. [Samsung Watch Casinos Online NZ - Casino Apps For Samsung Watch Online. https://casinosonline.net.nz/samsung-watch/
13. Projects | interAction. http://interaction.disi.unitn.it/index.php/projects/
14. The old site of TOTO - Topnewsnet. http://topnewsnet.com/the-old-site-of-toto/
15. Mailchimp – 56pixels.com. https://www.56pixels.com/tag/mailchimp/
16. What is an NFT? | E1 Asset Management. https://www.e1am.com/post/what-is-an-nft
17. Is The Dollar Dead? | Interview with Simon Dixon - Cryptocin. https://cryptocin.com/is-the-dollar-dead-interview-with-simon-dixon/
18. Illumos: manual page: ctfdump.1. https://illumos.org/man/1/ctfdump.
19. Ennico, C. (2021). When worlds collide: Seller financing and SBA loans. The Enterprise, 50(43), 6.
20. Blockchain encryption and use in crypto - Coinjupiter. https://blog.coinjupiter.com/blockchain-encryption-and-use-in-crypto/
21. KashFlow Software Security - IRIS KashFlow. https://www.kashflow.com/about/security/
22. University of California Health Lupus Clinical Trials for 2023 — California. https://clinicaltrials.ucbraid.org/lupus.
23. CentOS/Redhat Mirror Usage Help. http://mirror.moack.co.kr/.help/centos/
24. The Cicret Bracelet Amazing Technology | Vidsage.com.https://www.vidsage.com/technology/the-cicret - bracelet-amazing-technology/
25. Why Will the Blockchain Be A Game - Changer In Cybersecurity? https://onpassive.com/blog/why-will-the-blockchain-be-a-game-changer-in-cyber-security/
26. Help yourself by creating a better work/life balance | Oh So Steffany. https://www.ohsosteffany.com/help-yourself-by-creating-a-better-work-life-balance/
27. Blockchain Vending Machine: A Smart Contract-Based Peer-to-Peer Marketplace for Physical Goods Munich Personal RePEc Archive. https://mpra.ub.uni-muenchen.de/101733/

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Optimized Round Robin CPU Scheduling for Critical Processes

By Debashish Barman, Biswajit Paul, Swastik Bhattacharya, Dr. Sourav De & Dr. Govind Prasad Arya

Abstract- An operating system serves as a fundamental component of any computer system. Scheduling lies at the core of operating system functionality, involving the arrangement of processes to execute in a well-defined manner. The primary goal of scheduling is to enhance system efficiency and speed. Several fundamental scheduling algorithms exist, including First Come First Serve (FCFS), Round Robin, Priority-Based Scheduling, and Shortest Job First (SJF). This thesis primarily focuses on the Round Robin Scheduling algorithm and seeks to address certain limitations associated with it.

One notable drawback of Round Robin Scheduling is the critical choice of the time quantum. If the time quantum is excessively large, the scheduling behavior closely resembles that of FCFS. Conversely, a smaller time quantum leads to a higher number of context switches. The central objective here is to overcome this limitation inherent to the traditional Round Robin scheduling algorithm, thereby maximizing CPU utilization and enhancing system efficiency.

Keywords: *CPU scheduling, round robin scheduling, priority scheduling, time quantum, waiting time, turnaround time.*

GJCST-H Classification: *ACM Code: D.4.1*

Strictly as per the compliance and regulations of:

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Debashish Barman [α], Biswajit Paul [σ], Swastik Bhattacharya [ρ], Dr. Sourav De [ω] & Dr. Govind Prasad Arya [¥]

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In this thesis, we propose an innovative algorithm that classifies processes into two categories: high-priority processes and low-priority processes. This novel scheme significantly reduces the average waiting time of high-priority processes, regardless of the presence of low-priority processes. The overall average waiting time varies based on the specific set of processes under consideration. Our analysis demonstrates that the proposed scheme consistently outperforms previously suggested methods, resulting in reduced average waiting times for the selected process sets.

Keywords: CPU scheduling, round robin scheduling, priority scheduling, time quantum, waiting time, turnaround time.

I. Introduction

CPU scheduling is a fundamental practice in the realm of operating systems, orchestrating the execution of processes to efficiently utilize the CPU. This practice becomes necessary when a process must seize CPU control while another process is temporarily halted in a waiting state, typically due to resource unavailability, such as I/O operations. The primary objectives of CPU scheduling are to enhance system effectiveness, responsiveness, and fairness while maximizing CPU utilization.

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Process scheduling, an integral component of multiprogramming operating systems, involves managing the transition of processes in and out of the CPU based on a specific strategy. These operating systems can load multiple processes into executable memory concurrently, allowing them to share the CPU through time multiplexing.

There are two principal categories of CPU scheduling algorithms: preemptive and non-preemptive. In preemptive scheduling, a process allocated to the CPU can be interrupted, and its running state may be changed to a waiting state. This approach is known for temporarily suspending logically runnable processes and is referred to as preemptive scheduling. However, frequent arrivals of high-priority processes in the ready queue can potentially lead to starvation for lower-priority processes. It's important to note that preemptive scheduling comes with the overhead of managing these process interruptions.

In contrast, non-preemptive scheduling ensures that once a process gains access to the CPU, it retains control until its execution is complete. The CPU cannot be forcibly taken away from the process until it finishes its execution. In this scenario, a process voluntarily releases the processor only after its task is done.

While various CPU scheduling algorithms exist, some common ones include First In First Out (FIFO), Shortest Job First (SJF), Priority Scheduling, and Round Robin CPU Scheduling. Each of these algorithms offers unique advantages and trade-offs in managing the CPU's allocation to processes.

II. Literature Survey

In FCFS scheduling, jobs are executed in the order they arrive, following a "first come, first served" principle [1]. This algorithm can operate in both non-preemptive and preemptive modes depending on system requirements. It is easy to understand and implement, relying on a First-In-First-Out (FIFO) queue. However, FCFS suffers from the drawback of high average waiting times, limiting its overall performance.

Shortest Job First (SJF), also known as Shortest Job Next, prioritizes tasks based on their execution time [3]. It can function as both a preemptive and non-preemptive algorithm. SJF is particularly effective in reducing waiting times, making it a preferred choice in batch systems where CPU time requirements are known

in advance. However, it is impractical for interactive systems where predicting CPU time is challenging.

Priority scheduling is a non-preemptive algorithm commonly used in batch systems [5]. Each process is assigned a priority, with the highest-priority process scheduled first, followed by processes of equal priority in a first-come-first-served manner. Priorities can be assigned based on memory, time, or other resource requirements.

Round Robin is a preemptive scheduling algorithm where each process is allocated a fixed time quantum for execution [8]. When a process's time quantum expires, it is preempted, and another process is allowed to execute for its allocated time period. Context switching is necessary to manage preempted processes effectively.

Multiple-level queues are a manual scheduling algorithm [15] that leverages various existing algorithms to categorize jobs based on common characteristics. Multiple queues are maintained for processes with similar attributes, each with its specific scheduling algorithm [8]. Priorities are assigned to each queue, enabling effective organization. For instance, OS-bound jobs can be grouped in one queue, while I/O-bound jobs reside in another. The Process Scheduler selects jobs from each queue based on the algorithm associated with that queue. Multi-level queue scheduling was developed for scenarios where processes naturally belong to different groups.

III. Shortcomings of Existing Algorithm

We have evaluated the conventional Round Robin (RR) algorithm as our baseline scheduling approach. The RR algorithm is generally considered efficient because it ensures that all processes in the process set have an equal opportunity for execution. However, our research has identified that our system comprises both critical processes with high priority and normal (low-priority) processes. A significant limitation of the RR algorithm is its lack of consideration for process priorities, which we regard as a major drawback.

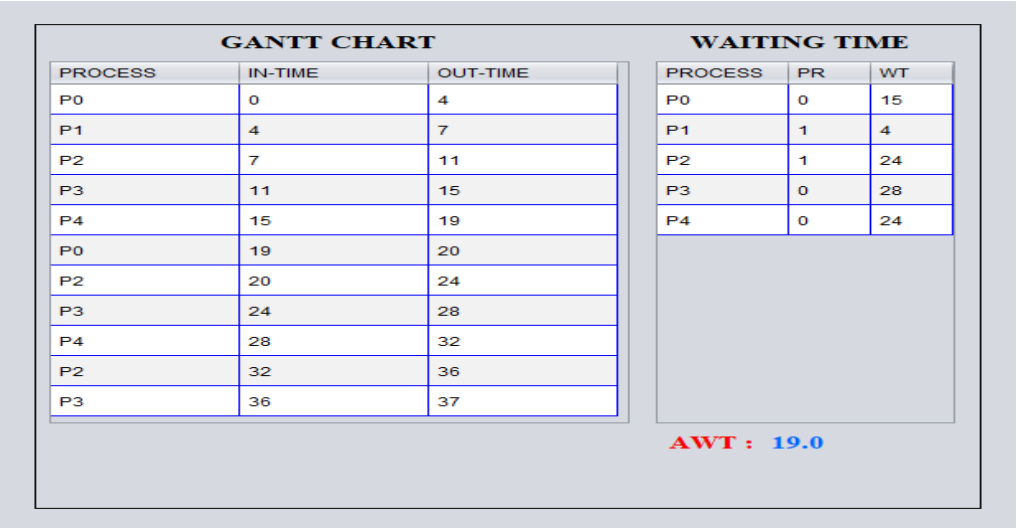
To address this limitation, we have proposed a novel methodology aimed at enhancing the RR algorithm's effectiveness.

Let's now consider the following set of processes with a fixed time quantum of 4.

Table 1: For the Existing Methodology, Processes in the Ready Queue

Process Name	Priority	Burst Time
P0	0	5
P1	1	3
P2	1	12
P3	0	9
P4	0	8

Round Robin scheduling is known for its ability to ensure a fair chance for every process in the set to execute. Consequently, Figure 1 illustrates the Gantt chart and waiting times for the given set of processes.



GANTT CHART

PROCESS	IN-TIME	OUT-TIME
P0	0	4
P1	4	7
P2	7	11
P3	11	15
P4	15	19
P0	19	20
P2	20	24
P3	24	28
P4	28	32
P2	32	36
P3	36	37

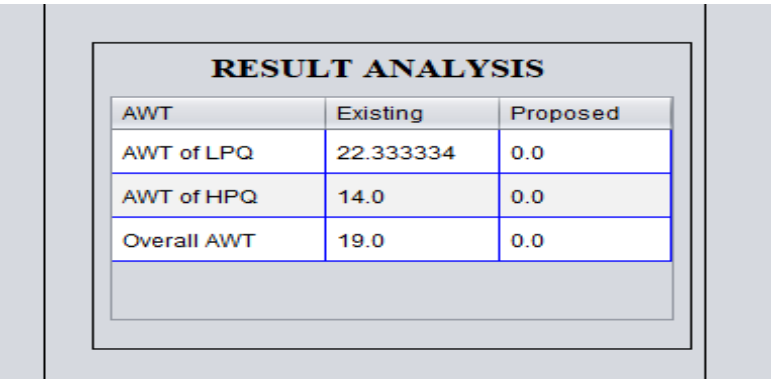
WAITING TIME

PROCESS	PR	WT
P0	0	15
P1	1	4
P2	1	24
P3	0	28
P4	0	24

AWT : 19.0

Figure 1: Gantt chart of Existing Methodology

The average waiting time (AWT) for processes with both low and high priorities is presented in Figure 2 below.



RESULT ANALYSIS

AWT	Existing	Proposed
AWT of LPQ	22.333334	0.0
AWT of HPQ	14.0	0.0
Overall AWT	19.0	0.0

Figure 2: Waiting Time Analysis of Existing Methodology

IV. Proposed Method

The Round Robin algorithm operates under the premise of treating all jobs with equal priority, executing processes one at a time for a specific duration known as the Time Quantum (TQ). A process can continue running until either its time quantum (TQ) is exhausted or it completes its CPU burst time. Within the system, processes have varying priorities, distinguishing between high-priority critical tasks, which demand immediate CPU attention, such as shutting down the computer due to overheating or issuing alerts for unauthorized access, and normal-priority processes, which encompass all other standard tasks.

V. Proposed Algorithm

Our proposed algorithm is given below.

Step 1: Input process details, including the process name, priority, and burst time.

Step 2: Save the collected information in a queue labeled as "READYQ."

Step 3: Establish two distinct queues: "HIGHPQ" for high-priority processes and "LOWPQ" for regular-priority processes.

Step 4: Repeat steps 5 to 11 until the remaining CPU burst times for processes in both "HIGHPQ" and "LOWPQ" reach zero.

Step 5: Choose the next process from "HIGHPQ" or "LOWPQ" alternatively, with the initial selection favoring "HIGHPQ" to give higher-priority tasks precedence.

Step 6: If the selected process has a remaining CPU burst time greater than or equal to the time quantum, proceed to step 7; otherwise, go to step 8.

Step 7: Execute the chosen process for the duration of the time quantum.

Step 8: Continue executing the selected process until its remaining burst time reaches zero.

Step 9: Update the remaining CPU burst time of the corresponding process in the respective queue.

Step 10: Record the process's IN-TIME and OUT-TIME in a table known as the GANTTCHART.

Step 11: If the previous process was selected from "HIGHPQ," switch the next turn to "LOWPQ," and vice versa.

In this study, I have introduced an approach that ensures high-priority processes receive precedence in execution. The methodology I've suggested involves granting alternating opportunities to both high and low priority processes. It begins by selecting a process from the high-priority queue, followed by the selection of the next process from the low-priority queue. The following steps outline the proposed methodology.

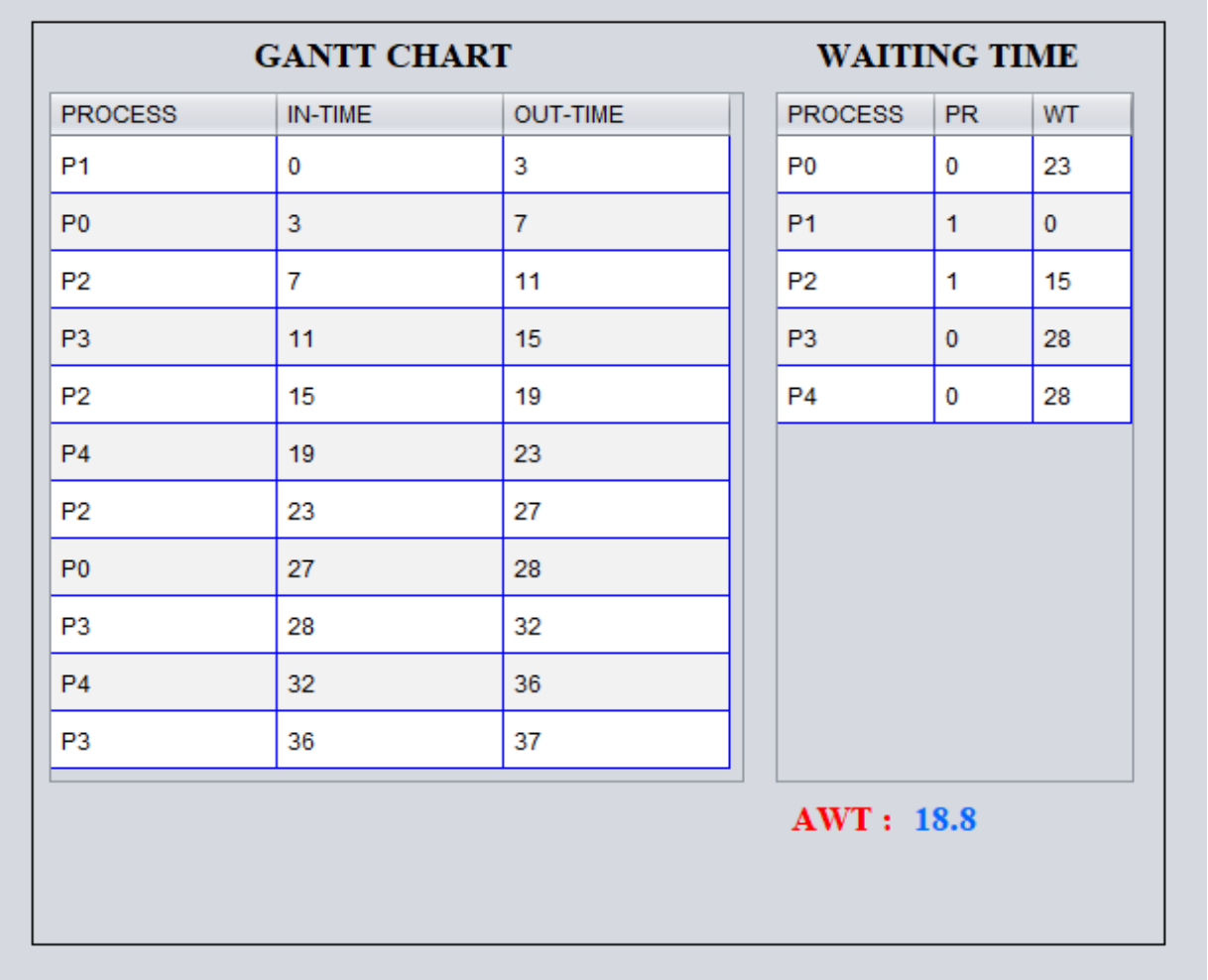
HIGHPQ- This queue contains the processes of high priority.

Process Name	Priority	Burst Time
P1	1	3
P2	1	12

LOWPQ- This queue contains the processes of low priority.

Process Name	Priority	Burst Time
P0	0	5
P3	0	9
P4	0	8

Below, in Figure 3, you can observe the Gantt chart and waiting times for the processes listed in Table 1, using a time quantum of 4.



GANTT CHART

PROCESS	IN-TIME	OUT-TIME
P1	0	3
P0	3	7
P2	7	11
P3	11	15
P2	15	19
P4	19	23
P2	23	27
P0	27	28
P3	28	32
P4	32	36
P3	36	37

WAITING TIME

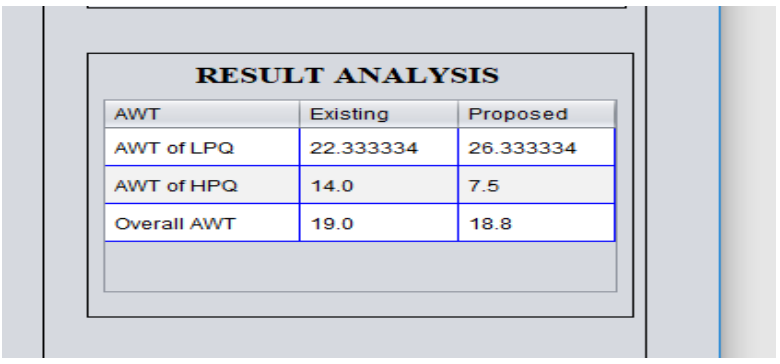
PROCESS	PR	WT
P0	0	23
P1	1	0
P2	1	15
P3	0	28
P4	0	28

AWT : 18.8

Figure 3: Working of Proposed Methodology

VI. Result and Analysis

The figure below illustrates the application of the proposed algorithm, resulting in an average waiting time for high-priority processes of approximately 7.5. This value is nearly half of the average waiting time observed when using the existing algorithm. Furthermore, the overall waiting time for the process set is significantly reduced through the implementation of the proposed algorithm.



RESULT ANALYSIS

AWT	Existing	Proposed
AWT of LPQ	22.333334	26.333334
AWT of HPQ	14.0	7.5
Overall AWT	19.0	18.8

Figure 4: Result Analyses of Existing Vs Proposed Methodology

The same result can be analyzed using bar chart shown in figure 5.

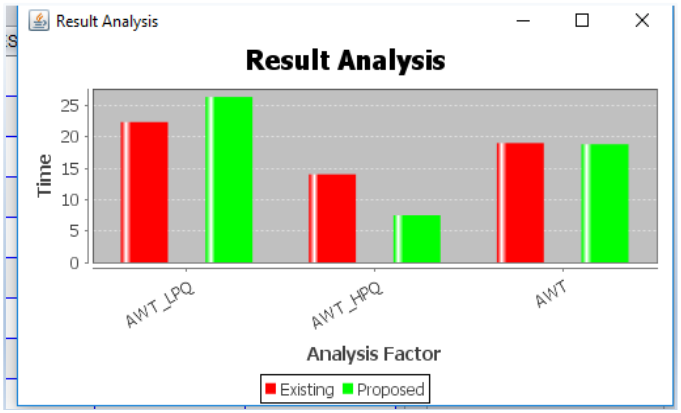


Figure 5: Result Analysis of Existing Vs Proposed Methodology Using Bar chart

VII. Conclusion

In this study, I've maintained the core principle of traditional round-robin scheduling, which aims to ensure that all processes receive an equal opportunity to execute within a specific time quantum. The innovation lies in the strategic placement of high-priority processes at the rear of the ready queue, preventing them from being excessively delayed by late arrivals. The proposed approach is expected to reduce the average waiting time for high-priority processes, but it may lead to an increase in the average waiting time for normal priority processes. The overall average waiting time for all processes within the ready queue may exhibit improvement or remain unchanged, contingent on the specific mix of processes.

Although the proposed algorithm demonstrates enhanced performance for high-priority processes, there remains an ongoing drive for continued improvement. In the future, these results could potentially be refined by introducing variable time quantum strategies. Furthermore, optimizing the algorithm's execution can be accomplished by leveraging more efficient data structures.

References Références Referencias

1. Sanjay Kumar Panda and Saurav Kumar Bhoi, "An Effective Round Robin Algorithm using Min-Max Dispersion Measure", International Journal on Computer Science and Engineering, 4 (1), pp. 45-53, January 2012.
2. Abraham Silberschatz, Peter Baer Galvin, Greg Gagne, "Operating System Concepts", Sixth Edition.
3. Rakesh Mohanty, H. S. Behera, Khusbu Patwari, Monisha Dash, "Design and Performance Evaluation of a New Proposed Shortest Remaining Burst Round Robin (SRBRR) Scheduling Algorithm", Proc. of International Symposium on Computer Engineering & Technology 2010, Vol 17, pp. 126-137, 2010 .
4. Abdulrazak Abdulrahim, Salisu Aliyu, Ahmad M Mustapha & Saleh E. Abdullahi, (2014) "An Additional Improvement in Round Robin (AAIRR) CPU Scheduling Algorithm", International Journal of Advanced Research in Computer Science and Software Engineering, Vol. 4, Issue 2, pp 601-610.
5. Improvised Round Robin (CPU) Scheduling Algorithm. Sirohi, Abhishek; Pratap, Aseem; Aggarwal, Mayank // International Journal of Computer Applications;Aug2014, Vol. 99, p40.
6. Pallab Banerjee, Probal Banerjee, Shweta Sonali Dhal, "Comparative Performance Analysis of Average Max Round Robin Scheduling Algorithm (AMRR) using Dynamic Time Quantum with Round Robin Scheduling Algorithm usingStatic Time Quanmtum", International Journal of Innovative Technology and Exploring Engineering, 1(3), pp. 56-62,August 2012.
7. P.Surendra Varma, "A Finest Time Quantum for Improving Shortest Remaining Burst Round Robin (SRBRR) Algorithm", Journal of Global Research in Computer Science, 4 (3), pp. 10-15, March 2013.
8. Two Queue based Round Robin Scheduling Algorithm for CPU Scheduling. Jindal, Srishty; Grover, Priyanka // International Journal of Computer Applications;Nov2014, Vol. 105 Issue 1-18, p21.
9. A 2LFQ Scheduling with Dynamic Time Quantum using Mean Average. Lenka, Rakesh K.; Ranjan, Prabhat // International Journal of Computer Applications;6/1/2012, Vol. 47, p15.
10. Raman, Dr. Pradeep Kumar Mittal, "An Efficient Dynamic Round Robin CPU Scheduling Algorithm (EDRR)", International Journal of Advanced Research in Computer Science and Software Engineering, 4 (5), pp. 907-910, May 2014.
11. Silberschatz, A., P.B. Galvin and G. Gagne, Operating Systems Concepts. 7th Edn., John Wiley and Sons, USA., ISBN:13: 978-0471694663, pp. 944.

12. An Effective Round Robin Algorithm using Min-Max Dispersion Measure. Panda, Sanjaya Kumar; Bhoi, Sourav Kumar // International Journal on Computer Science & Engineering; Jan2012, Vol. 4 Issue 1, p45.
13. Designing Various CPU Scheduling Techniques using SCILAB. Saini, Mona // International Journal of Computer Science & Information Technolo; 2014, Vol. 5 Issue 3, p2918.
14. Self-Adjustment Time Quantum in Round Robin Algorithm Depending on Burst Time of the Now Running Processes. Matarneh, Rami j. // Ameri- can Journal of Applied Sciences;2009, Vol. 6 Issue 10, p1831.
15. R. J. Matarneh, "Seif-Adjustment Time Quantum in Round Robin Algorithm Depending on Burst Time of the Now Running Proceses", American Journal of Applied Sciences, 6(10), pp. 1831-1837, 2009.
16. H. S. Behera, R. Mohanty, and D. Nayak, "A New Proposed Dynamic Quantum with Re-Adjusted Round Robin Scheduling Algorithm and Its Performance Analysis", International Journal of Computer Applications, 5 (5), pp. 10-15, August 2010.
17. E. O. Oyetunji, A. E. Oluleye," Performance Assessment of Some CPU Scheduling Algori-thms", Research Journal of Information Techno-logy,1(1): pp 22-26, 2009
18. Ajit Singh, Priyanka Goyal, Sahil Batra," An Optimized Round Robin Scheduling Algorithm for CPU Scheduling", (IJCSE) International Journal on Computer Science and Engineering Vol. 02, No. 07, 2383-2385, 2010.
19. Rami J. Matarneh."Self-Adjustment Time Quantum in Round Robin Algorithm Depending on Burst Time of Now Running Processes", American J. of Applied Sciences 6 (10):1831-1837, 2009.
20. Abdulrazak Abdulrahim, Saleh E. Abdullahi & Junaidu B. Sahalu, (2014) "A New Improved Round Robin (NIRR) CPU Scheduling Algorithm", International Journal of Computer Applications, Vol. 90, No. 4, pp 27-33.
21. Sourav Kumar Bhoi, Sanjaya Kumar Panda, Debashee Tarai, "Enhancing cpu performance using subcontrary mean dynamic round robin (smdrr) scheduling algorithm" ,JGRCS, Volume 2, No. 12, December 2011, pp.17-21.
22. Rakesh Mohanty, H. S. Behera, Khusbu Patwari, Monisha Dash, "Design and Performance Evaluation of a New Proposed Shortest Remaining Burst Round Robin (SRBRR) Scheduling Algorithm", International Symposium on Computer Engineering & Technology (ISCET), Vol 17, 2010
23. Ishwari Singh Rajput," A Priority based Round Robin CPU Scheduling Algorithm for Real Time Systems", (IJIET)International Journal of Innovations in Engineering and Technology Vol. 1 Issue 3 Oct 2012.
24. Manish Kumar Mishra & Abdul Kadir Khan, (2012) "An Improved Round Robin CPU Scheduling Algorithm", Journal of Global Research in Computer Science, Vol. 3, No. 6, pp 64-69.
25. P.Surendra Varma , "A FINEST TIME QUANTUM FOR IMPROVING SHORTEST REMAINING BURST ROUND ROBIN (SRBRR) ALGORITHM" Journal of Global Research in Computer Science, 4 (3), March 2013, 10-15.
26. Rakesh Kumar Yadav, Abhishek K Mishra, Navin Prakash, Himanshu Sharma," An Improved Round Robin Scheduling Algorithm for CPU Scheduling", (IJCSE) International Journal on Computer Science and Engineering Vol. 02, No. 04, 1064-1066, 2010.

57. Li Z, Li J, Ma Y, Wang R, Shi Z, Ding Y, Liu X. "Spatio-Temporal Adaptive Network with Bidirectional Temporal Difference for Action Recognition." *IEEE Transactions on Circuits and Systems for Video Technology.*, 2023.
58. Liu Z, Zhang H, Chen Z, Wang Z, Ouyang W. "Disentangling and unifying graph convolutions for skeleton-based action recognition." *In Proceedings of the IEEE/CVF conference on computer vision and pattern recognition*, pp. 143–152, 2020.
59. Feichtenhofer C. "X3d: Expanding architectures for efficient video recognition." *In Proceedings of the IEEE/CVF conference on computer vision and pattern recognition*, pp. 203–213, 2020.
60. Liu G, Zhang C, Xu Q, Cheng R, Song Y, Yuan X, Sun J. "I3D-Shufflenet Based Human Action Recognition." *Algorithms.* , vol. 11, 2020.
61. Iodice F, De Momi E, Ajoudani A. "Hri30: An action recognition dataset for industrial human-robot interaction." *In2022 26th International Conference on Pattern Recognition*, pp. 4941–4947, 2022.
62. Li Z, He L, Xu H. "Weakly-Supervised Temporal Action Detection for Fine-Grained Videos with Hierarchical Atomic Actions." *InComputer Vision–ECCV*, pp. 567–584, 2022.
63. Chen M, Wei F, Li C, Cai D. "Frame-wise Action Representations for Long Videos via Sequence Contrastive Learning." *InProceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition*, pp. 13801–13810, 2022.
64. Tanfous AB, Zerroug A, Linsley D, Serre T. "How and what to learn: taxonomizing self-supervised learning for 3d action recognition." *In2022 IEEE/CVF Winter Conference on Applications of Computer Vision*, pp. 2888–2897, 2022.
65. Asif U, Mehta D, Von Cavallar S, Tang J, Harrer S. "DeepActsNet: A Deep Ensemble Framework Combining Features from Face, Hands, and Body for Action Recognition." *Pattern Recognition.*, 2023.
66. Liu Y, Yuan J, Tu Z. "Motion-driven visual tempo learning for video-based action recognition." *IEEE Transactions on Image Processing.*, vol. 31, pp. 4104–4116, 2022.
67. Yin X, Wu S, Liu Y, Qin Z, Bi L, Fan R. "Underwater Target Tracking Algorithm Based on Optical Flow. " *Springer Nature Singapore.*, pp. 25– 34, 2022.
68. Shi L, Zhang Y, Cheng J, Lu H. "Skeleton-based action recognition with directed graph neural networks." *InProceedings of the IEEE/CVF conference on computer vision and pattern recognition*, pp. 7912–7921, 2019.
69. Li M, Chen S, Chen X, Zhang Y, Wang Y, Tian Q. "Symbiotic graph neural networks for 3d skeleton-based human action recognition and motion prediction." *IEEE Transactions on Pattern Analysis and Machine Intelligence.*, pp. 3316–3333, 2021.
70. Tu J, Liu M, Liu H. "Skeleton-based human action recognition using spatial temporal 3d convolutional neural networks." *IEEE International conference on multimedia and expo (ICME)*, pp. 1–6, 2018.
71. Ji X, Cheng J, Feng W, Tao D. "Skeleton embedded motion body partition for human action recognition using depth sequences." *Signal Processing.*, pp. 53–68, 2018.
72. Alibayev M, Paulius D, Sun Y. "Estimating motion codes from demonstration videos." *EEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, pp. 4257-4262, 2020.
73. Paulius D, Eales N, Sun Y. "A motion taxonomy for manipulation embed WOOKEY LEE. Wookey Lee received Ph.D., MS & BS. Dept. Industrial Engineering, Seoul Na tional University. Finished MSE, Carnegie Mel lon University. He is currently a Professor at the Departments of BMSE & IE at Inha University, Incheon, Korea, and the Director at Voice AI Insti tute, and the EIC of the BigData Service Journal, Steering Committee of IEEE BigComp, ECM of IEEE TCDE, Associate Editor: World Wide Web Journal, SUPE, CLUS, etc. Serving Chair posi ding." *arXiv preprint*, 2020.
74. Yang S, Heng W, Liu G, Luo G, Yang W, Yu G. "Capturing the motion of every joint: 3D human pose and shape estimation with independent tokens." *arXiv preprint* , 2023.
75. Dong M, Fang Z, Li Y, Bi S, Chen J. "AR3D: attention residual 3D network for human action recognition." *Sensors.* , p.1656., 2021.
76. Jiang B, Wang M, Gan W, Wu W, Yan J. "Stm: Spatiotemporal and motion encoding for action recognition." *InProceedings of the IEEE/CVF International Conference on Computer Vision*, pp. 2000-2009, 2019.
77. Dong M, Fang Z, Li Y, Bi S, Chen J. "AR3D: attention residual 3D network for human action recognition." *Sensors.* , p.1656., 2021.
78. Yang H, Ren Z, Yuan H, Wei W, Zhang Q, Zhang Z. "Multi-scale and attention enhanced graph convolution network for skeleton-based violence action recognition." *Frontiers in neurorobotics*, 2022.
79. Abdelbaky, A., Aly, S. "Two-stream spatiotemporal feature fusion for human action recognition. " *Vis Comput 37*, pp. 1821–1835, 2021.
80. Huh J, Chalk J, Kazakos E, Damen D, Zisserman A. "Epic-Sounds: A Large-Scale Dataset of Actions that Sound." *InICASSP 2023-2023 IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)*, pp. 1–5, 2023.
81. Lee, Jungho and Lee, Minhyeok and Lee, Dogyoon and Lee, Sangyoon. "Hierarchically Decomposed Graph Convolutional Networks for Skeleton Based Action Recognition." *arXiv preprint arXiv:2208.10741*, 2022.

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a) A title which should be relevant to the theme of the paper.
b) A summary, known as an abstract (less than 150 words), containing the major results and conclusions.
c) Up to 10 keywords that precisely identify the paper's subject, purpose, and focus.
d) An introduction, giving fundamental background objectives.
e) Resources and techniques with sufficient complete experimental details (wherever possible by reference) to permit repetition, sources of information must be given, and numerical methods must be specified by reference.
f) Results which should be presented concisely by well-designed tables and figures.
g) Suitable statistical data should also be given.
h) All data must have been gathered with attention to numerical detail in the planning stage.

Design has been recognized to be essential to experiments for a considerable time, and the editor has decided that any paper that appears not to have adequate numerical treatments of the data will be returned unrefereed.

i) Discussion should cover implications and consequences and not just recapitulate the results; conclusions should also be summarized.
j) There should be brief acknowledgments.
k) There ought to be references in the conventional format. Global Journals recommends APA format.

Authors should carefully consider the preparation of papers to ensure that they communicate effectively. Papers are much more likely to be accepted if they are carefully designed and laid out, contain few or no errors, are summarizing, and follow instructions. They will also be published with much fewer delays than those that require much technical and editorial correction.

The Editorial Board reserves the right to make literary corrections and suggestions to improve brevity.

Format Structure

It is necessary that authors take care in submitting a manuscript that is written in simple language and adheres to published guidelines.

All manuscripts submitted to Global Journals should include:

Title

The title page must carry an informative title that reflects the content, a running title (less than 45 characters together with spaces), names of the authors and co-authors, and the place(s) where the work was carried out.

Author details

The full postal address of any related author(s) must be specified.

Abstract

The abstract is the foundation of the research paper. It should be clear and concise and must contain the objective of the paper and inferences drawn. It is advised to not include big mathematical equations or complicated jargon.

Many researchers searching for information online will use search engines such as Google, Yahoo or others. By optimizing your paper for search engines, you will amplify the chance of someone finding it. In turn, this will make it more likely to be viewed and cited in further works. Global Journals has compiled these guidelines to facilitate you to maximize the web-friendliness of the most public part of your paper.

Keywords

A major lynchpin of research work for the writing of research papers is the keyword search, which one will employ to find both library and internet resources. Up to eleven keywords or very brief phrases have to be given to help data retrieval, mining, and indexing.

One must be persistent and creative in using keywords. An effective keyword search requires a strategy: planning of a list of possible keywords and phrases to try.

Choice of the main keywords is the first tool of writing a research paper. Research paper writing is an art. Keyword search should be as strategic as possible.

One should start brainstorming lists of potential keywords before even beginning searching. Think about the most important concepts related to research work. Ask, “What words would a source have to include to be truly valuable in a research paper?” Then consider synonyms for the important words.

It may take the discovery of only one important paper to steer in the right keyword direction because, in most databases, the keywords under which a research paper is abstracted are listed with the paper.

Numerical Methods

Numerical methods used should be transparent and, where appropriate, supported by references.

Abbreviations

Authors must list all the abbreviations used in the paper at the end of the paper or in a separate table before using them.

Formulas and equations

Authors are advised to submit any mathematical equation using either MathJax, KaTeX, or LaTeX, or in a very high-quality image.

Tables, Figures, and Figure Legends

Tables: Tables should be cautiously designed, uncrowned, and include only essential data. Each must have an Arabic number, e.g., Table 4, a self-explanatory caption, and be on a separate sheet. Authors must submit tables in an editable format and not as images. References to these tables (if any) must be mentioned accurately.

Figures

Figures are supposed to be submitted as separate files. Always include a citation in the text for each figure using Arabic numbers, e.g., Fig. 4. Artwork must be submitted online in vector electronic form or by emailing it.

Preparation of Eletronic Figures for Publication

Although low-quality images are sufficient for review purposes, print publication requires high-quality images to prevent the final product being blurred or fuzzy. Submit (possibly by e-mail) EPS (line art) or TIFF (halftone/ photographs) files only. MS PowerPoint and Word Graphics are unsuitable for printed pictures. Avoid using pixel-oriented software. Scans (TIFF only) should have a resolution of at least 350 dpi (halftone) or 700 to 1100 dpi (line drawings). Please give the data for figures in black and white or submit a Color Work Agreement form. EPS files must be saved with fonts embedded (and with a TIFF preview, if possible).

For scanned images, the scanning resolution at final image size ought to be as follows to ensure good reproduction: line art: >650 dpi; halftones (including gel photographs): >350 dpi; figures containing both halftone and line images: >650 dpi.

Color charges: Authors are advised to pay the full cost for the reproduction of their color artwork. Hence, please note that if there is color artwork in your manuscript when it is accepted for publication, we would require you to complete and return a Color Work Agreement form before your paper can be published. Also, you can email your editor to remove the color fee after acceptance of the paper.

Tips for writing a good quality Computer Science Research Paper

Techniques for writing a good quality computer science research paper:

1. Choosing the topic: In most cases, the topic is selected by the interests of the author, but it can also be suggested by the guides. You can have several topics, and then judge which you are most comfortable with. This may be done by asking several questions of yourself, like "Will I be able to carry out a search in this area? Will I find all necessary resources to accomplish the search? Will I be able to find all information in this field area?" If the answer to this type of question is "yes," then you ought to choose that topic. In most cases, you may have to conduct surveys and visit several places. Also, you might have to do a lot of work to find all the rises and falls of the various data on that subject. Sometimes, detailed information plays a vital role, instead of short information. Evaluators are human: The first thing to remember is that evaluators are also human beings. They are not only meant for rejecting a paper. They are here to evaluate your paper. So present your best aspect.

2. Think like evaluators: If you are in confusion or getting demotivated because your paper may not be accepted by the evaluators, then think, and try to evaluate your paper like an evaluator. Try to understand what an evaluator wants in your research paper, and you will automatically have your answer. Make blueprints of paper: The outline is the plan or framework that will help you to arrange your thoughts. It will make your paper logical. But remember that all points of your outline must be related to the topic you have chosen.

3. Ask your guides: If you are having any difficulty with your research, then do not hesitate to share your difficulty with your guide (if you have one). They will surely help you out and resolve your doubts. If you can't clarify what exactly you require for your work, then ask your supervisor to help you with an alternative. He or she might also provide you with a list of essential readings.

4. Use of computer is recommended: As you are doing research in the field of computer science then this point is quite obvious. Use right software: Always use good quality software packages. If you are not capable of judging good software, then you can lose the quality of your paper unknowingly. There are various programs available to help you which you can get through the internet.

5. Use the internet for help: An excellent start for your paper is using Google. It is a wondrous search engine, where you can have your doubts resolved. You may also read some answers for the frequent question of how to write your research paper or find a model research paper. You can download books from the internet. If you have all the required books, place importance on reading, selecting, and analyzing the specified information. Then sketch out your research paper. Use big pictures: You may use encyclopedias like Wikipedia to get pictures with the best resolution. At Global Journals, you should strictly follow here.

6. Bookmarks are useful: When you read any book or magazine, you generally use bookmarks, right? It is a good habit which helps to not lose your continuity. You should always use bookmarks while searching on the internet also, which will make your search easier.

7. Revise what you wrote: When you write anything, always read it, summarize it, and then finalize it.

8. Make every effort: Make every effort to mention what you are going to write in your paper. That means always have a good start. Try to mention everything in the introduction—what is the need for a particular research paper. Polish your work with good writing skills and always give an evaluator what he wants. Make backups: When you are going to do any important thing like making a research paper, you should always have backup copies of it either on your computer or on paper. This protects you from losing any portion of your important data.

9. Produce good diagrams of your own: Always try to include good charts or diagrams in your paper to improve quality. Using several unnecessary diagrams will degrade the quality of your paper by creating a hodgepodge. So always try to include diagrams which were made by you to improve the readability of your paper. Use of direct quotes: When you do research relevant to literature, history, or current affairs, then use of quotes becomes essential, but if the study is relevant to science, use of quotes is not preferable.

10.Use proper verb tense: Use proper verb tenses in your paper. Use past tense to present those events that have happened. Use present tense to indicate events that are going on. Use future tense to indicate events that will happen in the future. Use of wrong tenses will confuse the evaluator. Avoid sentences that are incomplete.

11. Pick a good study spot: Always try to pick a spot for your research which is quiet. Not every spot is good for studying.

12. Know what you know: Always try to know what you know by making objectives, otherwise you will be confused and unable to achieve your target.

13. Use good grammar: Always use good grammar and words that will have a positive impact on the evaluator; use of good vocabulary does not mean using tough words which the evaluator has to find in a dictionary. Do not fragment sentences. Eliminate one-word sentences. Do not ever use a big word when a smaller one would suffice.

Verbs have to be in agreement with their subjects. In a research paper, do not start sentences with conjunctions or finish them with prepositions. When writing formally, it is advisable to never split an infinitive because someone will (wrongly) complain. Avoid clichés like a disease. Always shun irritating alliteration. Use language which is simple and straightforward. Put together a neat summary.

14. Arrangement of information: Each section of the main body should start with an opening sentence, and there should be a changeover at the end of the section. Give only valid and powerful arguments for your topic. You may also maintain your arguments with records.

15. Never start at the last minute: Always allow enough time for research work. Leaving everything to the last minute will degrade your paper and spoil your work.

16. Multitasking in research is not good: Doing several things at the same time is a bad habit in the case of research activity. Research is an area where everything has a particular time slot. Divide your research work into parts, and do a particular part in a particular time slot.

17. Never copy others' work: Never copy others' work and give it your name because if the evaluator has seen it anywhere, you will be in trouble. Take proper rest and food: No matter how many hours you spend on your research activity, if you are not taking care of your health, then all your efforts will have been in vain. For quality research, take proper rest and food.

18. Go to seminars: Attend seminars if the topic is relevant to your research area. Utilize all your resources.

19. Refresh your mind after intervals: Try to give your mind a rest by listening to soft music or sleeping in intervals. This will also improve your memory. Acquire colleagues: Always try to acquire colleagues. No matter how sharp you are, if you acquire colleagues, they can give you ideas which will be helpful to your research.

20. Think technically: Always think technically. If anything happens, search for its reasons, benefits, and demerits. Think and then print: When you go to print your paper, check that tables are not split, headings are not detached from their descriptions, and page sequence is maintained.

21. Adding unnecessary information: Do not add unnecessary information like "I have used MS Excel to draw graphs." Irrelevant and inappropriate material is superfluous. Foreign terminology and phrases are not apropos. One should never take a broad view. Analogy is like feathers on a snake. Use words properly, regardless of how others use them. Remove quotations. Puns are for kids, not grunt readers. Never oversimplify: When adding material to your research paper, never go for oversimplification; this will definitely irritate the evaluator. Be specific. Never use rhythmic redundancies. Contractions shouldn't be used in a research paper. Comparisons are as terrible as clichés. Give up ampersands, abbreviations, and so on. Remove commas that are not necessary. Parenthetical words should be between brackets or commas. Understatement is always the best way to put forward earth-shaking thoughts. Give a detailed literary review.

22. Report concluded results: Use concluded results. From raw data, filter the results, and then conclude your studies based on measurements and observations taken. An appropriate number of decimal places should be used. Parenthetical remarks are prohibited here. Proofread carefully at the final stage. At the end, give an outline to your arguments. Spot perspectives of further study of the subject. Justify your conclusion at the bottom sufficiently, which will probably include examples.

23. Upon conclusion: Once you have concluded your research, the next most important step is to present your findings. Presentation is extremely important as it is the definite medium though which your research is going to be in print for the rest of the crowd. Care should be taken to categorize your thoughts well and present them in a logical and neat manner. A good quality research paper format is essential because it serves to highlight your research paper and bring to light all necessary aspects of your research.

Informal Guidelines of Research Paper Writing

Key points to remember:

- Submit all work in its final form.
- Write your paper in the form which is presented in the guidelines using the template.
- Please note the criteria peer reviewers will use for grading the final paper.

Final points:

One purpose of organizing a research paper is to let people interpret your efforts selectively. The journal requires the following sections, submitted in the order listed, with each section starting on a new page:

The introduction: This will be compiled from reference matter and reflect the design processes or outline of basis that directed you to make a study. As you carry out the process of study, the method and process section will be constructed like that. The results segment will show related statistics in nearly sequential order and direct reviewers to similar intellectual paths throughout the data that you gathered to carry out your study.

The discussion section:

This will provide understanding of the data and projections as to the implications of the results. The use of good quality references throughout the paper will give the effort trustworthiness by representing an alertness to prior workings.

Writing a research paper is not an easy job, no matter how trouble-free the actual research or concept. Practice, excellent preparation, and controlled record-keeping are the only means to make straightforward progression.

General style:

Specific editorial column necessities for compliance of a manuscript will always take over from directions in these general guidelines.

To make a paper clear: Adhere to recommended page limits.

Mistakes to avoid:

- Insertion of a title at the foot of a page with subsequent text on the next page.
- Separating a table, chart, or figure—confine each to a single page.
- Submitting a manuscript with pages out of sequence.
- In every section of your document, use standard writing style, including articles ("a" and "the").
- Keep paying attention to the topic of the paper.
- Use paragraphs to split each significant point (excluding the abstract).
- Align the primary line of each section.
- Present your points in sound order.
- Use present tense to report well-accepted matters.
- Use past tense to describe specific results.
- Do not use familiar wording; don't address the reviewer directly. Don't use slang or superlatives.
- Avoid use of extra pictures—include only those figures essential to presenting results.

Title page:

Choose a revealing title. It should be short and include the name(s) and address(es) of all authors. It should not have acronyms or abbreviations or exceed two printed lines.

Abstract: This summary should be two hundred words or less. It should clearly and briefly explain the key findings reported in the manuscript and must have precise statistics. It should not have acronyms or abbreviations. It should be logical in itself. Do not cite references at this point.

An abstract is a brief, distinct paragraph summary of finished work or work in development. In a minute or less, a reviewer can be taught the foundation behind the study, common approaches to the problem, relevant results, and significant conclusions or new questions.

Write your summary when your paper is completed because how can you write the summary of anything which is not yet written? Wealth of terminology is very essential in abstract. Use comprehensive sentences, and do not sacrifice readability for brevity; you can maintain it succinctly by phrasing sentences so that they provide more than a lone rationale. The author can at this moment go straight to shortening the outcome. Sum up the study with the subsequent elements in any summary. Try to limit the initial two items to no more than one line each.

Reason for writing the article—theory, overall issue, purpose.

- Fundamental goal.
- To-the-point depiction of the research.
- Consequences, including definite statistics—if the consequences are quantitative in nature, account for this; results of any numerical analysis should be reported. Significant conclusions or questions that emerge from the research.

Approach:

- Single section and succinct.
- An outline of the job done is always written in past tense.
- Concentrate on shortening results—limit background information to a verdict or two.
- Exact spelling, clarity of sentences and phrases, and appropriate reporting of quantities (proper units, important statistics) are just as significant in an abstract as they are anywhere else.

Introduction:

The introduction should "introduce" the manuscript. The reviewer should be presented with sufficient background information to be capable of comprehending and calculating the purpose of your study without having to refer to other works. The basis for the study should be offered. Give the most important references, but avoid making a comprehensive appraisal of the topic. Describe the problem visibly. If the problem is not acknowledged in a logical, reasonable way, the reviewer will give no attention to your results. Speak in common terms about techniques used to explain the problem, if needed, but do not present any particulars about the protocols here.

The following approach can create a valuable beginning:

- Explain the value (significance) of the study.
- Defend the model—why did you employ this particular system or method? What is its compensation? Remark upon its appropriateness from an abstract point of view as well as pointing out sensible reasons for using it.
- Present a justification. State your particular theory(-ies) or aim(s), and describe the logic that led you to choose them.
- Briefly explain the study's tentative purpose and how it meets the declared objectives.

Approach:

Use past tense except for when referring to recognized facts. After all, the manuscript will be submitted after the entire job is done. Sort out your thoughts; manufacture one key point for every section. If you make the four points listed above, you will need at least four paragraphs. Present surrounding information only when it is necessary to support a situation. The reviewer does not desire to read everything you know about a topic. Shape the theory specifically—do not take a broad view.

As always, give awareness to spelling, simplicity, and correctness of sentences and phrases.

Procedures (methods and materials):

This part is supposed to be the easiest to carve if you have good skills. A soundly written procedures segment allows a capable scientist to replicate your results. Present precise information about your supplies. The suppliers and clarity of reagents can be helpful bits of information. Present methods in sequential order, but linked methodologies can be grouped as a segment. Be concise when relating the protocols. Attempt to give the least amount of information that would permit another capable scientist to replicate your outcome, but be cautious that vital information is integrated. The use of subheadings is suggested and ought to be synchronized with the results section.

When a technique is used that has been well-described in another section, mention the specific item describing the way, but draw the basic principle while stating the situation. The purpose is to show all particular resources and broad procedures so that another person may use some or all of the methods in one more study or referee the scientific value of your work. It is not to be a step-by-step report of the whole thing you did, nor is a methods section a set of orders.

Materials:

Materials may be reported in part of a section or else they may be recognized along with your measures.

Methods:

- Report the method and not the particulars of each process that engaged the same methodology.
- Describe the method entirely.
- To be succinct, present methods under headings dedicated to specific dealings or groups of measures.
- Simplify—detail how procedures were completed, not how they were performed on a particular day.
- If well-known procedures were used, account for the procedure by name, possibly with a reference, and that's all.

Approach:

It is embarrassing to use vigorous voice when documenting methods without using first person, which would focus the reviewer's interest on the researcher rather than the job. As a result, when writing up the methods, most authors use third person passive voice.

Use standard style in this and every other part of the paper—avoid familiar lists, and use full sentences.

What to keep away from:

- Resources and methods are not a set of information.
- Skip all descriptive information and surroundings—save it for the argument.
- Leave out information that is immaterial to a third party.

Results:

The principle of a results segment is to present and demonstrate your conclusion. Create this part as entirely objective details of the outcome, and save all understanding for the discussion.

The page length of this segment is set by the sum and types of data to be reported. Use statistics and tables, if suitable, to present consequences most efficiently.

You must clearly differentiate material which would usually be incorporated in a study editorial from any unprocessed data or additional appendix matter that would not be available. In fact, such matters should not be submitted at all except if requested by the instructor.

Content:

- Sum up your conclusions in text and demonstrate them, if suitable, with figures and tables.
- In the manuscript, explain each of your consequences, and point the reader to remarks that are most appropriate.
- Present a background, such as by describing the question that was addressed by creation of an exacting study.
- Explain results of control experiments and give remarks that are not accessible in a prescribed figure or table, if appropriate.
- Examine your data, then prepare the analyzed (transformed) data in the form of a figure (graph), table, or manuscript.

What to stay away from:

- Do not discuss or infer your outcome, report surrounding information, or try to explain anything.
- Do not include raw data or intermediate calculations in a research manuscript.
- Do not present similar data more than once.
- A manuscript should complement any figures or tables, not duplicate information.
- Never confuse figures with tables—there is a difference.

Approach:

As always, use past tense when you submit your results, and put the whole thing in a reasonable order.

Put figures and tables, appropriately numbered, in order at the end of the report.

If you desire, you may place your figures and tables properly within the text of your results section.

Figures and tables:

If you put figures and tables at the end of some details, make certain that they are visibly distinguished from any attached appendix materials, such as raw facts. Whatever the position, each table must be titled, numbered one after the other, and include a heading. All figures and tables must be divided from the text.

Discussion:

The discussion is expected to be the trickiest segment to write. A lot of papers submitted to the journal are discarded based on problems with the discussion. There is no rule for how long an argument should be.

Position your understanding of the outcome visibly to lead the reviewer through your conclusions, and then finish the paper with a summing up of the implications of the study. The purpose here is to offer an understanding of your results and support all of your conclusions, using facts from your research and generally accepted information, if suitable. The implication of results should be fully described.

Infer your data in the conversation in suitable depth. This means that when you clarify an observable fact, you must explain mechanisms that may account for the observation. If your results vary from your prospect, make clear why that may have happened. If your results agree, then explain the theory that the proof supported. It is never suitable to just state that the data approved the prospect, and let it drop at that. Make a decision as to whether each premise is supported or discarded or if you cannot make a conclusion with assurance. Do not just dismiss a study or part of a study as "uncertain."

Research papers are not acknowledged if the work is imperfect. Draw what conclusions you can based upon the results that you have, and take care of the study as a finished work.

- You may propose future guidelines, such as how an experiment might be personalized to accomplish a new idea.
- Give details of all of your remarks as much as possible, focusing on mechanisms.
- Make a decision as to whether the tentative design sufficiently addressed the theory and whether or not it was correctly restricted. Try to present substitute explanations if they are sensible alternatives.
- One piece of research will not counter an overall question, so maintain the large picture in mind. Where do you go next? The best studies unlock new avenues of study. What questions remain?
- Recommendations for detailed papers will offer supplementary suggestions.

Approach:

When you refer to information, differentiate data generated by your own studies from other available information. Present work done by specific persons (including you) in past tense.

Describe generally acknowledged facts and main beliefs in present tense.

The Administration Rules

Administration Rules to Be Strictly Followed before Submitting Your Research Paper to Global Journals Inc.

Please read the following rules and regulations carefully before submitting your research paper to Global Journals Inc. to avoid rejection.

Segment draft and final research paper: You have to strictly follow the template of a research paper, failing which your paper may get rejected. You are expected to write each part of the paper wholly on your own. The peer reviewers need to identify your own perspective of the concepts in your own terms. Please do not extract straight from any other source, and do not rephrase someone else's analysis. Do not allow anyone else to proofread your manuscript.

Written material: You may discuss this with your guides and key sources. Do not copy anyone else's paper, even if this is only imitation, otherwise it will be rejected on the grounds of plagiarism, which is illegal. Various methods to avoid plagiarism are strictly applied by us to every paper, and, if found guilty, you may be blacklisted, which could affect your career adversely. To guard yourself and others from possible illegal use, please do not permit anyone to use or even read your paper and file.

Criterion for Grading a Research Paper (Compilation) by Global Journals Inc. (US)

Please note that following table is only a Grading of "Paper Compilation" and not on "Performed/Stated Research" whose grading solely depends on Individual Assigned Peer Reviewer and Editorial Board Member. These can be available only on request and after decision of Paper. This report will be the property of Global Journals Inc. (US).

Topics	Grades		
	A-B	**C-D**	**E-F**
Abstract	Clear and concise with appropriate content, Correct format. 200 words or below	Unclear summary and no specific data, Incorrect form Above 200 words	No specific data with ambiguous information Above 250 words
Introduction	Containing all background details with clear goal and appropriate details, flow specification, no grammar and spelling mistake, well organized sentence and paragraph, reference cited	Unclear and confusing data, appropriate format, grammar and spelling errors with unorganized matter	Out of place depth and content, hazy format
Methods and Procedures	Clear and to the point with well arranged paragraph, precision and accuracy of facts and figures, well organized subheads	Difficult to comprehend with embarrassed text, too much explanation but completed	Incorrect and unorganized structure with hazy meaning
Result	Well organized, Clear and specific, Correct units with precision, correct data, well structuring of paragraph, no grammar and spelling mistake	Complete and embarrassed text, difficult to comprehend	Irregular format with wrong facts and figures
Discussion	Well organized, meaningful specification, sound conclusion, logical and concise explanation, highly structured paragraph reference cited	Wordy, unclear conclusion, spurious	Conclusion is not cited, unorganized, difficult to comprehend
References	Complete and correct format, well organized	Beside the point, Incomplete	Wrong format and structuring

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