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Blockchain Technology Based on Agriculture

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ABSTRACT: Block chain technology is being explored to enhance transparency, efficiency, and trust in the a sector. At its core, block chain is a decentralized digital ledger that records transactions across a network of computers. In agriculture, this technology can revolutionize supply chain management by enabling farmers, distributors, retailers, and consumers to trace the journey of food products from farm to table. By recording every transaction or activity related to a product on the block chain, such as planting, harvesting, processing, and shipping, stakeholders can verify the authenticity and quality of agricultural products.

This transparency helps to combat food fraud, ensure food safety, and improve accountability throughout the supply chain. Moreover, block chain can facilitate direct peer-to-peer transactions between farmers and consumers, eliminating intermediaries and reducing costs. Smart contracts, which are self-executing contracts with the terms directly written into code, can automate payments based on predefined conditions, such as delivery confirmation or quality inspection.

Despite its potential benefits, challenges such as scalability, interoperability with existing systems, and the need for widespread adoption and education among stakeholders remain barriers to the full integration of block chain technology in agriculture. Ongoing research and pilot projects are exploring ways to overcome these challenges and unlock the full potential of block chain in transforming the agricultural industry.

INTRODUCTION:

Current agricultural development and reform are calling for new techniques and innovations to create a more transparent and accountable environment in the agriculture sector. One of the emerging tools is block chain technology. Unlike conventional centralized and monopolistic agricultural management systems, block chain provides a decentralized data structure to store and retrieve data that are shared with multiple untrusted parties. In this way, it could potentially resolve a number of serious problems in current systems caused by the following reasons: (I)

Hackers can easily attack the centralized system to tamper data integrity; (ii) insider manipulation of the centralized database could compromise data integrity; (iii) a supply chain management system is overreliant on the centralized database (single point failure problem); and

(iv) High costs when involving a third party to verify and monitor transactions. To solve these issues, distributed data base hanged by advanced cryptography is proposed in the past few decades. Among these, block chain is one of the most predominant emerging methods to solve trust related issues generated by the invention of Bitcoin in 2008.

In block chain technology, many advanced computational and cryptographic techniques are integrated into distribute data structure to achieve a digital trust system in an untrusted environment. In particular, hash function, as an algorithmic way to generate unique ids, is used as the key element for data authentication. Hash values can be embedded into a format of stored chain to verify whether the stored data are tampered to ensure data integrity. Digital signature is used to verify real identities of data senders and receivers in stored transactions. In addition, consensus mechanism is designed do involve all computer nodes thus minimizing potential risks of data being manipulated by minority attackers. Block chain applications in agriculture enhance diver's aspects in agricultural systems, especially supply chain and Internet of things (Its) based systems. These applications include food safety, food security, food quality monitoring and control, traceability for waster education, reliable operational data analysis and efficient contract exchanges and transactions to

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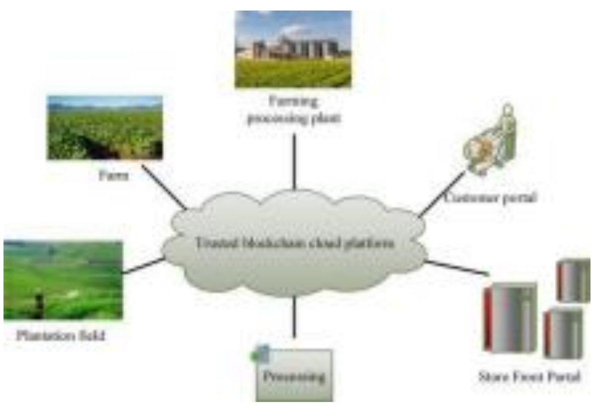
reduce economy costs, thus supporting smallscale farmers. These applications can be developed by using existing block chain platforms to facilitate easy and quick developments. Based on different deployment scenarios of these applications, different computational and cryptographic techniques can be plugged to provide flexibility to meet desperate user requirements. We first explain basic concepts of block chain technology, illustrate the current data storage ecosystem and analyze existing popular platforms by which the developed applications are implemented. Then we provide a comprehensive survey on diverse block chain applications in agriculture related projects. After the survey, we further discuss the prospective of the emerging technology and how current challenges could be solved in deployment of the systems. Further, an illustration is presented to demonstrate how block chain can be improved to build a more reliable and efficient food supply chain in future.

II. Problem Definition:

The block chain technology allows peer-to-peer transactions to take place transparently and without the need for an intermediary like a bank (such as for cryptocurrencies) or a middle man in the agriculture sector. By eliminating the need for a central authority, the technology changes the way that trust is granted – instead of trusting an authority, trust is placed in cryptography and peer-to-peer architecture. It thus helps restore the trust between producers and consumers, which can reduce the transaction costs in the Agra-food market.
The block chain technology offers a reliable approach of tracing transactions between anonymous participants. Fraud and malfunctions can thus be detected quickly. Moreover, problems can be reported in real-time by incorporating smart contracts.

III. Description:



Farm: Blockchain technologies can track all types of information about plants, such as seed quality, and crop growth, and even generate a record of the journey of the plant after it leaves the farm.

Farming Processing Plant:

Blockchain technology is a digital ledger that can be used in the agriculture industry to track and record information about crops, farms, and food products.

Plantation Field: Blockchain for seed distribution prevents fraud across the supply chain as details of every seed grant are recorded on-chain.
(I) Provenance traceability and food authentication; (II) Smart farming data management. (III) Trade finance in the supply chain management; and (IV) other information management systems. Processing: Blockchain can record information about crops, such as seed quality and growth, and track their journey after leaving the farm. This can help eliminate concerns about illegal or unethical operations, and make it easier to trace issues back to their source

IV. Applications

1) PROVENANCE TRACEABILITY AND FOODAUTHENTICATION:-

The most popular use of block chain technology in agriculture is the traceability and provenance function in product supply chain management. It is the most efficient way to enhance food
Safety, and reduce fraud and food scandals since all relevant data related to the product origin and its movements can be stored with minimal tampering risk. When each product item is produced, a corresponding digital token is attached to the item in order to ensure that it is tracked at a real-time manner. The developed applications include tracing Pork and Mango sold in Walmart supermarket, egg distribution from farm to the fork at Midwestern U.S., Brazilian grain export, the certificate verification of table grape shipped from Africa, the use of RFID tags to trace cold chain food, and the use of Iota sensor to trace products in supply chain.

Data and transactions collection procedure in the block chain traceability systems are designed based on requirements of the applications. In different event type's defined in the Electronic Product Code Information Services (EPCIS) specification, including Object Event, Aggregation Event, Quantity Event and Transaction Event, are uploaded into the block chain to ensure the better information traceability as the items and their main transaction events have unique codes. In and certification documents of the products are embedded into the transactions to satisfy the compliance with health and safety regulations. In other traceability systems, such as and using Iot sensors or RFID tags to automate the data collection could further reduce the manual mistakes for data integrity and improve the efficiency of data on-chain process.

SMART FARMING DATA MANAGEMENT"-

In addition to the previous mentioned traceability systems, iot techniques have also been widely used in smart farming for better productivity control and management. In these Iota sensor based systems, management and control decisions are made based on data collected from sensor networks. In, robotic swarm control is proposed as a key conception future smart farming and precision agriculture. Simply put, uavs and land robots could make either distributed or collaborative decisions based on data collected from robotic swarms and communications between them.

Thus, data privacy and integrity are the most important component in such systems.

EFFICIENCY IMPROVEMENT OF THE

TRADEFINANCE IN THE SUPPLY CHAIN:-

Block chain was originally proposed to improve the financial efficiency, and reduce transaction cost by removing in term diaries and audit cost via improved accountability in trading business process. This feature is powerful to support small scale farmers who are suffering from high cost of trade transactions and accidental losses caused by environmental disasters or other uncertainties. Therefore, the straightforward use cases of block chain in agriculture is to explore its financial functions to make these agricultural producers profitable.

Many agriculture related companies are developing block chain systems to support trading parties in supply chain management. In an integrated food trading systems with consortium block chain, called FTSCON, was built to facilitate costly and easy trading of agricultural products in Shan-
Dong province, China. Based on the trial between 2014 and2017, it was found that the total profit of different enterprizes in the region increased significantly. In a detailed solution of implementing a trading system in soybean supply chain was presented. It emphasized that this system could provide proof of delivery, automated payments and dispute handling. In, a case study was made by CBH grouping Australia to secure the seven days payment terms via a Quorum based block chain system.

The block chain technology is also under development to support agricultural finance by many financial institutions and commercial banks. In several case studies of blockchain systems which were jointly developed by banks and IT companies to illustrate that the block chain systems provided the letter of credit from the banks efficiently to speed up the trading process with much shorter period. In State Farm and USAA jointly developed a system to facilitate the automatic insurance claims from farmers to reduce the fraud risk as well as improve the claim efficiency. All these innovations have motivated farmers to produce more products by increasing their profit margins.

OTHER AGRICULTURE RELATED

DATAMANAGEMENT SYSTEMS:-

Blockchain technology is considered as the next generation information infrastructure promoted by many countries.It has made significiant impacts on both industrial and research projects. In food manufacture industry, a food quality monitoring system is built by combining smart contract and evaluation models to increase reliability of peach juice production process. On the agricultural research side

It is also calling for more transparent ways to increase cofidence on research results when multiple collaborators are involved in a project. For example, food science research society proposes to use blockchain to store and share collected research data

. Objective:

1. The block chain technology enables the traceability of information in the food supply chain and thus helps improve food safety.

2. It provides a secure way of storing and managing data, which facilitates the development and use of data-driven innovations for smart farming and smart index based agriculture insurance.

VI. Limitations:

A. Dependency on the farm size.

B. Policy and regulatory risks.
C. Speed of transaction.

VII. Advantages:

1. It improves production processes.

2. It increases transparency for final consumers.

3. It improves the management of farm finances.

4. Improving supply chains.

5. Quality level of the crop is recorded and can be accessed by all the parties. In the supply chain to ensure food safety and security.

VIII. Motivation:

1) Empower customer by giving access to information about the origin and Producing conditions of the crop.

2) Facilitating farmer as they can record and monitor the information like temperature, Humidity, light, PH value, from the sensors that are important for quality crop production.

3) Quality level of the crop is recorded and can be accessed by all the parties in the Supply chain to ensure food safety and security.

IX. Challenges And Solutions:

The major technological challenges can be summarized as the following aspects: (I) scalability issue when integrating with data intensive technology, such as Iot. The throughput of block chain is much lower than the conventional centralized databases, which can achieve tens to hundreds of thousands of transactions per second. Therefore, the dataintensive apple cations, e.g. Monitoring and controlling farming by sensor network, require fast storage speed and low network latency ;(ii) integration with existing legacy systems. Many organizations have deployed their own management systems for years and it is hard to migrate their entire systems to the emerging blockchain which could cause disruption to their current services; and

(iii) security and privacy. Blockchain encourage the decentralized infrastructure which increases the data transparency but compromise the data privacy. Although most recent block chain

Platforms allow the uploading of encrypted transaction records on-chain, more security features would enhance the data security and privacy to a higher level duet various types of attacks [108]. Based on the technical innovations discussed in the previous section, the potential solutions for solving these challenges are summarized.

Integration with legacy systems is another challenge when promoting block chain technology in agricultural organizations. It is highlighted that the blockchain systems are difficult to seamlessly integrate with legacy systems. We believe that the popular use of cloud services in most enterprises could potentially solve this issue. When data from legacy systems in individual companies are uploaded in cloud services, service providers can easily extend their services to block chain based systems if any business needs are proposed between multiple parties. In addition, the organizations could save the cost to enhance data privacy and security as the risks could be efficiently controlled and managed by the service providers.

In addition to these technical challenges, there are other challenges in environmental, social and organizational

Aspects to promote block chain technology in agro-cultural

Sector. There are still lack of

Regulatory and legal requirements to reinforce the deployment of block chain based systems. Thus, some enterprises are reluctant to adopt the technology if their current systems can satisfy their busyness needs. Further, it requires knowledge and skills on both agriculture and block chain to develop these applications. However, it is predictable that the use of block chain to build trustable systems would be predominant in many countries and these challenges would need to be addressed.

X. Conclusion:

Block chain technology, as a part of the emerging- agriculture system, is reshaping the whole sector to solve food crisis in new century. It plays key roles from the farm to the folk in many aspects: it ensures data privacy and integrity by combining smart farming and precision agroculture techniques to improve farm productivity; it creates a more efficient food supply chain by establishing trust among involving parties, thus simplifying the process; and the last not the least, it enables farmers to maximize their profit via a trusted platform. Overall, it adds great values to all stakeholders in the entire agricultural sector. In this paper, to promote block chain techniques, especially their various uses in the ecosystem of agricultural prod-cuts, we have presented a comprehensive survey on current block chain based agricultural applications and innovations. We have explained various concepts of block chain technology, including its data storage ecosystem and its several popular application platforms. We have offered a detailed investigation of desperate block chain applications in the agricultural sector. Then, we have considered several key challenges in the current use of block chain related technologies in agricultural applications

And provided some possible solutions. These challenges include: (1) scalability, (2) integration with existing legacy systems, and (3) security and privacy. Simply put, our suggested solutions can be viewed in a holistic fashion as a redesign of the system architecture. Further, we have indicated possible future developments and applications of block chain in this sector via an illustration, i.e. The current COVID-19 global food crisis. In future, we wish to provide further discussions on various aspects of block chain and explain in detail how current challenges as indicated in this paper can be resolved in future development of block chain in agricultural systems. Potentially, our illustration could be further extended to be a much fuller case study, which could then be evaluated via a series of empirical tests.

Reference

INTRODUCTION: Data warehouse (DWH), analytics and business intelligence (BI) stand for some of the most important information initiatives for companies [1], [2]. The continuous evolution of DWH implementation [3], the foundation for decision support systems [4]–[7], with new concepts such as data lakes [8], [9], big data [10]–[15], nosql technologies [16]–[19], and real-time streaming [20]–[23], is happening in an era characterized by persistently faster release cycles [24], [25] and constant product enhancements [26], [27]. DWH projects are mostly noted as large [28], time consuming [29], expensive [30]–[32], and change-sensitive [33] enterprise projects. Due to this specific nature of DWH implementations, they have shown high-failure rate outcomes [28], [34]–[36], [S15]. Such results, in combination with the trends mentioned above, demonstrate a need for the effective management of these projects, which should be established alongside other factors required for successful DWH implementation [6], [37], [38], [S7], [S22].

For a long time, project management (PM) has been recognized to play an important management role in achieving project success [39]–[41]. The relationship between PM and project success has been investigated on multiple levels. For example, studies by Joslin and Müller investigated the relationship between project management methodology (PMM) and project success [42], [43]. Furthermore, the application of PM practices in projects has been found to increase project success [44]. The role of PM has also been analyzed in the context of DWH implementations. Throughout the literature, there are many examples of how PM contributed positively to DWH success [5], [30], [45]–[47]. There are also studies that show PM to be one of the key determinants of DWH infusion [S1] and one of the prerequisites for

A successful DWH implementation [S3], [48]. Altogether, there is significant evidencthe need for PM in DWH implementations.

Benefits of data warehouse

Modern businesses generate data at a rapid speed. Data must be maintained to ensure that it's current, accurate and in the format required by analytics platforms. Managing data quality can be time-consuming, particularly if the data is spread across different platforms. But combining data into a data warehouse solution makes data cleansing easy and cost-effective. You can compare data from multiple sources, remove inaccurate or duplicated data and ensure that your data is reliable and consistent. And most data warehouse tools include sanitization techniques that automate the process and eliminate the need for costly data quality management programs. Increase data security

In the face of advanced cybersecurity threats, securing business-critical data has become a difficult challenge for all modern businesses. But especially so for some businesses with sensitive or proprietary data, such as banks and pharmaceutical companies. Storing data in one centralized location makes it easier to protect rather than having to monitor and manage multiple data banks and platforms. Many data warehouse tools include features that imp data security within and without a business. Users can create user groups limiting permissions and data access for certain people/departments within an organization. Data warehouses often implement encryption techniques that protect data at-rest and in flight. Some solutions also use security tactics to protect from external threats — such as the "slave read only" setup, which blocks malicious SQL code. Using a data warehouse makes it easier to store and categorize data properly. Data warehouses provide organizations with a centralized location to store, access, manage and protect business-critical data. Companies can leverage data warehouses to:Quickly analyze data for various business applications Improve decision-making speed and efficiencymaintain the accuracy and reliability of datareduce costs related to data storage and managementtrack long-term trends for better forecasting

For your business to remain competitive in this fast-paced digital era, you must take advantage of the features and benefits of data warehousing. Fivetran can help you load and consolidate all of your data into your data warehouse quickly and easily.

Our data connector enable you to effortlessly centralize your data in one location. They support rapid integration between your sources and destinations, so your team can access accurate data and make faster decisions.

With log-based change data capture (CDC), Fivetran can immediately identify changes made to data in a database and replicate those changes in near real-time — delivering data as frequently as five minutes (depending upon data volume

II. Architecture

Data warehouse (DWH), analytics and business intelligence (BI) stand for some of the most important information initiatives for companies [1], [2]. The continuous evolution of DWH implementation [3], the foundation for decision support systems [4]–[7], with new concepts such as data lakes [8], [9], big data [10]–[15], nosql technologies [16]–[19], and real-time streaming [20]–[23], is happening in an era characterized by persistently faster release cycles [24], [25] and constant product enhancements [26], [27]. DWH projects are mostly noted as large [28], time consuming [29], expensive [30]–[32], and change-sensitive [33] enterprise projects. Due to this specific nature of DWH implementations, they have shown high-failure-rate outcomes [28], [34]– [36], [S15]. Such results, in combination with the trends mentioned above, demonstrate a need for the effective management of these projects, which should be established alongside other factors required for successful DWH implementation [6], [37], [38], [S7], [S22].

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The role of project managers in DWH projects has also been analyzed. Authors such as Kimball [7, p. 409], Adelman and Moss [5], and Reeves [31, p. 87] emphasize the importance of the project manager role in DWH projects. Moreover, Gardner advises that a DWH project is not a good place for a novice project manager [S2, p. 60]. Several authors argue that DWH project managers need to have a wider technical expertise and knowledge of the overall DWH process and technology in order to implement their projects successfully [49] and [S1], [S3], [S19]. In addition, project managers face many challenges in DWH implementations [5], [31], [49]. Some of the commonly encountered impediments are lack of a methodology or the use of a wrong method [6], resistance to DWH implementation [5] long implementation

Charctarstics of Data warehouse

9], and scope management and/or schedule management [5], [31], [50].

In order to achieve more effective PM in DWH projects, project managers need a systematized reference of knowledge that focuses on PM in DWH implementations. It is important to ensure that project managers have such a resource at their disposal when faced with future DWH projects. Today, to the best of my knowledge, there are no systematic literature reviews that

Explicitly cover and focus on the PM aspect of DWH implementations. This is a problem for the PM community since, in their search for primary literature that would help them manage their DWH projects more effectively, project managers would not find a clearly structured overview as to what PM techniques, methodologies and practices have been used, what problems project managers have faced, what lessons have been learned from other implementations, and/or what have been the most recommended management guidelines in DWH projects. Implications for project managers proposed in this study provide some practical guidelines for practitioners, which can lead to more effective PM and conclusively, reduce the reported high failure rates of DWH implementations.

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A data warehouse is a centralized repository for storing and managing large amounts of data from various sources for analysis and reporting. It is optimized for fast querying and analysis, enabling organizations to make informed decisions by providing a single source of truth for data. Data warehousing typically involves transforming and integrating data from multiple sources into a unified, organized, and consistent format.

Prerequisite – Data Warehousing Data warehouse can be controlled when the user has a shared way of explaining the trends that are introduced as specific subject. Below are major characteristics of data warehouse :

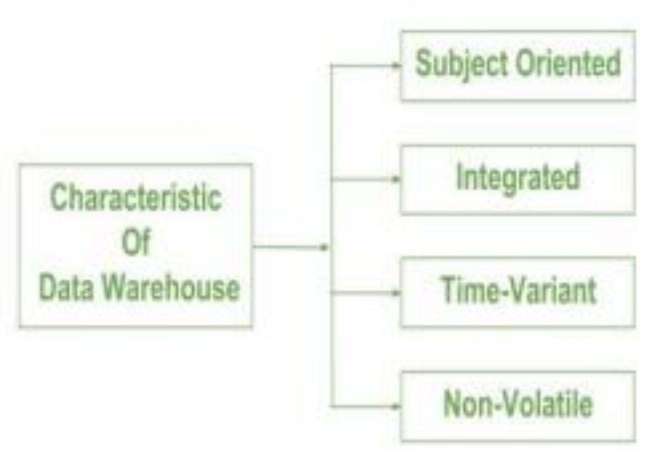

FIG: Characterstic of data warehouse

Subject-oriented – A data warehouse is always a subject oriented as it delivers information about a theme instead of organization's current operations. It can be achieved on specific theme. That means the data warehousing process is proposed to handle with a specific theme which is more defined. These themes can be sales, distributions, marketing etc. A data warehouse never put emphasis only current operations. Instead, it focuses on demonstrating and analysis of data to make various decision. It also delivers

An easy and precise demonstration around particular theme by eliminating data which is not required to make the decisions.

Integrated – It is somewhere same as subject orientation which is made in a reliable format. Integration means founding a shared entity to scale the all similar data from the different databases. The data also required to be resided into various data warehouse in shared and generally granted manner. A data warehouse is built by integrating data from various sources of data such that a mainframe and a relational database. In addition, it must have reliable naming conventions, format and codes. Integration of data warehouse benefits in effective analysis of data. Reliability in naming conventions, column scaling, encoding structure etc. Should be confirmed. Integration of data warehouse handles various subject related warehouse.

Time-Variant – In this data is maintained via different intervals of time such as weekly, monthly, or annually etc. It founds various time limit which are structured between the large datasets and are held in online transaction process (OLTP). The time limits for data warehouse is wide-ranged than that of operational systems. The data resided in data warehouse is predictable with a specific interval of time and delivers information from the historical perspective. It comprises elements of time explicitly or implicitly. Another feature of time-variance is that once data is stored in the data warehouse then it cannot be modified, alter, or updated. Data is stored with a time dimension, allowing for analysis of data over time.

Non-Volatile – As the name defines the data resided in data warehouse is permanent. It also means that data is not erased or deleted when new data is inserted. It includes the mammoth quantity of data that is inserted into modification between the selected quantity on logical business. It evaluates the analysis within the technologies of warehouse. Data is not updated, once it is stored in the data warehouse, to maintain the historical data. In this, data is read-only and refreshed at particular intervals. This is beneficial in analysing historical data and in comprehension the functionality. It does not need transaction process, recapture and concurrency control mechanism. Functionalities such as delete, update, and insert that are done in an operational application are lost in data warehouse environment. Two types of data operations done in the data warehouse are:

First, let's go over the concept of Data warehouse. You can think of a physical warehouse or library as an analog—a large, organized repository of things, in this case, data. Data warehousing is the process of collecting and managing data from various sources, like services, business systems, databases, data lakes, etc.

It's more than just storage; data warehousing involves organizing, cleansing, and structuring the data to make it useful for analysis. Well structured data warehouse acts like a central library, where data from different departments and functions within an organization is categorized, accessible, and ready for use.

A recent data study from CDMA found that one-third of organizations use more than 100 different applications and systems to manage their data. And as organizations grow, their data needs change. Specialized or protected data may be generated in separate systems. There may be an acquisition or merger with another company. Or an organization expands to another geographical location. In each case, more data is acquired, each one a separate 'library' with its own cataloging system. As data sources multiply, it increases the likelihood of creating data silos—isolated pockets of data that may be accessible to some departments but invisible to others. Perhaps worse is the possibility that one system might hold outdated information. These 'disconnects' between the data and the people who need it present challenges in generating accurate analyses.

Disconnected data sources also complicate the data management process. Each individual data store, with its singular structure and format, contributes to the difficulty of pulling data together to get a comprehensive view of the organization's data landscape.

The becomes more convoluted, requiring more time to access and process the data. Custom code might be created to try to bridge the gaps, but more data sources may require more ad-hoc code. While this may be practical now, this reactive approach can lead to a tangled web of makeshift solutions. Each new script or patch, meant to solve an immediate problem, multiplies the complexity of the system. Soon, IT teams find themselves managing a patchwork of codes and systems that are hard to maintain and prone to errors. As data volumes grow IT strunggle akeep up, leading to bottlenecks in data processing.

The result is that departments end up with older, potentially inaccurate, or conflicting data for their reports and analysis, skewing or invalidating the insights gleaned from them. Increased costs and inconsistent data management practices are likely to be a concern at this point, as well.

This is where data warehouse integration comes into play. It removes silos by connecting individual data silos into a single cohesive system, allowing unified access to all the stored data. Think of it as organizing a vast collection of books from different libraries into a single, well-ordered catalog.

Data warehouse integration works by standardizing data formats to ensure compatibility and then merging similar data points to reduce redundancies. For example, if customer data is stored in two separate locations, the integration acts as a cross-checker, making sure that the information matches. The result is a centralized resource that makes it easier to access information for analysis and business intelligence. It simplifies data management and enhances data quality, which supports more accurate and timely insights across the organization

Fuction

A data warehouse's main function is to store and analyze data from multiple sources to help businesses make informed decisions:

Data storage

A data warehouse is a central repository for current and historical data from various sources, including operational

systems, databases, and external sources. Data analysis
Data warehouses are used to create reports, dashboards, and analytical tools that help businesses analyze data and make decisions.
Data integration
Data warehouses can integrate data from multiple sources, including point-of-sale transactions, marketing automation, and customer relationship management. Data quality
Data warehouses can cleanse and structure data to ensure data quality before it's used for reporting.
Data warehouses can be designed to handle both structured and unstructured data, such as videos, images, and sensor data. They can also be hosted on premise, in the private cloud, or in the public cloud.
The GSM signal does not have any deterioration inside the office and home premises and offers good voice call quality due to digital encoding and error correction techniques used.
It is easy to integrate GSM technology stack with other wireless technology-based devices such as CDMA, LTE etc.
GSM incorporates encryption and authentication measures, making it more secure than analog systems.
GSM introduced SMS which became popular and cost-effective way to communicate.
Provides limited data rate capability, for higher data rate, GSM advanced version devices are used. GSM
In conclusion, data warehousing and mining are critical in dealing with and using data. Data warehousing gives a centralized repository for business information, while data mining extracts valuable insights from it. Both data warehousing and mining have advantages and disadvantages; however, while used collectively, they allow informed decision-making and uncover hidden information available to businesses.
Uplevel your knowledge of data mining with our Professional Certificate Course In Data Science in collaboration with renowned IIT Kanpur. Access a pool of asynchronous videos, hands-on experience, Simplilearn career assistance and masterclasses from IIT Kanpur faculty to stay ahead of the data science curve
• Since the primary task of management is effective decision making, the primary task of research, and subsequently data warehouses, is to generate accurate information for use in that decision making. It is imperative that an organization's Data warehousing strategies reflect changes in the internal and external business environment in addition to the direction in which the business is traveling .not be compatible with newer networks and require users to upgrade their devices.

• Since the primary task of management is effective decision making, the primary task of research, and subsequently data warehouses, is to generate accurate information for use in that decision making.
• It is imperative that an organization's data warehousing strategies reflect changes in the internal and external business environment in addition to the direction in which the business is traveling.

VII. Conclusion

The communication development and the increase of living standard of people are directly related to the more use of cellular mobile. Cellular mobile radio-the high end sophisticated technology that enables everyone to communicate anywhere with anybody. The mobile telephony industry rapidly growing and that has become backbone for business success and efficiency and a part of modern lifestyles all over the world.

In this thesis work we have tried to give and over view of the GSM system. We hope that we gave the general flavor of GSM and the philosophy behind its design. The GSM is standard that insures interoperability without stifling competition and innovation among the suppliers to the benefit of the public both in terms of cost and service quality.

The features and benefits expected in the GSM systems are superior speech quality, low terminal, operational and service costs, a highlevel security, providing international roaming support of low power hand portable terminals and variety of new services and network facilities. In near forth coming days, the thirdgeneration mobile telephony becomes available whole over the world, which will give the facility of videoconference in mobile telephone.

Reference

1) J. Liu, J. Yang, L. Xiong, and J. Pei, ''Secure and efficient skyline queries on encrypted data,'' IEEE Trans. Knowl. Data Eng., vol. 31, no. 7, pp. 1397–1411, Jul. 2019

2) R. Li, Z. Xu, W. Kang, K. C. Yow, and C.-Z. Xu, ''Efficient multi-keyword ranked query over encrypted data in cloud computing,'' Future Gener. Comput. Syst., vol. 30, pp. 179–190, Jan. 2014.

3) J. Chi, C. Hong, M. Zhang, and Z. Zhang, ''Privacy-enhancing range query processing over encrypted cloud databases,'' in Proc. Web Inf. Syst. Eng., Miami, FL, USA, 2015, pp. 63–77

4) R. Agrawal, J. Kiernan, R. Srikant, and Y. Xu, ''Order preserving encryption for numeric data,'' in Proc. ACM SIGMOD Int. Conf. Manag. Data, Jun. 2004, pp. 563– 574.

5) Gentry, ''Fully homomorphic encryption using ideal lattices,'' in Proc. 41st Annu. ACM Symp. Theory Comput., May 2009, pp. 169–178.

6) Cuzzocrea, P. Karras, and A. Vlachou, ''Effective and efficient skyline query processing over attribute-order-preserving-free encrypted data in cloud-enabled databases,'' Future Gener. Comput. Syst., vol. 126, pp. 237–251, Jan. 2022.

7) C. Lopes, V. C. Times, S. Matwin, R. R. Ciferri, and C. Dutra de Aguiar Ciferri, ''Processing OLAP queries over an encrypted data warehouse stored in the cloud,'' in Proc. Dawe, 2014, pp. 195–207.

8) S. Fugkeaw and H. Sato, ''Privacy-preserving access control model for big data cloud,'' in Proc. Int. Comput. Sci. Eng. Conf. (ICSEC), Nov. 2015, pp. 1–6, doi: 10.1109/ICSEC.2015.7401416.

9) M. Kantarcioglu and F. Shaon, ''Securing big data in the age of AI,'' in Proc. 1st IEEE Int. Conf. Trust, Privacy Secur. Intell. Syst. Appl. (TPS-ISA), Dec. 2019, pp. 218–220, doi: 10.1109/TPS-ISA48467.2019. 00035.

10) S. Fugkeaw, ''A lightweight policy update scheme for outsourced personal health records sharing,'' IEEE Access, vol. 9, pp. 54862–54871, 2021, doi: 10.1109/ACCESS.2021.3071150.